Disclaimer

The views expressed in this presentation are those of the author and do not reflect the official policy or position of the Department of Defense or US Government, except where specifically indicated.

No conflict of interest.
1. **External Environment**: direct, indirect factors
2. **Mission & Strategy**: mission, vision
3. **Leadership**: leadership structure, role models
4. **Culture**: values, how people work together, influence on greater good
5. **Structure**: hierarchy, communication, decision making
6. **Mgmt Practices**: implementation of vision
7. **Systems**: policies & procedures that govern day-to-day work
8. **Climate**: what your people think and feel about each other, hopes and expectations
9. **Tasks & Skills**: individual abilities, positional requirements
10. **Motivation**: needed for change
11. **Values & Needs**: importance, job satisfaction
12. **Performance**: productivity, quality, efficiency, customer satisfaction

Competency

NIH Proficiency Scale

Complex Tasks and Skills
- Mastery
- Proficient
- Familiar

Basic Tasks and Skills
- Mastery
- Proficient
- Familiar

Mastery
- Expert (Recognized Authority, Strategic Focus)
- Advanced (Applied Theory)
- Intermediate (Practical Application)
- Novice (Limited Experience)
- Fundamental Awareness (Basic Knowledge)
Wisdom

Knowledge

Experience

Judgement
The Causes of Death in Conventional Land Warfare: Implications for Combat Casualty Care Research


How People Die In Ground Combat
(From COL Ron Bellamy)

- 25% KIA - Surgically Uncorrectable Torso Trauma
- 12% DOW - Largely Infections & Complications Of Shock
- 10% KIA - Surgically Correctable Torso Injury
- 9% KIA - Exanguination From Extremity Wounds
- 7% KIA - Blast Mutilating Trauma
- 5% KIA - Tension Pneumothorax
- 31% KIA - CNS Injury
- 31% KIA - Airway Obstruction

≈ 88% Prehospital Deaths
United States Army Rangers in Somalia: An Analysis of Combat Casualties on an Urban Battlefield

Who: Task Force Ranger
What: Direct-action raid; 15-hr battle
Where: Mogadishu, Somalia
When: October 3-4, 1993
Why: Mission, capture Aidid lieutenants

* Mission completed, but 125 casualties
  ➢ 14 KIA, 111 WIA (4 DOW, 58 hosp, 49 minor)
  ➢ %KIA = 18.4, %DOW = 6.4, CFR = 23.7

≈ 78% Prehospital Deaths

❖ **Pyrrhic victory** – inflicted such a devastating toll, tantamount to defeat.
1996: TCCC = Evidence-based, best-practice, prehospital trauma care guidelines customized for the battlefield

1997: First used by USN SEALs & USA Rangers

1999: TCCC updates published in PHTLS manual
  – Endorsed by ACS and NAEMT

2001: CoTCCC established
  – Aligned under DoD Joint Trauma System in 2013
Three Objectives

(1) Treat the patient
(2) Prevent additional casualties
(3) Complete the mission

Three Phases of Care

(1) Care Under Fire
(2) Tactical Field Care
(3) Tactical Evacuation Care
BEFORE: “Civilian-Based Care”

- Based on trauma courses NOT developed for combat
- No emphasis for combining good medicine with good tactics
- Medics taught NOT to use tourniquets
- No hemostatic agents
- Two large bore IVs on all casualties with significant trauma
- Large volume crystalloid fluid resuscitation for shock
- No focus on prevention of trauma-related coagulopathy
- US Civil War-vintage (150 yo) battlefield analgesia (IM morphine)
- Aggressive spinal immobilization for all neck and back trauma
AFTER: “TCCC-Based Concepts”

- Phased “tactical” care
- Aggressive use of limb tourniquets
- Junctional tourniquets
- Hemostatic agents
- Improved non-surgical airways
- Surgical airways as needed for facial trauma
- Needle chest decompression
- IVs only when needed, and IO access if required
- Permissive hypotensive resuscitation and forward DCR
- Tranexamic acid (TXA) for torso hemorrhage
- Improved analgesia (IV morphine, OTFC, ketamine)
- Early admin of antibiotics; hypothermia prevention
Tactical Combat Casualty Care (TCCC)

