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Midlands Trauma Networks
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Scope

This document sets out the standards for all receiving units in the Midlands Trauma Networks in respect of Major Haemorrhage in trauma. **These are now the preferred adult and paediatric guidelines/flowcharts for all units.**

Introduction

The timely provision of tranexamic acid and blood products to major trauma patients is associated with improved outcomes. Evidence suggests that using a high ratio of Plasma (FFP/Octaplas) and platelets to packed red cells (PRC) reduces coagulopathy and overall blood use. Recent publications and consensus guidance has strengthened the recommendation for a PRC to plasma ratio of 1:1 and this should be adopted for all major trauma major haemorrhage protocols. It is recognized that major trauma bleeding **may be** different from other sorts of bleeding so providers may need two MHP protocols, one for major trauma and one for other bleeding scenarios.

Protocol

1. Every receiving unit should have a clearly defined **adult and paediatric** major haemorrhage protocol for trauma approved by the local blood transfusion committee.
2. Within the protocol there should be clear guidance on the following:
 - a. Activation criteria and method of activation

- b. The roles and responsibilities of the personnel involved
 - c. The ratio of packed cells to plasma which should be 1:1
 - d. Clear guidance on products to use in persons known or suspected to have been born after 1996.
 - e. Adult Major Trauma Centre's should maintain a stock of pre-thawed plasma for immediate use
 - f. The ratio of packed red cells to platelet transfusion
 - g. What products should be used pre-cross matching, specifically scenarios in which Group O Rh D +ve blood may be used.
 - h. The communication mechanism between clinicians and the labs
 - i. The availability and method of communicating with the on call haematology consultant.
 - j. The stand down criteria,
3. Every receiving unit must have clear guidance on the reversal procedure for oral anticoagulants including Warfarin and direct oral anticoagulants e.g. rivaroxaban, dabigatran, apixaban.
 4. Every receiving unit must have facilities for in line warming of blood products immediately available within the resuscitation room.
 5. Every receiving unit should have evidence that the activations of the major haemorrhage protocol are monitored and audited.
 6. Every receiving unit should have Tranexamic Acid immediately available in the resuscitation room.
 7. The time and dose of Tranexamic Acid administration must be recorded on the trauma chart.

References

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[See below for flowcharts](#)

Adult Major Haemorrhage in Trauma Management Flowchart

MHP Activation: ☎ 2222

- Nominate roles
- Distribute action cards
- Assess patient and MOI

Call Blood Bank: ☎ xxxx

- Identify biomedical scientist
- Give patient details
- State urgency of XM (15 min v 45 min) if known

Check availability and location of Emergency Group O red cells:

Use O RhD neg red cells if female <50 yr/ child known RhD neg/antibodies

Rapid assessment. Pre-hospital/hospital

SUSPECT MAJOR HAEMORRHAGE: HAS TXA BEEN GIVEN PRE-HOSPITALLY?
 Significant MOI / severe bleeding / shock/ Poor physiological response to IV fluids/pre-hospital transfusion (RCC or plasma). Consider Blood to Scene or pre-activate hospital Major Haemorrhage Protocol

Activate Major Haemorrhage Protocol

Activate team: 222
 'Major Haemorrhage, Specialty, Location'
Team collect action cards
Secure IV access & ensure ID band
Consultant involvement essential

RESUSCITATE
 Airway
 Breathing
 Circulation

STOP THE BLEEDING

Baseline bloods
 XM (x 2), FBC, PT, APTT, Fibrinogen, U+E, Ca²⁺
 ABG, lactate (and if available, TEG / ROTEM)

Order Pack 1

Prevent Hypothermia
Manage shock
 Minimise unnecessary use of crystalloids

Consider:
 Haemorrhage control
 Interventional Radiology
 Early surgery

Aims for post resuscitative therapy

Hb	80-100g/dl
Platelets	> 75 x 10 ⁹ /l
PT ratio	< 1.5
APTT ratio	< 1.5
Fibrinogen	> 1.5g/l
Ca ²⁺	> 1 mmol/l
Temp	> 36°C
pH	> 7.35 (ABG)

Monitor for hyperkalaemia

Cell salvage Haemostatic component support may be required during use of intra-operative salvage of washed red cells

Pack 1

Red cells*	4 units
Plasma	4 units

(*Emergency O blood, or group specific blood).
 Anticipate need for platelets and cryoprecipitate

Reassess: Suspected continuing haemorrhage
Repeat Trauma bloods
 FBC, PT, APTT, Fibrinogen, U+E, Ca²⁺
 ABG, lactate (and if available, TEG / ROTEM)

Anticipate low calcium
 10mls 10% calcium chloride IV over 10 mins after pack 1.

