Transfusion Emergency Preparedness for Mass Casualty Events

Dr Heidi Doughty  OBE MBA MD PhD
Consultant in Transfusion Medicine
NHS Blood and Transplant
Birmingham
Clinical lead – emergency planning
Hon Senior Lecturer in Transfusion Medicine, Dept of Clinical Trauma, University Hospitals Birmingham

Nov 2019
Heidi.doughty@nhsbt.nhs.uk
Faculty Disclosure

The author has no conflict of interest to declare

- The experience is based on man-made disasters
- Many of the slides have been shown as part of previous teaching material
- I am currently the president of the British Blood Transfusion Society and serve as an adviser to government organisations
- The views and opinions expressed in this presentation are those of the author

Acknowledgements:

- Dr Fatts Chowdhury and the UK National Blood Transfusion Committee, Emergency Planning working group
- Drs Justin Kreuter and Glenn Ramsay, US
- Mr Richard Rackham and the NHSBT Business Continuity team
Content

• Introduction
• Transfusion for trauma
• Demand planning
• Future directions
INTRODUCTION
Mass casualty events – need for transfusion services to prepare

- Major incidents require extraordinary measures – especially the use of resources
- Where major incidents are associated with mass casualties - the demand for blood may exceed local/immediate stocks
- Preparedness required to organise and move stock to meet a surge in demand
- Plans and practice essential to reduce risks associated with transfusion

Increasing awareness of the need for transfusion support in trauma and Mass Casualty Events
Aims of Transfusion Emergency Preparedness (NHSBT aims)

To protect and if possible enhance the reputation of organisation by effective incident management

To protect as far as is reasonably practicable the delivery of key products and services

To safeguard, as far as is reasonably practicable the health, safety and welfare of our donors, staff and visitors

*To manage the incident within the constraints of regulatory and legislative requirements

To strive for a recovery to Business As Usual (BAU) in the shortest possible time

Our Business Continuity framework is BSI ISO22301.
ISO 22301 specifies the requirements for a management system to protect against, reduce the likelihood of, and ensure your business recovers from disruptive incidents
Emergency preparedness, resilience and response (EPRR)

Civil contingencies
- National
- Emergency services

Healthcare
- NHS England EPRR
- Emergency Planning, Resilience and Response

Transfusion community
- Blood services
- Hospital transfusion teams
Preparation of the Public

RUN HIDE TELL

RUN to a place of safety. This is a far better option than to surrender or negotiate. If there’s nowhere to go, then...

HIDE. It’s better to hide than to confront. Remember to turn your phone to silent and turn off vibrate. Barricade yourself in if you can. Then finally and only when it is safe to do so...

TELL the police by calling 999.
TRANSFUSION FOR TRAUMA
Stop the bleeding

‘Shock/ATP’ Packs and blood group substitutes

Use group A (HT neg) plasma. Note alternative plasma – Octaplas, Lyophilised plasma. Consider Pre-thawed
Massive transfusion versus Mass casualty event

Massive Blood Transfusion

Mass Casualty Events
Transfusion and triage

Transfusion support in MCEs includes:

- Donation
- Distribution
- Diagnostics
- Direct care

Balancing the risks

Context

Sufficiency

Safety

Systems

Staff and Support
DEMAND PLANNING
A past Israeli survey of 1645 attacks involving 7497 casualties (Shinar et al, 2006) suggested
- 13% death at scene with
- 8% severe (p1) and
- 12% (p2) moderate casualties,
  i.e. a total of 20% who may need blood.

UK Planning assumptions

Bottom-up planning for incidents
- Number of casualties (P1 and P2) x
- Amount of RCC required x
- Red cell demand: use ratio x3

Assumptions
- Early use of other blood components
- Increased use of ‘universal components’ (75% group O RCC)
- Few casualties should require massive transfusion
- Consider nature of incident and need for continuing support and repeat surgery

Recent literature reviews (2013 and 2017)

- In Terrorist attacks - Relationship between mechanism/injury severity and blood use.
- Overall 2-3 RCC per casualty. 6 units RCC per critically injured. May be less RCC required if other components or Whole Blood used.
- Red cells, 2/3 (62-74%) used within first 4hr, 27% Group O, un-cross-matched.

23 patients (30.7% of 75 admitted) were transfused (20% of 112 originally reported physically injured)

A total of 89 units of RCC were used
Mean RCC use = 3.9 units per patient
• Min = 1
• Max = 15
• Mode = 2
3 patients received MT ≥ 10 units (*4 = 5.3%)
5 patients received ≥ 5 units (*6 = 8 %)

*Corrective factor for children (aged >19) using 50th centile on UK weight charts

Many young females leading to O neg use

Multi-trauma accounted for the majority of red cells used

Christchurch mass shootings 2019

• One tertiary hospital
• 46 patients triaged, 96% male
• 45% ISS > 15
• Close range, high velocity, hollow point bullets
• RBC Tx U median 2/ mean 7.6 (1 patient-199 units)
• 8 Massive Transfusion Protocols in 12 hr
• Labelling problems → O pos RCC and group A plasma

Transfusions in MCEs: Recent Trends (Ramsey 2019)

Proposed “75th-Percentile Rules of Thumb” for blood providers

– RBC : plasma : platelets - units per admission:
  – “4 : 1 : 0.25” for blood centers [event-wide needs]
  – “6 : 4 : 0.5” for trauma centers

Recent MC trends:

– Plasma usage trending up
– Intensive platelet use in mass shootings
FUTURE DIRECTIONS
Emergency Planning working group (UK)

- National Blood Transfusion Committee
- Recent experience
- Multi-disciplinary
- Integrated with wider planning
Current UK guidance for transfusion planning

Hospital planning assumptions and stock holdings should be guided by the pre-determined casualty regulations and capability chart from their regional MI plan.

- P1 to Major Trauma Centres,
- P2 to Trauma Units

General guidance is 3 RCC per casualty admitted and 7-8 RCC with components for the more severely injured with haemorrhage.

New roles and responsibilities

Consider sending haematology and transfusion staff forward to support:

• Emergency Department
• Trauma theatres

Roles could include:

– Transfusion triage and issue
– Traceability of blood units
– Transfusion sample security (second transfusion samples and changing ID)
– Haemovigilance

Exercising the role of a forward transfusion co-ordinator in Ex Pandora, University Hospitals Birmingham 2017.
Whole blood?

Offers simplified donation, logistics and speed of delivery

Considerations:

- Demand for group O neg
- Inventory management
- Platelet sparing leucodepletion
- Cold platelets
- Haemolysins

Endnote – the Human Factor

• Plan
• Prepare
• Prioritise
• Practice
• Communicate
• Care**
Working together

• Hospitals
• Blood services
• Healthcare agencies
• Volunteers and donors
• Emergency responders
• Military medicine and academia
• The international transfusion community