


CLINICAL PROCEDURAL DOCUMENTS				
Major Haemorrhage Protocol in Adults, Children and Neonates and Procedure for Obtaining Blood and Blood Components in an Emergency				
This document is relevant for staff at:	Luton Hospital site ✓	Bedford Hospital site	Both Hospital sites	
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Associated Trust Documents: CG 014 Guidance Document for the Safe Administration of Blood and Blood Components The management of Ante- or Post-partum Haemorrhage (see CG 119 and CG 209) The refusal of blood during childbirth (see CG 120) Transfusion of blood components for Neonates (See CG 288 and CG 427) Reversal of anticoagulation and management of bleeding in adult patients on warfarin, non-vitamin K oral anticoagulants (DOACs) or heparin (see CG 436)				
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MAJOR HAEMORRHAGE PATHWAY

1. Major Haemorrhage (MH) alert activated by clinical area on request from Dr via 2222
2. Baseline group samples should be taken where possible before transfusion of emergency blood components
3. Voice over alert goes to MH bleep holders via switchboard
4. Blood transfusion laboratory contacts clinical area for patient ID and information
5. Clinical area requests blood components
6. BMS prepares/issues requested blood components
7. Clinical area arranges collection of blood (porter or local collector from departmental satellite fridges)
8. Blood is collected and transported from Blood Transfusion Laboratory to clinical area via a blood trained porter only
9. Qualified staff member receives blood from porter
10. Qualified staff member performs ward receipt checks of blood component bags to confirm correct patient identifiers
11. Qualified staff member performs final bedside check using Blood 360 (2 person independent check if Blood360 unavailable or administering flying squad)
12. IV prescription sheet is completed, pink sticker attached with time started and chronological order of units e.g. 10.50am and units retrospectively prescribed by Dr against pink sticker evidence on prescription sheet
13. Blue section of trace safe label is completed to include patients first name, surname and hospital number ,signed and dated by staff administering the units , removed, and returned to Blood Transfusion Laboratory to confirm final fate of transfused unit
14. Further blood components are requested by calling Blood Transfusion Laboratory MH mobile number (07580 971564)
15. Repeat steps 4 – 13 until no further blood transfusion is anticipated.
16. Stand down porters and blood transfusion laboratory

EDUCATION AND TRAINING

Staffing Group	Training Offered	Frequency	Method	
Nurses Midwives ODPs	Blood Transfusion at Trust Induction	One off	Power point presentation New Starters Pack	TP Self-Directed
	Update "Blood Transfusion Stat Training"	Yearly	Power point presentation	TP
	NPSA face to face competency for Administration of Blood Components	Revalidated every 3 years	Pre-seen written questions and scenario assessment	Local transfusion trainer/ TP
	NPSA face to face competency for Pre Transfusion Sampling	Revalidated every 3 years	Pre-seen written questions and scenario assessment	Local transfusion trainer/ TP
	NPSA Revalidation for Pre-transfusion Sampling (if completed NPSA face to face competency previously)	Revalidated every 3 years	ELearning – Learn Blood Transfusion Modules	Self-Directed
	NPSA Revalidation for Administration of Blood Components (if completed NPSA face to face competency previously)	Revalidated every 3 years	ELearning – Learn Blood Transfusion Modules	Self-Directed
	Blood360 - Bedside Request, Receipt and Administration	One off	Scenario discussion	TP
Porters	Local Transfusion induction	One off	Practical demonstration	TP
	NPSA face to face competency for Collection and Transportation of Blood Components	Revalidated every 2 years	Scenario assessment	TP
	Blood360 - Collection and Delivery	One off	Scenario discussion	TP
Phlebotomists	Blood Transfusion at Trust Induction	One off	Power point presentation	TP
	NPSA face to face competency for Pre Transfusion Sampling	Revalidated every 3 years	Pre-seen written questions and scenario assessment	Local transfusion trainer/ TP
	NPSA Revalidation for Pre Transfusion Sampling (if completed NPSA face to face competency previously)	Revalidated every 3 years	ELearning – Learn Blood Transfusion Module	Self-Directed
FY1, FY2, ST1 – 3, ST4-6 + Senior Medical Staff	Blood Transfusion at Induction / Departmental Updates	One off	Power point presentation New Starters Packs	TP Self-Directed
	NPSA face to face competency for pre transfusion sampling, decision to transfuse, consent, prescription, transfusion reaction	Revalidated every 3 years	OSCE - pre-seen written questions and scenario assessment	TP (NICU local trainers)

