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Massive Haemorrhage

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NHS Blood and Transplant

Lab Matters study day
Oake Manor, Taunton, 8th July 2015

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Massive Haemorrhage

NPSA Rapid Response Report 2010

'Transfusion of blood and blood components in an emergency'

- Oct. 2006 to Sept. 2010: 11 deaths and 83 incidents of harm as a result of delays in provision of blood in an acute situation were reported
- RRR issued in Oct. 2010 on the provision of emergency blood components

- Recommendations:
  - Policy indicating roles and actions of all involved
  - Protocol enabling release of blood components
  - Familiarity of clinical & lab. staff with massive blood loss protocol: training and drill
  - Early recognition and communication to lab. of massive haemorrhage
  - Use of trigger phrase for MBL protocol
  - Ongoing communication between clinical, lab. and porters/support
  - Audit/review of MBL protocol triggers

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A practical guideline for the haematological management of major haemorrhage

6th July 2015

- Arbitrary definitions of major blood loss:
  - one blood volume within 24hrs
  - 50% of blood volume within 3hrs
  - >150ml/min

- Difficult to apply; often retrospective

- BCSH: bleeding resulting in HR > 110/min and/or BP <90mmHg systolic
- Hospitals must have locally agreed triggers

A practical guideline for the haematological management of major haemorrhage

Recommendations:

Medical, nursing and midwifery staff involved in frontline care must be trained to recognize major blood loss early, know when to activate/trigger the local major haemorrhage protocol and take prompt and appropriate action (1D).

Hospitals must have local major haemorrhage protocols with adaptations for specific clinical areas (1D).

All medical, nursing, laboratory and support staff must know where to find the haemorrhage protocol in relevant areas and be familiar with the contents; their knowledge should be supported by training and regular drills (1D).

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Recommendations:

Following trigger of the major haemorrhage protocol there must be a clear mechanism for contacting all relevant team members and a designated Team Leader should then co-ordinate further management (1D).

A Team Leader should be appointed and nominate a specific clinical team member to co-ordinate communication with Transfusion Laboratory staff and support services for the duration of the incident (1D).

>> the team:

1 Porter/other support staff
2 Senior clinician depending on clinical area
3 Anaesthetist/Intensive Therapy Unit
4 Senior nurse/midwife
5 Transfusion Laboratory
6 Other laboratories (Haematology and Coagulation, Biochemistry)
7 Clinical Haematologist on call
8 Radiology including interventional radiology

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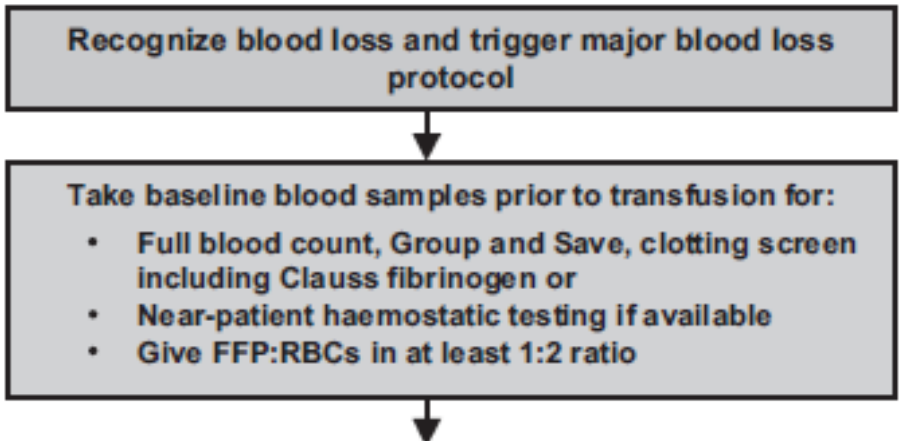

Serial haemostatic tests, including platelet count, PT, APTT and fibrinogen, from before and after resuscitation should be used regularly, every 30–60 min depending on the severity of the haemorrhage, to guide and ensure the appropriate use of haemostatic blood components (1C).

Recommendations:

Hospitals must have a strategy to ensure that red cells are readily available for life-threatening bleeding, through the use of emergency Group O red cells and also through the rapid provision of group-specific red cells by the transfusion laboratory (IC).

Patients must have correctly labelled samples taken before administration of emergency Group O blood (IC).