Haemostatic Drugs
 Vit K and Prothrombin complex concentrate (PCC) for warfarinised patients
 Other haemostatic agents and reversal of new anticoagulants: discuss with Consultant Haematologist

Pack 2

Red Cell	4 units
Plasma	4 units
Platelets	1 dose (ATD)

Give 2 pools (of 5) Cryoprecipitate if fibrinogen <1.5g/l or 2g/l and falling (Fibrinogen concentrate may be available – use as per trust guidelines)

TERMS
 ABG – Arterial Blood Gas
 FFP – Fresh Frozen Plasma
 PT – Prothrombin Time
 APTT – Activated Partial Thromboplastin Time
 MHP – Massive Haemorrhage Pack
 TEG/ROTEM –Thromboelastography
 ATD – Adult Therapeutic Dose
 NPT – Near Patient Testing
 XM - Crossmatch

Goal directed therapy
 Monitor patient
 Adjust component support based on Pack 2

STAND DOWN

- Inform lab ☎ Ext xxxx
- Track all blood units
- Return unused products
- Complete documentation including audit proforma

Paediatric Major Haemorrhage in Trauma Management Flowchart

MHP Activation: x 2222
ENSURE A CONSULTANT IS CALLED TO LEAD IF NOT ALREADY PRESENT

- Nominate roles
- Distribute action cards
- Call Blood Bank: ☎xxxx
- Identify Biomedical Scientist
- Give patient details inc. age, weight and gender to Blood Bank. They will advise if a further sample is required or if blood can be issued straight away
- State urgency of XM (15 mins v 45 mins)
- Patients born after 1/1/1996 will require MB treated FFP or **Octoplas (generically referred to as plasma in this flow chart)**
- Issue identification band

Ongoing severe bleeding e.g. Received 20 ml / kg of RBC or > 2ml / kg / min blood loss or >40 ml / kg of any resuscitation fluid in 3 hours. Signs of hypovolaemic shock and or coagulopathy
Administer tranexamic acid (in trauma) if < 3 hours post injury
Aim to give bolus within 1 hour

ACTIVATE PAEDIATRIC MAJOR HAEMORRHAGE PROTOCOL

Activate team X 2222
 'Paediatric Major Haemorrhage, Specialty, Location'
 Team collect action cards
 Consultant involvement essential. Paed SpR or Consultant

RESUSCITATE
 Airway
 Breathing

Baseline bloods
 If needed obtain bloods and send to Lab with porter
 1st XM, FBC, PT, APTT, Fibrinogen, U&E, Ca²⁺
 NEAR PATIENT TESTING: ABG, TEG if available
ORDER PACK 1

PREVENT HYPOTHERMIA

- Use a blood warmer
- Use forced air warming blanket

Give 0.2 ml / kg 10% calcium chloride or 0.3 ml/kg calcium gluconate after pack 1. Repeat if necessary. Max 10 ml

ADMINISTER PACK 1
 RBC 20 ml / Kg + Plasma 20 ml / Kg RBC – Plasma ratio 1:1

Additional aims:
 Ph >7.2
 Lactate < 1 mmol/L

STOP THE BLEEDING

Reassess: Suspected continuing haemorrhage
 Repeat Trauma bloods and send to lab:
 2nd XM if possible, FBC, PT, APTT, fibrinogen, U&E, Ca²⁺
 NEAR PATIENT TESTING: ABG if available
 Objectively evaluate after each 10ml/kg aliquot (max 250ml)
 1) Extent of bleeding 2) Response to treatment 3) Evidence of TACO
 + repeat baseline lab tests every 30-60 minutes if on-going bleeding
IF REQUIRED ORDER PACK 2
 RBC 1:1 Plasma
 If > than 40ml / Kg RBC consider PLTS 15-20 ml / Kg + Cryo 10ml/Kg (aim to keep the PLT count above 100)

STAND DOWN ☎xxxx

- End fate all blood and components
- Return unused components to blood bank or transfer blood with patient
- Ensure adequate handover

Consider:

- Haemorrhage control:**
 - Appropriate Surgical Specialists
 - Inform Theatres so they can prepare i.e. cell salvage
- Call Interventional Radiologist**
- Call Haematologist for advice**

ADMINISTER PACK 2

Once bleeding under control laboratory testing should guide blood component therapy

Continue Transfusing to achieve:

Hb > 80g/L
 Plt > 100
 Fibrinogen > 1.5
 APTT/PT < 1.5

HAEMOSTATIC DRUGS
 Patients on warfarin
 Vit K (250 – 300 mcg / kg up to 5 mg slow IV) + PCC

Other haemostatic drugs
 Discuss with Haematologists

After administering Pack 2 repeat bloods
 2nd XM if not already gained, FBC, PT, APTT, fibrinogen, U&E, Ca²⁺
 NEAR PATIENT TESTING: ABG if available
 Consider further calcium (keep the ionised Ca >1mmol/L)

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