	NPSA face to face competency for administration of blood components and pre transfusion sampling(anaesthetics only)	Revalidated every 3 years	Pre-seen written questions and scenario assessment	TP
	Blood360 – Bedside Request, Receipt and Administration (anaesthetists only)	One off	Scenario discussion	TP
	NPSA Revalidation for Pre transfusion Sampling, Safe Transfusion Practice, Transfusion Reaction (if completed NPSA face to face competency previously)	Revalidated every 3 years	ELearning – Learn Blood Transfusion Modules	Self-Directed
Student / Other	Upon Request	One off	Power point presentation	TP
Drivers for Keech Hospice Care and SPIRE Hospital Harpenden	NPSA face to face competency for collection and transportation of blood components	Revalidated every 2 years	Practical demonstration + competency assessment	Local trainer / Blood Transfusion Laboratory Staff

1. Introduction

The early recognition and effective management of major haemorrhage is vital if hypovolemic shock and its consequences are to be avoided. Successful treatment depends on:

- ✓ Prompt action and early involvement from senior clinicians with the necessary expertise
 - Early recognition of major haemorrhage
 - Seeking URGENT intervention - blood loss is usually underestimated and haemoglobin and haematocrit levels may not fall for several hours after acute haemorrhage
 - Restoration of blood volume to maintain tissue perfusion and oxygenation
 - Achieving haemostasis - treating surgical cause - correcting coagulopathy
 - Early use of tranexamic acid
- ✓ Good communication between clinicians, diagnostic labs, transfusion labs (and the blood service centre)
 - Team leader should appoint an experienced member of the clinical team as communications lead (communicates with the blood transfusion laboratory/other departments and activates the 'Major Haemorrhage protocol')
 - Pre-empting need for FFP (30 minute defrosting time) and platelets (may take 2 hours from regional blood centre in "blue light" situations)

2. Purpose and Scope

The Major Haemorrhage Protocols aim to facilitate the rapid provision of blood components for transfusion to patients with major or life-threatening haemorrhage.

MH decision making is supported by area specific MH pathways (See Intranet: Major Haemorrhage in Adults, Major Obstetric Haemorrhage, Major Haemorrhage in Children, Major Haemorrhage in Neonates)

MH flowcharts displayed in the clinical area are appropriate to the area it is displayed e.g. NICU – neonatal pathway, and all MH flowcharts are displayed on the intranet.

Any trained and competent staff involved in the transfusion pathway in all areas across the trust for Adults, Children and Neonates may be part of a major haemorrhage team, and assist in the management of major haemorrhage depending on their role.

3. Recognition of Major Haemorrhage

Definition of Major Haemorrhage (MH) in Adults including Obstetrics

- Loss of $\geq 40\%$ of total blood volume – 1500- 2000mls blood loss
- Loss of 4 litres in 24 hours or
- Loss of 2 litres in 3 hours or
- Rate of blood loss $> 150\text{ml}/\text{min}$

Definition of MH in Children and Neonates

- $>80\text{ ml}/\text{kg}$ loss in 24 hours
- $40\text{ml}/\text{kg}$ loss in 3 hours
- $3\text{ml}/\text{kg}$ loss/minute

Major haemorrhage may manifest as: pulse >110 , RR >30 , hypotensive BP <90 mmHg, urine $<20\text{ ml}/\text{h}$
Urgent clinical review should be sought without delay and escalated as appropriate (MET/Cardiac Arrest call)

Haemodynamic status and response to immediate volume resuscitation should be used in order to assess whether MH protocol activation is required.