- NICE (2014) stated there is insufficient evidence to support use of TEG/ROTEM in the management of trauma / obstetric haemorrhage

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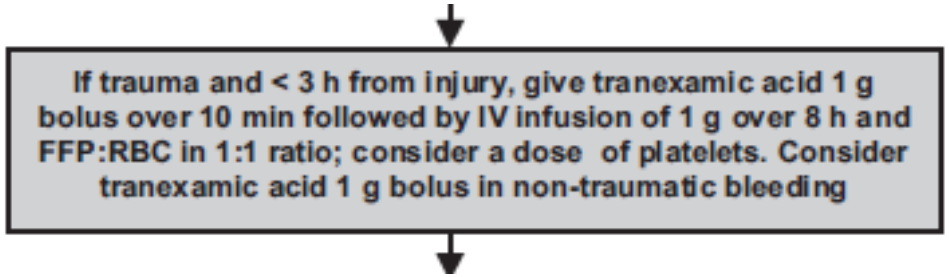
Recommendations:

Adult trauma patients with, or at risk of, major haemorrhage, in whom antifibrinolytics are not contraindicated, should be given tranexamic acid as soon as possible after injury, at a dose of 1 g intravenously over 10 min followed by a maintenance infusion of 1 g over 8 h (1A).

The use of tranexamic acid should be considered in non-traumatic major bleeding (1B).

The use of rVIIa is not recommended in the management of major haemorrhage unless as part of a clinical trial (1D).



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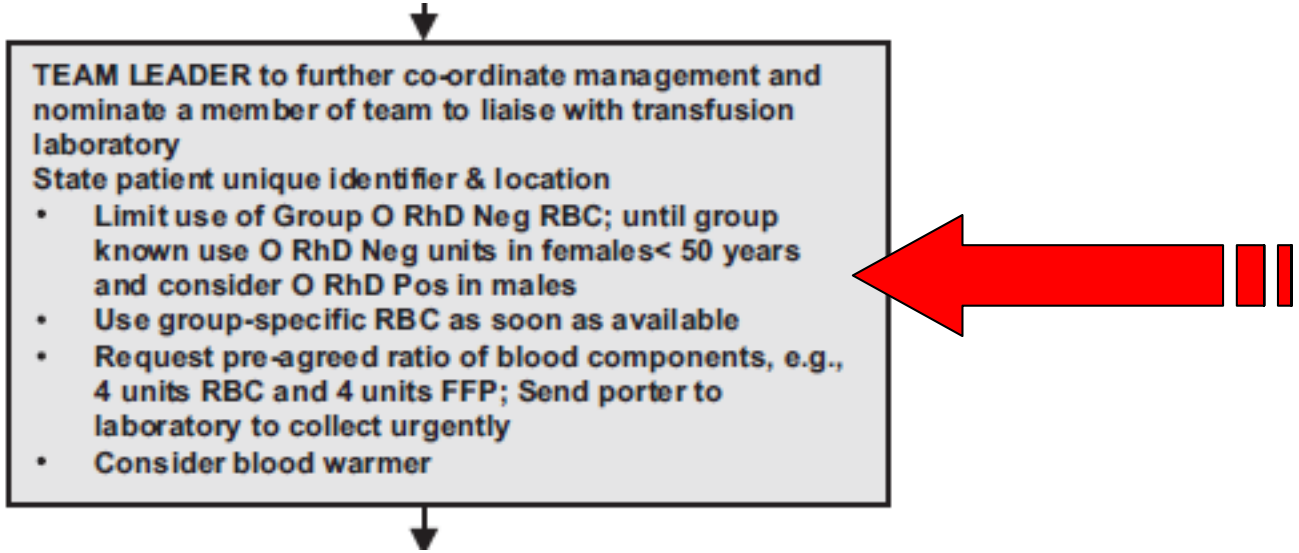

