Clinical Indications for Transfusion 2014

Review by the Trust Transfusion Committee: December 2013

Review date: December 2014
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1. **RED BLOOD CELL TRANSFUSION**

1.1 **General principles**

1.1.1 If the reason for anaemia is unknown, take blood samples to investigate pre-transfusion.

1.1.2 If a treatable cause is identified, e.g. B12, folate, iron deficiency, haemolysis - start treatment immediately. May avoid transfusion.

1.1.3 Perioperative transfusion may be reduced by discontinuation of anti-platelet agents, anticoagulants (see Document Management System for guidelines for the perioperative management of patients taking antiplatelet agents and therapeutic anticoagulation for elective procedures assessment and management guidelines) and the treatment of anaemia pre-operation – see directorate/specialty pre-operative assessment guidelines. Use of cell salvage and pharmacological agents to reduce bleeding should be considered.

1.1.4 Patients should be given information about the risks and benefits of transfusion (leaflets available from transfusion laboratory). The indication and patient consent should be documented on the transfusion record.

1.1.5 The volume of blood (desired Hb) is dependent on the patient’s body weight (4ml/kg typically → 10g/l rise). The rate of transfusion and need for diuretics is dependent on the risk of fluid overload e.g. increased in elderly (> 70 years), cardiac failure, renal impairment, chronic anaemia, hypoalbuminaemia or current evidence of fluid overload.

1.1.6 Acute blood loss in an emergency. Hb unreliable, resuscitation by an experienced clinician, transfuse if blood loss > 30%. When normovolaemic use Hb thresholds below.

1.2 **Recommended haemoglobin thresholds**

1.2.1 Surgery/medical/critical care
Use Hb of <70g/l as a guide for red cell transfusion
Cardiovascular disease – consider transfusion at Hb <80g/l or for symptoms e.g. chest pain; hypotension or tachycardia unresponsive to fluid resuscitation; or cardiac failure.
A medical management of patients with anaemia is available see appendix 1 - Pathway for Newly Identified Anaemia
Critical care – See appendix 2 for factors which modify Hb threshold. Consider paediatric sample tubes to reduce iatrogenic blood loss.

1.2.2 Radiotherapy – Limited evidence for maintaining Hb greater than 100g/l

1.2.3 Chronic anaemia – Maintain Hb to prevent symptoms of anaemia. Hb .80g/l appropriate for many patients. Patients with sickle cell disease require a lower Hb threshold for transfusion – discuss with haematologist.

1.2.4 Patients with a white cell count of greater than 50 x 10^9/l, paraproteinaemia, chronic severe anaemia or sickle cell disease (SCD) may develop complications. Red cell transfusion thresholds in these disorders should be discussed with a haematologist.

1.3 **Selection of units for Red Blood Cell Transfusion**

1.3.1 The same ABO and Rh(D) group as the patient should be matched where possible. For all patients this should be confirmed by 2 samples taken at different times.

1.3.2 All females of child bearing age (under 51 yrs) who are Kell negative or little c negative should receive blood negative for these antigens.
1.3.3 Patients with SCD, thalassaemia, autoimmune haemolysis, myelodysplastic syndrome and others requiring long term transfusion support should have Rh and Kell matched blood.

1.3.4 Neonates and infants (under 4 months) considered likely to require multiple top-up transfusions should be given small volume (50ml) paediatric multi-packs (4 to 5 per donation) to minimise donor exposure.

References:
- BCSH Guidelines on the management of anaemia and red cell transfusion in adult critically ill patients 2012
- National Blood Transfusion Committee indication codes for transfusion – an audit tool 2011
- BCSH Guidelines for Pre-transfusion Compatibility Procedures in Blood Transfusion Laboratories 2012
- BCSH Guidelines for the Clinical use of Red Blood Cell Transfusion 2001

2 FRESH FROZEN PLASMA

The aetiology of a coagulopathy must be known prior to the use of FFP or undertaking invasive procedures.

