

Major Haemorrhage Protocol

Lead Clinician(s)	
Dr.T. Skibbe (<i>Chair of Blood Transfusion Committee</i>)	Consultant Haematologist
Gillian Godding	Lead Transfusion Practitioner
This is the most upto date document and should be used until a revised version is in place :	4 th March 2021

Key amendments to this protocol

Date	Amendment	Approved by:
June 2018	New guidance for the management of major haemorrhage at KTC and ECH New guidance on the aims for therapy in major trauma included	Gill Godding
November 2019	Inclusion of paragraph in Activation of Protocol	Gill Godding
July 2020	Document extended for 6 months whilst review and approval process takes place	Gill Godding

This protocol outlines the steps to follow during **massive blood loss defined as:**

- 50% blood volume loss within three hours
- or 100% within 24hrs (70 ml/kg, >5 litres in a 70kg adult)
- or a rate of blood loss in excess of 150 ml/min

Successful treatment depends on

- prompt action
- good communication
- involvement from senior clinicians with the necessary expertise

THERE IS A SEPARATE POLICY FOR HAEMORRHAGE RELATING TO OBSTETRICS

Antepartum Haemorrhage Including Massive Obstetric Haemorrhage

This protocol is for use by the following staff groups:

All medical and nursing staff
 Blood Transfusion Staff

Please note that the key documents are not designed to be printed, but to be used on-line. This is to ensure that the correct and most up-to-date version is being used. If, in exceptional circumstances, you need to print a copy, please note that the information will only be valid for 24 hours and should be read in conjunction with the key document supporting information page/and or Key Documents intranet page, which will provide approval and review information

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Introduction

The aim of this protocol is to provide a clear management structure for massive blood loss to enable the provision of blood/blood components to be available as quickly as possible as required.

Staff competencies

All staff involved in the process of transfusion must have undertaken mandatory training and competency assessment relevant to their role.

Patients covered

All patients (**except obstetrics**) experiencing blood loss as defined by:

- 50% blood volume loss within three hours
- or 100% within 24hrs (70 ml/kg, >5 litres in a 70kg adult)
- or a rate of blood loss in excess of 150 ml/min

All patients **MUST** wear an identity band.

The identification of the patient must adhere to the blood transfusion policy and related procedural documents. The NHS number **MUST** be used as the primary identifier except if the patient is unconscious and/or unidentifiable when a unique A&E number can be used.

It may be difficult to assess the amount of blood loss, but consideration of lost circulating volume may be useful in guiding transfusion management. The table below is a classification of hypovolaemic shock according to percentage blood loss, and the associated clinical signs. Red cell transfusion is indicated in Class III, massive transfusion is indicated in Class IV.

	Class I	Class II	Class III	Class IV
Blood loss mls	750ml	750 – 1500ml	1500 – 2000ml	>2000ml
Blood loss %	< 15%	15 – 30%	30 – 40%	>40%
Pulse rate	<100	>100	>120	>140
Blood pressure	Normal	Normal	Reduced	Low
Pulse pressure	Normal	Decreased	Decreased	Decreased
Capillary refill:	Normal	Slow	Slow	Slow
Respiratory rate	14-20	20-30	30-40	>35
Urinary output ml/hr	>30	30-20	20-10	10-0
Mental state:	Alert	Anxious	Confused	Lethargic
Extremities:	normal	Pale	Pale/Cool	Pale /Clammy

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Classification of hypovolaemic shock according to blood loss (P. Freeman, March 2000)

Activation of the Protocol

A consultant or senior clinician must make the decision to trigger the major haemorrhage protocol (MHP).

When a patient meets the above criteria, one person in the clinical area should take responsibility for communication between the transfusion laboratory and the clinical area. This person should act as the “coordinator” to avoid miscommunication and facilitate the speedy delivery of blood components.

In theatre emergencies where multiple disciplines are present the consultant anaesthetist is best placed to lead the major haemorrhage. Communication between the anaesthetic and surgical teams is pivotal and formal consultant dialogue should be repeated regularly and marked by a pause in surgical activity for a “command huddle” to ensure appropriate management of the patient.

To activate the MHP Pathway

The Clinical area will:

Call 2222 - Major Haemorrhage, location, and the contact number and site

The Switchboard will:

Activate bleeps in the MHP team –

2222 major haemorrhage, location and the contact number.