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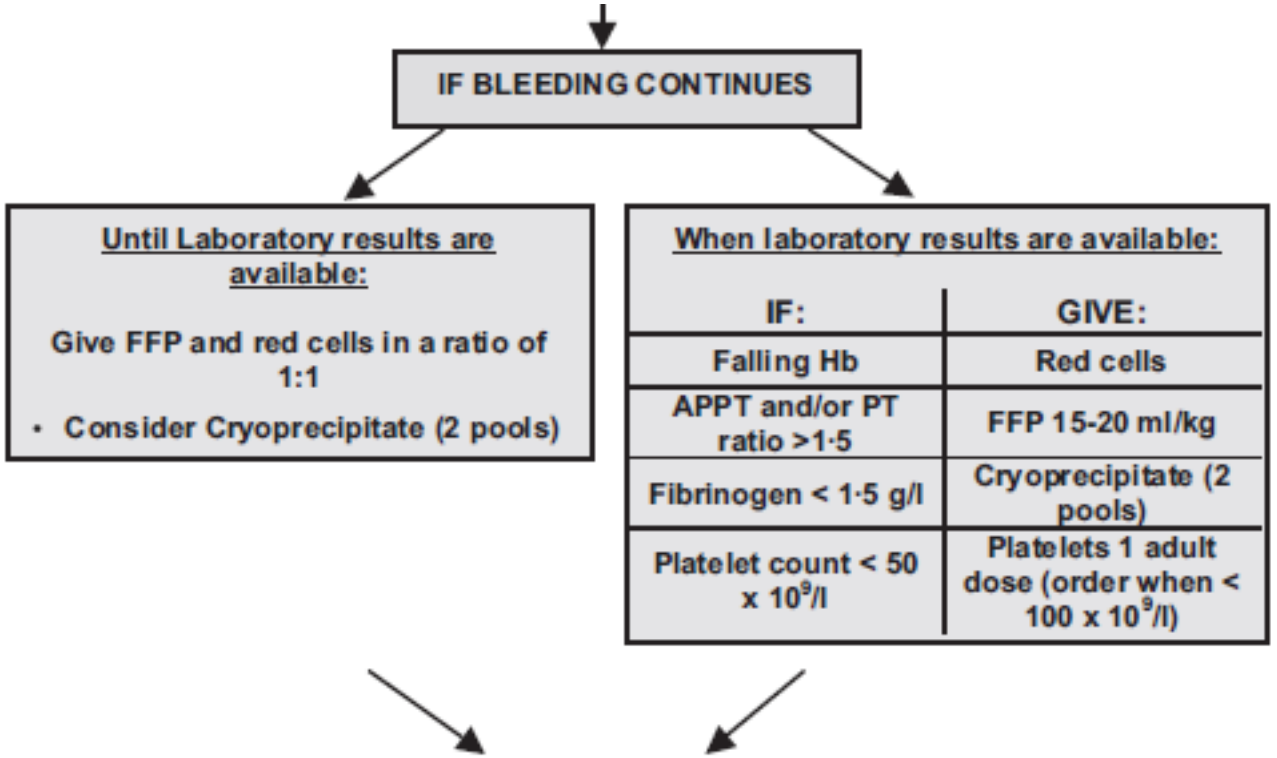

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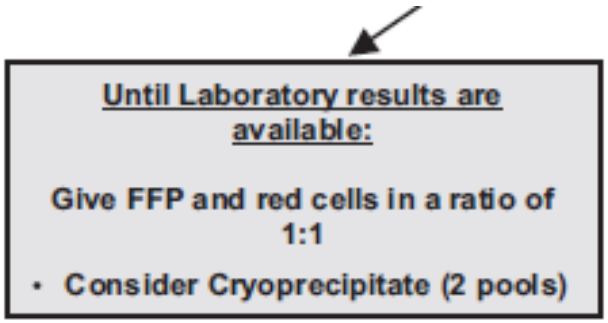

Recommendations:

Adult trauma patients with, or at risk of, massive haemorrhage should initially be transfused empirically with a 1: 1 ratio of plasma: red blood cells (1B).

The early use of platelets should be considered (1B).

The recent PROPPR trial (Holcomb *et al*, 2015) reported that in patients who have or are at risk of massive blood loss, initial infusion with plasma, platelets and red blood cells in a 1:1:1 ratio compared to 1:1:2 ratio did not improve overall survival. However in additional analyses more patients in the 1:1:1 group were reported to achieve 'anatomic' haemostasis and fewer may have experienced death due to exsanguination by 24 h. The relative contribution of platelets or plasma to the resuscitation outcomes could not be defined in this study. We recommend that plasma: red blood cells are given initially in a 1:1 ratio, but when bleeding is under control, laboratory testing should guide blood component therapy. We suggest consideration of early use of platelets.

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Transfusion of Plasma, Platelets, and Red Blood Cells in a 1:1:1 vs a 1:1:2 Ratio and Mortality in Patients With Severe Trauma

The PROPPR Randomized Clinical Trial

CONCLUSIONS AND RELEVANCE Among patients with severe trauma and major bleeding, early administration of plasma, platelets, and red blood cells in a 1:1:1 ratio compared with a 1:1:2 ratio did not result in significant differences in mortality at 24 hours or at 30 days. However, more patients in the 1:1:1 group achieved hemostasis and fewer experienced death due to exsanguination by 24 hours. Even though there was an increased use of plasma and platelets transfused in the 1:1:1 group, no other safety differences were identified between the 2 groups.