2.1 Definite indications

2.1.1 Replacement of single factor deficiencies when specific factor concentrates are not available. This should be virally inactivated- see below

2.1.2 Acute disseminated intravascular coagulation (DIC) - The underlying cause should be treated. FFP may be required to correct coagulation abnormalities if bleeding or an invasive procedure is planned.

2.1.3 Massive transfusion – Where there is anticipated large volume blood loss associated with routine surgery the PT and APTT should be kept within the reference range. FFP is likely to be needed after loss of one blood volume. For management of uncontrolled haemorrhage see NBT management of massive haemorrhage guideline

In all above situations monitor effectiveness with pre- and post-infusion clotting tests.

2.1.4 Thrombotic thrombocytopenic purpura (TTP) - virally inactivated FFP should be used.

2.2 Conditional indications for FFP

2.2.1 Liver disease (non-bleeding) – no evidence of benefit for FFP, regardless of PT ratio. If bleeding is uncontrolled consider prothrombin complex concentrate - discuss with haematologist.

2.3 Unjustified use of FFP

2.3.1 Plasma exchange - except in TTP, when the patient is haemorrhagic or following recent biopsy/surgery.
2.3.2 Vitamin K deficiency causing prolonged clotting times should be managed with vitamin K – 10mg x3/week in adults and 0.3mg/kg x3/week in children.

2.3.3 To reverse warfarin if prothrombin complex concentrate available

2.4 Paediatric use of FFP

2.4.1 Haemorrhagic disease of the newborn with significant bleeding - FFP plus iv vit K.

2.4.2 Neonates with coagulopathy who are bleeding, or about to have an invasive procedure, require FFP plus iv vit K.

2.5 Use of Virally Inactivated Plasma

This product should be used in preference to standard FFP in the following circumstances:-

2.5.1 Replacement of single clotting factor deficiencies when no specific concentrate is available

2.5.2 In situations where no other blood products such as red cells, platelets or cryoprecipitate are required.

2.5.3 All patients born in 1996 or later.

2.5.4 All patients with Thrombotic Thrombocytopenic Purpura (TTP) / Haemolytic Uraemic Syndrome (HUS).

2.6 Issuing Guidelines for FFP

2.6.1 Takes approximately 20 minutes to defrost.

2.6.2 ABO-compatible FFP whenever possible. Group O plasma only to group O recipients as it will contain donor derived anti A and B. Group A plasma to B recipient or vice versa – plasma MUST be ABO antibody high titre negative. Particular care in children or low weight adults

2.6.3 No requirement to Rh D match.

2.6.4 Dose 15ml/kg but monitor PT, APTT or specific factor. May require larger dose in massive bleeding

2.6.5 Use within 4hrs of defrosting if factor VIII replacement is needed e.g. DIC, TTP. Otherwise may be stored at 4°C in the blood bank before administration to the patient providing the infusion is completed within 24hrs of thawing.

2.6.6 In emergency where delay waiting for laboratory results might jeopardise patient care, 4 units of FFP may be issued.

References

- The transfusion of blood and blood components in an emergency. Rapid Response Report NPSA/2010/RRR017; 21 October 2010
3. PROTHROMBIN COMPLEX CONCENTRATE (PCC)

PCCs are pooled plasma products containing factors II, VII, IX and X and are used, with
Vitamin K, to reverse anticoagulation with vit K antagonists in the following circumstances
- Life threatening haemorrhage
- Trauma, particularly when associated with head injury
- Prior to an emergency invasive procedure
Dose is dependent on the INR and weight of the patient. The transfusion laboratory can advise
on the suggested dosing schedule.
Further information on anticoagulant reversal, including the new oral agents, is available in
“Therapeutic anticoagulation for elective procedures assessment and management guidelines”
which is located in the Document management System (DMS).

4. CRYOPRECIPITATE

4.1 Consider cryoprecipitate for
- Fibrinogen supplementation in
  - fulminant DIC, advanced liver disease, reversal of thrombolytic therapy, if bleeding
    or invasive procedure planned
  - massive blood transfusion.