- MHP teams: Blood bank, porters, all anaesthetists, theatre bleep, senior nurse and medical registrar

The Laboratory will:

- On 2222 Major Haemorrhage activation being received the laboratory will phone the clinical area on the designated contact number and obtain the patient’s details
- If no sample on the system one will be requested - O Rh negative red cells available in the interim
- The Lab will issue:
- Major Haemorrhage pack 1
- 4 units of red cells
- 4 units of Octoplas (or FFP) will be defrosted and issued
- Clinical area to notify lab to request MHP 2 if required

▶ The porters will:

- On receiving 2222 major haemorrhage bleep the porter will go straight to the laboratory
- Collect the 4 units of issued red cells
- Return to the laboratory **without** prompting to collect the 4 units of Octoplas (or FFP)

Communication is the key to successful major haemorrhage management.

The Clinical area should ensure that they notify all areas to **STAND DOWN** when incident under control.

The coordinator can also contact the haematology consultant on call for advice, this is essential when the patient is on anticoagulant therapy or the haemorrhage does not subside after administration of pack 1. They can be bleeped via switchboard and will advise on the use of haemostatic agents including Vitamin K, Prothrombin Complex Concentrate, Factor VII and Fibrinogen Concentrate.

Antiplatelet drugs (Aspirin, Clopidigrel etc.)

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- Platelet transfusion should be given as soon as possible

Vitamin K-antagonists (Warfarin and similar)

- give Vitamin K10mg IV and *Prothrombin complex concentrate* (Beriplex) dose calculated based on INR and estimated body weight

Rivaroxaban:

- *Prothrombin complex concentrate*: (Beriplex) can be used if the last dose was given within the last 24 hours - give 50 units / kg body weight max 5000 units IV

Dabigatran:

- if the last dose was given within the last 24 hours and conventional methods to stop bleeding fail consider *Recombinant Factor VIIa* at a dose of 80 mcg/kg max 14.4mg
- Consider activated charcoal for patients taking dabigatran and apixaban if ingested in the last 4 hours
- After discussion with a consultant haematologist give prothrombin complex concentrate (Beriplex) 25iU/kg (max dose 2500iU)
- If no improvement with prothrombin complex consider recombinant FVIIa (NovoSeven) 90 mcg/kg (rounded DOWN to the nearest 1000mcg), consideration should be given to a second dose 1 hour later if no response or loss of response.

Immediate clinical response

STOP THE BLEEDING & RESUSITATE PATIENT

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- 1) Maintain Airway, Breathing and Circulation.
- 2) Apply direct pressure / tourniquet if appropriate
- 3) The clinical team must administer Tranexamic Acid; this should be given by bolus as soon a major haemorrhage is identified.
- 4) Stabilise fractures
- 5) Consider surgical intervention including cell salvage, interventional radiology and endoscopic techniques
- 6) Prevent hypothermia by using fluid warming device and forced air warming blanket.

When blood loss exceeds 150ml/minute then emergency O Rh D negative red cells can be used to support the patient whilst waiting for the haemorrhage pack. Take all the samples prior to transfusion if possible.

Emergency O Rh D negative red cells are available from:

- Blood Issue Fridge WRH- 2 units
- Blood Issue Fridge Alex- 2 units
- Blood Issue Fridge KTC- 6 units
- Blood Fridge Evesham- 4 units

Major Haemorrhage Pack 1

The response of the laboratory to the activation of this protocol is to provide a standardised set of blood components that meets the immediate need of the patient.

The aim is to make blood components accessible within the time limit according to the clinical situation.

When a consultant/senior clinician activates the MHP the local transfusion laboratory will provide:

Adult Major Haemorrhage Pack 1(MHP1)

- 4 units of red cells
- 4 units of fresh frozen plasma or Octoplas (solvent detergent plasma)

The ratio of FFP: RBC should be 1:2 to 1:1.

Paediatric MHP 1

Weight	Red cells	FFP
<5kg	2 paediatric units (80-100ml)	2 'neonatal' units methylene blue (MB) treated FFP (100ml) or 1 unit Octoplas
5-10.9kg	1 adult unit (250ml) , will require LVT unit if <12 months old	1 unit MB FFP (225ml)or 1 unit Octoplas
11-20kg	2 adult units (500ml) or 2 LVT if <12 months old	2 units MB FFP (450ml)or 2 units Octoplas
> 20 kg	4 adult units (1000ml)	4 units MB FFP (900ml)or 4 units Octoplas

LVT: large volume red cell pack suitable for neonates and children 12 months or less

NB: MB treated Group AB cryoprecipitate is not routinely available: for group AB patients first choice is Group A and second choice is Group B

Time to receive at this clinical area WRH/ Alex:

- Electronic Issue red cells 5 minutes
- Group specific red cells 10 minutes
- FFP/Octoplas 30 minutes

MHP pack 1 (4 RBC and 4 Octoplas) will be collected and transported to the clinical area by the charge hand porter.

