Alder Hey Children's NHS
NHS Foundation Trust

Reference Number: FOI202122526
From: Private Individual

Date: 15 March 2022

Subject: Major haemorrhaging in hospital protocols

Q1 Following the publication of the NICE Pathway 'Major haemorrhaging in hospital' in May 2021, I am writing to enquire if Alder Hey Children's NHS Foundation Trust has protocols in place for the management of major haemorrhage, the rapid identification of patients taking anticoagulants and the reversal of anticoagulation agents. If such protocols are available, please could I request a copy.

A1 Please see documents attached - *Massive Haemorrhage Protocol* and *Massive Haemorrhage Checklist*

Massive Haemorrhage Checklist

Action	Completed
Recognise massive haemorrhage. Allocate team leader and one member of staff (caller) to make the 2222 call.	
Caller to dial 2222. (Clearly state MH situation, provide details of location of MH, patient demographic if available, who you are and your job role, bleep number if you have one and extension number you are calling from).	
Caller to ring lab with same information as above. Ext 2492 or alternatively 2490	
Once the wider team arrive, following the 2222 call, allocate a communication lead, sample taker and documenter (must have training to be able to order blood products).	
Documenter to complete Meditech order for MHP 1 (Orders, New Sets, Clinician, Type "Mas", complete "Edits") ** requires only contact number and collected today and now completing **. Otherwise complete paper order form (available as part of WHO checklist in high risk cases)	
Documenter to ensure blood transfusion prescription chart is available (check availability of document as part of WHO checklist)	
Sample taker to take initial set of bloods as per protocol (Crossmatch lilac top – 4mls, FBC pink top – 0.5mls, Clotting screen green top – 1.3mls, Blood gas, Biochemistry profile – orange top – 1.3mls, Glucose – yellow top – 0.25mls. Label with stickers from Meditech MHP order or hand write full patient demographic on tubes. Blood transfusion samples will always be hand written.	
Has Theatre porter (transporter) arrived with emergency O negative blood? If not, communication lead to re-bleep transporter on 498 or allocate runner from local team to retrieve O negative unit from either lab or theatre fridge	
Emergency O negative blood forms (in bag) to be given to documenter for completion and return to the lab	
Transporter/runner to take all samples to the laboratory along with MHP order form and completed emergency O negative form and await MHP 1 pack. (4 red cells & 4 Octaplas)	
***Consider TXA, Calcium gluconate, temperature of patient, vasoconstrictors, interventional radiology, invasive monitoring, TEG, Fib C, imaging, cell salvage, fluid warmers, and Bair hugger. PCC, Vit K, Protamine to be discussed with Consultant Haematologist. See further notes on reverse of this form.**	**NA**
First unit of emergency O negative given? Has transporter/runner arrived with MHP 1 pack? No? Do you need to send second runner for a further unit of O negative blood?	
If Transporter has been taken away from other duties to attend MH situation, Transporter to contact colleagues to provide assistance with taking over their duties.	
2nd Emergency O negative blood form (in bag) to be given to documenter for completion and return to the lab	
Continue with MHP1 pack in a ratio of 1:1 red cells to Octaplas in 10mls/kg aliquots	
Ensure only product required is removed from the transport box and that it is re-closed after each product is removed to maintain temperature in the box.	
**** Consider bleeding situation. Do you need to order MHP 2? (4 red cells, 4 Octaplas, 1 adult platelet and 2 adult Cryo). MHP 2 contains a significant amount of frozen product that will deplete**	**NA**

