

NUTH MAJOR HAEMORRHAGE PROTOCOL (MHP) RVI

	ADULT	PAEDIATRICS
Early Recognition of Major Haemorrhage	<ul style="list-style-type: none"> Suspected ongoing haemorrhage Systolic BP <90mmHg Poor response to initial fluids Penetrating Trauma / Positive FAST Scan / Prehospital Alert 	<ul style="list-style-type: none"> Signs of shock
Call for Senior Help	<ul style="list-style-type: none"> Establish Team Leader and Roles Escalate via parent team Consider need for Anaesthetic or Critical Care input ring 29999 	<ul style="list-style-type: none"> Escalate via parent team Consider need for PICU 26012, PETAL 29763 or PINC Anaesthetist 29214
Assess ABCDE	<ul style="list-style-type: none"> Attach monitoring High flow O₂ Large bore IV or IO access, use rapid infuser e.g. Belmont or Level 1 (if available). 	
Take Samples	<ul style="list-style-type: none"> Group and Save, FBC, Coag (PT, APTT, Claus Fibrinogen), U&E Near patient testing - ABG, HaemoCue, ROTEM (If available) 	
Initiate Major Haemorrhage Protocol	<ul style="list-style-type: none"> Phone Blood Bank on 29249 State 'Activate Major Haemorrhage Protocol' Give Patient's: MRN, Forename, Surname, Date of Birth, Male/Female, Location Give a 'nominated contact person' name and number for further communication during the Major Haemorrhage. Send Porter for Major Haemorrhage Pack 1 immediately Use Major Haemorrhage Prescription documents delivered in cool box 	
Early Haemorrhage Control	<ul style="list-style-type: none"> Compressible 	<ul style="list-style-type: none"> Direct pressure/haemostatic dressing Splint fractures including pelvis Apply tourniquet proximal to wound
	<ul style="list-style-type: none"> Non Compressible 	<ul style="list-style-type: none"> Consider Interventional Radiology Consider Damage Control Surgery
	<ul style="list-style-type: none"> Obstetrics <p>4 T's – Tone, Tissue, Trauma, Thrombin</p>	<p>Consider:</p> <ul style="list-style-type: none"> Uterotonic Drugs Early transfer to theatre for resuscitation & exploration - Bimanual compression, intra-uterine balloon +/- brace suture, packing or IR.
	<ul style="list-style-type: none"> GI Bleed 	<ul style="list-style-type: none"> Consider Drugs – Terlipressin and Antibiotics for varices (as per Cirrhosis Care Bundle) Early review by Gastro Reg (in hours) or Medical Reg (out of hours) Consider IR or Surgery
	<ul style="list-style-type: none"> Reverse Anticoagulation 	<ul style="list-style-type: none"> Discuss with Haematology Registrar on Call (via switchboard)
Cell Salvage	<ul style="list-style-type: none"> Consider use in all cases Avoid in gross contamination and malignancy Consider need for leucocyte filter e.g. Obstetrics Don't rely on cell salvaged blood for resuscitation (slow rate of collection) – re-transfuse when able 	
Resuscitate and Prevent Coagulopathy	<ul style="list-style-type: none"> Give Tranexamic Acid 1g bolus IV Commence transfusion in ratio of 1RBC:1FFP <ul style="list-style-type: none"> Pack 1 – 4 RBCs, 4 FFP Pack 2 – 4 RBCs, 4 FFP, 2 Platelets Pack 3 onwards – 4 RBCs, 4 FFP, 1 Plt, 2 Cryo Keep products in cool box after checking, prior to use 	<ul style="list-style-type: none"> Give Tranexamic Acid 15mg/kg bolus IV Commence transfusion in ratio of 5ml/kg RBC: 5ml/kg Octoplas After every 15ml/Kg RBC and 15ml/Kg Octoplas - give 5ml/kg Plt and 5ml/kg Cryo NB: First MH pack may contain FFP prior to Octoplas being available.
Repeat samples (After each MH pack)	<ul style="list-style-type: none"> Group and Save 2nd sample (unless already done), FBC, Coag (PT, APTT, Claus Fibrinogen), U&E Near patient testing - ABG, Haemoccue, ROTEM (if available) 	
Prevent	<ul style="list-style-type: none"> Hypothermia 	<ul style="list-style-type: none"> Early active patient warming Warmed blood components
	<ul style="list-style-type: none"> Acidosis 	<ul style="list-style-type: none"> Measure ABG and lactate
	<ul style="list-style-type: none"> Hyperkalaemia 	<ul style="list-style-type: none"> Aim K⁺ <6.0 Give 10 units Actrapid in 50ml 50% Dextrose IV over 30mins, check BM as per NUTH protocol
	<ul style="list-style-type: none"> Hypocalcaemia 	<ul style="list-style-type: none"> Aim iCa >1.0 Give 10mls 10% CaCl₂ IV over 10mins
Treatment Targets	<ul style="list-style-type: none"> Temp >36°C pH >7.2 Base Excess < -6 Lactate <2 Hb >100 during haemorrhage, Hb > 80 after haemorrhage control. Plts >100 Fib >1.5 (Fib >2.0 for obstetrics) iCa > 1.0 K⁺ <5.5 	

Stand-down Major Haemorrhage Protocol when no longer required.
Inform Blood Bank and return any unused blood components to the laboratory immediately.

Practicalities for Delivery of Paediatric Massive Transfusion

Paediatric Major Haemorrhage

BEWARE OVER TRANSFUSION WITH RAPID INFUSER

Child < 20Kg

Do not connect directly to rapid infuser. Use the 3-way tap & 50ml syringe system.

