Clinical Guideline

TRANSFUSION: PAEDIATRIC MAJOR HAEMORRHAGE PROCEDURE

SETTING Bristol Royal Hospital for Children

FOR STAFF Clinical, portering, laboratory and switchboard

PATIENTS Children with major haemorrhage regardless of cause:
- rapid blood loss with shock or with no likelihood of control
- anticipated or actual administration of >30ml/kg of blood products

Overview

This procedure ensures delivery of blood products in the minimum time to the location of a major haemorrhage.

Major haemorrhage is considered as any situation where immediate delivery of blood is required for a patient with rapid blood loss. All clinical and laboratory staff can activate the procedure if immediate emergency delivery of blood is deemed necessary.

The procedure is activated with one phone call:

Call 2222

State “I would like to trigger the major haemorrhage procedure in (location), extension (xxxxx)

Switchboard will call blood bank and return your call

Provide patient identification details, age, weight and products required

Upon activation, switchboard will mobilise portering and laboratory staff and alert the duty clinical support manager (CSM) and on-call haematologist (section 6). A dedicated porter will be assigned to transport blood and specimens between the clinical site and the laboratory (section 4).

Packed Red Cells, Fresh Frozen Plasma and platelets should be ordered in the form of “shock packs” containing multiple units of products (section 2). Cryoprecipitate or specialist products must be requested explicitly.

A specific member of the team should be designated as “Coordinator” at the clinical location to coordinate communication during the major haemorrhage (section 3).

Call blood bank to stand down when haemorrhage is under control.
Only blood bank should stand down porters/taxi.

Clinical guidelines

Major haemorrhage can be defined as suspicion of active haemorrhage **plus** any of:

- Bleeding at a rate >2 ml/kg/min
- 20 ml/kg of red cells in preceding hour
- 40 ml/kg of any fluid in preceding hour
- Hypovolaemic shock and/or coagulopathy

A consultant clinician should lead clinical care if the major haemorrhage procedure is activated. The aims are to provide fluid resuscitation as necessary and arrest bleeding if possible.

Positive patient identification is essential, and all blood component transfusion should comply with Trust Transfusion Policy

- Minimum information consists of patient sex and hospital number, staff name, sample date and time
- If patient is unknown use “unknown patient” pack in CED

Laboratory investigations to request

- Blood gas
- Crossmatch 4 units
- The following should also be sent. To select as a group in ICE, use “search”, selecting “test collections” and searching for “major haemorrhage”
    - FBC, Coagulation screen, Fibrinogen
    - Urea, Electrolytes, Creatinine, Liver function test, Calcium

Initial blood product doses for use in major haemorrhage

- Packed Red Cells (PRC): 5ml/kg aliquots titrated to clinical effect
- Fresh Frozen Plasma (FFP): 5ml/kg aliquots titrated to clinical effect
- Platelets: 10ml/kg aliquots
- Cryoprecipitate: 5ml/kg

NB – ongoing doses and ratios will depend on the clinical situation and available results

“Shock packs” are issued in a stepwise manner. Where possible, group specific products should be given.

- Pack A contains PRC
- Pack B contains PRC and FFP
- Pack C contains PRC, FFP and platelets

Immediate approach in major haemorrhage

- Tranexamic acid
  - Early administration is vital for efficacy, give in initial stages of resuscitation
  - Loading dose
    - 15mg/kg (max 1g)
    - dilute in convenient volume of Sodium Chloride 0.9% or Glucose 5%
    - give over 10 minutes
  - Maintenance infusion
    - 2mg/kg/hr
    - make 500mg in 500ml of Sodium Chloride 0.9% or Glucose 5%
    - give at 2mls/kg/hour for at least 8 hours or until bleeding stops