stocks for the rest of the hospital and is expensive. Please BE SURE that this amount of product is required before ordering.	
Documenter to complete Meditech order for MHP 2 (Orders, New Sets, Clinician, Type "Mas", complete "Edits") ** requires only contact number and collected today and now completing **. Otherwise complete paper order form (available as part of WHO checklist in high risk cases)	
Sample taker to take further set of bloods as per protocol - FBC pink top – 0.5mls, Clotting screen green top – 1.3mls, Blood gas, Biochemistry profile – orange top – 1.3mls, Glucose – yellow top – 0.25mls. Label with stickers from Meditech MHP order or hand write full patient demographic on tubes. Blood transfusion samples will always be hand written.	
Transporter/runner to take all samples taken to the laboratory along with MHP order form and emergency O negative form and await MHP 2 pack.	
• **Continue with MHP2 pack in a ratio of 1:1 red cells to Octaplas in 10mls/kg aliquots** • **Platelets 20 ml/kg if < 10 kg (actual or estimated weight), 1 adult therapeutic dose if > 10 kg.** • **10ml/kg of Cryoprecipitate.**	
Return to ** for ongoing bleeding or move down when bleeding is under control	**NA**
Communication lead to stand lab down Ext 2492 or alternatively 2490	
Team Lead/documenter to make sure O negative forms are completed and are returned to laboratory, all products given are fully written up (prescribed) on blood transfusion prescription chart; details of the administration of transfused products are documented on blood transfusion prescription chart. All drugs given are documented.	
Transporter to return any unused products to the laboratory with any emergency O negative forms that have been completed	

Notes
Antifibrinolytic: Tranexamic acid 15mg/kg bolus (max. 1000mg) over 10 minutes followed by infusion 2mg/kg/hr (max. 125mg/hr) for 8 hours or until bleeding controlled. Give in trauma if within 3 hours of injury. Consider in other causes of significant bleeding.
Metabolic: Regular blood gases and electrolytes - avoid acidosis and hyper/hypo-kalaemia. Calcium gluconate 10% 0.5ml/kg (max. 10ml/dose) to maintain ionised calcium above 1mmol/l. Track lactate to help assess response.
Temperature: Avoid hypothermia - aim for core temperature above 36C.Remove wet clothes, use warm blankets, Bair Hugger, blood warmer.
Avoid vasoconstrictors: Inappropriate use of vasoconstrictors increases mortality. However, use may be required in traumatic brain or spinal cord injury.
Surgery / interventional radiology: Consider damage control surgery or interventional radiology, particularly in unstable patients or those unresponsive to resuscitative measures - patients who remain hypotensive, acidotic, coagulopathic, hypothermic or continue to bleed. Surgery should be aimed at haemorrhage control, decompression, decontamination and splintage and not definitive treatment.
Imaging: Patients meeting NICE head injury guidelines to have CT within 60 minutes. CT Angiogram may be appropriate if significant vascular injury suspected - discuss with Vascular Surgeon and Radiologist.

Alder Hey Children's
NHS Foundation Trust

Management of Massive Haemorrhage:

An Alder Hey Specific Protocol based on the Toolkit for the Management of Massive Haemorrhage developed by the North West Regional Transfusion Committee.

North West Regional Transfusion Committee
Incorporating North Wales

Alder Hey
Transfusion Management of Massive Haemorrhage

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

Protocol Activation:
Via Switchboard on 2222

- **Emergency O red cells**

2 units of O negative red cells are stored in both the laboratory issue room fridge and theatre fridge (in the theatre corridor directly opposite the end of the PICU link bridge – first door on the left)

- **MHP1**

MHP1 will be available for collection from the lab 10-15 minutes from the call

Transfusion lab:
2492 (preferred)
2490 (alternative)
Bleep 289
Theatre Porter bleep 498
Consultant Haematologist:
via switchboard (0)

STOP THE BLEEDING

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

Haemostatic Drugs

Vitamin K and Prothrombin complex concentrate for warfarinised patients

Other haemostatic agents: discuss with Consultant Haematologist

(A)BG –	(Arterial) Blood Gas
APTT –	Activated partial thromboplastin time
MHP –	Massive Haemorrhage Pack
NPT –	Near Patient Testing
PT –	Prothrombin Time
TEG -	Thromboelastography
XM –	Crossmatch
OCT-	Octaplas

