MASSIVE HAEMORRHAGE

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Definitions

- Loss of entire blood volume equivalent within 24hrs
- Loss of 50% of blood volume within 3hrs
- Continuing blood loss of 150ml/min
- Continuing blood loss of 1.5ml/kg/min over 20 min

- Rapid blood loss leading to **decompensation** and **circulatory failure** *despite* volume replacement and interventional treatment

COMMON CAUSES

- Trauma
- Obstetric bleed
- Gastrointestinal bleed
- Aortic Aneurysm
- Surgical bleed

Massive Blood Loss Protocol

- NPSA Rapid Response Report 2010
- October 2006 to September 2010 11 deaths reported and 83 incidents of harm as a result of delays in provision of blood in an acute situation
- NPSA Rapid Response Report
  - Early recognition of major blood loss
  - Rapid provision of blood and blood components
  - Effective communication between all personnel

RD&E MASSIVE BLOOD LOSS PROTOCOL ACTIONS

- ABC
- Nominate member of staff to communicate with transfusion
- Activate massive blood loss – trigger phrase
- Resuscitate with warm crystalloid
- Blood samples for
  - Crossmatch
  - FBC
  - Coag
- Trauma pack
  - 1:1 red cells:FFP
  - Rapid issue of blood components without need for clotting results
- Tranexamic acid
- Platelets (>75 or >100 if brain or spinal injury)
- Re-assess FBC, coag, calcium and magnesium

Laboratory procedures

- BCSH guidelines 2014
  - Sample labelling for unknown patients
    - Unique number, gender and indication of age
  - Mislabelled samples
    - Use group O
  - Rapid grouping
    - Anti-A, anti-B and anti-D with control or reverse group
    - Watch out for apparent AB RhD positive patients
    - Sample on analyser asap
    - Second sample for group confirmation

Laboratory procedures

- Antibody screening
  - Retrospective after emergency blood issue
  - Recall procedure if antibody screen positive (or grouping issues)
- Selection of blood
  - Following an emergency rapid group, a second test to detect ABO incompatibility should be undertaken prior to release of group specific red cells.
    - a reverse group, using a new aliquot from the patient's sample;
    - a repeat forward group using a new aliquot from the patient's sample;
    - a saline spin crossmatch

Laboratory procedures

- >8 units of red cells
  - RhD positive blood for RhD negative females >50 and males with no detectable anti-D
- Concessionary release
  - Use of D positive blood for a D negative patient who would normally be excluded from receiving D positive units.
  - Use of antigen positive or un-typed red cells in patients with atypical red cell antibodies.
  - Issue of red cells to patients with AIHA without the necessary exclusion of underlying antibodies.
  - Issue of components that do not meet known special requirements, e.g. CMV negative or irradiated

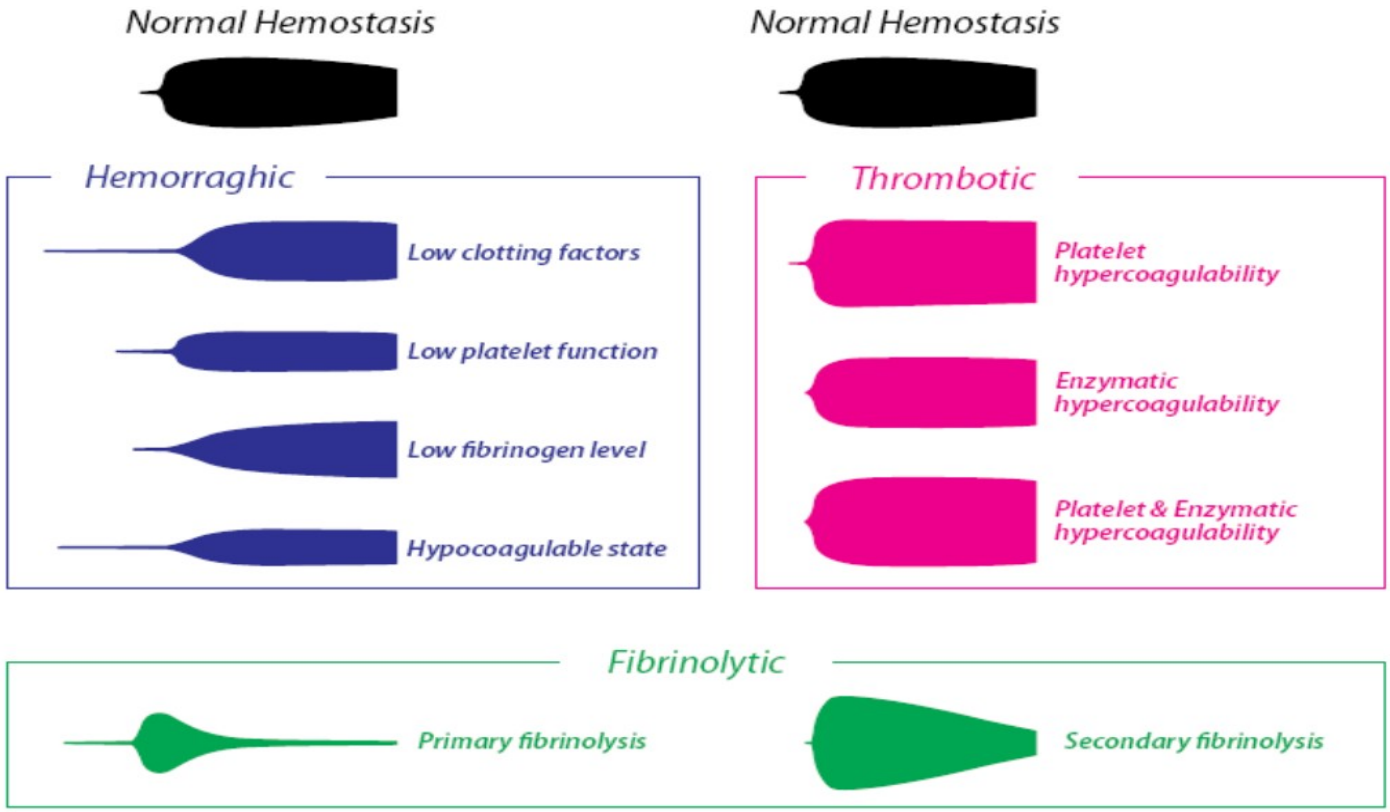
Communication

- Key to success!
- Trigger phrase known by clinical area, switchboard, lab
- One person in clinical area and one in the lab
- Stand down