Cryoprecipitate is indicated if fibrinogen less than 1g/l or 1.5g/l in major haemorrhage
Dosage – 2 pooled packs for an adult. 1 to 2 individual units/10kg (5ml/kg) body weight in a
child. Response and further replacement guided by coagulation monitoring
ABO-compatible whenever possible – see FFP issuing guidelines.
Use within 2hrs of defrosting for maximum effect.

4.2 FFP and Cryoprecipitate Product Specifications

<table>
<thead>
<tr>
<th>Product</th>
<th>Pooled</th>
<th>Viral inactivation</th>
<th>Mean Volume (ml)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FFP</td>
<td>No</td>
<td>No</td>
<td>273</td>
</tr>
<tr>
<td>Cryoprecipitate individual unit</td>
<td>No</td>
<td>No</td>
<td>39</td>
</tr>
<tr>
<td>Cryoprecipitate (x5 units)</td>
<td>Yes</td>
<td>No</td>
<td>152</td>
</tr>
<tr>
<td>Methylene Blue treated FFP*</td>
<td>No</td>
<td>Yes</td>
<td>60ml for neonatal use.</td>
</tr>
<tr>
<td>Solvent Detergent treated FFP</td>
<td>Yes</td>
<td>Yes</td>
<td>200</td>
</tr>
<tr>
<td>Methylene Blue treated</td>
<td>No</td>
<td>Yes</td>
<td>38</td>
</tr>
<tr>
<td>cryoprecipitate*</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*NHSBT Non UK sourced
5. **HUMAN ALBUMIN SOLUTION (HAS)**

4.5% HAS

- may be used in the management of burns and during plasma exchange or paracentesis.

20% HAS (salt poor solution)

- replacement for paracentesis
- treatment of diuretic resistant oedema in hypoalbuminaemic patients
- treatment of hypoalbuminaemic patients with ovarian hyperstimulation syndrome.

6. **PLATELETS**

The cause of thrombocytopenia should be established prior to platelet transfusion.

6.1 **Indications**

6.1.1 Bone marrow failure-

- reversible e.g. after chemotherapy. Serious spontaneous haemorrhage unlikely if patient stable and platelets $10 \times 10^9$/l or above.
- chronic bone marrow failure – platelets **only** required if bleeding or risk factors for bleeding - see table below.

6.1.2 Platelet function disorders with bleeding or if an invasive procedure is planned. Consider stopping anti-platelet drugs and other measures e.g. DDAVP. Platelet transfusion (x2 doses given immediately pre-operation) should be considered for patients on Clopidogrel requiring emergency renal transplant/biopsy.

6.1.3 Massive haemorrhage

For emergency situation see NBT management of massive haemorrhage guideline.

6.1.4 Peripheral consumption e.g. disseminated intravascular coagulation (DIC)

6.1.5 Peripheral destruction e.g. immune thrombocytopenia

- Immune thrombocytopenic purpura (ITP), Post transfusion purpura (PTP). Only as emergency treatment in advance of surgery or if major haemorrhage.
- Neonatal alloimmune thrombocytopenia - baby will require platelets negative for the implicated platelet antigen. Discuss with Haematologist and NHS Blood & Transplant.
### 6.2 Summary of Indications for Platelet Transfusion

