

Actual or anticipated 4 units RBC in < 4 hours, + haemodynamically unstable, +/- anticipated ongoing bleeding
Severe thoracic, abdominal, pelvic or multiple long bone trauma, major gastrointestinal, surgical or obstetric bleeding

Senior clinician determines that patient meets criteria for **MASSIVE TRANSFUSION PROTOCOL** activation

Baseline:

Group & Screen/cross match, full blood count, coagulation screen (PT, INR, APTT, fibrinogen), biochemistry, arterial blood gases.
If using ROTEM order EXTEM & FIBTEM (If patient is taking heparin order INTEM & HEPTTEM)

Notify transfusion laboratory (34018, page 4467.) to:
Activate MASSIVE TRANSFUSION PROTOCOL

Send courier to Transfusion Medicine Unit (TMU) (Ground floor, PP block) to collect Massive Transfusion Pack

NO ROTEM

MONITOR (every 30–60 mins):

full blood count
coagulation screen
ionised calcium
arterial blood gas

AIM FOR:

- temperature > 35°C
- pH > 7.2
- base excess < -6
- lactate < 4 mmol/L
- Ca²⁺ > 1.1 mmol/L
- platelets > 50x10⁹/L
- PT/APTT < 1.5 normal
- INR ≤ 1.5
- fibrinogen > 1.5 g/L

Senior clinician Request:

- 4 units Red blood cells (RBC)
- 2 units Fresh Frozen Plasma (FFP)

Consider

- 1 adult therapeutic dose platelet
- Tranexamic acid in trauma patients within 3hrs

Include

- 10 units cryoprecipitate if fibrinogen < 1.5 g/L

ROTEM

Refer to
The SCGH ROTEM Algorithm
for Critical bleeding
for the blood product
dosing guide
Page 2 of 3

Special Clinical Indications

Warfarin, antiplatelet and
novel oral anticoagulants
(NOACS)
Refer to page 3 of 3 for
further information

Bleeding controlled?

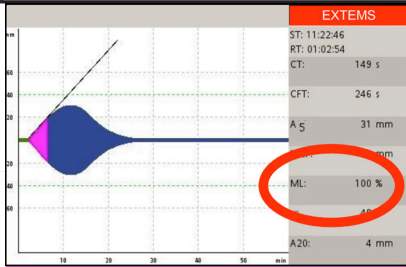
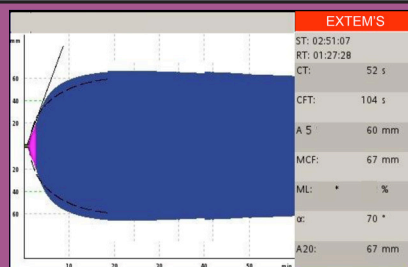

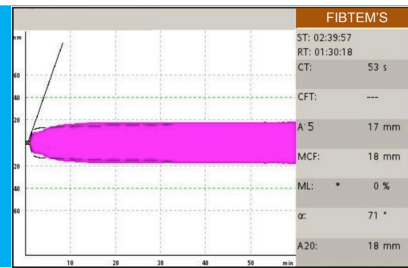
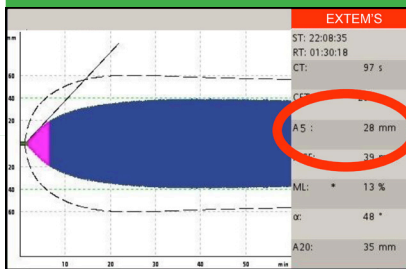
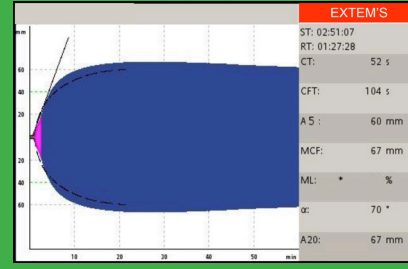
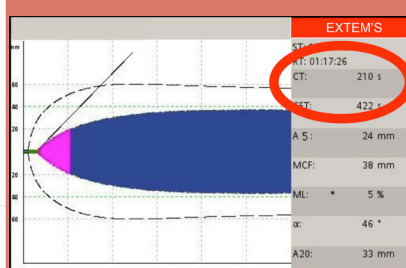
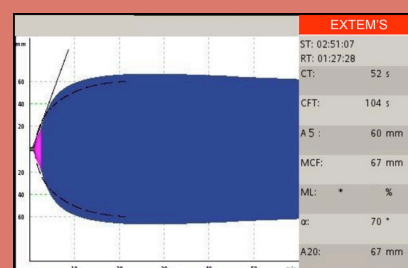
YES

NO

Notify transfusion laboratory to:
Cease Massive Transfusion Protocol by calling 34018
Return unused products to TMU immediately