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
Consider Tranexamic acid (mandatory in trauma – give within 3 hours of injury)
15mg/kg (max 1000mg) intravenously over 10 minutes, then infuse 2mg/kg/hr (max 125mg/hr) intravenously for at least 8 hours or until bleeding is controlled

Activate Massive Haemorrhage Pathway

Call for help
Call switchboard (2222) and declare:
'Massive Haemorrhage, Location, Specialty'
Assemble team and allocate roles
Consultant involvement essential

A signed, handwritten emergency blood order form will be accepted for products

RESUS
Airway
Breathing
Circulation

Take bloods and send to lab:
Select patient
Choose Orders, New sets, Choose Clinician, type "Mas"
Order MHP 1 (see table 1)
Includes XM, FBC, PT, APTT, fibrinogen, biochemistry profile, blood gas, lactate

MHP 1
Red cells and Octaplas: Give aliquots of **10ml/kg** in a 1:1 ratio. Re-asses rate of blood loss & response to treatment & repeat as necessary

When half of MHP 1 has been used consider ordering MHP 2
Re-assess
Suspected continuing haemorrhage requiring further transfusion
Take bloods and send to lab:
Select patient
Choose Orders, New sets, Choose Clinician, type "Mas"
Order MHP 2 (see table 2)
Includes XM, FBC, PT, APTT, fibrinogen, biochemistry profile, blood gas, lactate

MHP 2
Red cells and Octaplas: give aliquots of 10ml/kg in a 1:1 ratio. Reassess rate of blood loss and response to treatment & repeat as necessary.

Platelets: Give 20ml/kg if this is <200ml otherwise give 1 adult dose.

Cryoprecipitate: Give 10ml/kg

When half of MHP 2 has been used consider ordering another MHP 2
Re-assess
Take bloods and send to lab:
Order MHP 2

If blood tests only are required to re-assess patient.
Choose **'Massive Haemorrhage lab Tests'** after typing "Mas"

Continuous cardiac monitoring

Prevent Hypothermia
Use fluid warming device
Use forced air warming blanket

Consider 0.5ml/kg 10% calcium gluconate (max 10ml) over 30 min

Further cryoprecipitate (10ml/kg) if fibrinogen <1.5g/l or as guided by TEG

Aims for therapy
Aim for:

Hb	80-100g/l
Platelets	>75 x 10^9/l
PT ratio	<1.5
APTT ratio	<1.5
Fibrinogen	>1g/l
Ionised Ca^{2+}	>1.0mmol/l
Temp	>36°
pH	>7.35 (on ABG)
pH	>7.25 (cap/venous BG)

Monitor for hyperkalaemia

STAND DOWN
Inform lab
Return unused components
Complete documentation including audit

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Table 1 – Major Haemorrhage pack 1 (MHP 1)

Red cells	Octaplas
4 adult units (1000ml)	4 units (800ml)

Table 2 – Major Haemorrhage pack 2 (MHP 2)

Red cells	Octaplas	Cryoprecipitate	Platelets
4 adult units (1000ml)	4 units (800ml)	2 adult units (400ml)	1 adult pack (200ml)

These products will provided as O negative in the first instance. In the event there is extreme demand for O negative (i.e. major incident) the lab may revert to group specific products where the patient's group has been confirmed.

Red cells and Octaplas (OCT) may be given through the same cannula via a Y-connector or 3-way tap provided the connection to the cannula is a short line. Platelets are ideally infused through a separate line, or after a clear flush, but may be given infused with red cells or Octaplas at a Y-connector or 3-way tap with a short connection to the cannula, **but the mixing must only occur after the platelets have passed through the filter.**
Administer red cells and Octaplas in aliquots of 10 ml/kg and in a ratio of 1:1; constantly assessing and reassessing the extent and rate of blood loss and the response to each such aliquot.
When half of MHP1 has been administered consider ordering MHP 2, if bleeding is on-going and control of the situation remains elusive.
Continue to administer aliquots of red cells and Octaplas in 10 ml/kg boluses as dictated by the patient's response to fluids, rate of blood loss etc. (the whole clinical picture) until MHP2 is available.
With MHP2 use Red cells and Octaplas in the same fashion and administer a further dose of platelets via a separate line (if at all possible). Give 20ml / kg of platelets if this is going to work out < 200ml otherwise give 1 adult dose. In addition administer a bolus of cryoprecipitate in a dose of 10 ml/kg. NB. Cryoprecipitate is not routinely available for group AB patients. First choice will be Group A second choice will be Group B.
Stop administering Red cells and Octaplas if the patient's condition stabilises and it does not seem to be clinically indicated.
Fine tune what products to give and in what volumes based on the lab results (when these become available) and bedside evidence of coagulopathy (micro vascular bleeding).