<table>
<thead>
<tr>
<th>Indication</th>
<th>Transfusion indicated (threshold provided)/ not indicated</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Routine prophylactic use</strong></td>
<td></td>
</tr>
<tr>
<td>- Reversible bone marrow failure</td>
<td>10 x 10⁹/L</td>
</tr>
<tr>
<td>- Chronic bone marrow failure, peripheral destruction/consumption, abnormal platelet function</td>
<td>Not indicated</td>
</tr>
<tr>
<td>- Prophylactic use in the presence of risk factors for bleeding (e.g. sepsis, antibiotic treatment, abnormalities of haemostasis)</td>
<td></td>
</tr>
<tr>
<td>- Reversible/chronic bone marrow failure</td>
<td>20 x 10⁹/L</td>
</tr>
<tr>
<td>- Peripheral destruction/consumption, abnormal platelet function</td>
<td>Not indicated</td>
</tr>
<tr>
<td><strong>Prophylactic use pre-procedure except eyes or brain</strong></td>
<td></td>
</tr>
<tr>
<td>- Reversible/chronic bone marrow failure and platelet destruction/consumption if urgent/other therapy failed</td>
<td></td>
</tr>
<tr>
<td>- Bone marrow aspirate or trephine</td>
<td>Not indicated</td>
</tr>
<tr>
<td>- Epidural anaesthesia</td>
<td>80 x 10⁹/L</td>
</tr>
<tr>
<td>- ^ All other procedures</td>
<td>50 x 10⁹/L</td>
</tr>
<tr>
<td>- Abnormal platelet function</td>
<td></td>
</tr>
<tr>
<td>- Bone marrow aspirate and trephine</td>
<td>Not indicated</td>
</tr>
<tr>
<td>- all other procedures in selected patients if alternative therapy failed/contraindicated</td>
<td>Not possible to state threshold</td>
</tr>
<tr>
<td><strong>Prophylactic use pre-procedure involving eyes or brain</strong></td>
<td></td>
</tr>
<tr>
<td>- Reversible/chronic bone marrow failure and platelet destruction/consumption if urgent/other therapy failed</td>
<td>100 x 10⁹/L</td>
</tr>
<tr>
<td>- Abnormal platelet function</td>
<td></td>
</tr>
<tr>
<td>- all other procedures in selected patients if alternative therapy failed/contraindicated</td>
<td>Not possible to state threshold</td>
</tr>
<tr>
<td><strong>Therapeutic use</strong></td>
<td></td>
</tr>
<tr>
<td>$ Massive haemorrhage, all patient indication categories except abnormal platelet function where not possible to state threshold</td>
<td>75 x 10⁹/L</td>
</tr>
<tr>
<td>For patients with multiple trauma or CNS injury</td>
<td>100 x 10⁹/L</td>
</tr>
</tbody>
</table>

* BCSH guidelines for Multiple Myeloma recommend a threshold count of 30 with Bortezomib treatment
  BCSH guidelines for Aplastic Anaemia recommend a threshold count of 30 during treatment with ATG and a threshold count of 20 if pregnant or fever.
^ American Society for Haematology ITP guidelines recommend a threshold count of 80 for major surgery
$ TTP and HIT platelet transfusion contraindicated unless life-threatening haemorrhage

### 6.3 Contraindications

- TTP
  - Heparin induced thrombocytopenia (HIT)

### 6.4 Selection of Platelets

6.4.1 Try and use the same ABO group as the patient. It is more important to give compatible plasma than compatible platelets. Avoid group O platelets for group A,B or AB recipients - if unavoidable (i.e. HLA, HPA matched, CMV negative) units should be confirmed as having a low titre of anti-A and anti-B.
6.4.2 Rh D negative recipients should get Rh D negative platelets wherever possible. If Rh D positive platelets are given to Rh D negative females of childbearing potential (under 51 yrs) or children under 16 yrs, 500iu of prophylactic anti-D should be given by sc injection. See section on Use of Prophylactic anti-D immunoglobulin (Anti-D Ig)

6.4.3 Single donor apheresis platelets are recommended for patients born in or after 1996.

6.5 Dose, administration and response

6.5.1 Dose - 1 adult therapeutic dose (ATD) of platelets should produce an increment of ~30 x 10^9/l in 70kg recipient with 5L blood volume.

6.5.2 Administration - over 30 mins via platelet giving set (a fresh blood giving set can be used if platelet giving set not available).

6.5.3 Refractory to standard platelets - an increment of less than 10 x 10^9/l indicates a poor response. Discuss with haematologist.

