MANAGEMENT OF MASSIVE TRANSFUSION

Northwest Regional Toolkit for the Management of Massive Haemorrhage
Document Change History - changes from previous issues of document (if applicable):

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<td>Insertion of flow charts to clarify the process</td>
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1. **INTRODUCTION**

This guideline is to be followed for the management of all patients undergoing a massive blood transfusion. All clinical and laboratory staff managing a patient with a massive blood transfusion. This document is intended to be used in conjunction with: “The Northwest Regional Toolkit for the Management of Massive Haemorrhage”

2. **CLINICAL ACTIVATION OF THE GUIDELINES**

The Massive Haemorrhage guidelines will be activated for a patient requiring a massive blood transfusion. This can be defined as patients with:

- > 1 Blood Volume loss per 24 hours
- > 50% blood volume loss in 3 hours
- ongoing blood losses > 150mls per hour

*(Definition from The British Committee for Standards in Haematology)*

The transfusion laboratory will not issue Major Haemorrhage Packs (MHP) for the anticipation of a massive haemorrhage for a patient in whom there is currently no active major bleeding as defined above. The only exception to this is in cases of ruptured abdominal aortic aneurysms who are to undergo surgery imminently, in which case one MHP may be ordered by a consultant only.

Where there is an anticipation of MHPs being required, and it is possible the Massive Haemorrhage Guidelines will be activated, it is advisable to alert the laboratory to this possibility at the earliest opportunity. This enables resources to be put in place in the laboratory to facilitate timely and expeditious issue of MHPs should the need then subsequently arise.

**Documents for Use at The Walton Centre:**

1. Transfusion Management of Massive Haemorrhage in Adults
2. Laboratory Algorithm
3. “Seven Steps For Successful Coordination Of Massive Haemorrhage: Walton Centre / Aintree”
4. Transfusion Management of Massive Haemorrhage in children (appendix 1)
Management of Massive Transfusion
Date Ratified: February 2012
Date To Be Reviewed: February 2014

Transfusion Management of Massive Haemorrhage in Adults

Patient bleeding / collapses
Ongoing severe bleeding eg: 150 mls/min
Clinical shock

Call for help
‘Massive Haemorrhage, Location, Speciality’
Alert: Outreach team (if appropriate),
On-call consultant and patient’s consultant, blood
transfusion laboratory.
Consultant involvement is essential

Take bloods and send to lab:
XM, FBC, PT, APTT, fibrinogen, U+E,
Adjusted Ca
NPT: ABG,
and
Order MHP 1
Red cells* 4 units
FFP 4 units
Platelets 1 dose (ATD)
(*Emergency O blood, group specific blood
, XM blood depending on availability)

Give MHP 1

Reassess
Suspected continuing haemorrhage
requiring further transfusion
Take bloods and send to lab.

Order MHP 2
Red cells 4 units
FFP 4 units
Platelets 1 dose (ATD)
and subsequently
request Cryoprecipitate 2 packs
if fibrinogen <1g/l (or <2g/l in obstetric
haemorrhage)

Give MHP 2

Once MHP 2 administered, repeat bloods:
FBC, PT, APTT, fibrinogen, U+E,
NPT: ABG to inform further blood
component requesting

Aims for therapy
Aim for:
Hb 8-10g/dl
Platelets >75 x 10^9/l
PT ratio < 1.5
APTT ratio <1.5
Fibrinogen >1g/l
Adjusted Ca mmol/l
Temp > 36°C
pH > 7.35 (on ABG)
Monitor for hyperkalaemia

CELL SALVAGE
if available and
appropriate
Consider ratios of other
components:
1 unit of red cells = c.250 mls
salvaged blood

Haemorrhage Control
Direct pressure / tourniquet if
appropriate
Stabilise fractures
Surgical intervention
Interventional radiology
Endoscopic techniques
Obstetric techniques