Seven Steps for Successful Coordination in Massive Haemorrhage

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

Activate the protocol when a massive haemorrhage situation is recognised.
Massive haemorrhage may be defined as a situation where 1 to 1.5 blood volumes may need to be infused either acutely or within a 24 hour period. (Anaesthesia 2010, 65, p 1153 – 1161)
Other definitions include:

- Loss of 1 blood volume within 24 hours, or
- Loss of 50% of the blood volume within 3 hours, or
- Loss of ≥ 2-3 ml/kg/min (≥150 ml/min in adults).[2]

However, standard definitions are not particularly helpful as they are retrospective. The context may be trauma, major surgery or an underlying medical condition affecting coagulation (or obstetric haemorrhage).

Activate the protocol by contacting switchboard (dial 2222).
State the following:

We have a massive haemorrhage situation.
Activate the massive haemorrhage protocol.
The patient's location is …
The patient's details are: name, date of birth, hospital number.
My details are: name, occupation and grade, bleep number.
The telephone extension from which I am calling is…

If the patient is a cardiac surgical patient instruct switchboard to contact the cardiac surgeon on-call in addition to those listed below.

Switchboard operator: call the following via Massive Haemorrhage Alert Code:

- Theatre porter - bleep 498,
- Hospital transfusion laboratory biomedical scientist (bleep 289; ext. 2492/2490),
- Anaesthetic Specialist Registrar on-call,
- Surgical Specialist Registrar on-call,
- PICU Registrar on-call,
- ODP (bleep 329)
- Emergency Theatre Co-ordinator (bleep 353)
- Band 8 bleep holder (bleep 304)
- Clinical Nurse Specialist (bleep 317)
- Night Matron (bleep 306)

Switchboard will also inform Consultant Anaesthetist and Consultant Surgeon on call.

Switchboard operator: inform each of the following individuals

That there is a **massive haemorrhage situation**,
The patient's location is…,
The patient's name is. . .

All team members to assemble and manage the situation.

Early consultant involvement is important and the anaesthetic, surgical and PICU registrars must inform and involve their consultants in an opportune fashion. Similarly the transfusion laboratory biomedical scientist must inform the consultant haematologist as appropriate and in a timely manner.

2. Allocate team roles

I. Team leader:
In theatre this will be the consultant anaesthetist responsible for the anaesthetic care of the patient.
In AED this will be the AED consultant.
On PICU this will be the consultant intensivist responsible for the case.
On a general ward this will the most senior clinician present until the arrival of the responsible consultant.

II. Communication lead– dedicated person for communication with other teams, especially the transfusion laboratory and support services. In theatre this may be the anaesthetic registrar involved in the case. Consider contacting the perfusionist to assist with cell salvage. Consider contacting the ECG techs to assist with near patient testing such as TEG and ABGs. **Contact the radiologist on call.** The radiologist can decide if they have the skills necessary to help with the specific case. If not then there is an informal agreement that we can contact Laurence Abernethy and/or Andrew Healey for urgent vascular interventional work. If they are not available then there is an informal arrangement with some of the adult interventional radiologists from the region to come and help out.