Point of Care Coagulation testing

- ROTEM vs TEG
- Haemostasis testing in whole blood – rapid results
- Hypo and hyperfunctional stages of the clotting process
- Targeted therapy
  - Blood components
  - Factor concentrates
  - Anticoagulants
  - Antifibrinolytics

Targeting therapy - TEG



Haemostatic Agents and Sealants

- Animal source
  - Floseal
  - SURGIFLO
- Human source
  - TachoSil
- Plant derived
  - SURGICEL
- Synthetic

HemCon

- Shellfish derivative (chitosan)
- Causes Ionic attraction of red cells to stick to tissue + over injured vessels
- Works independently of the clotting cascade
- Highly effective
- Now in thinner dressings –easier to push in
- Shelf-life 2yrs

QuikClot

- Gauzes impregnated with Kaolin – activates clotting cascade
- Acts as a sponge, rapidly absorbing fluid to produce coagulation and a stable blood clot in the wound
- It is chemically inert and is not absorbed into the body
- Safe to stay in the wound as long as needed
- Used
  - Military
  - Trauma centres
  - Emergency services

Anti-fibrinolytics

- Potential to reduce blood loss
- Aprotinin, Tranexamic acid, Epsilon aminocaproic acid
- Aprotinin suspended by FDA 2007 as result of reports of increased mortality in CABG
- Major international trial CRASH-2
  - Use of Tranexamic Acid within 3 hours of injury reduces death due to bleeding
  - Use >3 hours after injury can increase death due to bleeding

SHOT cases – communication failures and lab issues

- **Case 1: Delayed provision of red cells as a result of poor labelling and communication confusion**
- *An elderly man required an emergency transfusion during massive gastrointestinal haemorrhage (Hb fell from 88 to 47g/L) complicated by a warfarin-related high INR of 11.5.*
- *Group-specific red cells were issued but were unlabelled for the patient and could not be transfused.*
- *The samples were sent by the incorrect route (pneumatic tube rather than hand-delivered),*
- *There were communication failures between the clinical area and the laboratory.*
- *The patient arrested and died, and the delay in transfusion may have contributed (3 errors).*

Delay in activation of MH

- **Case 2: A woman with pneumonia developed gastrointestinal bleeding with failure to recognise**
- **signs of bleeding and role of medication**
- *A 44 year old woman was admitted with bacterial pneumonia.*
- *On the third day of admission (Wednesday) she had a large haematemesis – Hb was 94g/L having*
- *been 124g/L on admission. Endoscopy took place on Friday and showed 3 gastric ulcers which were*
- *not actively bleeding, but she had a tachycardia of 116bpm.*
- *No medical notes were recorded for the weekend which was interpreted in the RCA as a failure to review the patient.*
- *Late on Sunday night she had repeated further episodes of haematemesis with melaena, Hb was 73g/L, blood pressure (BP) 88/55mmHg.*
- *She received one unit of blood; 2 hours later Hb was 52g/L, pulse rate 132 and she was distressed. The major haemorrhage protocol was then activated. She suffered a cardiac arrest with at least 15 minutes without an output with successful resuscitation but suffered hypoxic brain injury.*
- The root causes were identified as a failure to recognise haemodynamic compromise with delay in activation of the MHP.
- There should be a clearly defined escalation policy to ensure the delivery of basic and essential medical and nursing care at night and the hospital should ensure that trainee medical staff on duty at night are competent to deal with all relevant acute medical conditions.

Incorrect trigger phrase for MH

- **Case 3: Confusion about the trigger phrase for massive haemorrhage leads to the wrong**
- **emergency team being alerted and a delay in receipt of components**
- *A patient was admitted to a maternity hospital with pulseless electrical activity due to hypovolaemia from a ruptured uterus.*
- *The MHP was triggered by the clinical staff at 23:40 using an incorrect trigger phrase. This was not recognised by the hospital switchboard who consequently activated only the cardiac arrest team in error.*
- *The caller from the clinical area did not realise he had not been connected to the transfusion laboratory to discuss the requirements for the patient.*
- *At 00:55 the clinical area called the transfusion laboratory to ask where the platelets were. The laboratory had not been advised of the activation of the MHP, but was able to prepare and rapidly issue appropriate components.*
- *Three emergency O RhD negative units were transfused before group specific blood became available.*
- *The patient required admission to ITU.*

PID errors and delays with sample

- **Case 4: More haste less speed – wrong date of birth**
- *A 66 year old man with a ruptured aortic aneurysm had delayed provision of major haemorrhage packs as the ambulance staff transferring him from one hospital to another gave the wrong date of birth to the emergency department.*
- *This was entered into the Trust information technology (IT) system.*
- *In addition, the blood sample was delayed reaching the laboratory and had not been marked as urgent (2 errors).*

Main messages

- Know local protocols – regular drills
- Preparation as soon as MH call received
- Ask for help
- STAY CALM!!