4. Triggering Major Haemorrhage Protocol

Appointed staff member activates MH via 2222 and ask switchboard to activate the Major Haemorrhage protocol and provide location, then clearly state type of MH, and the location e.g.

- Obstetric Major Haemorrhage, Delivery Suite room 6 / maternity theatre B
- Adult Major Haemorrhage EAU
- Paediatric Major Haemorrhage Ward 25
- Neonatal Major Haemorrhage NICU
- Trauma Major Haemorrhage A&E Resus

5. Mechanism for Contacting Team

Switchboard put out a group bleep with voiceover stating ‘Major Haemorrhage’ to identified response teams for the clinical areas activating the alert.

6. Response

PORTER RESPONSE

Upon receipt of voice over bleep a porter trained in the collection of blood components will be mobilised under direction of the Portering shift manager in 1 of 2 ways - based on location of MH.

MH Location	Porter Actions
All Theatres / Delivery Suite / NICU / ED	Attend clinical area originating MH alert
Wards / other areas	Attend Blood Transfusion Laboratory

Only blood trained porters may collect blood from the blood transfusion laboratory issue annexe (upon instruction from clinical team).

Porters may collect blood from satellite fridges under the instruction of ED or Maternity recovery /theatre staff.

CLINICAL TEAM RESPONSE

- Allocate the Team Leader (usually most senior clinician) (p15): Team Leader Action Card
- Allocate Blood Coordinator (p16): Blood Coordinator Action Card

The MH mobile number used for communication with the Blood Transfusion Laboratory (BTL) is only answered when there is an active MH in progress. Frequent unnecessary calls causes delay in the provision of compatible blood components.

The clinical area will receive a call from the Blood Transfusion Laboratory (on the specified contact number) as soon as the blood components are available

The BTL have a zero tolerance policy for incorrectly labelled samples / request forms. This includes emergency requests. Errors can delay provision of blood components.

Imaging for haemorrhage should be performed as required.

Surgery and interventional radiology should be performed as required.

Simple dressings with direct pressure should be used to control external haemorrhage, and tourniquets may be used in major limb trauma where direct pressure has failed to control a life threatening bleed.

BLOOD TRANSFUSION LABORATORY (BTL) RESPONSE

Upon receipt of voice over bleep alert the BTL will contact the clinical area by phone and will request

- Patient first name, surname, DOB and hospital number / unique identifier
- Blood components required
- Degree of urgency

Where patients name unknown BTL require:

- phonetic alphabet name
- hospital number
- approximate age
- gender

BTL identify if they hold record of a historical ABO group result, have a current group sample, and advise if further sample(s) are required.

BTL may be able to advise time frames for blood component provision on receipt of a valid group and save sample (see Table 1).

BTL prepare the components requested verbally. Name and contact details of the requestor and consultant in charge of patient are documented.

Response to activation of Major Haemorrhage Protocol takes priority over routine work to enable the provision of suitable blood components in a timely manner.