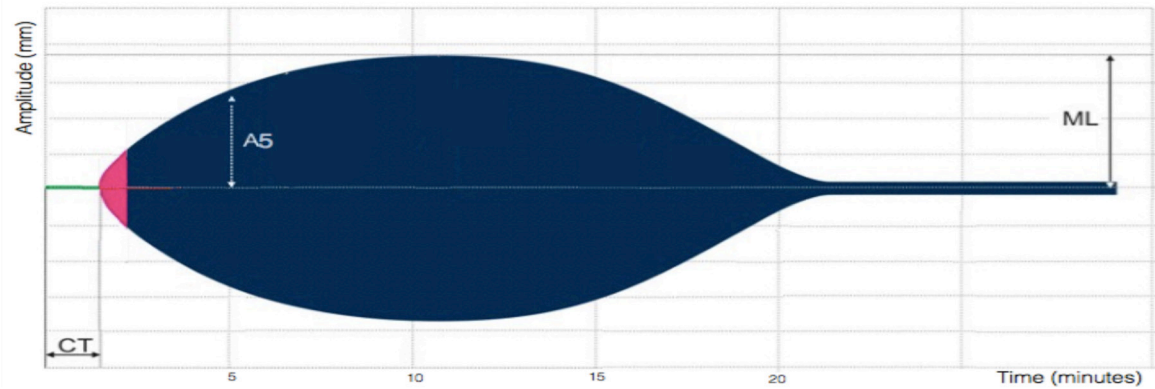
SCGH ROTEM Algorithm for Critical Bleeding

Key Points: This algorithm is for use in patients with CRITICAL BLEEDING only. Only treat abnormal values if active bleeding or at high risk of bleeding.
Repeat ROTEM analysis 10 mins after intervention to assess response.

	ABNORMAL ROTEM	CRITERIA	DIAGNOSIS	INTERVENTION	CORRECTED ROTEM	
FIBRINOLYSIS		Early Diagnosis EXTEM A5≤35mm or FIBTEM CT >600s	High likelihood of excess fibrinolysis	Tranexamic acid 1g Consider repeat dose if has lost over 1 blood volume since initial dose (If no contra-indications)		
		Late Diagnosis EXTEM or FIBTEM ML ≥5%	Excess fibrinolysis			
FIBRINOGEN		FIBTEM A5≤10mm	Low fibrinogen	Cryoprecipitate (see dosing guide)		
PLATELETS		EXTEM A5 ≤35mm and FIBTEM A5 >10mm	Low platelets	Platelets: 1 adult dose (correlate with platelet count)		
		EXTEM A5 ≤25mm and FIBTEM A5 ≤10mm	Low platelets and Low fibrinogen	Platelets and fibrinogen (correlate with platelet count)		
FACTORS		EXTEM CT 80-140s and FIBTEM A5 ≤10mm	Low fibrinogen	Correct fibrinogen and reassess		
		EXTEM CT >80s but FIBTEM A5 >10mm	Low coagulation factors	FFP 1-4U or (+ Fibrinogen if indicated)		
		EXTEM CT >140s and FIBTEM A5 ≤10mm	Low fibrinogen and Low coagulation factors			

Fibrinogen Dosing Guide

FIBTEM A5 Target: ≥12mm		
FIBTEM A5 Cryoprecipitate*	Increase required	Cryoprecipitate*
9-10mm	2-3 mm	10 Units
7-8mm	4-5 mm	15 Units
4-6mm	6-8 mm	20 Units
<4mm	≥9mm	20-25 Units
*Cryoprecipitate dosing is for standard adult units (Cryo 5 units = Fibrinogen A5 increase of approx 2mm)		



PATIENTS ON ANTICOAGULANTS EXPERIENCING CRITICAL BLEEDING - QUICK REFERENCE GUIDE

****FOR GENERAL REFERENCE ONLY - DISCUSS ALL MANAGEMENT WITH HAEMATOLOGIST**

Patients on anticoagulants have an underlying predisposition to thrombosis and the decision to use pharmacologic reversal should always be balanced against the risk of precipitating thrombosis. Where feasible maximise the use of non - pharmacologic treatments such as surgical techniques, embolisation or balloon tamponade / packing. Seek advice from the appropriate specialists and Haematology. In critical or life threatening haemorrhage urgent reversal may still be required: (see below)

Detect and Exclude other abnormalities
Perform ROTEM to detect and treat other abnormalities that may develop during haemorrhage e.g. low fibrinogen or platelets, hyperfibrinolysis, coagulation factor deficiency.

DIAGNOSTIC TESTS			INTERVENTION & REVERSAL	
WARFARIN	use INR to guide reversal (*ROTEM is insensitive)		Vitamin K 5-10mg IV Prothrombinex VF 25 - 50 U/kg +/- FFP 1-2 units	
HEPARIN (Unfractionated)	INTEM CT > 240s and HEPTTEM CT / INTEM CT > 0.8 (- indicates reversible heparin effect)		Cease heparin (short half life) Consider protamine 1mg / 100u heparin Give protamine slowly 10mg/min -Maximum dose 50mg	
	APTT > 38s			
LMWH (low molecular weight heparin)''	INTEM CT > 240s Anti Factor Xa Levels		Up to 60% of LMWH effect may be reversible with protamine	Consider Protamine (max 50mg): If < 8hrs: Protamine 1mg / 1mg enoxaparin If > 8hrs: Protamine 0.5mg / 1mg enoxaparin - Give protamine slowly 10mg/min
NOACS (Novel Oral Anticoagulants)	AGENT - Mechanism of action	Laboratory Tests / Antidotes	General Advice Maximise physical measures: Direct pressure Embolisation Surgical ligation	Pro-Haemostatic Drugs (if no antidote) Discuss with on call Haematologist In life-threatening bleeding when other measures have failed consider: Prothrombinex VF 25-50iu/kg Tranexamic Acid 1g
	Dabigatran - Direct thrombin inhibitor	Dabigatran level/ Idarucizumab click here		
	Rivaroxaban - Direct Xa inhibitor	Rivaroxaban/ Apixaban level No Antidote Available		
	Apixaban - Direct Xa inhibitor			
Anti-platelets agents (Aspirin & Clopidogrel)			Give one adult dose of platelets	