PRE-HOSPITAL CARE & MASSIVE TRANSFUSION: A MILITARY PERSPECTIVE

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Introduction

- Why me?
- Why this talk?

Overview

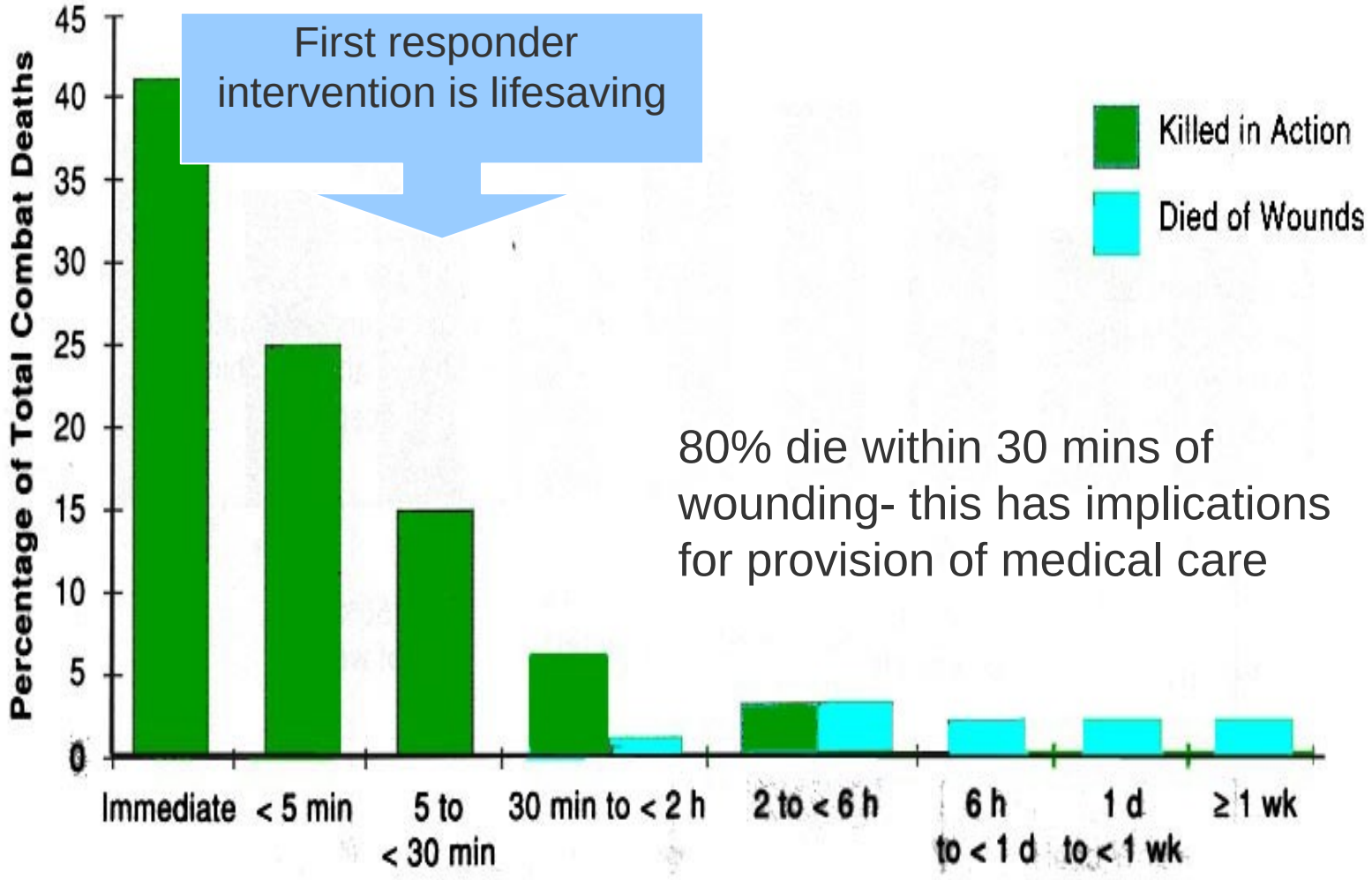
- Differences between military/civilian PHC
- What is Military Massive Transfusion?
- Military management of Massive Transfusion
- Evidence…
- Practicalities
- Research
- Questions

Evacuation Chains

- **Civilian**
  - Point of Injury
  - Recovery by Ambulance Service
  - Definitive treatment in Hospital
  - (Referral for Specialist Care)
  - <100km
- **Military**
  - Point of Injury
  - Self/Buddy Aid/Team Medic
  - Casevac
  - Initial treatment role 2 (+)
  - Tactical CCAST
  - Strategic CCAST
  - RCDM
  - 1000km+

