



Supporting Information 2

Supplementary material

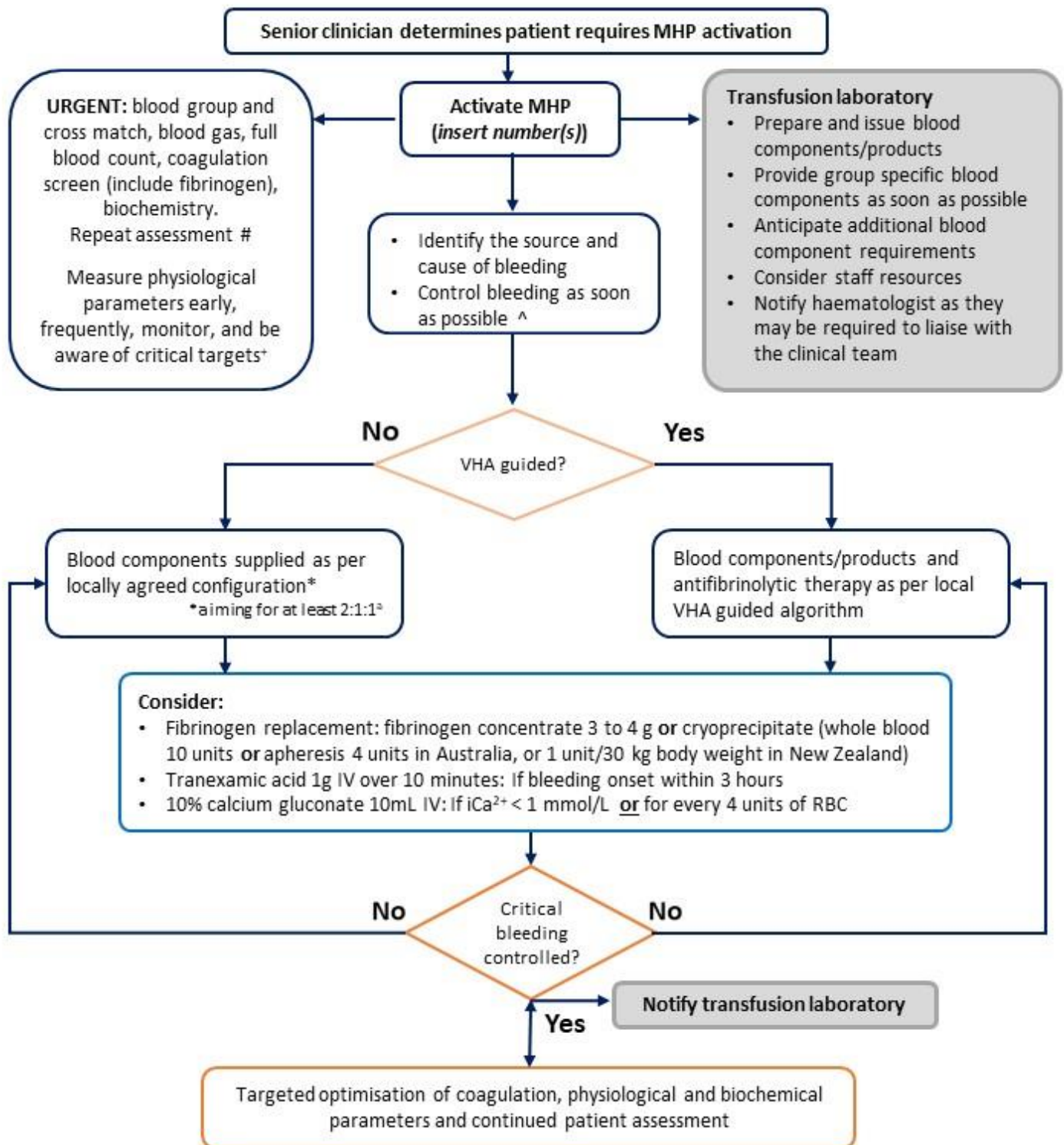
**This appendix was part of the submitted manuscript and has been peer reviewed.
It is posted as supplied by the authors.**

Appendix to: Mitra B, Jorgensen M, Reade MC, et al. Patient blood management guideline for adults with critical bleeding. *Med J Aust* 2024; doi: 10.5694/mja2.52212.

