Changing the Paradigm:
Tactical Emergency Casualty Care Guidelines for High Risk Scenarios

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Disclaimer

- No financial interests to claim
- Dr. E Reed Smith
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Just another day....

- Dispatch for fire at Rosslyn, VA metro station
- Initial dispatch as Box Alarm
  - 4 engines, 2 trucks, 1 rescue, 1 medic unit, 2 battalion chiefs, 1 EMS supervisor, 1 battalion aide
**Scenario**

- First arriving units report smoke from underground entrance and injured persons at entrance
  - Victims reporting large blast occurred as train entered station

**Scenario**

- Scenario recognized as likely IED detonation on crowded metro
- Reports of multiple injured persons in need of rescue
- What now?

**High Threat Mass Casualty**

- What is the traditional teaching on operational medical response for the recon and subsequent rescue in scenarios with known wounded but active threats?
  - Do rescuers stage and wait for the all clear?
High Threat Mass Casualty

- If they decide to effect life rescue and enter the scene, are they carrying the right equipment?

![Image of medical equipment]

High Threat Mass Casualty

- Are they knowledgeable about and trained to do the appropriate care prior to and during evacuation?

![Image of first responders]

Defining the problem

- Is there a currently gap in how civilian first responders train to and respond to the high risk operational scenarios, both in medical tactics and medical actions?

   Absolutely
Why is this important??

- We have dedicated a lot of training for WMD and disaster medical response over the past 20 years
  - BUT both threat and practice environment are evolving

- Well documented evidenced based medical guidelines currently in use in GWOT

The New Reality

- Traditional WMD
  - Difficult to acquire
  - Difficult to deliver
  - Requires extensive training and resources

- New tactics
  - Improvised explosives
  - High velocity ballistics
  - Lone wolf active shooters
  - Dynamic coordinated small unit attacks
New Threat Environment

- May initially seem routine but must be quickly recognized as atypical
  - 'Disturbance' at a school
  - Fire on a metro bus
  - 'Trouble unknown' at a mall
  - Fight at a restaurant

New Threat Environment

- Characterized by a multi-lateral spectrum of potential threats
  - One or more perpetrators willing to die
  - Military style tactics and coordination
  - Multi-capacity high velocity weapons
  - Atypical threats such as home-made IEDs
  - Potential for toxic hazards
  - Austere conditions due to operational limitations and geography

New Threat Environment: Impact on delivery of medical care

- Medical first responder must maintain enhanced situational awareness while simultaneously providing appropriate and effective patient care
  - Must change care protocols from what can be done to only that which MUST be done for life-saving
  - Not an altered or relaxed standard of care
  - A new standard of care specific to environment
**New Threat Environment: Impact on delivery of medical care**

- Restrictions to care in this environment:
  - Supplies and equipment limited to what is brought into scene
    - Unable to ‘run back out to the rig’
  - Limited personnel operating on scene
  - Need for rapid mitigation
  - Potential for prolonged horizontal and vertical extraction of casualties

- Casualty profile shifted towards significant traumatic morbidity and mortality
  - Multiple victims each with multiple wounds
    - Combination of blunt and penetrating injury
    - Blast injury
    - Burns
  - Delayed time to care
  - Potential for contamination

- Medical decision-making must be based on risk-benefit assessment
  - Benefits of proposed medical interventions MUST be weighed against potential for further harm to patient or first responders
  - Care must be tailored to the relationship between the provider and the dynamic threat
Stage and Wait? Time Counts!

- Systematic review of combat casualty data showed that the majority of fatal combat injuries die within 30 minutes
  - Every minute with uncontrolled injury decreases chance of survival!!

Death Curve for Penetrating Trauma (in combat)

Concept of Point-of-Wounding Care

- As with almost all advances in pre-hospital medicine, we must look to the military...
**Battlefield Medicine prior to 1990s**

- Combat corpsman and medics taught to manage battlefield injuries using the civilian standard for trauma care
- Advanced Trauma Life Support
  - Designed to train the non-trauma physician how to manage trauma victims in a hospital setting
  - Based on ‘Golden Hour’ with emphasis on rapid evacuation to care
  - Best practice? Research was being done as well...