Haemostatic Drugs
Tranexamic acid 1g bolus
followed by 1g over 8 hrs
Vit K and Prothrombin complex
concentrate for warfarinised
patients and
Other haemostatic agents:
discuss with Consultant
Haematologist

Continuous cardiac
monitoring

Prevent Hypothermia
Use fluid warming device
Used forced air warming blanket
Consider 10 mls Calcium
chloride 10% over 10 mins

STAND DOWN
Inform lab
Return unused
components
Complete traceability
tags & documentation
Including audit proforma

Thromboprophylaxis should be considered when patient stable

ABG – Arterial Blood Gas
APTT – Activated partial thromboplastin time
ATD- Adult Therapeutic Dose
FFP- Fresh Frozen plasma
MHP – Massive Haemorrhage Pack
NPT – Near Patient Testing
PT- Prothrombin Time
XM - Crossmatch

STOP THE BLEEDING

North West Regional Transfusion Committee Incorporating North Wales
Aintree University Hospitals NHS Foundation Trust
NHS
Management of Massive Transfusion
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Laboratory Management of Massive Haemorrhage

Massive Haemorrhage Pathway Activated

Transfusion receives Call

'Massive Haemorrhage, Location, Specialty'
On standby

Receive call from designated communication lead in clinical area:

'This relates to massive haemorrhage situation'
The caller will state:
- Name and contact telephone number, name of consultant responsible
- Patient’s ID (surname, forename, hospital number, DOB or minimum acceptable patient identifiers if unknown)
- Requirements:
  - Whether O Neg has been used
  - Order massive haemorrhage pack 1
  - Clarify urgency of requirements to decide on need for further emergency group O, or time to wait for group specific or crossmatched red cells (issue as part of pack 1)
  - U+E, FBC, PT, APTT, Fibrinogen, ABG*, Calcium*, lactate*
*may be near patient test

Receive samples and request forms

Haematology
Perform FBC, PT, APTT, Fibrinogen

Ring results to communication lead when available

Receive further calls from communication lead in clinical area:
Repeat investigations
Order for MHP 2
Liaise with on call haematologist (consultant / SpR)
Order for further components dependent on ongoing results
Stand down

Transfusion
Perform Group, antibody screen and crossmatch
Prepare MHP 1
Red cells* 4 units
(‘emergency group O blood, group specific blood, unused blood depending on urgency)
FFP (group specific) 4 units
Platelets 1 dose (ATD)
(from stock or order 2 ATD on blue light from blood centre)

Ring clinical area (communication lead) when blood / components ready

Prepare MHP 2
Red cells 4 units
FFP 4 units
Platelets 1 ATD

Restock Emergency Group O blood in satellite fridges
Complete traceability audit trail

v1 2011
Seven Steps for Successful Coordination in Massive Haemorrhage: Aintree

1. Recognise trigger and activate pathway for management of massive haemorrhage: assemble the emergency response team

   - Phone 2222 and request Outreach (if applicable).
   - Call consultant responsible for care of patient (if out of hours on call cons).

2. Allocate team roles
   I. Team leader
   II. Communication lead – dedicated person for communication with other teams, especially the transfusion laboratory and support services
   III. Sample taker / investigation organiser / documenter
   IV. Transporter - HCA, or other transfusion-trained member of team from clinical area

3. Complete request forms / take blood samples, label samples correctly / recheck labelling
   U+E, FBC, Crossmatch, PT, APTT, Fibrinogen, ABG, Calcium, lactate

   - Form should be an addressograph (preferable) otherwise handwritten with 4 identifiers (full name, DOB, hosp/NHS No).
   - Sample: Pink EDTA tube must be handwritten, (full name, DOB, hosp/NHS No) if emergency unknown patient then 2 identifiers are accepted (eg ‘unknown 006785’).

