

# Adult Massive Transfusion Protocol

Version 5.0 July 2019

## Trauma

Emergency Department

## Non-trauma

Other locations

### Suspected critical bleeding

Should I activate Code Red?

Major trauma and 2 or more of the following:

- Penetrating injury
- FAST scan positive for intra abdominal fluid
- HR > 120/min
- SBP < 90 mmHg

or Major trauma and

- Senior clinician's suspicion of ongoing bleeding and circulatory failure despite volume resuscitation

- Bleeding > 150 ml/min
- Blood loss > 1500ml
- Loss of half the circulating blood volume in less than 2 hours
- Rapid blood loss leading to circulatory failure despite volume resuscitation

Activate **CODE RED 2222**

### 1. Request Pack A

Stop the cause of bleeding

**Stop bleeding** - apply physical methods.

**Damage Control Resuscitation.** Identify occult source of bleeding.

Send bloods for baseline tests and ROTEM.

**Transfuse Red Cells and up to 6 g Fibrinogen concentrate:** Aim for Hb 100g/L and FIBTEM A5 ≥ 10 mm

Drugs

**Tranexamic acid** 1g if within 3h of injury. Reverse **warfarin** (give Octaplex). DOACs - seek Haematology advice.

### 2. Request Pack B if ongoing bleeding

Repeat ROTEM.

Ensure Hb 100g/L and FIBTEM A5 ≥ 10 mm

**Give additional products according to ROTEM**

### 3. Request Pack C if ongoing bleeding after 6 units of Red cells

Ensure Hb 100g/L; FIBTEM A5 ≥ 10 mm and EXTEM A5 > 35 mm

**Give additional products according to ROTEM**

### 4. Request Pack D if patient still bleeding or ROTEM unavailable

Targets

#### Bloods

Hb 90-100 g/L,  
FIBTEM A5 > 10 mm  
EXTEM A5 > 35 mm; CT <85s  
Platelets > 50 x 10<sup>9</sup>/L  
Fibrinogen > 2.0 g/L

#### Metabolic

Temp > 34 deg C  
pH > 7.2  
iCa > 0.9 mmol/L

#### Haemodynamics

Systolic BP 80-100mmHg.  
If Traumatic Brain Injury - Mean BP ≥ 80 mmHg  
Ensure cardiac output is adequate (CI > 2.5)

### Excessive transfusion = worse outcomes

Hb 90-100 g/L is enough - Re-check Hb and ROTEM to guide ongoing resuscitation.

Packs

#### Pack A

4 units Red Cells  
6g Fibrinogen concentrate

#### Pack B

4 units Red cells  
4 units FFP

#### Pack C

4 units Red cells  
4 units Cryoprecipitate  
1 pool Platelets

#### Pack D

4 units Red cells  
4 units FFP  
1 pool Platelets  
6g Fibrinogen concentrate



<b>Priority tasks</b>	<b>Personnel</b> <ul style="list-style-type: none"> <li>Call for senior clinician and assistance</li> <li>Appoint a Transfusion Coordinator</li> <li>Identify dedicated blood porter</li> <li>Inform Theatres if appropriate</li> </ul>	<b>Patient care</b> <ul style="list-style-type: none"> <li>Immediate physical methods to stop bleeding</li> <li>Give Tranexamic acid</li> <li>Warm patient; warm fluids; warm room</li> <li>Monitor blood pressure directly</li> </ul>	<b>Investigate</b> <ul style="list-style-type: none"> <li>FAST scan if trauma</li> <li>Look for occult source of bleeding</li> <li>Monitor cardiac function by ECHO or ODM</li> </ul>
<b>Other tasks</b>	<b>Send blood for these tests</b> <ul style="list-style-type: none"> <li>FBC</li> <li>ROTEM</li> <li>Clotting</li> <li>Fibrinogen</li> </ul>	<b>Monitor</b> <ul style="list-style-type: none"> <li>Arterial blood gas: Hb, Lactate, Base deficit</li> <li>Repeat ABG and ROTEM every 30 mins until patient stable</li> <li>iCa if available</li> </ul>	<b>Hypocalcemia</b> Consider treating hypocalcemia if ionised [Ca] < 0.9 mmol/L
<b>Ring Transfusion</b>	<b>Give patient information</b> <ol style="list-style-type: none"> <li>Name</li> <li>Gender</li> <li>Age</li> <li>Date of Birth</li> <li>Weight - estimate</li> <li>Hospital number</li> </ol>	<b>Communication</b> <ul style="list-style-type: none"> <li>Agree telephone extensions to call</li> <li>Deviate from MTP advisory packs if ROTEM suggests alternative treatment required</li> </ul>	<b>Warfarin + major bleeding</b> <ul style="list-style-type: none"> <li>Request Octaplex if INR &gt; 1.5</li> <li>Give 30-50 IU per Kg</li> <li>Maximum dose is 3000 IU</li> </ul>

<b>A5 - amplitude (mm) at 5 min for FIBTEM and EXTEM</b>	FIBTEM < 10mm	Give 4-6g Fibrinogen concentrate or 4 packs of CRYO
	FIBTEM ≥ 10mm	Check EXTEM
	EXTEM < 35mm	If FIBTEM A5 < 10mm - give 4-6g Fibrinogen concentrate or 4 packs of CRYO If FIBTEM A5 ≥ 10mm - give PLATELETS
	EXTEM ≥ 35mm	No further blood products if FIBTEM A5 ≥ 10mm and EXTEM CT < 85s
<b>CT - clotting time (s) for EXTEM</b>	EXTEM CT < 85s	No further blood products if FIBTEM A5 ≥ 10mm and EXTEM A5 ≥ 35mm
	Extem CT ≥ 85s	If FIBTEM A5 < 10mm - give 4-6g Fibrinogen concentrate or 4 packs of CRYO If FIBTEM A5 ≥ 10mm - give PLATELETS (EXT A5 < 35 mm) or FFP (EXT A5 ≥ 35mm)

Revised 10.01.2018

**1. Check FIBTEM A<sub>5</sub> first** v. A<sub>5</sub>

**If active or suspected bleeding: correct low FIBTEM (low fibrinogen) first**

**2. Look at EXTEM CT and A<sub>5</sub>** Repeat FIBTEM and EXTEM after blood product transfusion or every 30 mins if actively bleeding

**STOP the cause of bleeding!**

- Physical
- Surgical

**Tranexamic acid Targets**

- Hb 90-100 g/L if bleeding
- Platelets > 50 x10<sup>9</sup>/L
- Systolic BP 80-100 mmHg
- Mean BP ≥ 80 if brain injury
- Temperature 35 - 37\* C
- pH > 7.2

**Doses**

*Cryoprecipitate (5u/bag)*

- 4 bags ~ 6g Fibrinogen
- 3 bags ~ 4.5g
- 2 bags ~ 3g

*Fibrinogen 25-50 mg/kg*

*FFP 20 ml/kg*

*Platelets - 1 pool*

*Tranexamic acid 2g (10-30 mg/kg)*

**Dual anti-platelet drugs or DOAC - ask specialist help**

**ROTEM® - guided intervention in critical bleeding**