Table1. Availability of blood components according to samples held by the BTL

Samples Held By Laboratory	Response	Action Required by Clinical Team (Collection Request for Porters / Samples to be taken for crossmatch)	Time to Issue
Current and historical group held by laboratory already AND crossmatched blood is already prepared	Emergency uncrossmatched group O RBC collected immediately by porter/satellite fridge users	Verbally inform BTL of intention to use	None
	Pre-requested crossmatched blood in issue fridge ready for collection	Send collection request to porter	None
Current and historical group held by laboratory already	Emergency uncrossmatched group O RBC collected immediately by porter/satellite fridge users	Verbally inform BTL of intention to use	None
	Pre-requested crossmatched blood in issue fridge ready for collection	Send collection request to porter	None
	Electronic Issue of fully crossmatched RBC (where patient history allows)	Send collection request to porter either via blood 360 / ICE collection form or blood request book upon receipt of phone call from BTL when units issued	10 minutes
	Full serological crossmatch of RBC (when Electronic Issue is not possible)	Send collection request to porter either via Blood 360 / ICE collection form or blood request book upon receipt of phone call from BTL when units issued	45 minutes (may be more - depending on antibodies)
Single or historical group held by laboratory only	Emergency uncrossmatched group O RBC collected immediately by porter/satellite fridge users	Verbally inform BTL of intention to use	None
	ABO group specific RBC issue of fully crossmatched RBC (where patient history allows) UPON RECEIPT OF GROUP AND SAVE SAMPLE ONLY	<ul style="list-style-type: none"> ➤ Take Group and Save Sample ➤ Send collection request to porter either via Blood 360 / ICE collection form or blood request book upon receipt of phone call from BTL when units issued 	10 minutes
	Fully crossmatched RBC UPON RECEIPT OF GROUP AND SAVE SAMPLE ONLY		45 minutes (may be more - depending on antibodies)
No current or historical blood group held by laboratory	Emergency uncrossmatched group O RBC collected immediately by porter/satellite fridge users	Verbally inform BTL of intention to use	None
	ABO group specific RBC issue of fully crossmatched RBC (where patient history allows) UPON RECEIPT OF 2 x GROUP AND SAVE SAMPLES ONLY - TAKEN AT DIFFERENT TIMES, BY DIFFERENT PEOPLE IF POSSIBLE	<ul style="list-style-type: none"> ➤ Take Group and Save Samples – 2 different times, by 2 different people if possible ➤ Send collection request to porter either via Blood 360 / ICE collection form or blood request book upon receipt of phone call from BTL when units issued 	10 minutes
	Fully crossmatched RBC UPON RECEIPT OF 2 x GROUP AND SAVE SAMPLES ONLY - TAKEN AT DIFFERENT TIMES, BY DIFFERENT PEOPLE IF POSSIBLE		45 minutes (may be more - depending on antibodies)

Requesting Collection of Emergency Blood Components via the porter/locally trained collector

- A collection request is required to collect named units (group specific / cross matched)
- Collection request should be generated on Blood360 (this can only be done once blood is issued)
- In the absence of Blood360 collection request should be made via contingency (ICE collection form or blood request book).
- Porter should be notified of the collection request, and clear verbal instruction of what to collect should be given (face to face or via bleep 552).
- Multiple units may be collected from one collection request if verbal instruction has been given to do so.
- Requested units should be available to request collection Blood 360 within 5-10 minutes of discussion with the Blood Transfusion Laboratory
- Porter must give units to a qualified staff member on arrival to clinical area to perform ward receipt checks
- Blood received in a cool box should **only be ward receipted on Blood360** when unit is removed from cool box to be transfused
- The red blood transport cool box must contain RBC or FFP and cool packs only.
- The box lid must remain firmly closed whilst units are kept in the clinical area to maintain optimum storage temperature of blood components.
- Units returned after 60 minutes of removal from blood fridge are disposed of by the blood transfusion laboratory staff.
- Units returned within 60 minutes of removal from blood fridge will be returned to the blood fridge by staff trained in blood collection and units are then available for re issue at a later date.
- Platelets and cryoprecipitate are maintained at room temperature and should not be stored in the red blood transport cool box.
- If patient blood group is not known uncrossmatched group O RBC may be collected.
- Porter should be verbally instructed to collect the emergency blood.
- No collection request is required to collect emergency uncrossmatched group O RBC.
- Where patient blood group remains unknown and the primary pack / secondary pack is required, the BMS will continue to issue emergency O blood and the porter can be sent directly to blood bank to collect the unnamed units and access the fridge via the emergency module.
- In the absence of Bloodhound revert to paper contingency of ICE collection request form and blood request book

Blood Product Provision – Type and Available Locations

Readily available RBCs for life threatening bleeds include emergency group O RBC, group specific RBC and electronically issued RBC depending on the number of group and save samples held by the BTL, and the times they were taken.