- Blood product ratio
  - In patients with severe trauma a 1:1 ratio of PRC:FFP (5ml/kg aliquots of each) should be employed in the initial resuscitative phase
  - Following administration of 15 ml/kg of each (ie total volume of 30ml/kg):
    - Give further blood products based on initial results if available
    - Give platelets (10ml/kg) and cryoprecipitate (5ml/kg) empirically if bleeding ongoing and no results available
    - Recheck FBC, coagulation and fibrinogen
    - Continue PRC and FFP in 1:1 ratio until results available

- Giving blood
  - Group O negative blood is available for immediate use from the blood fridge in BRHC Theatres, Level 4
  - Remember to give through warming device

- Aims of resuscitation are to return physiologic/haemodynamic parameters to normal range and correct any coagulopathy

Other causes and ongoing management of haemorrhage may be directed by results as available

- If Hb <100g/l – give PRC
- If PT or APTT >1.5 x normal – give FFP
- If platelets <75x10^9 – give platelets
- If fibrinogen <1.5g/l after FFP – give cryoprecipitate
- Near patient testing may be used to guide replacement components pending laboratory results in clinical areas where it is available
- If calcium low give Calcium Gluconate 10% 0.5ml/kg

Prevent/correct causes of coagulopathy including hypothermia, acidosis, anticoagulant, electrolyte disturbances

Monitor:

- Clinical response continuously
- FBC, coagulation, fibrinogen, urea, electrolytes, liver function, calcium at least hourly until bleeding stops

If bleeding ongoing, consider recombinant factor VIIa

Major Haemorrhage present or likely?
Senior clinician to assess

Trigger major haemorrhage procedure:
Call [redacted]
Nominate co-ordinator
Portering will attend for direction

Take bloods for:
- FBC & Crossmatch
- Coagulation screen
- Fibrinogen
- U&E, Creatinine
- Liver function tests

If blood needed immediately for absolute emergency, give group O negative blood, found in the blood fridge in BRHC Theatres, Level 4

Give Tranexamic acid
15mg/kg (max 1g) over 10 minutes, then 2mg/kg/hr infusion

Are you likely to need multiple products for massive haemorrhage eg major trauma?

Request "shock pack", give 5ml/kg aliquots of PRC:FFP* at 1:1 ratio to 15ml/kg of each
**note: FFP takes 30 minutes to defrost. therefore PRC alone may be used initially*

Reassess for ongoing bleeding

Results available

Request and replace components based on results:

Hb <100g/l – PRC
PT/APTT >1.5 x normal – FFP
Platelet <75x10^9 – platelets
Fibrinogen <1.5g/l – cryoprecipitate

Regular blood gas analysis
and core temperature
Correct:
Hypothermia
Acidosis
Hypocalcaemia
Hyperkalaemia
Anticoagulants

Results not available

Give platelets 10ml/kg
Give cryoprecipitate 5ml/kg

Request further shock packs as necessary based on weight and continue resuscitation using doses and ratios as above

If ongoing bleeding consider recombinant factor VIIa

Recheck FBC, coagulation, fibrinogen, biochemistry (with calcium) at least hourly until bleeding stopped

Clinical communications

Identify a specific member of clinical team as “Coordinator” for communication. Coordinator should:

- inform blood bank immediately of patient details (name, Trust number, age, weight), clinical area contact details and products required
- identify clinician leading resuscitation
- phone blood bank to request second/subsequent shock packs
- phone switchboard to stand down when appropriate
- identify a specific individual to contact for subsequent case review (notify blood bank)