References

• National Blood Transfusion Committee indication codes for transfusion – an audit tool 2011
• BCSH Guidelines in neonates and children 2004
• BCSH Guidelines on platelet transfusion 2003
• BCSH Guideline on management of bleeding in patients on antithrombotic agents 1012

7. IRRADIATION OF BLOOD COMPONENTS

Aim: To avoid transfusion graft versus host disease (TA-GVHD) caused by engraftment of viable donor T lymphocytes.

Patients should be given an information leaflet and card. The blood bank should be informed of the need for irradiated products and the front of the patient’s notes clearly marked with “irradiated blood products only”, signature of authorising doctor and date.

Cryopreserved RBCs, FFP, cryoprecipitate and fractionated plasma products have not been implicated in TA-GVHD.

7.1 Specific indications

7.1.1 Congenital immunodeficiency states

7.1.2 Neonatal / Paediatric

1. Intra-uterine transfusions (IUT) - red cells or platelets (use within 24 hrs).
2. Exchange transfusions - essential if there has been a previous IUT or if the donation comes from a first or second degree relative. In other circumstances, irradiation is recommended provided this does not delay the transfusion (use within 24 hrs).

Top-up transfusions - if previous IUT (until 6 months after expected date of delivery), or the donation is from a first or second degree relative.

7.1.3 Therapy or disease induced immunodeficiency in both children and adults

1. Recipient of allogeneic bone marrow (BMT)/stem cell transplant (SCT). Continue until GVHD prophylaxis discontinued or lymphocytes more than 1 x 10^9/l. Continue irradiation if chronic GVHD or immunosuppression continued.
2. Recipient of autologous BMT/SCT. Continue until 3 months post transplant or 6 months if total body irradiation.
3. Patients undergoing harvesting for BMT/SCT. During harvest and for 7 days before.
4. Patients with/previous Hodgkins Disease
5. Patients treated with purine analogues and related drugs – e.g. Fludarabine, Cladribine, Pentostatin, Clofarabine and Bendamustine
6. Patients treated with alemtuzumab
7. Aplastic anaemia patients treated with anti-thymocyte globulin (ATG)

7.1.4 Blood components that always require irradiation

1. Directed donations from family members
2. Granulocyte transfusions
3. HLA matched products

References

- BCSH Guidelines on the use of irradiated blood components 2010

8. CMV NEGATIVE BLOOD COMPONENTS

Indications for use in CMV –ve patients given in table of “special” blood components below. CMV is transmitted in leucocytes. All blood components other than granulocytes are now leucocyte depleted which is an effective alternative, therefore CMV seronegative components rarely required. FFP and cryoprecipitate do not need to be CMV negative.

Use of “special” blood components

<table>
<thead>
<tr>
<th>Blood Component</th>
<th>CMV negative</th>
<th>Irradiated</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMT/SCT</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>7 days before and during harvest for BMT/SCT</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>Granulocyte transfusions</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Hodgkins disease</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>Purine analogues and related drugs e.g. Fludarabine, Cladribine, Pentostatin, Clofarabine, Bendamustine.</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>Alemtuzumab therapy</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>Anti-thymocyte globulin in Aplastic Anaemia or MDS</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>Congenital immunodeficiency</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>HIV</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HLA matched products</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>Donations from relatives</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>*Children up to 28 days post expected date of delivery</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>Intra-uterine transfusion</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Exchange transfusion</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>After delivery if previous IUT</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>Elective transfusion of pregnant women</td>
<td></td>
<td>√</td>
</tr>
</tbody>
</table>

*All small sized blood packs intended for neonates should be CMV –ve
9. **USE OF PROPHYLACTIC ANTI-D IMMUNOGLOBULIN (ANTI-D Ig)**

RhD -ve females capable of childbearing (under 51 yrs) who have not formed anti-D antibodies should receive prophylactic anti-D Ig following a potentially sensitising event. Anti-D Ig is manufactured from imported plasma because of the theoretical risk of contracting vCJD from UK blood products.

Guidance for the use of Anti-D in pregnancy is provided in the Women and Children’s health guidance - *Antenatal Screening for Blood Group and Red Cell Antibodies in Pregnancy*.

