Advancing Pre-Hospital Care: Battlefield to Street - Street to Battlefield

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Standard Disclaimer

• “The opinions or assertions contained herein are the private views of the author and are not to be construed as official or as reflecting the views of the Department of the Army or the Department of Defense.”

• May not represent the position of:
  – The DoD
  – The AMEDD
  – My boss
  – My boss’s boss
  – Etc...
GEN Patton on War
(if he were around today)

“No bastard ever won a war by making PowerPoint slides for his country.”

“He won it by making the other poor dumb bastard make slides for his country.”

George C. Scott as George S. Patton Jr.
Evolution of Military EMS
Evolution of Military EMS
Early Military Trauma Systems
THE PAST

• 1926- First use of Army aircraft for medical evacuation
• 1950-53 – Korea-17,700 patients by helicopter
• 1961-1975 – Vietnam -900,000 patients by helicopter
• 1966- Trauma White Paper / NHTS Act passed
• 1967-First paramedic training program in US
• 1970- MAST / Maryland State Police
• 1977- EMT-Ps operating in every state
• 1979-Emergency Medicine becomes a Specialty
• 1980-32 HEMS Systems operating in US
• 1984- NAEMSP – Practice of medicine out of hospital
• 1987-First Level I trauma center designated in US
• 2001- US Army adopts EMT-B standard for medics
Development of Civilian EMS Systems

Cardiac or ACLS

Trauma or ATLS
Are these the same?
Applying Civilian Trauma Principles to the Military Trauma Setting
Threat-based care guidelines

- Tactical Combat Casualty Care (TCCC)
  - Paradigm shift
  - Significant decreases in combat mortality
• This is bad
EMS Responsibility

1) Make air go in and out
   – O2 into lung

2) Make blood go round and round
   – Keep blood on the inside, not the outside
Vietnam: 9% KIA
Death From Extremity Wounds
OIF/OEF: 2-3 % KIA
Death From Extremity Wounds
Iraq or Afghanistan?
THE TOURNIQUET

Each Stretcher bearer, each officer, each man if possible, should know how to fix a garrot. The use of the garrot has been much criticized, but if it causes the loss of a limb it may save a life. Many men die unnecessarily from hemorrhage on the battlefield and at the ambulance.

Vincent
April 1918
Wounds that May Result in Junctional Hemorrhage

Typically caused by dismounted IED attacks
Recommended Hemostatic Agents

Combat Gauze

Chito gauze
Combat Ready Clamp
Abdominal Aortic Tourniquet

Today

1800’s
New Drugs

- Tranexamic acid (TXA)
Got Bleeding?

NOW APPROVED FOR POINT OF INJURY

Tranexamic Acid
TXA

LNAME: TRANEXAMIC ACID INJECTION 1 ML OF
STER SOL 10 ML AMPULES 10S
NSN: 6505-015917298

Technical Questions: 318-431-4441
or JTTS_LDRS.MAIL@swa.army.mil

**CONCLUSION:**

Resuscitative aortic BO increases central perfusion pressures with less physiologic disturbance than thoracotomy with aortic clamping in a model of hemorrhagic shock. Endovascular BO of the aorta should be explored further as an option in the management of noncompressible torso hemorrhage.
Making Air Go In and Out
Survival of trauma patients who have prehospital tracheal intubation without anaesthesia or muscle relaxants: Lockey D, BMJ. 2001 Jul 21;323

- In a six year period, from January 1990 to December 1996
- **492 (33.2%) were intubated** without drugs:
  - 275 (55.8%) by physicians
  - 216 (43.9%) by paramedics
- **One patient (0.2%) survived.**
  - This person had a cardiac arrest after penetrating chest trauma and underwent a thoracotomy on scene

- 20 trauma casualties with advanced airway management done by a medic at the Point of Injury
  - 1 LMA
  - 10 Combitubes
  - 3 Crics (two also with Combitube)
  - 6 ETT
Who dies from an airway?

- 18/1000 airway deaths
- All from trauma
- Most from GSW, most of those single GSW
- Disrupted anatomy
- Bloody
- Aspiration of blood
- Failed crics
Prehospital SC in OEF and OIF

- Review of 72 cricothyroidotomies performed in OIF and OEF
- Over 30% failure rate among combat medics performing a surgical airway at the point of injury (Mabry JSOM).
SURGICAL AIRWAYS

**Indications**

- Obstruction
- Facial Trauma
- Intubation or other alternatives impossible
- Trismus (clenching)

-> 8-12 years old (for open procedures)

FIRST OR LAST RESORT?
Yellow Lab

Black Lab

Chocolate Lab

Meth Lab
Lots of ways to skin this cat...
New Technique
Morphine
“Pain control in Baghdad, 2003, was the same as in the Civil War—a nurse with a syringe of morphine.”
Ketamine

• How it works?
  – Ketamine is a noncompetitive NMDA receptor antagonist that blocks glutamate. Low (subanesthetic) doses produce analgesia, and modulate central sensitization, hyperalgesia and opioid tolerance. Reduces polysynaptic spinal reflexes.
  – Translation

• Dosing per TC3: 50 mg IN or IM, or 20 mg IV

• Benefits
  – Respiratory Drive
  – Good hemodynamic effects
  – Reduces opioid requirements
  – PTSD?

• Risks
  – Mental Status
  – TBI
  – Rapid administration
  – Laryngospasm (IM primarily)
BACKGROUND

Inadequate point-of-injury (POI) analgesia has significant downstream healthcare quality effects and associated costs. Untreated or undertreated pain not only causes physical and emotional suffering but also is associated with an increased risk of Post-Traumatic Stress Disorder (PTSD), depression, chronic pain, opioid dependence, delayed recovery, and long-term disability. Early and effective pain control in the prehospital setting has been shown to reduce the sequelae of untreated pain.

