

# Major haemorrhage protocol (MHP)

## Continue resuscitation

- Give tranexamic acid 1 g IV over 10 minutes (if not already given)
- Maintain accurate fluid balance
- Refer to flowchart: Initial response to PPH

## Optimise

- Oxygenation
- Tissue perfusion
- Cardiac output
- Temperature
- Metabolic state

## Targets

- Temperature > 35° C
- pH > 7.2
- Base excess > minus 6 mmol/L
- Lactate < 4 mmol/L
- Ionised calcium > 1 mmol/L
- Platelets > 50 x 10<sup>9</sup>/L
- PT/aPPT < 1.5 x normal
- INR ≤ 1.5
- Fibrinogen > 2.5 g/L

## Monitor (30–60 minutely)

- FBC
- Fibrinogen levels (Claus more accurate than PT derived assays)
- Coagulation screen
- Ionised calcium
- Arterial blood gases

## If ROTEM®/TEG®

- 10 minutes post blood components

## Communication

- Notify lab of products required
- Specialist involvement ASAP
- Check special situations (e.g. warfarin)
- Notify lab when MHP ceased
- Inform partner/family

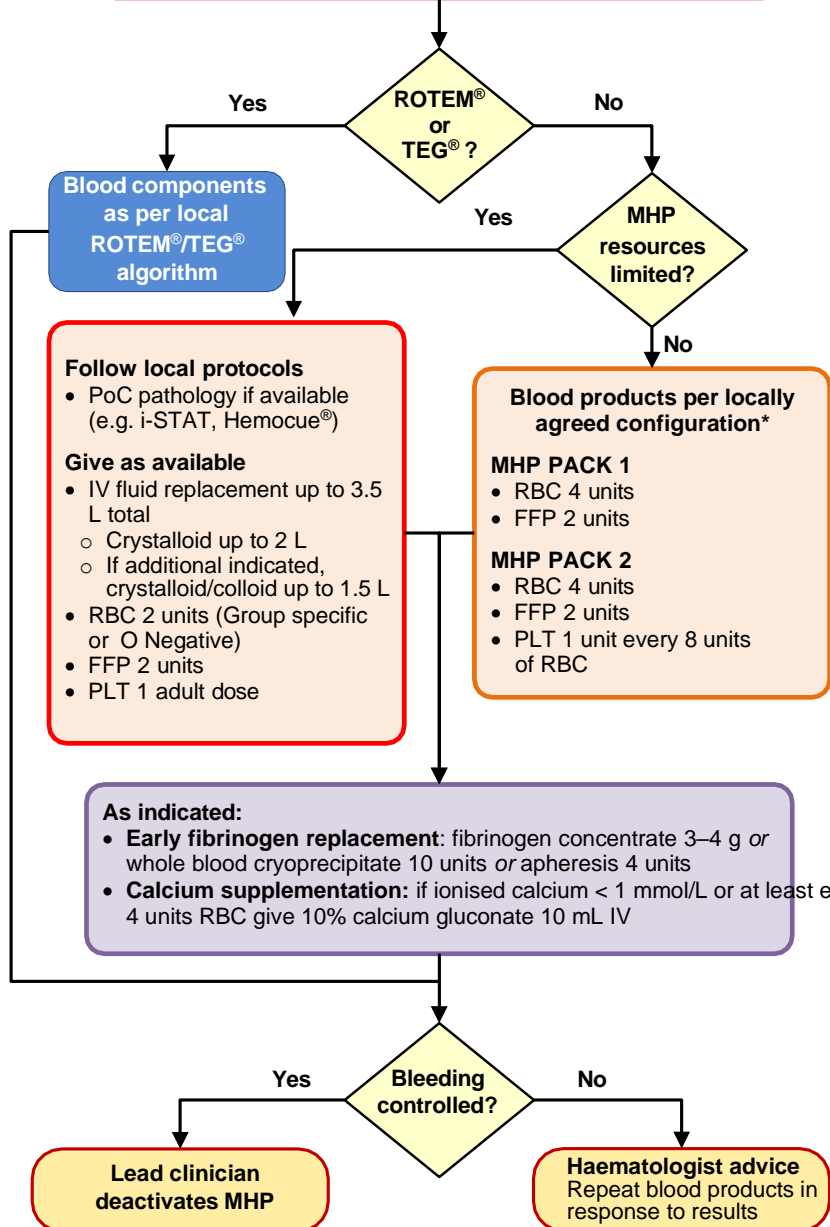
**MHP activation criteria** Actively bleeding and any of the following:

- Major haemorrhage, estimated blood loss of > 2.5 L
- Actual or anticipated need for ≥ 5 units RBC in 4 hours
- Haemodynamic instability
- Clinical or laboratory signs of coagulopathy

**OR in lower resource settings as per local protocol**

**Lead clinician activates MHP**

- Notify usual/nearest laboratory/blood bank
- Request additional staff support relevant to local setting e.g. anaesthetist, haematologist, surgeon, interventional radiologist
- Identify time frame for blood product delivery
- Inform lab if using ROTEM® or TEG®
- Contact RSQ 1300 799 127 early (as relevant to service)



