BMS Education Training Day

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Transfusion for Fetuses, Neonates and Older Children

Date: 15 April 2016

Appropriate transfusion of fetal and paediatric patients of all ages is vital in order to balance transfusion benefits against risks. These risks include transfusion of an incorrect blood component due to errors such as mistaken patient identity, or unpredictable acute transfusion reactions (Stansby et al, 2006). Recent studies suggest that a significant percentage of paediatric transfusion recipients receive only one transfusion during their admission (Sorim et al, 2008; New et al, 2014), raising the possibility that some may be avoidable.

Specialised components are available for transfusion to different paediatric patient groups and for different clinical indications.

Plasma components have been imported for all patients born on or after 1st Jan 1996 in order to reduce the risk of transfusion transmission of variant Creutzfeldt-Jakob disease (vCJD; see section 7). Additional component safety measures are applied for fetal and neonatal patients, who are particularly vulnerable recipients because of their small size and developmental immaturity and who also have the longest potential lifespan. The clinical section focuses largely on aspects relating to transfusion indications and administration, whereas the laboratory section contains most of the information relating to pre-transfusion testing and component selection.

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Questions

• What is the total blood volume for a 2 year old?
• Define massive blood loss
• How would you manage this case, what products would you recommend?
• What are your targets?
Answers

1. Total blood volume 80mls/kg

2. Massive blood loss defined
   - 80mls/kg in 24 hours
   - 40mls/kg in 3 hours
   - 2-3mls/kg/min

3. Targets
   - Hb 80
   - Fibrinogen >1.5g/L
   - PT ration <1.5
   - Platelet >75
If peripheral / central access is difficult what do you do?
Activate resuscitation
Specialist support
Group O Rh D negative / Group Specific

Replace in \textbf{mls/kg}

Anticipate and treat coagulopathy / low platelet
Tranexamic acid 15mls/kg
Avoid
• hypothermia
• Hypocalcaemia
• Acidosis
• hyperkalaemia

Immediate transfusion:
20mls/kg RBCs
1 FFP : 2 RBC

Use FFP , Cryo & Platelets early if bleeding ongoing

After initial resuscitation
20mls/kg RBC
20mls /kg FFP
10mls/kg Cryo
Platelets 15-20mls /kg
(after every 40mls/kg RBC)

Avoid
• hypothermia
• Hypocalcaemia
• Acidosis
• hyperkalaemia
Appendix 4
Example massive blood loss algorithm

Transfusion management for children (<50 kg) with massive blood loss*

Clinical picture compatible with massive blood loss

Trigger local children’s massive blood loss protocol (including the necessary clinician and transfusion teams)

Ensure intravenous access and take blood samples for:
- Full blood count
- Group and save (with subsequent second sample)
- Clotting screen to include fibrinogen
- Near patient testing (blood gas, electrolytes)

Give tranexamic acid (in trauma) if < 6 h post-injury (see timing and dosage recommended by RCPCH)

Initiate emergency transfusion:
- 20 mL/kg red cells 0 D-negative or ABO and D-specific
- Request massive blood loss components RBC/FFP/patients

If bleeding continues

Until laboratory results available

If laboratory results available:

Give:
- RBCs to 20 mL/kg
- FFP to 20 mL/kg aliquots
- To achieve RBC:FFP ratio 1:1

If < 40 mL/kg RBCs given consider:
- Platelets 15-20 mL/kg
- Cryoprecipitate 10 mL/kg

Continue blood products in the ratios above until bleeding controlled

Additional aims:
- Central bleeding
- Normothermia (ax < 38°C)
- Normal CO2 > 1 mmol/L
- pH > 7.34
- Lactate < 3 mmol/L

Blood Component ABO Compatibility Chart

<table>
<thead>
<tr>
<th>Patient’s ABO Group</th>
<th>Compatible Red Blood Cells (RBCs)</th>
<th>Compatible Plasma</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group O</td>
<td>Group O</td>
<td>Group O, A, B, AB</td>
</tr>
<tr>
<td>Group A</td>
<td>Group A and O</td>
<td>Group A and AB</td>
</tr>
<tr>
<td>Group B</td>
<td>Group B and O</td>
<td>Group B, AB</td>
</tr>
<tr>
<td>Group AB</td>
<td>Group O, A, B, AB</td>
<td>Group AB</td>
</tr>
</tbody>
</table>

*This is an example algorithm of transfusion-related management of massive blood loss. Local guidelines will need to be developed to take into account current national and local resuscitation standards and surgical and trauma standards.

Algorithm may be adapted for neonatal use. Children (<50 kg) should be managed according to adult guidelines.

APTT, activated partial thromboplastin time; FFP, fresh frozen plasma; PT, prothrombin time; RBC, red blood cell; RCPCH, Royal College of Paediatrics and Child Health.