4. Request blood / blood components
   Team leader should decide on use of:
   I. Emergency O Neg (immediate)
      - O neg blood available from transfusion laboratory (5 mins).
      - 2 units O neg blood available in Recovery Fridge
   II. Group specific 20 mins from receipt of sample
   III. Full Crossmatch 45 mins from receipt of sample
   IV. Communication lead to contact laboratory:
      - Hotline: ☑️ 4567 or bleep 3772 out of hours if no response on hotline.

      and inform the BMS of the following:
      a. Your name, location and ext number
      b. ‘this relates to the massive haemorrhage situation’
      c. The patient’s details: ideally surname, forename, hospital number, DOB (if unknown casualty: the hospital number and the unknown person number)
      d. Whether O Neg will be required and how many units (usually 2)
      e. Order massive haemorrhage pack(s)
f. Contact lab if blood has been transferred with patient from another Trust (transferred blood must be sent in a box to the laboratory at Aintree prior to use) or patient is being transferred to another Trust

5. **The clinical / laboratory interface**
   I. Communication lead to arrange for transport of samples / request form to the laboratory
   II. BMS to ring communication lead with results of urgent investigations
   III. BMS to ring communication lead when blood / blood components are ready
   IV. Communication lead to arrange to collect blood and blood components from the laboratory

Designate HCA or other suitable staff member to transport samples to the laboratory.
The HCA must alert laboratory reception staff of the urgency of the request when delivered.

6. **Communicate stand down of pathway** and let lab know which products have been used

7. **Ensure documentation is complete**
   I. Clinical area: monitoring of vital signs, timings of blood samples and communications (lab and cons haematologist), transfusion documentation in patient casenote record, return traceability information to laboratory.
   II. Laboratory: keep record of communications / telephone requests in patient laboratory record
APPENDIX 1

Transfusion Management of massive haemorrhage in children

Ensure a consultant is aware of the massive haemorrhage and a senior member of staff is available to take charge of resuscitation if not already present.

**Ongoing severe bleeding (overt / covert) and received 20ml/kg of red cells or 40ml/kg of any fluid for resuscitation in preceding hour.**

Signs of hypovolaemic shock and / or coagulopathy

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**Activate Massive Haemorrhage Pathway**

**Call for help**

- Massive Haemorrhage, Location, Specialty
- Alert Outreach if appropriate
- A&E consultant
- Blood Transfusion Laboratory
- Consultant involvement is essential

**RESUSCITATE**

- Airway
- Breathing
- Circulation

**Continuous cardiac monitoring**

**Prevent Hypothermia**

- Use fluid warming device
- Use forced air warming blanket

Consider 0.2 ml/kg 10% calcium chloride (max 10ml) over 30 min

**STOP THE BLEEDING**

**Haemorrhage Control**

- Direct pressure / tourniquet if appropriate
- Stabilise fractures
- Surgical intervention (consider damage limitation surgery)
- Interventional radiology
- Endoscopic techniques

**Haemostatic Drugs**

- Tranexamic acid 20mg/kg bolus over 10 mins (max 1.5g)
- and 10 mg/kg/hr infusion
- Vitamin K and Prothrombin complex concentrate for unfractionated patients
- Other haemostatic agents: discuss with Consultant Haematologist

**Give MHP 1**

- Administer up to:
  - Red cells 40 ml/kg
  - FFP 20 ml/kg
  - Platelets 10 ml/kg
- Rate will depend on child's weight and rate of blood loss

**Reassess**

- Suspected continuing haemorrhage requiring further transfusion

**Give MHP 2**

- Administer up to:
  - Red cells 20 ml/kg
  - FFP 20 ml/kg
  - Platelets 10 ml/kg

Once MHP 2 administered, repeat bloods:

- FBC, PT, APTT, fibrinogen, U-E, adjusted Ca (A)BG
- NPT; (A)BG

To inform further blood component requesting

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The Walton Centre
NHS Foundation Trust