9.1 **Management of RhD -ve women of childbearing potential who have received RhD +ve blood products**

9.1.1 Platelets

RhD -ve products should be provided for RhD -ve women of childbearing potential (under 51 yrs) and children under 16 yrs. If unavailable anti-D by *subcutaneous injection* is required.

Platelets – 500iu anti-D will cover 5 ATD platelets over a 6 week period.

9.1.2 Inadvertent transfusion of RhD-positive RBCs

Calculate dose of anti-D on the basis that 500iu im anti-D will suppress sensitization by 4ml of RhD-positive rbc.

- less than 48ml transfused – use standard preparations (500, 1500iu) im anti-D (max im dose 10,000iu).
- more than 48ml transfused – give iv anti-D (iu per ml of blood transfused according to manufacturers instruction).
- more than 2 units RhD +ve blood - discuss with haematologist. Consider exchange transfusion; estimate residual RhD +ve cells by flow cytometry and give anti-D. Repeat RhD +ve rbc estimation is required every 48 or 72hrs after iv or im anti-D.

N.B. Maximum dose of iv Rhophylac 15,000iu. If more than 15,000iu Rhophylac required give im 125iu/ml im or successive iv doses at 8 hourly intervals.

N.B. Large doses of passive anti-D (greater than 2500iu) may remain detectable for more than 6 months. A negative antibody screen is not 100% proof that immunisation has been prevented as anti-D may be below the level of detection.

9.1.3 Renal allograft

Rh D -ve women of child-bearing potential (less than 51 yrs) who are receiving a RhD +ve kidney should be given 500iu of anti-D by im injection at the time of transplant. Consider estimation of D +ve red cells in the circulation by flow cytometry to identify clearance.

References

10. ADDITIONAL GUIDELINES FOR GOOD PRACTICE AND STANDARDS

- Perioperative Blood Transfusion for Elective Surgery – A national clinical guideline. [http://www.sign.ac.uk/](http://www.sign.ac.uk/)


- Joint National Institute of Biological Standards and Control and United Kingdom Blood Transfusion Services guidelines. [www.transfusionguidelines.org.uk](http://www.transfusionguidelines.org.uk)

Appendix 1

Medical Pathway for Newly Identified Anaemia

Anaemia

Primary Risk Assessment – Are they unwell or medically at risk from the anaemia?

No symptoms/signs

Hb > 70 (>80 if elderly/cardiovascular disease)

No significant symptoms/signs

Low MCV

No significant symptoms/signs and Hb > 70 (>80 if elderly/cardiovascular disease)

Admit

Hb < 70 (<80 if elderly/cardiovascular disease) or significant symptoms/signs

Symptoms/signs - chest pain; hypotension or tachycardia unresponsive to fluid resuscitation; or cardiac failure

NB exclude hyperviscosity, autoimmune haemolysis – D/W haematologist

NB risk of circulatory overload with blood transfusion if chronic anaemia

Y

If ‘no’ consider is transfusion needed?

- may not be needed if chronic anaemia and alternative treatment e.g. B12, folate, iron replacement

Urgent transfusion. Aim for Hb just over level defined above.

In chronic anaemia - lower target Hb to relieve symptoms may be appropriate. Consider 1 unit.

Non urgent transfusion

Consider 1 unit only

Hb unstable and/or ongoing symptoms

Unresolved pathology e.g. bleeding/haemolysis?

Haemodynamically unstable?

Y

Oral iron if likely iron deficiency and no impairment to absorption. Consider iv if known iron deficient.

Suggested dose 500mg – 1 gm

Y

Continue inpatient medical workup

FU next AAU OP clinic with results

N

Consider OP management*

Low MCV

N

Y
All patients – Workup considerations

History -
- bleeding (GI, GU, PV) (consider third space loss as clinically indicated e.g. haematoma, AAA)
- drugs/alcohol
- malabsorption
- FH
- diet
- blood donation
- AID

If Afro-Caribbean/ Mediterranean consider sickle cell/thalassaemia

Is this acute or chronic anaemia (recent symptoms versus slow increase in symptoms)

Examination –
- GI examination including PR for melena
- Are there any massive haematomas?
- Evidence of cardiac failure? Pulse/BP

Consider the FBC result - does the result fit the clinical picture?

