

## 5. Massive haemorrhage – see [Appendix 1](#) for additional resources

This guideline is intended to supplement local policies for the management of the paediatric bleeding patient and concentrates on the communication around the use of blood components for the resuscitation of victims of major trauma. The guideline assumes that all necessary measures to identify and control bleeding sites are on-going and effort must be directed at preventing hypothermia by the use of fluid warmers and external warming devices (such as a Bair Hugger).

References to guidelines from the British Committee for Standards in Haematology (BCSH) and NICE have been made in line with their recommendations.

### Key Points

- In clinical practice, haemodynamic changes compatible with hypovolaemia accompanying evidence or suspicion of serious haemorrhage are the usual triggers for massive haemorrhage
- Approximate patient weight in kg can be estimated from the formulae below or using the APLS aide-memoire.
  - <1yr (0.5 x age in months) +4
  - 1-5yrs (2 x age in years) +8
  - >5yrs (3 x age in years) +7

### Communication with the Transfusion Lab

Early communication with the Transfusion Lab is essential for timely provision of blood.

- Give patient details and request the Major Haemorrhage Pack.
- Ensure a correctly labelled sample is sent as soon as possible. *Incorrectly labelled samples will lead to a delay in the provision of blood and blood components*

Administer red cells and FFP in a 1:1 ratio in 10ml/kg aliquots

### **Liaise with laboratory staff regarding the provision of the most appropriate blood components:**

<b>Red Cells</b>	<ul style="list-style-type: none"> <li>• Emergency O RhD negative</li> <li>• Un-crossmatched or group specific</li> <li>• Crossmatched</li> </ul>
<b>Fresh frozen plasma (FFP)</b>	<ul style="list-style-type: none"> <li>• FFP issued for children born after 01/01/1996 is virally inactivated and octaplasLG or MBFFP (methylene blue treated FFP) may be supplied.</li> <li>• Allow time for thawing of FFP</li> </ul>
<b>Platelets</b>	<ul style="list-style-type: none"> <li>• Standard dose is 10ml/kg</li> <li>• Be aware of stock levels within the hospital</li> </ul>
<b>Cryoprecipitate</b>	<ul style="list-style-type: none"> <li>• Aim to maintain fibrinogen levels &gt;1.5 g/l</li> <li>• Allow time for thawing of cryoprecipitate</li> </ul>

**IV tranexamic acid** 15mg/kg (max 1g) should be given ideally within the first hour and should not be commenced after 3 hours. This is followed by a maintenance dose of 2mg/kg/hour over the next 8 hours.

Do not wait for blood results but be guided by the clinical assessment of the on-going need for blood component resuscitation.

#### **Transfer of blood products and components between hospitals**

- Contact the lab and request blood for transfer; confirm who will organise appropriate documentation and storage requirements
- Blood products and components being transferred with a patient to another hospital must:
  - be packaged appropriately
  - have transit documentation completed (appendix)
  - have a transport label on the outside of the transfer box.
- After blood has arrived in the clinical area, those units should not be sent on with the patient without being packaged by the blood bank staff.
- Please inform the Transfusion Laboratory at the receiving hospital if the patient has received any blood products/components.

**See Appendix 1 – additional resources**

**[1a. Management of massive haemorrhage flow chart](#)**

**[1b. Transfusion transfer documentation](#)**

**[1c. Massive haemorrhage – additional information](#)**

## Appendix 1a

# Yorkshire & Humber Regional Paediatric Trauma Guideline for Management of Major Haemorrhage Paediatric patients <50kg

**Clinical picture compatible with Massive Blood Loss**

**Activate Paediatric Major Haemorrhage Protocol  
Early communication with Blood Bank**

**Secure intravenous access and take blood samples:**

- FBC
- Group & Crossmatch
- Coagulation screen
- Near patient testing

**Give IV Tranexamic Acid 15mg/kg (max 1g)  
followed by infusion  
and keep the patient warm**

**Transfuse Red Cells and FFP: ratio of 1:1 at 10ml/kg  
(Advise Transfusion Lab of Volume Required)**

- Fully crossmatched blood when available
- Uncrossmatched ABO group specific when blood group known
- Use uncrossmatched group O Rh D negative only in extreme emergency (where sample is not available)
- **Aim to give all blood products via a blood warming device**

**If bleeding continues**

**Until lab results available**

**If lab results available**

**Transfuse Red cells and FFP: ratio 1:1 at 10ml/kg  
Consider Platelets at 10-15ml/kg  
Consider Cryoprecipitate 10ml/kg**

Continue transfusion to achieve

- Hb >80g/l
- Platelets >75x10<sup>9</sup>/l
- Fibrinogen >1.5g/l
- APTT/PT <1.5 x midpoint of normal

**Continue blood products in the ratios above until bleeding controlled**

**Complete transfusion documentation to transfer with patient**

Please complete this document prior to transfer and attach to patient notes

Patient Details:

Name .....

DoB .....

ID Number .....

Transfer:

From .....

To .....

Blood transfused prior to transfer or in transit:

Red cells donation numbers:

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.....

.....

Platelets donation numbers:

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.....