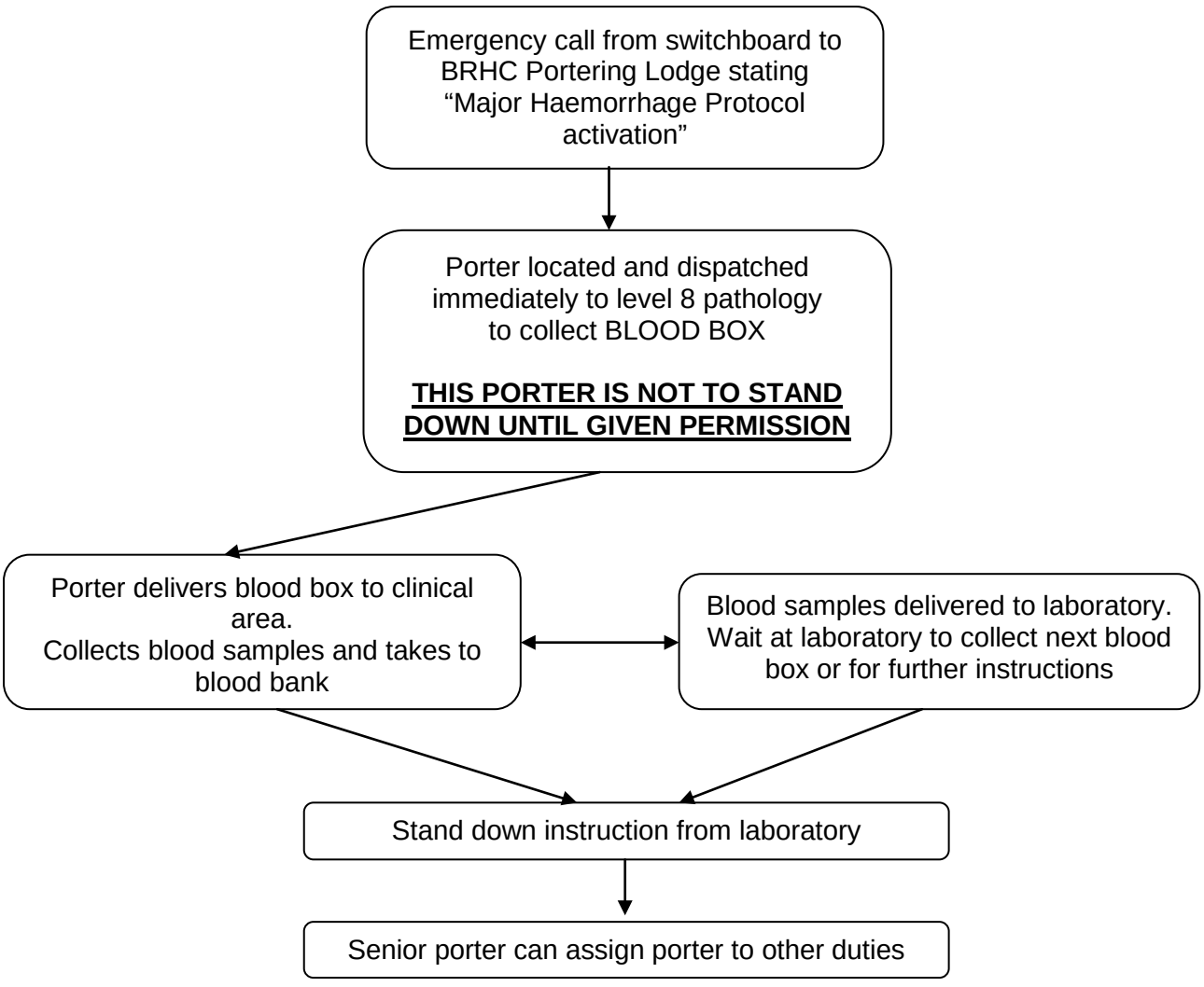
Identify scribe to record time of requests and product/result receipt in patient notes.

Ongoing product support to be discussed with haematology registrar (haemostasis registrar in hours, or on call registrar out of hours).

All phone communications should start with “this call relates to the major haemorrhage in (location)”. If there is difficulty contacting blood bank contact switchboard via [redacted] to advise.