**Wound Data and Munitions Effectiveness Team (WDMET) study**

- Post-Vietnam era study of all combat deaths to identify aspects of weapon lethality
  - Sub-analysis revealed interesting findings
  - First study to show unique characteristics of battlefield field trauma management
  - Multiple subsequent studies have substantiated

**Wound Data and Munitions Effectiveness Team (WDMET) study**

- Greatest opportunity for life saving intervention is early on....
  - 90% of deaths occurred prior to definitive care
    - 42% immediately
    - 26% within 5 minutes
    - 16% within 5 and 30 minutes
    - 8-10% within 30 minutes and 2 hours
    - Remainder survived between 2 and 6 hours during prolonged extrication to care
  - Only 10% of combat deaths occurred after medical care initiated
Wound Data and Munitions Effectiveness Team (WDMET) study

- Summary Results
  - “The greatest benefit will be achieved through a configuration that puts the caregiver at the patient’s side within a few seconds to minutes of wounding.”
  - “Far forward placement of medical assets is lifesaving.”

Anatomical Distribution of Penetrating Wounds (%) in Ground Combat

- Summary: Penetrating wounds to the limbs occur in more than 1 out of every 2 combat wounds

Causes of death in conventional land warfare

- Landmark study by R.F. Bellamy
  - Military Medicine 1984
- Examined military autopsy data from multiple conflicts
- Lists cause of death described at autopsy
  - Does not describe wound pattern or non-lethal injuries
Summary:
- 15% of fatalities in combat from **readily treatable** causes:
  - 9% Exsanguination from peripheral hemorrhage
  - 5% Open/Tension pneumothorax
  - 1% Airway obstruction
Rapid application of simple appropriate stabilizing treatment at or near the site of wounding

PLUS

Expedient evacuation to closest appropriate medical facility

EQUALS

Maximal survival rate for those injured
The Military Paradigm Shifts....

- Navy Special Operations community conducted an extensive funded review of the data on combat death and the principles of combat trauma care
- Followed several military special operation actions where the loss of life was high & medical care impacted tactical operations

The Military Paradigm Shifts....

- Identified shortcomings of applying ATLS for combat care
- ATLS lacked of provisions for the specific combat environment
  - Hostile action and continued threats
  - Environmental factors
  - Casualty transportation problems and long delays to definitive care
  - Need to balance the management of casualties within the conduct of an ongoing combat mission

Tactical Combat Casualty Care

- Result was set of medical guidelines for use on the battlefield
  - Published by Butler et al in 1996 Supplement to Military Medicine
- Adopted quickly throughout the Special Operations Community
  - Now widely adopted throughout all combat troops
Prioritization and application of medical care to address the preventable causes of death while accounting for specific limitations and conditions surrounding combat:
- High threat environments and on-going tactical operations
- Limited medical equipment and resources
- Limited medical personnel

Comparison of Statistics for Battle Casualties, 1941 – 2005
Holcomb et al ]Trauma 2006
The U.S. casualty survival rate in the GWOT is the best in our nation’s history

<table>
<thead>
<tr>
<th>%Casualty Fatality Rate</th>
<th>World War II</th>
<th>Vietnam</th>
<th>OIF/OEF</th>
</tr>
</thead>
<tbody>
<tr>
<td>19.4%</td>
<td>15.8%</td>
<td>9.4%</td>
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</tbody>
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OIF/OEF: 2-3 % KIA
Bleeding to Death From Extremity Wounds
5% KIA → <3% 
Tension Pneumothorax

Air escapes from injured lung... pressure builds in chest
Air pressure causes the lung to collapse
Ultimately the heart is not able to pump because of the pressure

1% KIA → ±% (But much more complex) 
Airway Obstruction

Evidence based and best practice based
- A decade of data with continued evidence to support guidelines
- Well known and well supported throughout the military
- Now is being brought back to Civilian Fire/EMS by returning veterans

The power of TCCC
TCCC: A New Civilian Paradigm??

- Reality: Current standard Fire/EMS operational medical response is inadequate for atypical emergencies
- TCCC seemed initially to be the answer....
- BUT, it doesn’t translate exactly to civilian operations.

Applying Military Medical Lessons Learned to Civilian High Threat Prehospital Care

Where TCCC potentially fails...