Check previous history/results. Has this already been investigated?

Low MCV
- Haematinics (if ferritin <100µg/L and/or transferrin saturation <20% likely iron deficient if inflammation /infection present)
- TSH
- Coeliac disease screen
- CRP/PV
- Consider Hb electrophoresis
- If bleeding likely arrange appropriate investigations e.g. OGD, colonoscopy, abdo US

Normal/High MCV
- Reticulocyte count
- Haematinics
- Blood Film
- LDH
- Direct Antiglobulin Test
- Myeloma screen
- Coeliac disease screen
- TSH
- Renal & liver function

Arrange investigations e.g. OGD, colonoscopy, abdo US

Outpatient considerations

Is the patient otherwise well and displays minimal symptoms?
Do they have any evidence of acute blood loss?
Can they cope at home?

What is the benefit of an admission – would they be better managed by OP investigation?
Appetite 2

ICU Hb Targets & Blood Transfusion Guidelines

Management of Anaemia in Critical Care Without Major Haemorrhage*

Is the patient anaemic and haemodynamically stable and is the Hb >90 g/L?

- Yes → DO NOT TRANSFUSE
- No

Does the patient have ischaemic heart disease, severe sepsis or a neurological injury?

- No → General Critical Care
  - Use a default Hb transfusion trigger of <70 g/L
  - Target range between 70 – 90 g/L
- Yes

Ischaemic Heart Disease
Patients with ACS
  - Target Hb >80 – 90 g/L
Patients with stable angina
  - Target Hb >70 g/L

Severe Sepsis
Early (<6H from onset)
  - Target Hb 90 – 100 g/L
  - IF evidence of tissue hypoxia
Late (>6H from onset)
  - Target Hb >70 g/L

Neurological Injury
Traumatic Brain Injury (TBI) and evidence of cerebral ischaemia
  - Target Hb 90 g/L
  - TBI
  - Target 70-90 g/L
Subarachoid haemorrhage
  - Target Hb >80 – 100 g/L
Acute ischaemic stroke
  - Target >90 g/L

*Based on ‘Guidelines on the management of anaemia and red cell transfusion in adult critically ill patients’ by the British Committee for Standards in Haematology, 2012

If in doubt, discuss with the consultant
Please remember that these are guidelines. Critically ill patients have many factors that influence optimal management. Each decision relies on both current guidelines, evidence based practice and clinical judgement

When using Hb transfusion triggers of 70 g/L be LESS confident IF:
  - the patient is elderly with significant cardiorespiratory co-morbidities
  - the patient has evidence of inadequate oxygen supply to tissues (high lactate or low central venous oxygen saturation)
Be MORE confident IF
  - the patient is younger than 55 years
  - the severity of illness is relatively low

Do not use erythropoietin or routine iron supplementation
Do not use RBCs to assist weaning when Hb >70 g/L
Be aware of the risks & symptoms of transfusion associated circulatory overload (TACO) and transfusion related acute lung injury (TRALI)
Appendix 3

Summary Of Blood Products Available For Neonatal/Paediatric Use
N.B. All are leucocyte depleted (less than 5x 10^6 per unit). Paediatric packs recommended for top-up transfusion in children less than one year.