It is important for the clinical area to liaise closely with the transfusion laboratory to avoid miscommunication and to ensure that the appropriate components are issued in a timely way

At KTC and Evesham the supply will be via taxi arranged by laboratory

Aims for Therapy

Reassess patient after giving pack 1 by repeating the FBC, PT, APTT, fibrinogen, UE & CA²⁺. The aim is to maintain the following parameters:

- Haemoglobin 80-100g/L
- Platelets >75 x 10⁹ /L

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- PT ratio < 1.5
- APTT ratio <1.5
- Fibrinogen >1.5g/L
- Ca²⁺ >1 mmol/L (give 10 mls Calcium chloride (10%) over 10 minutes after pack 1. Repeat if necessary)
- Temperature > 36^o C
- pH > 7.35 (on ABG)

Monitor for hyperkalaemia

If haemorrhage is continuing then order massive haemorrhage pack 2

Major Haemorrhage Pack 2 (MHP2)

Adult MHP2

This pack will contain:

- Red cells 4 units
- FFP 4 units
- Platelets 1 dose (ATD)
- Cryoprecipitate Give 2 packs if fibrinogen <1.5g/l (< 2g/L for obstetric haemorrhage)
- Fibrinogen concentrate instead of Cryoprecipitate will be issued to patients born after 01/01/1996

Once administered, repeat the FBC, PT, APTT, fibrinogen, UE & CA²⁺.

Paediatric MHP2

Weight	Red cells	FFP	Cryoprecipitate	Platelets
<5kg	2 paediatric units (80-100ml)	2 'neonatal' units methylene blue treated (MB) FFP (100ml) or 1 unit Octaplas	1 single MB donor unit (40ml)	1 paediatric pack of platelets (50ml)
5-10kg	1 adult unit (250ml), will require LVT if < 12 months old	1 unit MB FFP (225ml) or 1 unit Octaplas	2 single MB donor units (80ml)	2 paediatric packs of platelets (100ml)
11-20kg	2 adult units (500ml) will require LVT if less than 12 months old .	2 units MB FFP (450ml) or 2 units Octaplas	5 single MB donor units (200ml)	1 adult apheresis pack (200ml)
> 20 kg	4 adult units (1000ml)	4 units MB FFP (900ml) or 4 units Octaplas	10 single MB donor units (400ml)	1 adult apheresis pack (200ml)

Further components will need authorisation from the consultant haematologist.

Stand Down

When massive haemorrhage has subsided the clinical coordinator must ensure that:

- The laboratory is informed
- Any used components are returned
- All documentation is completed including traceability

Once the patient is stable thromboprophylaxis should be considered.

Satellite sites

At Kidderminster there 6 units O Rh Negative units available for use. Fibrinogen concentrate and prothrombin complex are also available in theatre recovery.

At Evesham there are 4 units of O Rh D negative units.

- The Major haemorrhage protocol is activated by surgeon/anaesthetist responsible for patients care
- A member of clinical staff will be allocated to act as coordinator
- The coordinator will contact Worcester transfusion laboratory on 30635 to inform them of the MHP activation
- The coordinator will then arrange for the O Rh negative units to be collected from the KTC issue fridge
- The coordinator will then call 2222 to notify all areas of a MHP activation at KTC this will inform the senior nurse, RMO, porters and minor injuries of the situation
- Laboratory staff must then contact Alexandra hospital switchboard to arrange a taxi. The taxi service should be informed that there is a major haemorrhage and the location (Kidderminster or Evesham). A taxi will be sent to collect the blood and take it to the advised location.
- The laboratory will issue the required components and pack the boxes ready for collection
- For KTC the driver should be instructed to take it to the minor injuries unit
- Minor injuries should inform theatres that the blood has arrived
- For ECH the driver should be instructed to take the blood to theatres
- Should further units require transportation then a further taxis should be ordered via Alex switchboard

Complications

Disseminated Intravascular Coagulation in acute bleeding is rare outside obstetric practice – treatment is with platelets, FFP/Octoplas and cryoprecipitate given 'sooner rather than later'.

Hypothermia may induce coagulopathy therefore both the patient and the blood should be warmed

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 and plasma fibrinogen predictably falls to sub-haemostatic levels (<1.5 g/L). Coagulation is also impaired by hypothermia, acidosis and reduced ionised calcium (Ca²⁺) concentration.