- Circulation – Massive Hemorrhage Control
  - Extremity
  - Junctional
  - Truncal

- Airway

- Breathing – Respiratory

- Circulation – Resuscitation
  - Permissive Hypotension
  - Forward Damage Control Resuscitation

- Hypothermia Prevention

- Infection Control

- Pain Control

- Documentation (Casualty Card, AAR, Registry)

- Evacuation (MEDEVAC, CASEVAC)
  - Reduce time to required capability (DCR, DCS)
Committee on Tactical Combat Casualty Care (CoTCCC)

• 42 members - all services

• Trauma Surgeons, EM and Critical Care physicians; operational physicians and PAs; medical educators; combat medics, corpsmen, and PJs

• Most with combat deployment experience

• Under the US DoD Joint Trauma System
Changes to TCCC Guidelines

- JTS Weekly Trauma Telephone Conferences
- DoD Casualty Data
- Research Facilities
- New Technology
- Service Medical Lessons Learned Centers
- Coalition Partner Nations
- Direct Input From Combat Medical Personnel
- Published Prehospital Trauma Literature
Distribution of TCCC Guidelines

Email Distribution List, Facebook, Twitter, LinkedIn
Meeting, Conference, Course Presentations

Publications:
• Journal of Special Operations Medicine (JSOM)
• Prehospital Trauma Life Support (PHTLS)

Websites:
• JTS: http://jts.amedd.army.mil/
• CoTCCC: http://cotccc.com/
• DHA: https://deployedmedicine.com/
• MHS: http://www.health.mil/tcc
• NAEMT: http://www.naemt.org/education/TCCC/tccc.aspx
• JSOM: https://www.jsomonline.org/TCCC.html
• SOMA: http://www.specialoperationsmedicine.org/Pages/tccc.aspx
“Lessons Learned are not Lessons Learned Unless You Learn Them.”

How do you integrate Prehospital Lessons Learned through Performance Improvement?

Six Steps...
STEP 1: Provide Casualty Care.

But...what is the Right Care?
TCCC is Right Care...however...

If...Culture follows Structure...

If...Strategy follows Structure...

Then...Casualty care directed through the Right Structure has the best opportunity to improve Culture and Strategy.

So...what is the Right Structure?
The Right Structure Depends on the Organization and Mission

Example: 75th Ranger Regiment

- U.S. Army’s premier raid force and largest USSOCOM combat element (> 3,500 personnel).
- Their mission is to support the U.S. National Defense through precise and timely execution of special operations and light infantry tactics.
- Combat missions include airborne, air assault, and other direct-action raids to seize key targets, destroy strategic facilities, and capture or kill enemy forces.
• **Tactical Leader Ownership**
• **“The Big 4” Training Priorities**
  1. Marksmanship
  2. Physical Training
  3. Small Unit Tactics
  4. Medical Training
• **Standards**
• **Mastery of the Basics**
• **Casualty Response System**
  – Command Directed
  – Tiered
  – TCCC-Based

❖ Train all for what is expected...also train leaders for what is unexpected.
Culture: “Flatten the Organization”

- GEN Stanley McChrystal

- Core Leadership Traits: responsibility, accountability, & ownership.

- Develop culture of personal accountability: where leaders and subordinates possess freedom to make bold decisions and courage to assume risk and take ownership...this is a vital characteristic of a successful organization.

- Ownership: exhibited in individuals who are invested in what they are doing, and engaged with the greater good of the organization.

- Once individuals are engaged and have ownership, they will be compelled to accomplish tasks and innovate solutions for the betterment of the organization and to complete the mission.
Culture: Cohesion

• Cohesion is a critical factor for organizational performance.

• Cohesion creates shared responsibility for success, while also giving each individual the confidence that someone else is watching over them.

• As medical training and readiness became a leader priority, it created another cultural opportunity for cohesion that primed the organization for a prehospital casualty response system.
Strategy: **Eliminate Preventable Death**

• Using the term “casualty response” rather than medical training, as it conveys a communal obligation for all to take action.

• When a casualty occurs, it is a tactical and leader problem to be solved and not just consigned to medical personnel.