The platinum ten minutes

US Army Vietnam

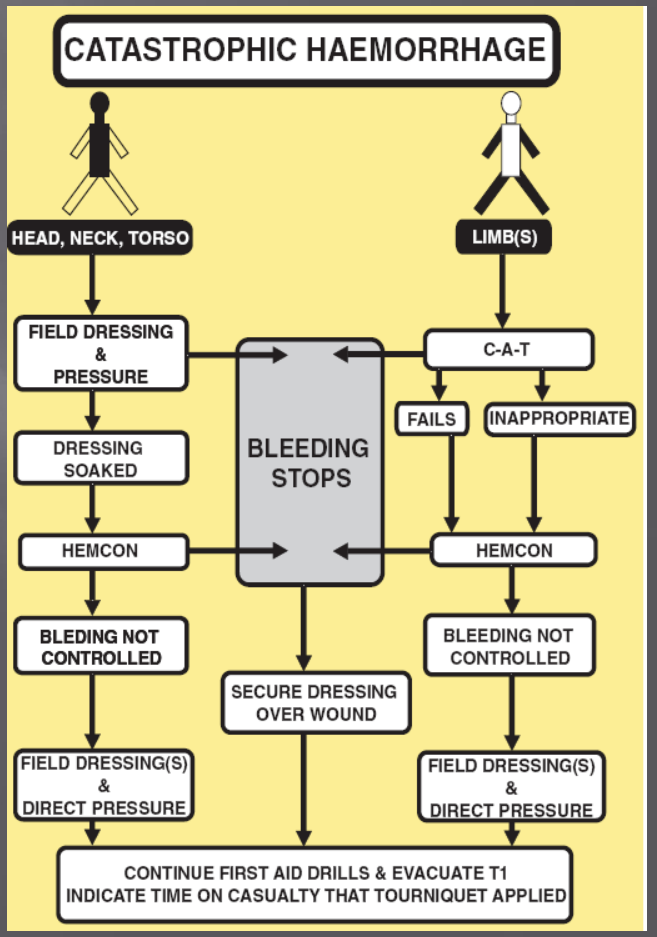


80% die within 30 mins of wounding- this has implications for provision of medical care

- So- military casualties are different.
- Can we still learn from them?

New wars, new ideas

- Traditional ATLS teaching- ABCDE
  - Stabilise for surgery
  - Definitive surgery early
  - Tourniquets are bad
- New paradigms:
  - C-ABc
  - CAT
  - DCR & DCS



Immediate management: Haemorrhage Control

- Early: FFD, Tourniquet, Haemostatics
- Later: ACoT treatment

New Ideas: ACoT

- 25% arrive in ED with coagulopathy
  - Incidence increases with severity of trauma
  - Multifactorial
    - Fibrinogen
    - Acidosis related platelet dysfunction
    - Dilutional
    - Consumption of factors

Brohi et al J Trauma 2003. 54(6)

Changes in Military Transfusion Practice

- Evolving Information/Evidence
  - Observational, multiple data bases
- Military v NHS
  - rapid changes in doctrine possible
  - CRASH 2 (& subsequent observational studies)
  - ROTEM/TEG

Military Pre-Hospital Care

MERT offers:

Haemorrhage Control
Airway Management
Analgesia & Anaesthesia
Chest Drains
Blood & Products
Complex Decision making
Overflight to surgery

Military Massive Transfusion

- Definitions
- Historical Management
- Changing demographics allied to rapid transfer

What is a massive transfusion?

- Civilian practice:
  - 100% BV 24hrs
- Military practice:
  - Life threatening bleeding
    - 50% BV 3hrs
    - 100% 24hrs
    - 150ml/min