GOAL

To determine compliance rates of newly implemented Tactical Combat Casualty Care pain management guidelines instituted in October, 2013.

METHODS

This was a process improvement (PI) project to study the before and after effects of the recent release of the latest iteration of the Tactical Combat Casual Care (TCCC) guidelines on 31 OCT 2013. Documentation of the point of injury (POI) care was reviewed. The pre-intervention period was considered 31 JUL to 31 OCT 2013. The post-intervention period was considered 01 NOV 2013 to 31 MAR 2014.

The primary measurement was the administration of analgesia in accordance with contemporary TCCC guidelines at the POI. Secondary measurements included the types of medications being administered.

CON = conventional forces  
SOF = special operations forces  
MS = morphine sulfate  
OTFC = oral transmucosal fentanyl citrate  
TCCC = tactical combat casualty care  
POI = point of injury

*55 patients received 62 doses of medications

DATA

PATIENT POPULATION

• 346 US casualties evacuated to higher level of care
• 185 had POI records available for review
• 134 met criteria for POI analgesia (66 pre-intervention, 68 post-intervention)

PRE INTERVENTION

• 17% of eligible patients received TCCC POI analgesia
• 81% of conventional forces and 58% of SOF forces received no analgesia at POI

POST INTERVENTION

• 29% of eligible patients received TCCC POI analgesia
• 66% of conventional forces and 33% of SOF forces received no analgesia at the POI
• IM morphine, which is not a TCCC recommended analgesic, was the most frequently agent used by conventional forces (43%)
• Only 14% in before group and 17% in after group of eligible conventional force casualties received analgesia IAW current TCCC guidelines

CONCLUSIONS

• While battlefield analgesia administration has improved since implementation of the TCCC Triple Option guidelines, 66% of CON casualties and 33% of SOF casualties received no pain medication in the prehospital setting
• IM morphine, which is not TCCC recommended, is the most common analgesic given by conventional forces
• Further research is needed to improve prehospital pain management
EMS Lessons for the Military
Where can we save the most lives?

Who / where are the Experts in Battlefield Medicine?
Combat Medic: Today’s reality

- Frequently assigned to isolated outpost far from a provider
- Required to perform primary care and preventive medicine tasks with very little training
  - Civilians: Peds, geriatrics, dental
- Formerly only Special Forces medics or medical officers did this
Future Model: Skills increase with rank?

- **E1-E4 (Basic EMT)**
  - Focus on Point of Injury care...”plug the smoking hole”
  - Present focus of 68W IET

- **E4-E6 (Advanced EMT or EMT-”Military”)**
  - Should be able to operate independently at remote location with a company sized element
    - Sick call
    - Camp hygiene
    - Civilian and coalition care
    - Dental?

- **E6-E8 (EMT-P)**
  - “Master Medic”
  - Mentor and instructor
  - Run BAS with PA/ MD
  - Additional provider during MASCAL
Military vs Civilian HEMS

Military
- Platforms / Aviation Focus
- Single EMT-B
- Medical Direction-An intern
- No Army Standard Protocol
- Documentation rarely gets to medical record
- No Standard PI/QI

Civilians
- Patient Care Focus
- Two CC paramedics or nurses
- Medical Direction- EMS physician
- Standard Protocols
- Required documentation
- Required PI/QI
Snapshot of one MEDEVAC units deployment to OEF

- 86% Trauma Cases
- 14% Medical Cases
  - Includes AMI, COPD, CVA, toxic exposure, psychosis, Sz
- 14% Critical care level
  - Intubation, vent management, chest tube insertion, advanced medications, etc.
  - 6% moderate to severe head injuries
- 62% EMT-P level (includes CC cases)
- 94% Adult (age range from 1 to 68 years old)
- 6% Pediatric
  - 2% critical care pediatrics
THE NEW REALITY...

- Compared regular medevac units to California Guard unit with 75% civilian trained CCFP’s
- Survival of critically injured patients at 48 hours
- Standard group- 16% mortality
- CCFP group- 8% mortality
New Army Critical Care Flight Paramedic Program

• Three phases- 9 months
• 11th Class
  – 100% NRP pass rate
• Anticipate expansion to local NRP programs and possibly various critical care training sites
• Challenges
  – Bridging 3-5 years of ALS experience
  – Sustainment
Military Lessons for Civilian EMS
Ft. Hood Incident
November 5, 2009

- Ft. Hood Army Base in Killeen, TX
- Major Nidal Hassan opened fire at a crowded Army Soldier Readiness Center
- Shooting lasted 10 minutes
- 30 wounded and 13 killed
Boston, MA
April 15, 2013
New Paradigm in “Tactical Medicine”

- New tactics
  - Explosives
  - Active Shooter
  - Dynamic small unit tactics
  - Lone wolf
  - Targeting first responders

- Yet what do we exercise?
Mumbai, India
November 26, 2008
Nation’s largest church opens in stadium
Congregation takes over arena where
Houston Rockets played

Members of the Lakewood Church — all 16,000 of them — worship on Saturday at the grand opening of their new building in a Houston arena that was formerly home of the city’s NBA team.
Day after Thanksgiving at the Mall
Challenges

• How do we train?
• How do we collect data?
• How do we act on data?
• How do we sustain?
• How do we learn from each other?
To those who risk their lives for others...