Management of Massive Transfusion
Date Ratified: February 2012
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Table 1 – Major Haemorrhage pack 1 (MHP 1) order these volumes, which are also the maximum volumes to be administered from this pack in each weight category. Calculate volumes to be administered as detailed in the flow chart, but do not exceed these maximums (see example below)

<table>
<thead>
<tr>
<th>Weight</th>
<th>Red cells * group O, group specific, crossmatched depending on availability</th>
<th>FFP</th>
<th>Platelets</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;5kg</td>
<td>2 Paediatric units (80-100ml)</td>
<td>2 'neonatal' units of Methylene Blue (MB) treated FFP (100ml)</td>
<td>1 Paediatric pack of platelets (50ml)</td>
</tr>
<tr>
<td>5-10kg</td>
<td>1 Adult unit (250ml)</td>
<td>1 Paediatric unit MB treated FFP (225ml)</td>
<td>2 Paediatric packs of platelets (100ml)</td>
</tr>
<tr>
<td>10-20kg</td>
<td>2 Adult units (500ml)</td>
<td>2 Paediatric units MB treated FFP (450ml)</td>
<td>1 Adult apheresis pack (200ml)</td>
</tr>
<tr>
<td>&gt;20kg</td>
<td>4 Adult units (1000ml)</td>
<td>4 Paediatric units MB treated FFP (900ml)</td>
<td>1 Adult apheresis pack (200ml)</td>
</tr>
</tbody>
</table>

Table 2 – Major Haemorrhage pack 2 (MHP 2) order these volumes, which are also the maximum volumes to be administered from this pack in each weight category. Calculate volumes to be administered as detailed in the flow chart, but do not exceed these maximums (see example below)

<table>
<thead>
<tr>
<th>Weight</th>
<th>Red cells</th>
<th>FFP</th>
<th>Cryoprecipitate - Request if fibrinogen &lt;1g/l or according to TEG / ROTEM</th>
<th>Platelets</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;5kg</td>
<td>2 Paediatric units (80-100ml)</td>
<td>2 'neonatal' units of Methylene Blue (MB) treated FFP (100ml)</td>
<td>1 single donor unit MB treated (40ml)</td>
<td>1 Paediatric pack of platelets (50ml)</td>
</tr>
<tr>
<td>5-10kg</td>
<td>1 Adult unit (250ml)</td>
<td>1 Paediatric unit MB treated FFP (225ml)</td>
<td>2 single donor units (60ml)</td>
<td>2 Paediatric packs of platelets (100ml)</td>
</tr>
<tr>
<td>10-20kg</td>
<td>2 Adult units (500ml)</td>
<td>2 Paediatric units MB treated FFP (450ml)</td>
<td>1 pool (5 units) (200ml)</td>
<td>1 Adult apheresis pack (200ml)</td>
</tr>
<tr>
<td>&gt;20kg</td>
<td>4 Adult units (1000ml)</td>
<td>4 Paediatric units MB treated FFP (900ml)</td>
<td>2 pools (10 units) (400ml)</td>
<td>1 Adult apheresis pack (200ml)</td>
</tr>
</tbody>
</table>

An example:

In a 5kg child, you may administer up to 200 mls RBC (40ml/kg) and 50mls platelets (10ml/kg), however, in a 30kg child do not administer more than 4 adult units of RBC (33ml/kg) or 1 ATD of platelets (6ml/kg).
This information can be translated on request or if preferred an interpreter can be arranged. For additional information regarding these services please contact The Walton centre on 0151 525 3611.

Gellir cofn am gael cyfieithiad o’r deunydd hwn neu gellir trefnu cyfieithydd ar y pryd os yw hynny’n well gennych. I wybod rhagor am y gwasanaethau hyn cysylltwch à chanolfan Walton ar 0151 525 3611.

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一經要求，可对此信息进行翻譯，或者如果愿意的话，可以安排口译员。如需这些服务的额外信息，请联络Walton中心，电话是: 0151 525 3611。