III. Sample taker / investigation organiser / documenter. This could be an anaesthetic registrar or ODP.

IV. Transporter – this will be the theatre porter carrying the 498 bleep. When bleeped by switchboard contact switch-board by dialling 0. You will be informed that there is a massive haemorrhage situation and told the location of the patient. On removing one unit of O negative blood from theatre fridge, go directly to the scene of the massive haemorrhage situation and present yourself to the team-leader as the transporter. Your role is to transport specimens from the scene of the massive haemorrhage situation to the laboratory and to transport blood products from the laboratory to the scene of the massive haemorrhage situation. If you are not actively transporting specimens to the laboratory or blood products from the laboratory you must be present at the scene of the massive haemorrhage situation and in direct contact with the communication lead and the team leader until told to stand down.

3. Complete request forms / take blood samples, label samples correctly / recheck labelling.

This can be done through an order set on Meditech **(Select patient, choose Orders, New sets, Clinician and type "Mas").** This process can be used to request blood tests alone or blood products with blood tests included.

A signed, handwritten emergency blood order form will be accepted for products

MHP BLOOD TESTS – U&E, FBC, PT, APTT, Fib, Blood Gas, Calcium, Lactate

MHP 1 – Blood products as outlined in Table 1 + MHP BLOOD TESTS

MHP 2 - Blood products as outlined in Table 2 + MHP BLOOD TESTS

- **Blood grouping and cross-matching**:

Purple top EDTA tube
1.3 ml if < 4 months old,
4ml if > 4 months old,
hand written label,

- **Full blood count**:

Pink top EDTA tube
0.5 ml

- **Prothrombin time, activated partial thromboplastin time, Clauss fibrinogen:**

Green top citrate tube
1.3 ml

- **U&E**:

Orange top
1.3 ml

- **Blood gas**:

1 ml heparinised blood gas syringe

- **Thromboelastogram**:

1 ml blood drawn up in a plain syringe and added to the purple topped TEG-Kaolin tube as soon as possible (within 2-3 min) and then a sample from this tube must be tested immediately. The TEG – Kaolin tubes are kept in the fridge in the ECG-techs' room where the blood gas analysers are. During office hours the ECG-techs will run the test for you. Out of hours this test is not available unless you are personally trained to run the test.

4. Request blood / blood components according to the algorithm above. Team leader should decide on use of:

I. Emergency O Neg: time to availability – immediate.

2 units of O Neg red cells are stored in both the laboratory issue room fridge and the theatre fridge (in the theatre corridor directly opposite the end of the PICU link bridge – first door on the left). In the event that there is no crossmatched blood already available in the fridge for the patient (eg planned surgery), the theatre porter will bring 1 unit initially on receiving Massive Haemorrhage alert

Communication lead to contact laboratory:

2492 (preferred); 2490 (alternative)

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 (unknown casualties are registered as UNKNOWN UNKNOWN and given a specific account number)
d. Whether O Neg has been used and how many units
e. Order massive haemorrhage pack(s)
f. Contact lab if blood has been transferred in with patient from another Trust or patient is being transferred to another Trust.

5. The clinical / laboratory interface

I. Communication lead to arrange for transport of samples / request forms to the laboratory
II. BMS to ring communication lead with all results of urgent investigations until told to stand down
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
V. Any units of O emergency O negative blood that are taken from theatre fridge MUST be replaced as soon as possible by laboratory staff.

The Transporter is the theatre porter carrying the 498 bleep.

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. Transfusion documentation on blood transfusion prescription chart or through TAR, return of paperwork that comes with emergency O negative units from theatre fridge and issue fridge, completion of audit proforma.
II. Laboratory: keep record of communications / telephone requests in patient laboratory record

Additional useful information

Estimate the patient's blood volume: [1]

- Preterm neonate 100 ml/kg
- Term neonate 90 ml/kg
- Infant 85 ml/kg
- Children 80 ml/kg
- Adult 70 ml/kg.