National stocks of Group O RhD negative RBC are preserved by allocating RhD positive RBC to suitable recipients; please limit the use of O RhD negative bloods to:

All patients under 16

Women aged 50 or younger

O RhD Negative – All under 16. Women aged 50 and younger

O RhD Positive RBC. Men aged 16 and older, and Women 51 and older

Porter MUST inform BMS when removing the Flying Squad units from the issue fridge so that it can be replaced

The following blood types are available for immediate collection request in the following locations:

Blood Transfusion Laboratory (Issue Fridge)

2 O Rh D Negative (Flying Squad units)

2 O Rh D Positive (Flying Squad units)

Units of pre-ordered crossmatched blood (patient specific)

Emergency Department (Satellite Fridge)

2 O Rh D Negative (Flying Squad units)

2 O Rh D Positive (Flying Squad units)

Maternity Theatres (Satellite Fridge)

2 O Rh D Negative (Flying Squad units)

1 O Rh D Negative Paedipack (Neonatal Flying Squad unit)

Units of pre-ordered crossmatched blood (patient specific)

Blood Product Provision – MH Pack Contents and Guidance

Request Options:

- Adult MH / Adult Trauma
- Paediatric MH/Paediatric Trauma
- Neonatal MH

Adult MH Packs Contents:

Adult MH Primary Pack (Aim for RBC: FFP ratio 2:1)

1 box: 5 units of Red cells

1 box: 4 units of Fresh Frozen Plasma (FFP) - allow 20 minutes thawing time for FFP.

Adult MH Secondary Pack contains:

1 box: 5 units of Red cells
1 box: 4 units of FFP
1 bag: 1 unit of Platelets
1 bag: 2 units of cryoprecipitate

Adult MH for Trauma Pack Contents:**Adult MH Primary Pack for TRAUMA only (Aim for RBC: FFP ratio1:1)**

1 box: 5 units of Red cells
1 box: 4 units of Fresh Frozen Plasma (FFP) -allow 20 minutes thawing time for FFP.
1 bag: 1 pool platelets - If stock platelets are not available, allow for delivery time from NHSBT blood centre (at least 90 minutes delivery time).

Adult MH Secondary Trauma Pack contains:

5 units of Red cells
4 units of FFP - allow 20 minutes thawing time
2 units of cryoprecipitate - allow 20 minutes thawing time

Red Cell Use:

- Emergency Group O blood (Flying Squad) should be used if immediate need or life threatening emergency until ABO and RhD groups known.
- During major haemorrhage due to trauma and obstetrics, consideration should be given to transfusing red cells and FFP in preference to other intravenous fluid.
- If Flying Squad units are transfused ensure that the Trace Safe labels are completed with patient details and returned to blood bank to maintain vein to vein traceability.
- Obtain a suitable sample from the patient for cross-match as soon as possible
- Uncross-matched ABO Group-specific blood available for issue within 10 -15 minutes of receipt of a correctly labelled sample in blood bank
- Use group specific blood as soon as available
- Fully compatible cross-matched blood can be available for use within 45 minutes of receipt of a correctly labelled blood sample in blood bank
- Consider using a blood warmer

Replacement of Coagulation Factors and Platelets

- Transfusion of large volumes of red cells and other intravenous fluids that contain no coagulation factors or platelets causes Dilutional Coagulopathy
- Major traumatic haemorrhage is often associated with activation of the coagulation and fibrinolytic systems ('acute traumatic coagulopathy')
- Coagulation is also impaired by hypothermia, acidosis and reduced ionised calcium (Ca²⁺) concentration. Ionised hypocalcaemia may be caused by rapid transfusion of blood components containing citrate anticoagulant.