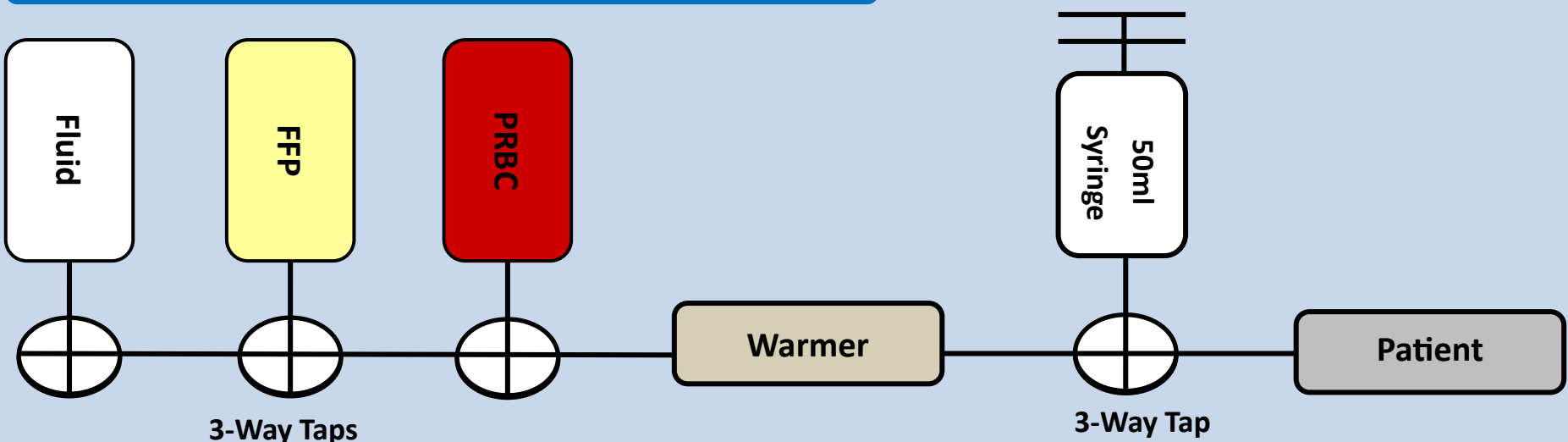
Child 20-30Kg

If sufficient expertise, direct connection to the rapid infuser may be used.

Child > 30Kg

Connect directly to the rapid infuser. Ensure safe and appropriate settings. Note the Belmont only warms at flows of >10ml/hr.

3-Way Tap System for Rapid Fluid Administration



Re-evaluate regularly and beware fluid overload

Best Practice Guidance for Hospital Blood Banks

No Sample

MH Pack 1

- 4 units Red Blood Cells (Group O)
- 4 units FFP (Group A or AB)

MH Pack 2

- 4 units Red Blood Cells (Group O)
- 4 units FFP (Group A or AB)
- 2 Platelet Pools (Group A)

Subsequent MH Packs

- 4 units Red Blood Cells (Group O)
- 4 units FFP (Group A or AB)
- 1 Platelet Pool (Group A)
- 2 Pools Cryoprecipitate (Maintain Fib >1.5g/dL)

Sample Received— Results Pending

MH Pack 1

- 4 units Red Blood Cells (Group O)
- 4 units FFP (Group A or AB)

No Historical Group or patient still in Emergency Department

MH Pack 2

- 4 units Red Blood Cells (Group O)
- 4 units FFP (Group of sample)
- 2 Platelet Pools (Group of sample)

Subsequent MH Packs

- 4 units Red Blood Cells (Group O)
- 4 units FFP (Group of sample)
- 1 Platelet Pool (Group of sample)
- 2 Pools Cryoprecipitate (Maintain Fib >1.5g/dL)

Known Historical Group and patient in isolation

MH Pack 2

- 4 units Red Blood Cells (Group Specific)
- 4 units FFP (Group Specific)
- 2 Platelet Pools (Group Specific)

Subsequent MH Packs

- 4 units Red Blood Cells (Group Specific)
- 4 units FFP (Group Specific)
- 1 Platelet Pool (Group Specific)
- 2 Pools Cryoprecipitate (Maintain Fib >1.5g/dL)

Valid Sample in accordance with the Two Sample Rule

MH Pack 1

- 4 units Red Blood Cells (Group specific)
- 4 units FFP (Group specific)

MH Pack 2

- 4 units Red Blood Cells (Group Specific)
- 4 units FFP (Group Specific)
- 2 Platelet Pools (Group Specific)

Subsequent MH Packs

- 4 units Red Blood Cells (Group Specific)
- 4 units FFP (Group Specific)
- 1 Platelet Pool (Group Specific)
- 2 Pools Cryoprecipitate (Maintain Fib >1.5g/dL)

Paediatric Major Haemorrhage

Paediatric MH Pack 1

AGE / Weight	RBC (Units)	Octoplas (200mL)
<1yr / <10kg	1	1
1-10 yrs / 10-30kg	2	2
10-16 yrs / 30-50kg	3	3
>16yrs / >50kg	Refer to Adult Protocol	

- **NB:** First MH pack may contain FFP prior to Octoplas being available.

Paediatric MH Pack 2

- Red Blood Cells and Octoplas as in Paediatric MH Pack 1
- 1 Platelet pool (group specific)

Subsequent Paediatric MH Packs

- Red Blood Cells, Octoplas and Platelets as in Paediatric MH Pack 2
- 5mL/kg Cryoprecipitate

References

1. Defence Medical Services: Defence Anaesthesia, Pain and Critical Care Faculty, Paediatric Anaesthesia in the Role 2/3 Field Hospital.
2. British Committee for Standards in Haematology (BCSH) (2015) A practical Guideline for the Haematological management of major haemorrhage. British Journal of Haematology.