Red cell products

<table>
<thead>
<tr>
<th>CMV status</th>
<th>Mean Volume</th>
<th>Clinical uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paediatric packs</td>
<td>Negative</td>
<td>43ml</td>
</tr>
<tr>
<td>Red cells for exchange transfusion</td>
<td>Negative</td>
<td>324ml</td>
</tr>
<tr>
<td>Red cell for IUT</td>
<td>Negative</td>
<td>244ml</td>
</tr>
<tr>
<td>Large volume red cell transfusion in neonate/infant (excluding exchange transfusion)</td>
<td>Negative</td>
<td>200 – 300ml</td>
</tr>
<tr>
<td>Red cells in additive solution</td>
<td>negative</td>
<td>280 ml</td>
</tr>
</tbody>
</table>

Platelet product

<table>
<thead>
<tr>
<th>CMV status</th>
<th>Mean Volume</th>
<th>Clinical uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paediatric Apheresis platelets (equivalent to 0.25 adult dose)</td>
<td>Negative</td>
<td>55ml</td>
</tr>
<tr>
<td>Platelets for IUT Hyperconcentrate</td>
<td>Negative</td>
<td>73ml</td>
</tr>
<tr>
<td>Platelets –apheresis</td>
<td>Tested on request</td>
<td>186ml</td>
</tr>
</tbody>
</table>

FFP and Cryoprecipitate product – see also section on Clinical Use of FFP.

<table>
<thead>
<tr>
<th>CMV status</th>
<th>Mean Volume</th>
<th>Clinical uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>FFP – (methylene blue treated)</td>
<td>Not required</td>
<td>60ml</td>
</tr>
<tr>
<td>FFP – (methylene blue treated)</td>
<td>Not required</td>
<td>239ml</td>
</tr>
<tr>
<td>FFP (Solvent detergent treated)</td>
<td>Not required</td>
<td>200ml</td>
</tr>
<tr>
<td>Methylene Blue treated cryoprecipitate – single unit</td>
<td>Not required</td>
<td>38ml</td>
</tr>
</tbody>
</table>
## Choice of ABO Blood Group Products for Administration

<table>
<thead>
<tr>
<th>Patient’s ABO group</th>
<th>ABO group of blood products to be transfused</th>
<th>Red cells</th>
<th>Platelets</th>
<th>FFP*</th>
</tr>
</thead>
<tbody>
<tr>
<td>O</td>
<td></td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>First choice</td>
<td></td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Second choice</td>
<td></td>
<td>-</td>
<td>A or B</td>
<td>A or B or AB</td>
</tr>
<tr>
<td>A</td>
<td></td>
<td>A</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>First choice</td>
<td></td>
<td>A</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>Second choice</td>
<td></td>
<td>O†</td>
<td>B†‡</td>
<td>AB</td>
</tr>
<tr>
<td>Third choice</td>
<td></td>
<td>-</td>
<td>O†</td>
<td>B†</td>
</tr>
<tr>
<td>B</td>
<td></td>
<td>B</td>
<td>B†</td>
<td>B</td>
</tr>
<tr>
<td>First choice</td>
<td></td>
<td>B</td>
<td>B†</td>
<td>B</td>
</tr>
<tr>
<td>Second choice</td>
<td></td>
<td>O†</td>
<td>A†</td>
<td>AB</td>
</tr>
<tr>
<td>Third choice</td>
<td></td>
<td>-</td>
<td>O†</td>
<td>A†</td>
</tr>
<tr>
<td>AB</td>
<td></td>
<td>AB</td>
<td>AB‡</td>
<td>AB</td>
</tr>
<tr>
<td>First choice</td>
<td></td>
<td>AB</td>
<td>AB‡</td>
<td>AB</td>
</tr>
<tr>
<td>Second choice</td>
<td></td>
<td>A† or B†</td>
<td>A† or B†‡</td>
<td>A†</td>
</tr>
<tr>
<td>Third choice</td>
<td></td>
<td>O†</td>
<td>O†</td>
<td>B†</td>
</tr>
</tbody>
</table>

* Group O FFP should only be given to patients of group O. Although group AB FFP can be given to any ABO group patient, supplies are usually limited.

† Components which test negatively for ‘high titre’ anti-A and/or anti-B should be selected. The use of group O platelets for non-O patients should be avoided as much as possible. This does not apply to red cells suspended in additive solution.

‡ Platelet concentrates of group B or AB may not be available.