TACO (transfusion associated circulatory overload) is defined as acute or worsening pulmonary oedema within 6 hours of transfusion. Typical features include acute respiratory distress, tachycardia, raised

Blood Transfusion Pathway

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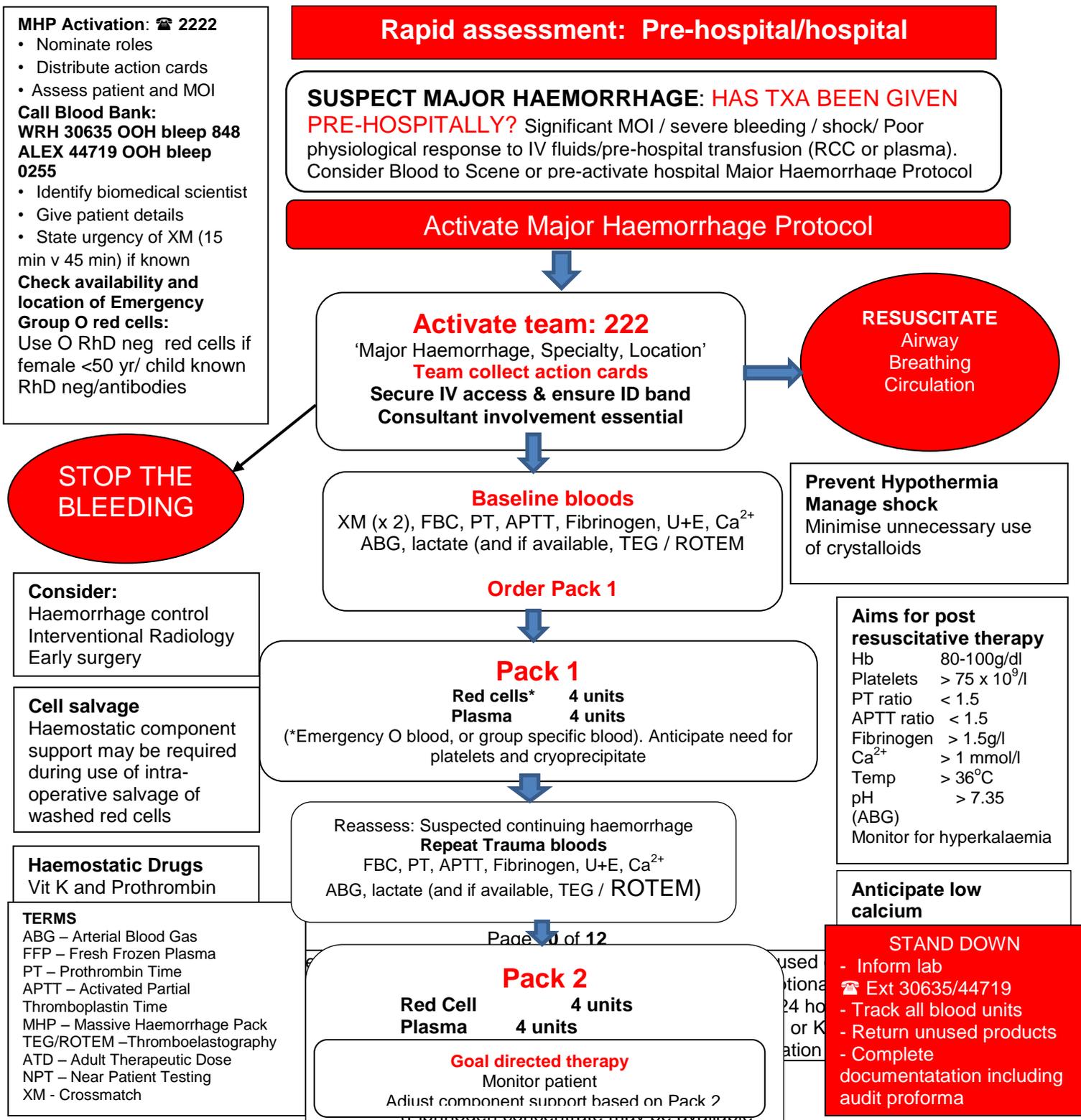
blood pressure and evidence of positive fluid balance. Poor pre-transfusion clinical assessment and inadequate monitoring during transfusion is a common feature of reported cases. The treatment of TACO involves stopping the transfusion and administering oxygen and diuretic therapy with careful monitoring and critical care support if required