- Blood components should be given according to clinical status and in major haemorrhage it may be necessary to request components before laboratory results are available
- It is essential that the efficacy of replacement therapy is regularly assessed by clinical and laboratory monitoring to guide the need for further replacement therapy

Fresh Frozen Plasma (FFP)

- The recommended adult therapeutic dose of FFP is 15ml/kg (1 litre or 4 units for adult patient)
- Paediatric dose = 20mls /kg up to 4 units
- Aim to maintain PT and APTT <1.5 x control
- Allow 15 minutes thawing time and anticipate the need for FFP after 4 units' blood replacement and continuing bleeding.
- FFP will be issued empirically with the Primary MH pack which contains 5 units Red cells, 4 units FFP.
- In trauma, aim for RBC:FFP ratio 1:1
- If patient continues to bleed, order Secondary MH pack, which contains 5 units Red cells, 4 units FFP, 1 unit platelets, 2 packs cryoprecipitate
- Frequent monitoring of coagulation tests will be required to assess efficacy following infusion

Platelets

- Standard adult therapeutic dose (ATD) = 1 unit
- Paediatric dose = 15mls/kg up to one unit
- Aim to maintain platelet count >50 x 10⁹/l (but > 100x10⁹/l if multiple or CNS trauma)
- Anticipate platelet count <50 x 10⁹/l after 2 x blood volume replacement.
- 1 ATD platelets will be issued as part of the Primary MH pack in identified Trauma cases only and the Secondary MH pack
- Allow for delivery time as this may need to be ordered from Colindale NHSBT (at least 90 minutes delivery time)
- Early use should be considered in trauma patients

Cryoprecipitate

Fibrinogen predictably falls to <1.5 g/L after 1 to 1.5 litre blood volume replacement (earlier in the presence of coagulopathy, hyper fibrinolysis, or pregnancy (<2.0g/L) with ongoing bleeding)

- Allow 15 - 20 minutes thawing time
- Standard dose is 2 pooled packs (= 10 units) for an adult
- Paediatric dose = 5-10ml/kg (up to 300mls)
- Cryoprecipitate is included in the Secondary Major Haemorrhage pack

Paediatric MH Packs Contents (dependent on weight range of the child) Contents:

Aim RBC: FFP = 2:1

	Weight of Child		
	<10kg	10-40kg	>40kg
Paediatric MH Primary Pack	2 units red cells 400ml FFP	4 units red cells 800ml FFP (4 units)	5 units red cells 4 units FFP 1 pool platelets – give if over 40ml/kg of red cells transfused
Paediatric MH Secondary Pack	2 red cells 400mls FFP (2 units) 1 adult platelet dose 50ml or 1 adult pool Cryoprecipitate	4 units red cells 800mls FFP (4 units) 1 adult platelet dose 160ml or 2 adult pools Cryoprecipitate	5 units red cells 4 x FFP 1 adult platelet dose 160ml or 2 adult pools Cryoprecipitate

Paediatric MH for Trauma Contents (specific requests dependent on weight of the child):

Paediatric MH Primary Pack for TRAUMA only (Aim: RBC: FFP ratio 1:1)

- Blood 30ml/kg up to 5 units
- FFP 15-30ml/kg up to 4 units and 1 pool platelets – give if over 40ml/kg of red cells transfused

Although similar to adults, advice for the treatment of major haemorrhage in children is based on the child's weight and blood loss. Therapeutic aims in children during an active MH:

- Hb >80g/L
- Platelets >75 x 10⁹/l
- Fibrinogen >1.5g/L
- APTT/PT <1.5x midpoint of normal range
- Ionised calcium (on ABG) >1mmol/L
- pH >7.2
- Lactate <1mmol/L
- Core temperature >35°C

Neonatal MH Pack Contents:

1 x Neonatal emergency O Rh Negative red cell unit – collected from the maternity satellite fridge

Dose: 10ml/kg red cells IV bolus and re assess

After 30ml/kg of red cells replacement or continued bleeding anticipate need for platelets and FFP at 10-30ml/kg

Neonatal MH - Points to consider:

Suitable RBC should routinely be available to cover most neonatal major haemorrhage requests.