- Guidelines of TCCC is largely based off of evidence gleaned from the overall young and healthy military combat population
- Written for the military combatant treating the combat wounded military population in the combat environment
- Fails to account for the differences in civilian settings and resources
Civilian Differences

- Scope of practice and liability
- Patient population to include geriatrics and pediatrics
- Availability of transport assets and transport distance to definitive care
- Differences in barriers to evacuation and care
- Baseline health of the population
- Wounding patterns without ballistic armor
- Chronic medication use in the injured
- Special populations

Civilian Transition Initiative

- 2005: Process began with TCCC Transition Initiative
- 2009: GW and ACFD coined the term Tactical EMERGENCY Casualty Care for all Civilian Pre-hospital High Threat Medicine
  - Not only the Law Enforcement and LE tactical medicine
- 2011: Established 501 3c Committee and held conference of Subject Matter Experts

Committee for Tactical Emergency Casualty Care (C-TECC)
Tactical Emergency Casualty Care (TECC)

- Civilian threat-based medical care guidelines
  - New framework based on a decade of TCCC military lessons learned and evidenced based medicine adapted to civilian operations

TECC: The new paradigm

- TECC Goals:
  - To establish a medical care framework that balances the threat, civilian scope of practice, differences in civilian population, medical equipment limits, and variable resources for ALL atypical emergencies and mass casualty
  - To provide for aggressive forward deployment of stabilizing medical interventions

TECC: The new paradigm

- TECC Goals:
  - To provide principles for point of wounding management of trauma in HIGH THREAT AND MASS CASUALTY ENVIRONMENTS
  - To provide care guidelines that account for ongoing threat and operations to minimize provider risk while maximizing pt benefit
Tactical, not Law Enforcement

- In TECC, “Tactical” means operational, not Law Enforcement
  - Tactics answer the question, “how will we achieve our objective”
- Operational response involves multiple tactical decisions that will be affected by and have an effect on medical care decisions

What TECC is...

- Civilian driven, civilian appropriate
- Representative of multi-agencies and specialties
- Vetted, evolving *principles* of care and operational recommendations
- Venue for future operational medical research

What TECC is NOT...

- Law Enforcement Tactical Medicine specific
- Only for LE Tactical Medics
- A comprehensive tactical medicine program
- **Rigid** care protocols
Only for medical personnel??

- ANY first responder can initiate TECC care
  - Guidelines can be implemented at any level
  - Patrol officers and non-medical first responders should initiate care as the tactical situation allows

TECC Guidelines

TECC is Situation-Driven

- Operational medical guidelines applied in 3 distinct phases defined by the relationship between the provider and the threat

- Phases of Care
  - Direct Threat Care (DTC)
  - Indirect Threat Care (ITC)
  - Evacuation Care (Evac)
Direct Threat Care

Medical actions when the external, ongoing threat to life is as or more dangerous than the injury sustained
- Risk of further injuries to the casualty and the rescuer is extremely high

Very minimal “medical” intervention is generally warranted
- Emphasis on evacuation and operational mitigation of threat
- Focus on immediate life rescue with a minimum of essential personnel only

Guidelines for Direct Threat Care

Stop life threatening external hemorrhage if operationally feasible:
- Apply the tourniquet over top of the clothing as proximal (high on the limb) as possible and tighten until bleeding stops and distal pulse is no longer palpable
- Consider moving to safety prior to application of the TQ if on-going threat is too high

Decision to apply tourniquet versus evacuation to safety based on provider determination of severity of bleeding and relative risk
Guidelines for Direct Threat Care

- Tourniquet placed for
  - Total or partial amputations
    - High risk of rebleeding
  - Wounds WITH life-threatening arterial or massive venous bleeding

- Airway management is deferred until Indirect Threat Care phase

- Emphasis on evacuating the casualty to cover

Guidelines for Direct Threat Care

Indirect Threat Care
Indirect Threat Care

- Risk to provider and casualty exists but is not direct and immediate
  - However... scene and threat are dynamic
    - MUST be able to react to rapidly shifting conditions
- Priority is focused assessment and management of the immediate life threats
- Constant evaluation comparing the benefit of medical treatment versus the risk of remaining in a potentially hostile area