Consider coagulation profile **CONCURRENTLY** during management

**APPT:** activated partial thromboplastin time, **ASAP:** as soon as possible, **FBC:** full blood count, **FFP:** fresh frozen plasma, **INR:** international normalised ratio, **IV:** intravenous, **MHP:** major haemorrhage protocol, **PLT:** platelets, **PoC:** point of care, **PPH:** postpartum haemorrhage **PT:** prothrombin time, **RBC:** red blood cells, **ROTEM®/TEG®:** types of blood clotting analysers, **RSQ:** retrieval services Queensland, **<:** less than, **>:** greater than, **≥** greater than or equal to  
 \*Aim for transfusion ratio RBC:FFP:PLT no lower than 2:1:1



1. Flow rates of devices

**Table 2** Flow rates of devices

Intravenous catheter	Rate of flow with gravity (ml/min)	Rate of flow with pressure (ml/min)	Rate of flow with Bionector (ml/min)	Percentage increase with pressure	Percentage decrease with Bionector
14G 50 mm cannula	236.1	384.2	138.3	62.7%	-41.4%
14G 14 cm Abbocath	197	366	131.3	85.8%	-33.4%
16G 50 mm cannula	154.7	334.4	109.6	116.2%	-29.2%
14G 15 cm Leadercath	117.3	211.1	101.1	80%	-13.8%
18G 45 mm cannula	98.1	153.1	80.3	56%	-18.1%
16G distal port triple lumen central line	69.4	116.1	67.4	67.3%	-2.88%
20G 33 mm cannula	64.4	105.1	58.5	63.2%	-9.17%
22G 25 mm cannula	35.7	71.4	34.7	100%	-2.80%
18G proximal port triple lumen central line	29.7	79.3	28.7	167%	-3.37%



Reddick, A. D., Ronald, J., & Morrison, W. G. (2011). Intravenous fluid resuscitation: was Poiseuille right? *Emergency medicine journal:EMJ*, 28(3), 201–202. <https://doi.org/10.1136/emj.2009.083485>

2. ETM Flow Rate Guide

Size	Type	1000ml infusion time
8.5 Fr	RIC Line	0:46 sec
7 Fr	RIC Line	1:00 min
8.5 Fr	Sheath introducer	1:05 min
14 Ga	Standard IV cannula	1:30 min
6 Fr	Sheath introducer	2:10 min
14 Ga	Angiocath (13.3cm) IV	2:10 min
16 Ga	Standard IV cannula	2:20 min
18 Ga	Standard IV cannula	4:23 min
14 Ga	4-Lumen CVC	5:20 min
20 Ga	Standard IV cannula	6:47 min

<https://etmcourse.com/large-bore-iv-access-showdown/>

3. Hand pump set for rapid transfusion

<p><b>Alaris™ Products</b> SmartSite™ Needle-Free System</p> <p><b>CE</b> 0197</p> <p><b>STERILE EO</b> EO = ETHYLENE OXIDE</p> <p>Made in the People's Republic of China.</p> <p>MANUFACTURER: Anhui Tiankang Medical Technology Co., Ltd. No.228 Wuyi Road, Economic Development Zone, Tianchang City, 239300 Anhui, China.</p> <p>EU REPRESENTATIVE: Shanghai International Holding Corp. GmbH (Europe) Frastrasse 60, 20537 Hamburg, GERMANY Tel: 0049-40-2513175</p>	<p><b>TRANSFUSION PUMP SET WITH 200µm FILTER</b> <b>TWO SMARTSITE™ NEEDLE-FREE VALVES</b></p> <p><b>CAUTION</b> REPLACE EVERY 24 HOURS, OR IN ACCORDANCE WITH HOSPITAL POLICY. APPROPRIATE INFECTION CONTROL SHOULD BE OBSERVED. SEE OVERLEAF FOR DIRECTIONS FOR USE.</p> <p><b>NON PYROGENIC</b></p> <p><b>SINGLE USE ONLY. REUSE COMPROMISES SAFETY AND EFFICACY.</b></p> <p><b>DO NOT USE IF PACKAGE IS DAMAGED</b></p> <p><b>DEHP FREE</b>      <b>LATEX FREE</b></p> <p><b>20 DROPS PER MILLILITRE</b></p>	<p><b>USE BY</b> 2026-10</p> <p><b>LOT NUMBER</b> 20231126</p> <p><b>CATALOGUE NUMBER</b> 32860H</p> <p><b>310 cm</b> <b>70 ml</b></p>  <p>07613203532469</p>
	<p>In Australia by: Becton Dickinson Pty Ltd, 66 Waterloo Road, Macquarie Park NSW 2113, Australia</p>	<p>In New Zealand by: Becton Dickinson Limited, 14B George Bourke Drive, Mt Wellington Auckland 1060, New Zealand</p>