Estimate the blood loss:

Massive haemorrhage may be defined as a situation where 1 to 1.5 blood volumes may need to be infused either acutely or within a 24 hour period. (Anaesthesia 2010, 65, p 1153 – 1161)

Other definitions include:

- Loss of 1 blood volume within 24 hours, or
- Loss of 50% of the blood volume within 3 hours, or
- Loss of ≥ 2-3 m/kg/min (≥150 ml/min in adults).[2]

However, standard definitions are not particularly helpful as they are retrospective.

Anticipate the need for blood products:

- Acute loss of 10% of the blood volume in a neonate → transfuse red cells. [3]
- Acute loss of 30 - 40% of the blood volume in any other child → red cell transfusion is likely to be required. [2]
- After replacement of 100 – 150% of the blood volume → anticipate coagulation factor deficit (25% activity after 200% blood volume replacement). [2]
- After replacement of 150% of the blood volume → fibrinogen is likely to be < 1 g/l. [2]
- After replacement of 150 – 200% of the blood volume → anticipate a platelet count of < 50 x 10^9 l^{-1}. [2]

Anticipate the time delay between requesting and receiving blood products.

- Red cells:
  Immediately available as O Rh Negative packed red cells, 2 adult units, in the theatre fridge or laboratory issue room fridge
  Unless cross matched blood has been arranged pre-op you will receive O Rh Neg red cells as part of the MHP packs in 10-15 minutes of the MH call.
- Neonatal FFP 5 minutes to thaw (per pack)
- Octaplas 15 minutes to thaw (per pack)
- Adult Cryoprecipitate 15 minutes to thaw (per pack)
- Platelets: May be stocked on site but may need to come from Liverpool NBS or Manchester NBS. Blue light from Liverpool NBS – 60 minutes. Blue light from Manchester NBS - > 60 min.

Blood products come in the following volumes:[4]

Red cells (adult unit)	250 – 300 ml
Red cells (Paediatric unit)	45 ml
Octaplas	200ml
FFP neonatal unit	40 – 60 ml
Cryoprecipitate single donor unit	20 – 50 ml
Platelets (1 Adult Therapeutic Dose)	150 – 350 ml
Platelets (single paediatric pack)	30 – 40 ml

Red Cells and Platelets are split into paediatric packs at the Liverpool NBS in Speke, not in this Hospital's Blood Bank!

Respond to laboratory test results.

Repeat laboratory blood investigations (PT, APTT, Fibrinogen, and FBC) at least **every hour if bleeding is on-going**, after replacement of 1/3 of the blood volume and after giving blood products.

- Hb < 70 g/L → transfuse red cells. Neonates with Hb < 100 g/L**.**
- Platelets < 75 x 10^9 /L and actively bleeding → transfuse platelets. 20 ml/kg if < 15 kg; 1ATD if > 15 kg. [3]
- APTT ratio > 1.5 and actively bleeding → give FFP/OCT 10 ml/kg. [3]
- INR > 1.5 and actively bleeding → give FFP/OCT 10 ml/kg. [3]
- Fibrinogen < 1 g/L after FFP/OCT → give cryoprecipitate 10 ml/kg.

Widespread micro vascular oozing is a clinical marker of haemostatic failure irrespective of blood tests and should be treated aggressively.

Tranexamic Acid.

Tranexamic acid is administered intravenously as an initial loading infusion of 15 mg/kg (up to a maximum of 1000 mg) over 10 min followed by a continuous intravenous infusion of 2 mg/kg/hr (up to a maximum of 125 mg/h.) for at least 8 hours or until bleeding controlled.

For trauma patients, commence within 3 hours of injury.
This dose regimen has been extrapolated from the CRASH-2 trial and follows the dosing recommendation of the RCPCH.

Recombinant FVIIa.