• Eliminating preventable death is an organizational and community issue requiring the attention of all leaders, both medical and nonmedical.
STEP 1: Provide Casualty Care.
STEP 2: Document Care.
## How do you convince non-medical Leaders that documentation is important?

<table>
<thead>
<tr>
<th><strong>PATIENT</strong></th>
<th>✓ Improve care, continuity of care, historical record, and support for entitlements</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PROVIDER</strong></td>
<td>✓ Provider-to-provider communication of patient status, injuries, and treatment</td>
</tr>
<tr>
<td></td>
<td>✓ Use data, statistical analysis, and epidemiologic study to reduce morbidity and mortality through:</td>
</tr>
<tr>
<td></td>
<td>1. Preventive Medicine: force protection modifications</td>
</tr>
<tr>
<td></td>
<td>2. Good Medicine: evidence-based treatment protocols</td>
</tr>
<tr>
<td></td>
<td>3. Standardized Medicine: global policy application</td>
</tr>
<tr>
<td><strong>LEADERS</strong></td>
<td>✓ Use data, statistics, trends, and analysis to:</td>
</tr>
<tr>
<td></td>
<td>1. Improve command visibility of their casualties</td>
</tr>
<tr>
<td></td>
<td>2. Augment their decision-making process</td>
</tr>
<tr>
<td></td>
<td>3. Validate and refine their casualty response system</td>
</tr>
<tr>
<td></td>
<td>4. Refine personnel, training, equipment &amp; force protection</td>
</tr>
<tr>
<td></td>
<td>5. <strong>Reduce morbidity &amp; mortality; directed procurement</strong></td>
</tr>
</tbody>
</table>

❖ **Cost Effective** – data informs decisions and justifies expenditures of time and monies.
Documentation Requirements:

1. Usable in “Tactical” environment
   - Cannot detract from mission or hinder care
   - Should prompt appropriate care

2. Driven by “First Responder” tasks

3. “First Responder-centric,” not medic-centric

4. Simple, durable, ubiquitous, and redundant

5. Multiple opportunities to document – Card and AAR

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DD Form 1380
FMC

1999: Ranger Casualty Card

2008: CoTCCC-TCCC Card

2009: DA Form 7656 TCCC Card

2014: DD Form 1380 TCCC Card
TCCC Casualty Card
TCCC After Action Review

<table>
<thead>
<tr>
<th>Event Date</th>
<th>Time</th>
<th>Location</th>
<th>Country</th>
<th>Region</th>
</tr>
</thead>
<tbody>
<tr>
<td>2023-02-15</td>
<td>12:00</td>
<td>U.S.</td>
<td>CA</td>
<td>West</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Evacuation Category</th>
<th>A</th>
<th>J</th>
<th>B</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ground Injury Type</td>
<td>Blast</td>
<td>Struck by</td>
<td>Puncture</td>
<td>Crush</td>
</tr>
<tr>
<td>Ground Vehicle Type</td>
<td>Car</td>
<td>Bus</td>
<td>Motorcycle</td>
<td>Train</td>
</tr>
<tr>
<td>Aircraft</td>
<td>Plane</td>
<td>Helicopter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time of Inj.</td>
<td>Time of Evac.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
<th>Rank</th>
<th>Duty</th>
</tr>
</thead>
<tbody>
<tr>
<td>John Smith</td>
<td>Doe</td>
<td>Captain</td>
<td>Medical Officer</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Aircrew</th>
<th>Casualty</th>
<th>General</th>
<th>Mechanism of Injury</th>
<th>Associated Injuries</th>
<th>Associated Injuries Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aircraft</td>
<td>Crew</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mechanism of Injury</th>
<th>Associated Injuries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blast</td>
<td>Struck by</td>
</tr>
<tr>
<td>Puncture</td>
<td>Crush</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Breathing</th>
<th>Spontaneous</th>
<th>Laboried</th>
<th>Assisted</th>
<th>Assisted with BVM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Chest Seal</td>
<td>Needle Decompression</td>
<td>Chest Tube</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Medications</th>
<th>Pain, Sedation, Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Route</td>
<td>IM, IV, PO, PR, SL, SC</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>General Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sustains (Treatment, Equipment, Evacuation, Operations)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Improves (Treatment, Equipment, Evacuation, Operations)</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Date</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>2023-02-15</td>
<td>Medical Unit</td>
</tr>
</tbody>
</table>

OD Form XXXI, 20190311 v.1.0
Mandate and Enforce!

