

NUTH MAJOR HAEMORRHAGE PROTOCOL (MHP) RVI

ADULT

PAEDIATRICS

Early Recognition of Major Haemorrhage

- Suspected ongoing haemorrhage
- Systolic BP <90mmHg
- Poor response to initial fluids
- Penetrating Trauma / Positive FAST Scan / Prehospital Alert

- Signs of shock

Call for Senior Help

- Establish Team Leader and Roles
- Escalate via parent team
- Consider need for Anaesthetic or Critical Care input ring -----

- Escalate via parent team
- Consider paediatric arrest call or need for paediatric critical care / anaesthetist

Assess ABCDE

- Attach monitoring
- High flow O₂
- Large bore IV or IO access, use rapid infuser e.g. Belmont or Level 1 (if available).

Take Samples

- Group and Save, FBC, Coag (PT, APTT, Claus Fibrinogen), U&E
- Near patient testing - ABG, HaemoCue, ROTEM / TEG (if available)

Initiate Major Haemorrhage Protocol

- Phone Blood Bank on -----
- 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 / staff member for Major Haemorrhage Pack 1 immediately**
- Use **Major Haemorrhage Prescription** documents delivered in cool box

Early Haemorrhage Control

Compressible

- Direct pressure/haemostatic dressing
- Splint fractures including pelvis
- Apply tourniquet proximal to wound

Non Compressible

- Consider Interventional Radiology
- Consider Damage Control Surgery

Obstetrics

4 T's – Tone, Tissue, Trauma, Thrombin

Consider:

- Uterotonic Drugs
- Early transfer to theatre for resuscitation & exploration - Bimanual compression, intra-uterine balloon +/- brace suture, packing or IR.

GI Bleed

- 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

Reverse Anticoagulation

- Discuss with **Haematology Registrar on Call (via switchboard)**

Cell Salvage

- 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

- Give Tranexamic Acid 1g bolus IV
- Commence transfusion in ratio of 1RBC:1FFP
 - ◆ 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

- Give Tranexamic Acid 15mg/kg bolus IV
- Commence transfusion in ratio of **5ml/kg RBC: 5ml/kg FFP**
- After every 15ml/Kg RBC and 15ml/Kg FFP - give **5ml/kg Plt** and **5ml/kg Cryo**
- **NB:** Octaplas will be provided after MH pack 1 for patients <1 year old

Repeat samples (After each MH pack)

- Group and Save 2nd sample (unless already done), FBC, Coag (PT, APTT, Claus Fibrinogen), U&E
- Near patient testing - ABG, Haemocue, ROTEM / TEG (if available)

Prevent

Hypothermia

- Early active patient warming
- Warmed blood components

Acidosis

- Measure ABG and lactate

Hyperkalaemia

- Aim K⁺ <6.0
- Give 10 units Actrapid in 50ml 50% Dextrose IV over 30mins, check BM as per NUTH protocol

- Give 0.1units/kg Actrapid in 5ml/kg 10% Dextrose IV over 1 hour, check BM after 15mins, then every 30 mins

Hypocalcaemia

- Aim iCa >1.0
- Give 10mls 10% CaCl₂ IV over 10mins

- Give 0.2ml/kg 10% CaCl₂ IV over 10 mins

Treatment Targets

- 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.

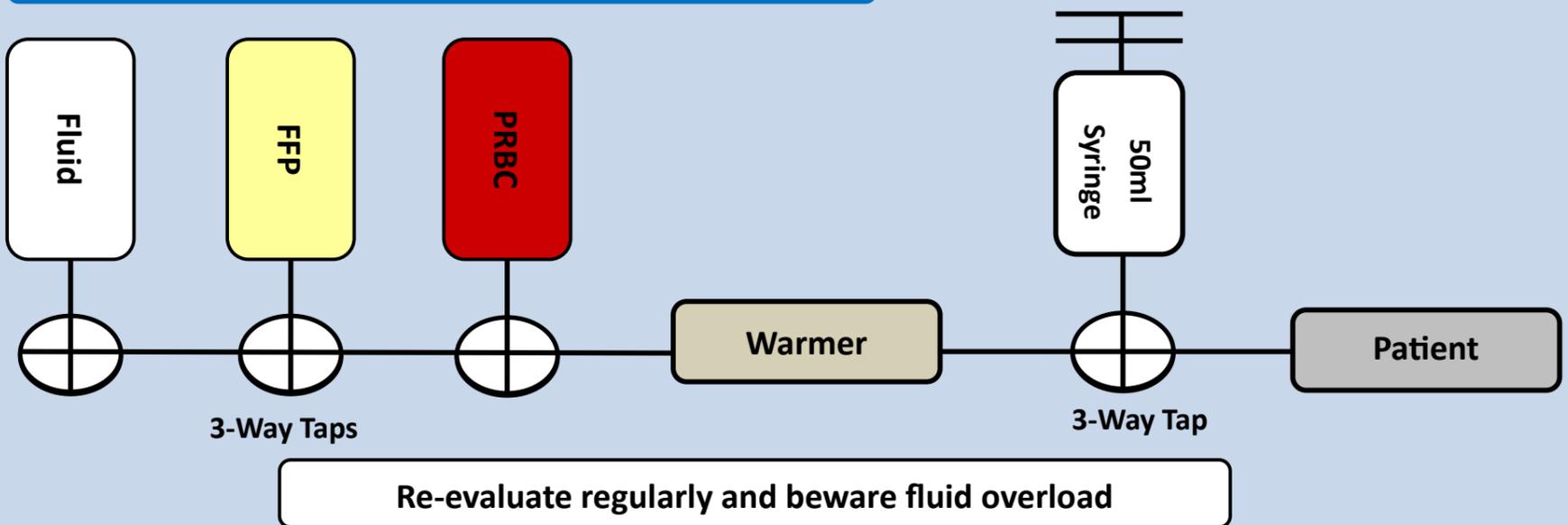
Child 20-30Kg

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



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

Age/Weight	RBC	FFP*	Plt
<1 year	1	1	1
<10 Kg			
1-10 Years	2	2	1
10-30 Kg			
10-16 Years	3	3	1
30-50 Kg			
>16 years	Refer to Adult Protocol		
>50 Kg	Refer to Adult Protocol		

*Octaplas will be provided after pack 1 for patients <1 Year Old

Paediatric MH Pack 2 and Subsequent MH Packs

- Red Blood Cells, FFP* and Platelets as in Paediatric MH Pack 1
- 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