Is Pre-Hospital Blood Needed?

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My Background

East of England Trauma Network

- Pre Hospital Physician since 2007
  - Biased and opinionated
- Chair of Department of Pre-Hospital and Retrieval Medicine at Addenbrookes and a national pre-hospital curriculum and development lead (RCSEd)
- MTC resuscitation Lead at Addenbrookes
- No expertise in transfusion – only experience

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Is Pre-Hospital Blood Necessary?
(the ground rules)

- Language
  - ***No Blood*** - Packed Red Blood Cells (PRBC)
  - O Negative

It is simply impossible currently to define who would benefit from PRBC in the pre-hospital phase - the patient journey and outcome data is just not robust enough.

Discussion

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- Is administering pre-hospital packed red blood cells and/or blood products feasible?
- Evidence behind pre-hospital packed red cells
- Unintended consequences of carrying PRBC
- What next for the East of England

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Is pre-hospital packed red blood cells feasible?

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Is pre-hospital packed red blood cell administration feasible?

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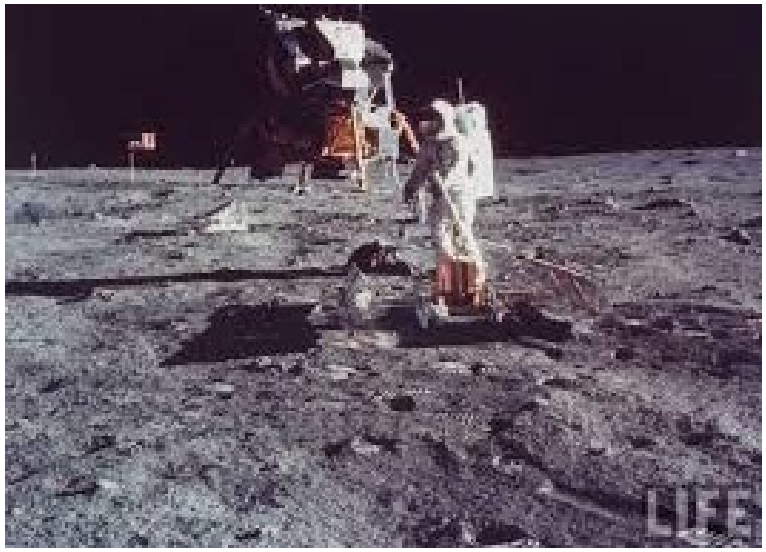

Evidence behind pre-hospital packed red cells

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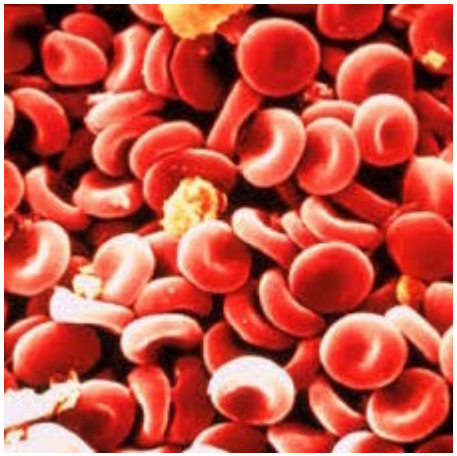

- What evidence do we want?
- What outcomes do we want?
- What regime/ policy should we adopt?
- What do we want to avoid?

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In a perfect world?

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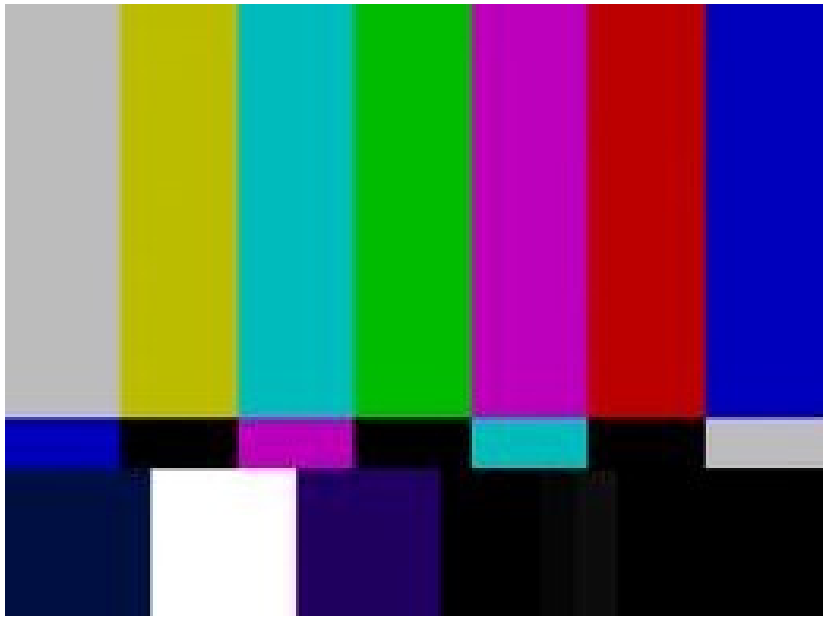
- Give the packed cells to the right patient – one who will die before they reach an ED without oxygen carrying fluid
- Isolated PRBC transfusion confer survival benefit over nothing/IV crystalloid
- No significant increased risk of coagulopathy or transfusion reaction with isolated PRBC transfusion
- Decrease in subsequent required hospital transfusion
- Large clinical trials

There is no quality evidence!