As all have the potential to be a casualty, and all have the potential to be a first responder...

...all will carry a Bleeder Control Kit (or Individual First Aid Kit).

...all will carry a Casualty Card to document care.

- CSM Mike Hall

...AARs will be completed within 72 hours.

- LTG Paul LaCamera
STEP 1. Provide Casualty Care.
STEP 2: Document Care.
STEP 3: Collect and Consolidate Data.
A Prehospital Trauma Registry for Tactical Combat Casualty Care

Kotwal RS, Montgomery HR, Mechler KK. US Army Med Dep J. 2011 Apr-Jun:15-7
STEP 1. Provide Casualty Care.
STEP 2: Document Care.
STEP 3: Collect and Consolidate Data.
STEP 4: Analyze Data.

* Outcomes – Morbidity, Mortality, etc.
Definitions standardize numbers and allow comparisons and trends.

**Killed in Action (KIA)**

KIA refers to the number of combat deaths that occur before reaching an MTF (battalion aid station, forward surgical, combat support and higher levels of hospital care), expressed as a percent of the Wounded in Action minus the RTDs.

\[
\%\text{KIA} = \frac{\text{Deaths before MTF}}{\text{KIA} + (\text{WIA} - \text{RTD})} \times 100
\]

**Died of Wounds (DOW)**

DOW is the number of all deaths that occur after reaching an MTF, expressed as a percentage of total wounded minus the RTDs.

\[
\%\text{DOW} = \frac{\text{Died after reaching MTF}}{(\text{WIA} - \text{RTD})} \times 100
\]

**Case Fatality Rate (CFR)**

CFR refers to the fraction of an exposed group—all those wounded in action including all those who die (at any level), expressed as a percent.

\[
\text{CFR} = \frac{\text{KIA + DOW}}{\text{KIA + WIA}} \times 100
\]
“Accurate understanding of the epidemiology and outcome of battle injury is essential to improving combat casualty care.”

<table>
<thead>
<tr>
<th>%KIA – Potential measure of:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. weapon lethality</td>
</tr>
<tr>
<td>2. effectiveness of prehospital care</td>
</tr>
<tr>
<td>3. availability of tactical evacuation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>%DOW – Potential measure of:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. precision of initial prehospital triage and care</td>
</tr>
<tr>
<td>2. optimization of evacuation procedures</td>
</tr>
<tr>
<td>3. application of a coordinated trauma system</td>
</tr>
<tr>
<td>4. effectiveness of MTF care</td>
</tr>
</tbody>
</table>

| CFR – Potential measure of overall battlefield lethality in a battlefield population |
STEP 1: Provide Casualty Care.
STEP 2: Document Care.
STEP 3: Collect and Consolidate Data.
STEP 4: Analyze Data.

STEP 5: Enact Performance Improvement.
   A. Refine best practice guidelines.
   B. Update personnel, training, and equipment requirements.
   C. Modify how you provide casualty care.
STEP 1: Provide Casualty Care.
STEP 2: Document Care.
STEP 3: Collect and Consolidate Data.
STEP 4: Analyze Data.
STEP 5: Enact Performance Improvement.
STEP 6: Publish Findings.
   A. Publish internally and externally.
   B. Activate force modernization.
   C. Activate research and development.
   D. Integrate and distribute lessons learned.
**Example 1: Tactical**

Four Combat Jumps:
Afghanistan Oct 2001, Iraq Mar 2003. 634 jumpers, 83 injuries in 76 Rangers (12%); 27 (4%) unable to continue mission and evacuated, 11 (2%) required surgery following evacuation.

**Equipment Load:**
Load average 50lbs greater for missions into Iraq; total parachutist weight exceeded 360-lb safety threshold for T10C parachute; descent rate greater than acceptable max of 22 ft/s, resulting in greater force on impact.
Example 2: Clinical

OTFC:

Verbal Pain Scores:
Mean difference (5.77; 95% CI 5.18-6.37) significant between 0 and 15 min.