Consider use for persistent major bleeding in blunt trauma despite standard attempts to control bleeding and best practice use of blood component therapy
Preconditions: Fibrinogen ≥ 0.5 g/l, platelets > 50 x 10^9 l^{-1}, pH ≥ 7.2. Also correct hypothermia and hypocalcaemia.
Dose: 90 micrograms/kg. This should be rounded up or down to the nearest number of whole vials, except in very small babies.
The dose can be repeated after 1 hour if bleeding continues.
Expect clotting factors and platelets to be consumed rapidly after giving rFVIIa: be prepared to give more.
Likely to increase the risk of thromboembolic complications.[11]
Novoseven is available as 1mg, 2mg, 5mg and 8mg vials.

Equipment.

All components should be transfused through a dedicated blood giving set with a screen filter 170 - 200µ (micrometre) .[3] You **do not** need to use an additional micro aggregate filter.

There are two administrations sets available for the administration of blood and blood components:

- Standard Alaris blood giving set
- Alaris MFX2207E neonatal giving set

The Biotest fluid warmer is available for warming components.

Note on specific requirements: CMV and Irradiated components.

In an emergency where an MHP has been called, special requirements, i.e. CMV neg, irradiated etc will not apply.

Specific subgroups.

1. **Gastrointestinal haemorrhage.**

   Resuscitation and stabilisation is essential prior to endoscopy.
   Contact the general surgeons in the first instance. A gastroenterologist should be contacted for advice as required.
   IV PPI (omeprazole) before endoscopy.
   Emergency O Neg if not stabilised after initial resuscitation with fluids, otherwise crossmatched.

2. **Trauma**.

   Small volume resuscitation may be appropriate in blunt or penetrating trauma, but not in the head injured patient. Small volume resuscitation involves giving volume in aliquots or 10ml/kg and assessing response and need for further volume. If the patient responds, maintains an adequate heart rate, blood pressure and mental status then no more fluid is given until definitive treatment or there is a deterioration in clinical condition necessitating further fluid resuscitation.

Consent.

Consent for blood product transfusion is not required in major haemorrhage. This includes children of parents of the Jehovah's Witness faith. All patients/carers should be informed of the use of blood product transfusion subsequently.

Regarding training and competency to administer blood products, medical staff and nursing staff should have completed, and be in date with, both their E-Learning and clinical skills session. Staff prescribing, ordering, collecting and administering blood products must have the relevant training and competencies.

References:

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+ North West RTC Audit of Major Haemorrhage +

Audit code | | | | | | Major Haemorrhage Date | | | | Time | | |
DD MM YY HH MM

Patient Age (years) | | Diagnosis | |

Patient location at start: (please tick) Theatre | | Day unit | | Ward | | ICU | | A&E | | Other specify | |

Please tick speciality

General surgery	Vascular surgery	Cardiac Surgery	Ortho-paedics / trauma	A&E	ITU	Obstet rics	SCBU	Gastro-enterology	Plastics / burns	Other (specify)

Was the pathway activated? Yes | | No | | If no, what happened? | |

Who activated the pathway? Staff group? | | Grade | | Specialty | |

	BP	Pulse	Resp rate
Baseline			

Was the pathway activation appropriate? Yes | | No | | Comment | |

Was Emergency O Neg used? Yes | | No | | If yes, how many units? | |

		Date	Time	N/A
Start of Red cell transfusion	O Neg			
	Gp Specific			
	Crossmatched			
	Start of FFP/OCT transfusion			
	Start of platelet transfusion			

Was cell salvage used Yes | | No |

Start of salvaged red cell infusion | | |

Total dose of allogenic red cells transfused In first 24 h | | Units | | mls

Total dose of autologous red cells transfused In first 24 hours | | Mls

Total dose OCT/FFP transfused | | units | | mls Total dose platelets transfused | | ATD | | mls

	Date	Time	Hb	Plt	PT	APPT Fn		Yes	No
First set of results							Was TEG used?		
2nd set of results							Was TEG used?		

Was consultant haematologist / Haematology SpR consulted? Yes ☐ No ☐ If yes, what time? ☐☐ HH ☐☐ MM

What advice was given?