Military transfusion

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Military Experience

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American ten-year analysis of transfusion in Operation Iraqi Freedom and Operation Enduring Freedom (2012)

- 3632 patients
- Coagulopathy had x5 increase in mortality
- High FFP to PRBC ratios increased survival

The Armed Services Blood Program: blood support to combat casualty care 2001 to 2011

- Earlier cryo, platelets and high FFP to PRBC ratios

Civilian data

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- J Trauma Acute Care Surg. 2014 Jul 21
- Time matters in 1: 1 resuscitations: Concurrent administration of blood: plasma and risk of death
- 169 trauma patients in level 1 trauma centre
- Patients who were able to meet the 1:1 ratio had a noticeable decrease in risk of death compared with those who achieved less than 1:1 transfusions
- Mortality increased 8 times with poorer FFP to PRBC ratios

Civilian data - cont

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- Characteristics and outcomes of patients administered blood in the prehospital environment by a road based trauma response team - Australia
  - Emerg Med J 2014;31:583-588

- 71 patients
- No patient mortality/outcomes described

retrospective, descriptive study of current practice

Unable to draw any conclusions about outcome or increased/decreased morbidity or mortality

What do we know about trauma transfusion

- Poor PRBC to FFP ratios increase mortality (x8)
- 33% of patients come in to ED already coagulopathic (increase in mortality x5)
- No published evidence to support PRBC in isolation
- No pre-hospital studies showing PRBC in isolation confer benefit of survival to hospital, discharge

Unintended consequences

Pre-hospital Physicians

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- Limited set of interventions in very difficult circumstances
- No evidence we do any good – always seeking to prove we're adding value
- We have all know of someone who has exsanguinated at the roadside
- We all want to "bring the ED to the patient" – but we cant!
- We all believe our own propaganda


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Rh POSITIVE

Pre-hospital decision making

- Often patients have been on scene a long time
- Limited diagnostics available
- High stress situation
- Poor awareness of time which has passed since injury (average scene time 45 minutes)

Over triage

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- J Trauma Acute Care Surg. 2014
- 825 patients cared for by pre-hospital doctor paramedic emergency team
- 60% over triage of injuries

Case

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East of England regional case:

- Discussed recently in public governance forum
- Case described as showing why pre-hospital PRBC is necessary and would have helped

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Case 1

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- Female in early 30's jumps from height (>5 metres) onto concrete – not trapped
- All limbs fractured, some open - hypotensive
- 999 call to HEMS arrival (1 hour) – at night
- Team on scene - 30 minutes
- Planned flight to Addenbrookes - 45 minutes
- 999 call to Addenbrookes would have been - 2.5 hours

Same patient

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4 minutes by road from large emergency department with consultant led trauma team and massive transfusion policy.

- What would PRBC's have added?
- Delay to care?
- The wrong destination hospital?

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What next for the East of England?

- We are not London!
  - Different case mix - 4 MTC's within a 10 minute drive

- Responsibility lies with the regional trauma network
  - Significant risk with services "going it alone"
  - Already have a regional massive transfusion policy

- Wider implications for patients than just administering the PRBC's
  - (delay in definitive care, coagulopathy, sampling issues in resus)

  - If patient requires PRBC surely closest hospital should be the destination.

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Why not use evidence?

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RePHIL Study:

Resuscitation with Pre-Hospital Blood Products

•Multi-centre, open label randomised controlled trial of pre-hospital resuscitation with PRBC and FDP against standard restricted crystalloid resuscitation.

•Patients will be included if they are adults (aged 16 or above), attended by a pre-hospital doctor and are hypotensive (SBP <90mmHg or absence of palpable radial pulse) as a result of traumatic haemorrhage.

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- **Primary outcome measure**

  Venous lactate concentration on the first blood gas taken after arrival in hospital.

- **Secondary outcome measures**

  Time spent on scene

  Patient vital signs on arrival

  Standard laboratory tests of blood clotting

  Survival at 6, 12 and 24 hours and at 30 days

  Blood product administration at 6, 12 and 24 hours

  Development of acute respiratory distress syndrome during hospital admission

  Coagulation status (measured viscoelastically by ROTEM) and platelet function (measured with MultiPlate) on arrival will be assessed where these capabilities are available.

A study of 520 patients is required to provide 80% power to detect a 20% difference in venous lactate with 95% significance

What next for the East of England?

- Consensus from regional Summit held on 11/9/2013
- All stakeholders present:
  - Regional third sector providers, trauma network, ambulance service, MTC and regional transfusion
- Agreement to engage with RePHIL trial and set up national multi centre trial with EoE, West Mids and Severn
- ....let's wait and see what the evidence shows.....