Toxic effects from citrates, changes in electrolytes and plasma pH

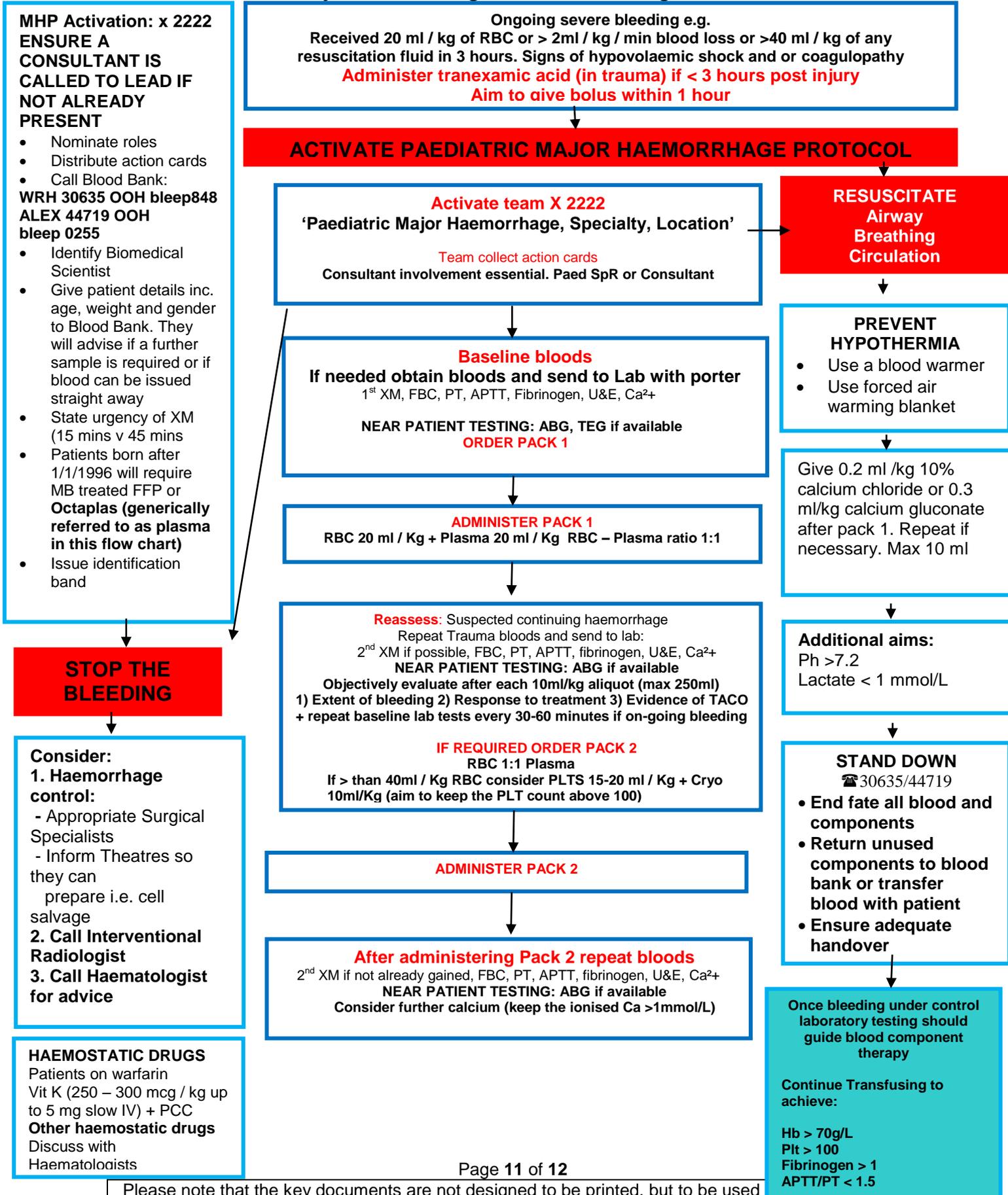
Audit

Audit is important to assess adverse events, timeliness of blood component support, patient outcome and component wastage. There should be multidisciplinary review of cases that trigger the major blood loss protocol to ensure it is being applied appropriately and effectively. All cases will be reviewed at the Hospital Transfusion Committee.

Adult Major Haemorrhage in Trauma Management Flowchart



Paediatric Major Haemorrhage in Trauma Management Flowchart



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Blood Components to request by weight

	20ml / kg	20ml / kg	15-20 ml / kg	10ml / kg
WEIGHT	RBC	Plasma	PLTS	CRYO
< 5 kg	80-100 ml	80-100 ml	50-80 ml	50 ml
5-10.9 kg	1 unit	1 unit	100 ml	80 ml
11-20 kg	2 units	2 units	1 unit	1 pool
20-50 kg	3 units	3 units	1 unit	2 pools
>50 kg	4 units	4 units	1 unit	2 pools

90ml /kg in term infants and 70-80 ml/kg in adolescence

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