					Dose	Date	Time	N/A
Tranexamic acid	Yes	☐	No	☐		☐☐☐	☐☐	☐
Cryoprecipitate	Yes	☐	No	☐		☐☐☐	☐☐	☐
Fibrinogen concentrate	Yes	☐	No	☐		☐☐☐	☐☐	☐
rVIIIa	Yes	☐	No	☐		☐☐☐	☐☐	☐
Prothrombin Complex	Yes	☐	No	☐		☐☐☐	☐☐	☐

Did the patient have any other haemostatic challenge?

Warfarin?	Yes ☐	No ☐	Corrective action		
LMWH	Yes ☐	No ☐	Corrective action		
Unfractionated heparin	Yes ☐	No ☐	Corrective action		
Aspirin	Yes ☐	No ☐	Corrective action		
Clopidogrel	Yes ☐	No ☐	Corrective action		
Coagulopathy	Yes ☐	No ☐	Corrective action		

Were there any delays in treatment? Yes ☐ No ☐

If yes, please describe

Patient Outcome

	Alive	Deceased	Morbidity	N/A
24 hours	☐	☐	☐	☐

	Alive	Deceased	Morbidity	N/A
4 weeks	☐	☐	☐	☐

Please state morbidity:

Please state morbidity:

Blood product wastage? (please write amount units or mls)

Red cells ☐ FFP/ OCT ☐ Plts ☐ Cryo ☐

Any other comments?

Please return completed form to: Jane Murphy – RTC Administrator NWRTC

Massive Haemorrhage Protocol - Version: 1.12. Index: IBT-013. Printed: 08-Feb-2022 11:51

Management of Massive Haemorrhage Protocol	
Version:	8.1
Ratified by:	Transfusion Specialist / ED / Anaesthetics
Date ratified:	July 2021
Name of originator/author:	Bimal Mehta, Consultant in Paediatric Emergency Medicine
Name of responsible committee:	Massive Haemorrhage Leads
Key search words:	Massive, haemorrhage, protocol, blood, trauma, transfusion, bloods
Date issued:	October 2021 (minor update)
Review date:	July 2024

Version Control Table

Version	Date	Author	Status	Comment
8.1	October 2021	Bimal Mehta, Consultant in Paediatric Emergency Medicine	Current	Vial sizes of Novoseven updated
8	July 2021	Bimal Mehta, Consultant in Paediatric Emergency Medicine	Archived	Minor change to product description
7.1	August 2020	Bimal Mehta, Consultant in Paediatric Emergency Medicine	Archived	Correction of maximum dose of Tranexamic acid in flowchart. Updated to 2 adult doses of cryoprecipitate
7	May 2018	Bimal Mehta, Consultant in Paediatric Emergency Medicine	Archived	
6	April 2014	Bimal Mehta, Consultant in Paediatric Emergency Medicine	Archived	Refined order sets for products added
5	June 2013	Bimal Mehta, Consultant in Paediatric Emergency Medicine	Archived	Hb g/dl changed to g/L in line with Trust laboratory changes. Calculations updated
4	December 2012	Bimal Mehta, Consultant in Paediatric Emergency Medicine	Archived	Minor edits. MMC Chair's action December 2012
3	October 2012	Bimal Mehta, Consultant in Paediatric Emergency Medicine	Archived	No content changes. Image quality improved
2	October 2012	Bimal Mehta, Consultant in Paediatric Emergency Medicine	Archived	Minor edits
1	September 2011	Bimal Mehta, Consultant in Paediatric Emergency Medicine	Archived	

Review & Amendment Log
Record of changes made to guideline version 8.1

Section Number	Page Number	Change/s made	Reason for change
N/A	9	Updated vial sizes of Novoseven	Change to product

Review & Amendment Log Record of changes made to guideline version 8			
Section Number	**Page Number**	**Change/s made**	**Reason for change**
Table 2	3	Amendment to product description	No longer using MB treated products
N/A	3	Amendment to product description	No longer using MB treated products
Additional Useful Information	8	Changed to adult doses	This is what would be provided