RBC for Neonates of mothers with RH group anti-c or anti-e, or other clinically significant blood group antibodies are not stored routinely on site. If blood is required in a life threatening haemorrhage, concessionary release of incompatible RBC must occur under the instruction of a neonatal consultant. Neonatal split packs compatible with mother's antibodies should be requested specifically from the laboratory when transfusion is required.

Platelets for neonates are not routinely stored on site. In the event of life threatening haemorrhage the emergency pool of platelets suitable for adult use may be used. Emergency adult platelets do not meet the requirements for a neonate (not CMV screened + non apheresis), but can be used under concessionary release from the laboratory under the instruction of a neonatal consultant.

Blood Component Use in Trauma Major Haemorrhage – General Advice

- Use peripheral intravenous access, if this fails - consider intra-osseous access while central access is being achieved.
- Use a restrictive approach for patients with active bleeding to volume resuscitation until definitive early control of bleeding has been achieved. Move rapidly to haemorrhage control, titrating volume resuscitation to maintain central circulation until control is achieved.
- For patients who have haemorrhagic shock and a traumatic brain injury:
If haemorrhagic shock is the dominant condition, continue restrictive volume resuscitation
Or
If traumatic brain injury is the dominant condition, use a less restrictive volume resuscitation approach to maintain cerebral perfusion.
- Do not use crystalloids for patients with active bleeding. For patients who do not have active bleeding, see the NICE Pathway on intravenous fluid therapy in hospital for advice on tetrastarch).

Team leader Major Haemorrhage Action Card

(Usually most senior Dr in Attendance)

Responsibilities:

- Coordinating further management of patient
- Nominating team member to co-ordinate communication with Blood Transfusion Laboratory (BTL) and porters Ensuring IV access – 2 cannula (largest possible)
- Ensuring baseline samples are taken prior to administration of blood – Group and Save/Crossmatch, FBC, PT, APTT, Fibrinogen, U+E, LFT, Bone Profile, Arterial / venous blood gas.
- Where appropriate, ensuring second group and save sample is taken prior to administration blood
- Ensuring fresh samples are taken for PT, APTT, Fibrinogen, FBC (for platelets) to monitor haemostasis (30 - 60 minute intervals depending on the severity of the haemorrhage) and results are reviewed
- Ensuring the initial blood product provision matches the urgency of blood required
- Anticipating the need for further blood products, and ensuring the “Primary Pack” (and if relevant “Secondary Pack”) is requested on the initial telephone response from the BTL as appropriate
- Ensuring samples are sent immediately to the BTL by hand
- Ensuring further ordering of blood components is guided by haemostasis results
- Ensuring a plan has been made for thromboprophylaxis to be started as soon as possible after bleeding ceases

Porters phone / bleep: 552 + 07970 639663

Blood Transfusion Lab: 07580 971564

Consultant Haematologist: 0 (switchboard) ask for consultant haematologist on call

Transfusion Coordinator Action Card- refer to local Major Haemorrhage scripts

Team member coordinating communication with BTL and porters is responsible for:

Coordination

- Ensuring further MH packs are ordered using the BTL major haemorrhage mobile number (07580 971564) if bleeding persists, or where further blood loss is anticipated
- Ensuring BTL is kept informed of the patient's progress so that they can anticipate any further requirements
- Ensuring porter is aware of what needs to be collected. Porter shift manager may be contacted on the mobile number if porter is not in the clinical area at time of request (07970 639663)
- Communicate "stand down" to lab and porters when no further blood or blood components are required

Documentation

- Ensuring blood transfused is prescribed to meet trust guidance
- Ensure transfusion administration is documented on the prescription form
- Ensure all trace safe labels are fully completed
- Ensuring pink sticker is added to prescription to confirm final fate

Suggested method during active MH:

- Remove pink sticker from trace safe label and stick on blank prescription sheet and add time of administration and chronological order of unit.
- IV prescription sheet can be completed retrospectively to provide evidence of transfusion for the blood or blood component donation number

Porters phone / bleep: 552 + 07970 639663

Blood Transfusion Lab: 07580 971564

Consultant Haematologist: 0 (switchboard) ask for consultant haematologist on call

Cell Salvage

The use of intra-operative cell salvage is recommended in all non-obstetric patients with blood loss >500 ml. See local theatres guidance.