Indirect Threat Care

- Indirect threat care is performed
  - At or near the point of injury
    - If threat eliminated and scene declared clear but not secure
  - At a casualty collection point
    - Pre-designated safe areas within the scene that have cover/security where patients can be initially stabilized
- Examples
  - Care provided after IED explosion on metro once patient extricated to casualty collection point
  - Care provided during active shooter event in areas of the building that are clear but not secure

Indirect Threat Care

- Rapidly address major PREVENTABLE causes of death while maintaining operational goals
- Stabilize the casualty as required as close to the point of wounding to permit safe extraction to dedicated treatment sector or medical evacuation assets
- **DO NOT DELAY** casualty extraction/evacuation for non life-saving interventions
**Indirect Threat Care**

- The overall approach to care during IDT care phase can be accomplished in a systematic manner as is taught by the standard EMT trauma survey
  - HOWEVER there is a different emphasis on care necessitated by threat environment
- MARCH-E vs X-ABCDE vs SCAB-E

**Guidelines for Indirect Threat Care**

- **Major Care Interventions**
  - **Major Bleeding**: Tourniquets, Hemostatics, Wound packing
  - **Airway**: Adjuncts, positioning, Cricothyrotomy
  - **Respiration**: Chest seals, needle decompression
  - **Circulation**: Fluid resuscitation? / Shock
  - **Head/Hypothermia**: Mental status, TBI, C-spine
  - **Everything Else**: Full evaluation “Head to toe, treat as you go.”

**Do the Right Thing at the Right Time**

- Assessment and procedures must be followed in the correct order during the Indirect Threat Care Phase

  Why do we use the Acronym: MARCHE???

- Death from arterial bleeding: 2-4 minutes
- Death from airway compromise: 4-6 minutes
- Death from tension pneumothorax: 15-20+ minutes
- “Golden Hour” for Shock: 60 minutes

It is pointless to treat a casualty for a developing tension pneumo while he is dying from uncontrolled bleeding
Evacuation Care (EVAC)

Evacuation Care

- Care provided when there is no external threat
  - Is dynamic and NOT geographic
- More consistent with conventional pre-hospital care WITH an emphasis on those field conditions that increase mortality
- Guidelines recommendations may be continued on through continuum of trauma care

Evacuation Care

- Implemented when:
  - Evacuation is delayed
  - Multiple patients waiting evacuation
  - Prolonged evacuation
  - Atypical evacuation personnel or platform
- May NOT be implemented if no delay in transport
Guidelines for Evacuation Care

- Guidelines are largely the same in EVAC as for Indirect Threat Care
  - Some differences that reflect the additional medical equipment and personnel that may be present
  - Emphasis on mitigation of conditions with known morbidity/mortality effect

Guidelines for Evacuation Care

- Utilize additional resources to maximize care and address preventable mortality
  - Triage for transport priority and destination
  - RSI / intubation / chest tubes
  - Advanced monitoring
  - Advanced hemostasis
  - Blood products and damage control resuscitation
  - Immobilization
  - Continued hypothermia management
  - Advanced pain control options

Conclusions: TECC
The goal of TECC is to identify and treat those casualties with preventable causes of death and keep them alive long enough to reach the hospital.

If they don’t arrive alive, there is nothing that the trauma surgeons can do for them.

Evidence and best practice based Prehospital care Principles and Guidelines

Is a Starting point and an on-going process

The power in the process

Value Added for daily trauma call management

Where is TECC needed??
Where is TECC needed??

Tactical Emergency Casualty Care

- Applications: Active Shooter Response

- Applications: Fire/EMS Response to Explosives
Tactical Emergency Casualty Care

- Applications: Patrol Officer Down

Tactical Emergency Casualty Care

- Applications: SWAT/Tactical Medic

Tactical Emergency Casualty Care

- Applications: Technical Rescue Medic
Tactical Emergency Casualty Care

- Applications: Wilderness Medical Response

Tactical Emergency Casualty Care

- Applications: Mass Casualty Response

Summary points

- Traditional prehospital guidelines are not written for high threat environments, thus the current threat scenario requires a new paradigm

- Battlefield military medical guidelines are not directly appropriate for use in civilian scenarios

- Tactical Emergency Casualty Care is a set of best practice, evidence based guidelines for use by all prehospital providers in all high risk operational medical settings
Questions???

“The fate of the injured often lies in the hands of the one who provides the first care to the casualty”

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