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FFP donation numbers:

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## Appendix 1c - Massive Haemorrhage - additional information

### Definitions

These may be difficult to apply in the acute situation. BCSH (2015) advise the following:

- Massive blood loss may be defined as either 80 ml/kg in 24 h, 40 ml/kg in 3 h or 2–3 ml/kg/min.
- In clinical practice, the usual triggers are haemodynamic changes compatible with hypovolaemia accompanying evidence or suspicion of serious haemorrhage
- A senior doctor (middle grade or above) authorises its use to ensure that scarce blood component resources are used appropriately.
- Normal paediatric blood volume ranges from 70-80ml/kg

### Communication with the Transfusion Lab

Successful treatment of massive blood loss depends on prompt action, good communication and involvement of senior clinicians with the necessary expertise.

- Pre-alert the Transfusion Lab if time allows.
- Give patient details and request the Major Haemorrhage Pack.
- Ensure a correctly labelled patient ID wristband is in place detailing the patient's NHS number as the primary identifier.
- Send a correctly labelled transfusion sample to the Transfusion Lab. There is a zero-tolerance approach to mislabelled samples, and incorrectly labelled samples will lead to a delay in the provision of blood and blood components
- Take samples for FBC, clotting screen and urea and electrolytes

For patients with active bleeding use a restrictive approach to volume resuscitation until definitive early control of bleeding has been achieved. Administer red cells and FFP in a 1:1 ratio in 10ml/kg aliquots.

- Any unused blood components MUST be returned to blood bank immediately
- If red cells arrive in a cool box it should be kept in the cool box in which it arrives for up to the maximum length of time stated on the transport slip.
- Each blood unit should be removed and used one at a time, between each removal ensure the lid is securely positioned on the cool box at all times. Platelets must not be stored in the cool box.

<b>Red Cells</b>	<b>It is preferable to use fully cross matched blood or type specific where available but if necessary O negative should be used if to delay would be harmful</b>	
	Extreme urgency - immediate transfusion	Group O Rh negative red cells should only be used if the doctor feels that a delay of only 5 to 10 minutes would endanger the patient's life
	Very urgent - grouped but uncrossmatched	Uncrossmatched blood of a compatible ABO group can be provided within 15 minutes of receiving a sample and a warning telephone call
	Urgent - emergency crossmatch	The procedure for an emergency crossmatch may be completed in a minimum of 40 minutes from receipt of sample
<b>Fresh frozen</b>	<ul style="list-style-type: none"> <li>• FFP must be thawed before use: a process which takes up to 40 minutes, therefore</li> </ul>	

<b>plasma (FFP)</b>	<p>clear and pre-emptive communication with the laboratory is important</p> <ul style="list-style-type: none"> <li>• FFP issued for children born after 01/01/1996 is virally inactivated and methylene blue (MBFFP) or octaplasLG may be supplied.</li> <li>• If fibrinogen levels remain critically low (&lt;1.5g/l) cryoprecipitate therapy should be considered</li> </ul>
<b>Platelets</b>	<ul style="list-style-type: none"> <li>• Communicate early with the Blood Bank Laboratory to highlight requirement for platelets. Be aware of stock levels within the hospital.</li> <li>• Order 20 ml/kg platelets after 50% blood volume has been transfused (40 ml/kg if there is ongoing blood loss)</li> <li>• The standard dose is 10 ml/kg</li> <li>• Transfusion is recommended once a level of <math>75 \times 10^9</math> per litre is reached in acutely bleeding paediatric patients; this level can be anticipated when approximately two blood volumes have been replaced by fluid or red cell components (earlier if DIC occurs)</li> <li>• Transfusion is recommended once a level of <math>100 \times 10^9</math> per litre is reached in those with multiple high energy trauma, those with central nervous system injury, or if platelet function is known to be abnormal</li> </ul>
<b>Cryoprecipitate</b>	<ul style="list-style-type: none"> <li>• Cryoprecipitate must be thawed before use: a process which takes up to 40 minutes so be aware of timings</li> <li>• Aim to maintain fibrinogen levels &gt;1.5 g/l</li> <li>• Two units of cryoprecipitate provides 3.2 – 4g fibrinogen in a volume of 150-200mls</li> <li>• Administer as per clinical condition at 10ml/kg; cryoprecipitate is available in pooled and single units. One pooled unit contains 5 single units.</li> </ul>
<b>Tranexamic acid</b>	<ul style="list-style-type: none"> <li>• Give IV tranexamic acid 15mg/kg (max 1g) within 3 hours, followed by a maintenance dose of 2mg/kg/hour over the next 8 hours.</li> </ul>

**Do not wait for blood results but be guided by the clinical assessment of the on-going need for blood component resuscitation.**

### Transfer of blood products and components between hospitals

- Contact the lab and request blood for transfer; confirm who will organise appropriate documentation and storage requirements
- Blood products and components being transferred with a patient to another hospital must:
  - be packaged appropriately
  - have transit documentation completed (appendix)
  - have a transport label on the outside of the transfer box
- DO NOT send blood from the clinical area
- All blood products and components are stored under conditions which ensure that they remain safe to use therefore adherence to Blood Quality Management is essential
- Upon arrival at the receiving hospital any blood products/components that are not being transfused and are not immediately required must be **delivered to the blood bank** as soon as possible
- The Transfusion lab staff will re-issue the products/components once they are satisfied that they are safe to use
- Please inform the Transfusion Laboratory at the receiving hospital if the patient has received any blood products/components.