Patients on Anticoagulants

Rapid reversal of anticoagulation is required for all patients who have major trauma with haemorrhage, or active or suspected bleeding. Refer to CG436: Reversal of Anticoagulation and Management of Bleeding of Patients on Warfarin, Non-Vitamin K Oral Anticoagulants (DOACs) or Heparin. Seek advice from a consultant haematologist for patients aged fewer than 16.

Andexant Alfa available from pharmacy in order to reverse Apixaban or Rivaroxaban in adults with life threatening or uncontrolled bleeding of the gastrointestinal tract.

Patients on Antiplatelet drugs (Aspirin, Clopidogrel etc.)

Platelet transfusion should be given as soon as possible during active bleeding.

Pharmacological Agents

Tranexamic Acid (TxA)

- Inhibits plasmin and hence reduces fibrinolysis.
- Intra venous (IV) TxA should be used as soon as possible with major trauma and active or suspected active bleeding . A large Clinical research Trial showed that Tranexamic acid provided no mortality benefit in GI haemorrhage and was associated with increased risk of venous thromboembolic events: Reference
[https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(20\)30848-5/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(20)30848-5/fulltext)
- Trauma patients with or at risk of major haemorrhage should be given tranexamic acid as soon as possible after injury.
- IV TxA should not be used more than 3 hours after injury unless there is evidence of hyper fibrinolysis.
- Tranexamic acid is recommended in high risk surgery to prevent bleeding where blood loss > 500 ml is possible 10mg/kg followed by 1mg/kg/h.
- Maximum dose = 1g

Adult dose

Adult dose for trauma / bleeding	Loading dose	1g in at least 100ml Sodium Chloride 0.9% or glucose 5% over 10 minutes
	Followed by maintenance infusion	IV infusion of 1g over 8 hours

Paediatric

Dose for trauma or surgical bleeding*	Loading dose	15mg/kg (max 1g) diluted in a convenient volume of Sodium Chloride 0.9% or Glucose 5% and given over 10 minutes
	Followed by maintenance infusion	2mg/kg/hour (maximum 125 mg/hour). Suggested dilution 500mg in 500ml of sodium chloride 0.9% or glucose 5% given at a rate of 2mls/kg/hour for at least 8 hours or until bleeding stops

*The treatment regimen for this indication is unlicensed. It is the regimen from the referenced CRASH-2 trial and the RCPCH/NPPG Medicines Committee and Clinical Standards Committee Evidence Statement on Major trauma and the use of tranexamic acid in children, November 2012.

Recombinant Activated Factor VII (rFVIIa) (Novo Seven):

No longer recommended in the management of major haemorrhage unless as part of a clinical trial.

Audit and Review

In order to ensure effective systems are in place for the management of MHs:

- Use of emergency O “flying squad” blood is reviewed:
 - on the next working day by transfusion practitioners
 - monthly by the Hospital Transfusion Team

- three monthly by the Hospital Transfusion Committee Chair for
- Appropriate clinical use of emergency O “flying squad” blood is reviewed by Emergency Department Consultant monthly
- Transfusion practitioners attend Major Haemorrhage Alerts Monday to Friday 0700-1600 in order to promote best practice
- Incidents are raised via Datix
 - Remedied locally between transfusion practitioners and team members/area involved. Broader cross-team issues are discussed within the HTT and escalated to HTC where further actions are required

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