Adult major haemorrhage protocol (MHP) *template**

*must be adapted to local institutional requirements and resources

An MHP includes a multidisciplinary approach to haemorrhage control[^], correction of coagulopathy and normalisation of patient physiological parameters (*insert key contact names and numbers*)



OPTIMISE	#REPEAT ASSESSMENT	*CRITICAL TARGETS	
<ul style="list-style-type: none"> Oxygenation Cardiac output Tissue perfusion Metabolic state 	(at least every 4 units of RBC): <ul style="list-style-type: none"> Full blood count Coagulation screen Ionised calcium Blood gas 	<ul style="list-style-type: none"> Temperature $\geq 35^{\circ}\text{C}$ pH ≥ 7.2 Base excess $\geq -6\text{mmol/L}$ Lactate $\leq 4\text{ mmol/L}$ $i\text{Ca}^{2+} \geq 1.0\text{ mmol/L}$ 	<ul style="list-style-type: none"> Platelets $> 50 \times 10^9/\text{L}$ PT/APTT $\leq 1.5 \times \text{normal}$ INR ≤ 1.5 Fibrinogen $\geq 2.0\text{ g/L}$

^a At least 1 unit FFP for every 2 units of RBC, and 1 adult dose PLT (equivalent to 4 donor units) for every 8 units of RBC.

^b The normal range for base excess is -2 to +2. A base excess of ≥ -6 refers to a base excess of -5, -4, -3 and so forth. A base excess of -7, -8, -9 and so on is associated with worsening prognosis.

Other considerations

Haemorrhage control

- Early identification of cause of bleeding
- Control bleeding, using:
 - compression
 - packing
 - tourniquet
 - pelvic binder
- Surgical assessment:
 - early surgery or angiography to control bleeding

Suggested criteria for MHP activation

- Clinical suspicion of critical bleeding **and** one or more of:
- Systolic blood pressure < 100 mmHg
 - Heart rate > 100 bpm
 - Positive focused assessment with sonography for trauma (FAST)
 - Estimated blood loss > 1L
 - Pallor

Resuscitation

- Institute active warming, avoid hypothermia
- Warm RBC through an approved blood warming device if available
- Prioritise blood components over crystalloids
- Consider permissive hypotension (systolic BP: 70 to 100 mmHg)

Special clinical situations

Direct oral anticoagulants

- Refer to haematologist

Warfarin reversal:

- Refer to [warfarin reversal guidelines](#)

Obstetric haemorrhage:

- Consider additional fibrinogen replacement

Severe traumatic brain injury:

- Permissive hypotension relatively contraindicated

Older adults:

- Hypotension and tachycardia may be late observations
- Caution with permissive hypotension

Suggested key contacts (*modify locally*)

- Blood bank/transfusion laboratory
- Anaesthetist
- Surgeon
- Haematologist
- Interventional radiology

Acronyms

APTT: activated partial thromboplastin time, **BP:** blood pressure, **bpm:** beats per minute, **iCa²⁺:** ionised calcium, **FFP:** fresh frozen plasma, **INR:** international normalised ratio, **IU:** international unit, **IV:** intravenous, **MHP:** major haemorrhage protocol, **mmHg:** millimetres of mercury, **mmol/L:** millimoles per litre, **PLT:** platelets, **PT:** prothrombin time, **RBC:** red blood cells, **VHA:** viscoelastic haemostatic assays

Notes:

- This template was developed using the recommendations and good practice statements in the *Patient blood management guideline for adults with critical bleeding*. Recommendations in the guideline were based on the results of multiple systematic reviews. Good practice statements were developed based on indirect evidence and expert consensus. For further details see the full guideline.
- The content in this MHP is a guide only and must be adapted to local institutional requirements and resources. Health professionals should use clinical judgement and consider the clinical circumstances and patient preferences, to determine the appropriateness of this template for an individual patient.
- © National Blood Authority, 2023. ISBN 978-0-6453281-1-0

National Blood Authority. Patient blood management guideline for adults with critical bleeding. Canberra: NBA, 2023.

<https://blood.gov.au/system/files/documents/Patient%20blood%20management%20guideline%20for%20adults%20with%20critical%20bleeding%20-%20Final%20-%20Converted%20from%20MAGICapp%20-%202024%20Aug%202023.PDF>