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Recommendations:

Fresh frozen plasma (FFP) should be as part of initial resuscitation in major haemorrhage in at least a 1 unit: 2 unit ratio with red cells until results from coagulation monitoring are available (see also separate specific guidance for trauma below).

Once bleeding is under control, further FFP should be guided by abnormalities in laboratory tests with transfusion trigger of PT and/or APTT >1·5 times normal for a standard dose e.g. 15–20 ml/kg (2C).

If laboratory results are not available, and bleeding continues, further FFP may be transfused in at least a 1:2 ratio with red cells, prior to moving on to blood product use guided by laboratory results (2C).

Use of FFP should not delay fibrinogen supplementation if it is required (2C).

The use of PCC is not recommended in the management of major haemorrhage unless as part of a clinical trial

When laboratory results are available:

IF:	GIVE:
Falling Hb	Red cells
APPT and/or PT ratio >1·5	FFP 15-20 ml/kg
Fibrinogen < 1·5 g/l	Cryoprecipitate (2 pools)
Platelet count < 50 x 10^9/l	Platelets 1 adult dose (order when < 100 x 10^9/l)

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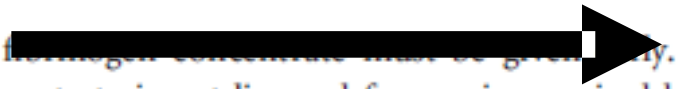
Recommendations:

Fibrinogen supplementation should be given if fibrinogen levels fall below 1·5 g/l (1C). Cryoprecipitate is the standard source of fibrinogen in the UK and two five-donor pools will increase fibrinogen in an adult by approximately 1 g/l.



[redacted]y. Fibrinogen concentrate is not licensed for use in acquired bleeding disorders in the UK, but is widely used in mainland Europe; again there is a lack of clinical trials to define safe and effective use, nor any high level evidence comparing outcomes in patients receiving fibrinogen concentrate compared to cryoprecipitate.

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In major haemorrhage aim to keep platelets >50 × 10^9/l (1B); we suggest that platelets should be requested if there is on-going bleeding and the platelet count has fallen below 100 × 10^9/l (2C).

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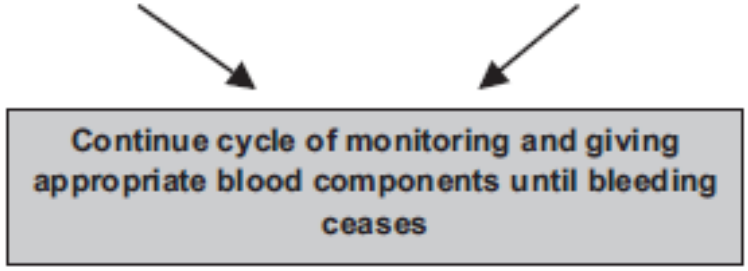

Recommendations:

In major obstetric haemorrhage, blood component management should follow a similar pathway as for non-pregnant patients (2C), except that meticulous attention should be paid to fibrinogen levels and consideration given to the early use of fibrinogen supplementation when fibrinogen levels are <2·0 g/l and there is on-going bleeding (1D).

In major obstetric haemorrhage, consideration should be given to using tranexamic acid (1B).

In gastro-intestinal non-massive haemorrhage a restrictive strategy of red cell transfusion is recommended for many patients (1A).

Multidisciplinary audit and case review should be undertaken to ensure that effective systems are in place for major haemorrhage management (1A).

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RD&E MBL protocol - actions

- ABC
- Nominate member of staff to communicate with transfusion
- Activate MBL protocol – 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

RD&E 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

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RD&E Laboratory procedures

- Antibody screening
  - retrospectively after emergency blood issue
  - recall procedure if antibody screen positive (or grouping issues)

- Selection of blood
  - following an emergency rapid group, a second ABO incompatibility test 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

RD&E Laboratory procedures

- >8 units of O RhD- red cells
  - O RhD+ red cells for O RhD- females >50 and males with no detectable anti-D

- Concessionary release
  - use of D+ blood for a D- patients who would normally be excluded from receiving D+ 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.