However, mean difference (0.39; 95% CI 0.18-0.96) not significant between 15 min and 5 hrs indicating sustained action of OTFC without need for redosing.
Example 3: Epidemiological

CCC Statistics
Data analyzed for combat missions conducted by 75th Ranger Regiment in Afghanistan and Iraq over 8.5 years, from October 2001 to March 2010.

419 BI casualties. Regiment’s %KIA, %DOW, and CFR rates significantly lower than for U.S. military as a whole.

Of 32 fatalities, 0 DOW from infection, 0 potentially survivable through additional prehospital medical intervention, and 1 potentially survivable in hospital setting.

Substantial prehospital care provided by non-medical personnel.

Eliminating Preventable Death on the Battlefield
Kotwal RS, Montgomery HR, Kotwal BM, et al.
Arch Surg. 2011;146(12):1350-1358.
### Table 2. Comparison of Proportional Statistics for Battle Injuries in the 75th Ranger Regiment vs Total US Military Ground Troops Between October 1, 2001, and March 31, 2010

<table>
<thead>
<tr>
<th>Statistic</th>
<th>75th Ranger Regiment (n=419)</th>
<th>US Military Ground Troops (n=43311)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Overall</td>
<td>OEF</td>
</tr>
<tr>
<td>RTD, %(^a)</td>
<td>40(^b)</td>
<td>46</td>
</tr>
<tr>
<td>KIA, %(^c)</td>
<td>10.7(^b)</td>
<td>12.5</td>
</tr>
<tr>
<td>DOW, %(^d)</td>
<td>1.7(^b)</td>
<td>2.2</td>
</tr>
<tr>
<td>CFR(^e)</td>
<td>7.6</td>
<td>8.4</td>
</tr>
</tbody>
</table>

### Table 3. Hemorrhage Control Interventions Administered by 75th Ranger Regiment Personnel by Provider Level During Care Under Fire and Tactical Field Care Phases of Tactical Combat Casualty Care Between October 1, 2001, and March 31, 2010\(^a\)

<table>
<thead>
<tr>
<th>Intervention</th>
<th>RFR</th>
<th>Nonmedic EMT</th>
<th>Medic</th>
<th>Medical Officer</th>
<th>Total, No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure dressing(^b)</td>
<td>33</td>
<td>16</td>
<td>136</td>
<td>21</td>
<td>206</td>
</tr>
<tr>
<td>Gauze dressing</td>
<td>28</td>
<td>16</td>
<td>121</td>
<td>23</td>
<td>188</td>
</tr>
<tr>
<td>Tourniquet(^c)</td>
<td>27</td>
<td>10</td>
<td>49</td>
<td>3</td>
<td>89</td>
</tr>
<tr>
<td>Hemostatic dressing(^d)</td>
<td>3</td>
<td>1</td>
<td>26</td>
<td>7</td>
<td>37</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>91</td>
<td>43</td>
<td>332</td>
<td>54</td>
<td>520</td>
</tr>
</tbody>
</table>

Abbreviations: EMT, emergency medical technician; RFR, Ranger First Responder.
\(^a\) Nonmedical personnel provided 26% (134/520) of all hemorrhage control interventions and 42% (37/89) of all tourniquets.
STEP 1: Provide Casualty Care.
STEP 2: Document Care.
STEP 3: Collect and Consolidate Data.
STEP 4: Analyze Data.
STEP 5: Enact Performance Improvement.
STEP 6: Publish Findings.
The Ranger casualty response system integrated a performance improvement cycle to continuously validate, refine, and solidify Prehospital (TCCC) Standards.

Data and lessons learned inform and educate, and also recruit and garner support from Leaders.
“Lessons Learned are not Lessons Learned Unless You Learn Them.”

- **Leadership and a Casualty Response System for Eliminating Preventable Death.**
A performance improvement cycle is required to preserve and advance lessons learned.

Although it initially came at a cost of Ranger lives, a “silver lining” of the Somalia conflict was the subsequent Ranger pursuit of eliminating preventable death...
QUESTIONS?

http://jts.amedd.army.mil/