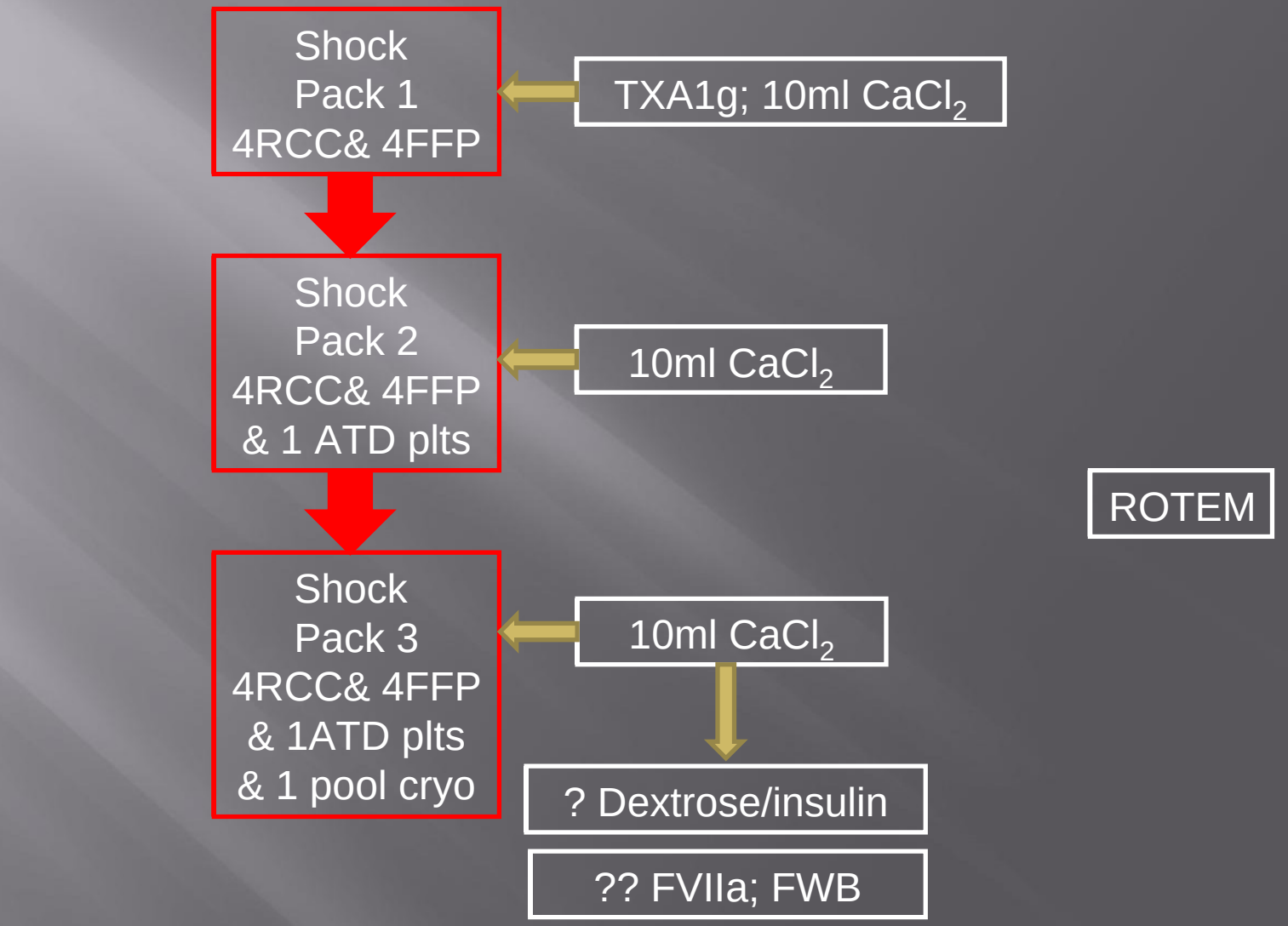
Protocol	Salient Features
Riskin et al[102]	• Definition of massive transfusion: anticipation that > 10 units PRBCs will be required in resuscitation • Who can activate the protocol: anyone • FFP:PRBC ratio: 1:1.5 • Given in packages of 6 units PRBCs, 4 units FFP, and 1 unit apheresis platelets
Cotton et al[103]	• Definition of massive transfusion: attending surgeon thinks patient will need > 10 units of blood • Who can activate the protocol: attending surgeon • FFP:PRBC ratio: initially ~1:2.5; subsequently, 1:1.5 • Given in packages. Initial package: 10 units PRBCs, 4 units FFP, and 2 units single-donor platelets. All subsequent packages: 6 units PRBCs, 4 units FFP, and 2 units single-donor platelets
Dente et al[104]	• Definition of massive transfusion: > 10 units of PRBCs anticipated in 24 hours • Who can activate the protocol: ED, surgery, anesthesia, ICU • FFP:PRBC ratio: 1:1 • Given in packages of 6 units PRBCs, 6 units FFP; 1 unit apheresis platelets given with every other package delivery

UK military MTP

- 11% of UK casualties have MTP (10u/24hr)
- 20% of MTP have >100u
- Mean 22u, max 237u/24h
- 85% survival

Allcock EC et al. JRAMC Dec 2011. 157(4)

Military MTP



Fresh Whole Blood

- Used in WWI & II
- Uncommon in Civilian Practice
- 10-15% of US military use
- Walking donor pool
  - (inc platelet donation)

Issues

- Cold Chain – 5000miles
- Afghan temperatures (-25-+50^{O}C)
- Rapidly warming blood
- Tracking transfusions

What else is (more) important?

Rapid access to:

- Appropriate surgery
- Decision Makers-

  Damage Control Surgery

  & Investigations
- Blood & products
  - (Bastion c.f NHS)
- Monitoring

Ongoing research

- Haemostatic Resuscitation
  - Cryoprecipitate, Prothrombin Complex Concentrate, Antifibrinolytics, lyophilised plasma (LyoPlas N)
- Freeze dried products
  - E.g. platelet derived haemostatic agent-PDHA, platelet microparticles etc
- Oestragen, Haemoglobin substitutes

Blue Skies & Beyond

- Hypothermic acellular resuscitation
  - (Emergency Preservation & Resuscitation- EPR)
- Animal in vivo experiments
- Human Clinical trial started

- H_2S, LT69L

- Space surgery
  - Robotics, foam packing

Lessons for Civilian care

- MTP Rarely required in civilian practice
- Concepts are transferrable
- MTP is only one part of whole trauma care

Summary

- Military care different from Civilian care
  - Different casemix
  - Different Product requirements
- But applicable lessons/concepts
- Dynamic response
  - DCR/DCS/Whole body CT etc
  - Products before results
  - Major haemorrhage packs
- Educated sensible discussion with colleagues

Questions?