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Point of Care Coagulation testing

- ROTEM vs TEG
- Haemostasis testing in whole blood – rapid results
- Hypo- and hyper-functional stages of the clotting process
- Targeted therapy
  - blood components
  - factor concentrates
  - anti-coagulants
  - anti-fibrinolytics

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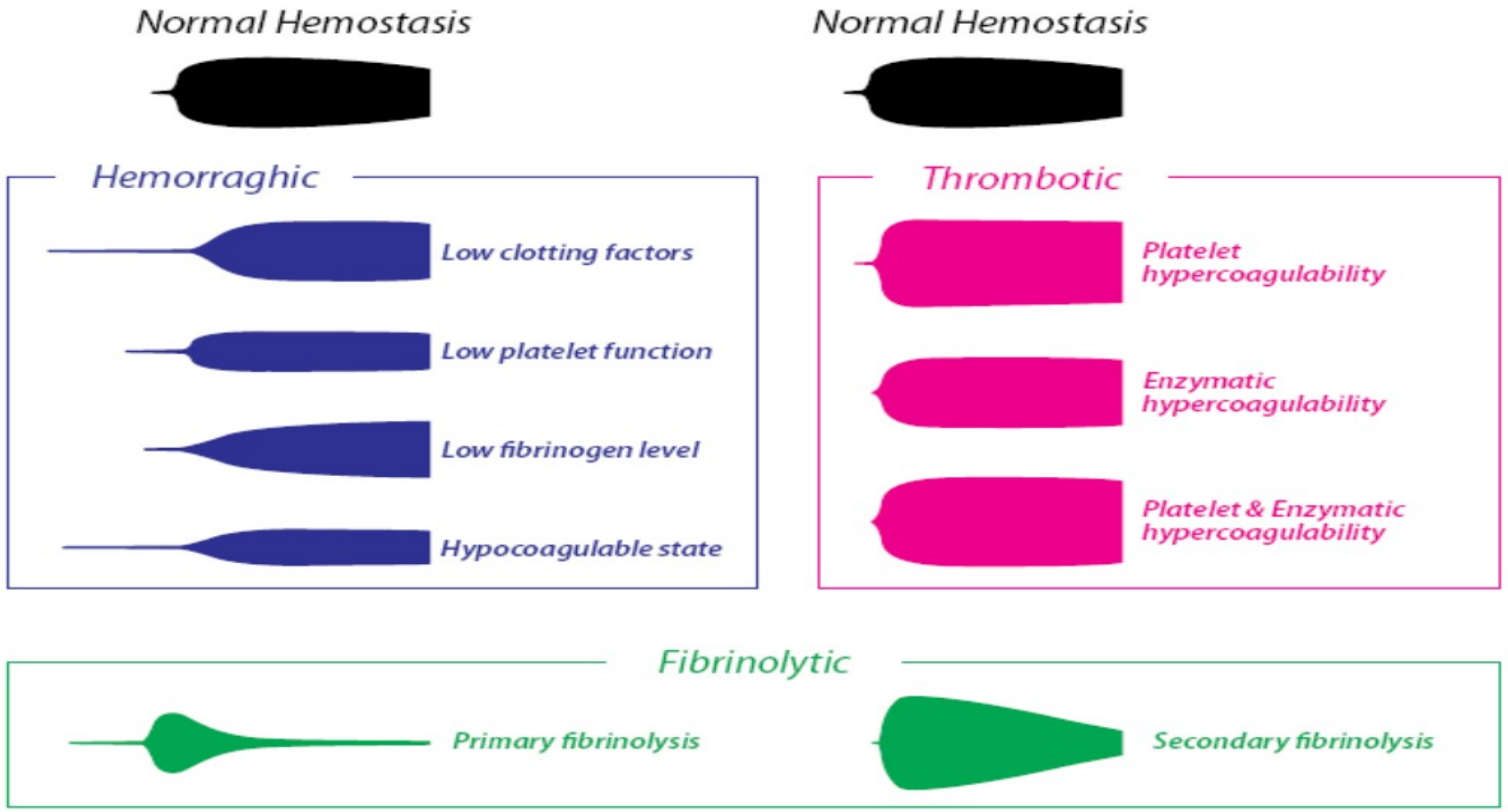
Targeting therapy - TEG



RD&E - Communication

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

SHOT - delay in activation of MH

- **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.

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SHOT - incorrect trigger phrase for MH

- **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.*

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Main messages

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

Acknowledgment

Thanks to Jeni Davies, Royal Devon & Exeter NHS FT