Portering arrangements

Note: blood samples must be given directly to a member of laboratory staff, not left at reception



Role of Laboratory staff

- Notify reception staff and coagulation staff that major haemorrhage protocol has been activated
- Reception staff must take major haemorrhage samples immediately to blood bank, coagulation and biochemistry laboratories
- Issue blood products in temperature controlled blood boxes
- Perform Clauss fibrinogen on all coagulation samples
- Start audit sheet and complete minimum details
- Call haemostasis registrar (on call registrar out of hours) on 2nd shock pack activation or after 30 ml/kg PRC issued (give registrar any blood results available)
- Consider calling second on call if out of hours
- Call clinical location when blood products have been collected by porter
- Contact clinical location triggering paediatric major haemorrhage procedure if no communication from location for 30 minutes to enquire if stand down is appropriate
- When stand down activated contact porters lodge so that porters can be stood down

Role of haematology medical staff

Haemostasis registrar (on call registrar out of hours) contacted by switchboard when [redacted] call is activated

Haematology registrar should also be contacted by BMS:

- After issue of 30ml/kg of PRC
- If unusual product requests made

Registrar should attend or make contact with blood bank approximately 30 minutes after [redacted] call activation. If major haemorrhage is still in progress they should then contact the clinical location.

Advise on additional product support and investigations based on guidelines. Key roles are to ensure appropriate product support has been given and to advise on ongoing management of any coagulopathy

Ensure clinicians at location have registrar or consultant contact details

Discuss with consultant haematologist at discretion or if Novoseven considered

Role of switchboard

Following [redacted] activation, notify the following individuals by speaker bleep or by interrupting telephone call with phrase *"Paediatric major haemorrhage protocol activated, [Location]"*

- Blood bank (on call BMS overnight)
- Clinical Site Manager for Bristol Royal Hospital for Children
- Porters lodge at Bristol Royal Hospital for Children

Connect whoever is activating the paediatric major haemorrhage procedure to the blood bank by bleep or interrupting telephone call

Notify the following by ordinary bleep

- Transfusion practitioner
- Haematology registrar

Communications should begin with phrase “this call relates to the paediatric major haemorrhage in (location)”

Monitoring and evaluation

The Hospital Transfusion Team will review all major haemorrhages on a weekly basis.

A Major Haemorrhage log sheet should be completed for each major haemorrhage event to enable review.

A minimum dataset should be completed at the time of the event to enable retrospective completion.

Major Haemorrhage Logsheet should be opened by laboratory staff:

- on activation of paediatric major haemorrhage procedure
- if more than 30 ml/kg of blood issued within 24 hours

Minimum details to complete at time

- Patient details, location, date and time
- Diagnostic category (trauma/obstetric/GI/Cardiac surgery/ non-cardiac surgery/other)
- Time shock packs issued
- Name of clinician(s) involved
- Difficulties encountered

Remainder of sheet can be completed next working day

- Products issued and transfused
- Laboratory results
- Outcome (did patient survive 24 hours)

Debrief: A member of the hospital transfusion team will contact clinical and laboratory staff involved with the massive haemorrhage by the next working day. A “Structured Debrief” should be completed and filed with the Major Haemorrhage Logsheet. The porter’s log sheet should be filed with the major haemorrhage log sheet.

REFERENCES	Blood transfusion and the anaesthetist: management of massive haemorrhage. Association of Anaesthetists of Great Britain and Ireland. Anaesthesia 2010;65:1153-1161 Massive transfusion in children and neonates. Diab YA, Wong ECC, Luban NLC. British Journal of Haematology 2013;161:15-26 The paediatric transfusion challenge on deployed operations. Bree S, Wood K, Nordmann GR, McNicholas J. J R Army Corps 156 (4 Suppl 1):S361-364 Major trauma and the use of tranexamic acid in children. Evidence Statement, RCPCH, November 2012. Available at www.rcpch.ac.uk
RELATED DOCUMENTS AND PAGES	Transfusion: Major Haemorrhage Procedure Blood transfusion: Clinical guidelines including use of blood products
AUTHORISING BODY	Paediatric Major Trauma Governance Group
SAFETY	All clinically reasonable procedures related to transfusion practice must be undertaken to ensure safety to patients and staff
QUERIES AND CONTACT	[redacted]