Introduction to Tactical Combat Casualty Care for Medical Personnel
03 June 2016
Pre-Test
What is TCCC and Why Do I Need to Learn about it??

- Coalition forces in Afghanistan presently have the best casualty treatment and evacuation system in history.
- TCCC is what will keep you alive long enough to benefit from it.
The U.S. casualty survival rate in Iraq and Afghanistan has been the best in U.S. history.

<table>
<thead>
<tr>
<th></th>
<th>World War II</th>
<th>Vietnam</th>
<th>OIF/OEF</th>
</tr>
</thead>
<tbody>
<tr>
<td>CFR</td>
<td>19.1%</td>
<td>15.8%</td>
<td>9.4%</td>
</tr>
</tbody>
</table>

Note: CFR is the Case Fatality Rate – the percent of the wounded who die
Why Are We Doing Better?

• Improved Personal Protective Equipment
• Tactical Combat Casualty Care
• Faster evacuation time
• Better trained medics

Holcomb et al  J Trauma 2006
TCCC: The New Standard of Care for Managing Trauma on the Battlefield

• Used by Army, Navy, Air Force, Marine Corps, Coast Guard
• Used by most coalition partner nations
• Used by NATO
• Used by other countries around the world
Objectives

- EXPLAIN the differences between military and civilian pre-hospital trauma care
- DESCRIBE the key factors influencing combat casualty care
- UNDERSTAND how TCCC developed
- DESCRIBE the phases of care in TCCC
Importance of the First Responder

- Almost 90% of all combat deaths occur before the casualty reaches a Medical Treatment Facility (MTF)*
- The fate of the injured often lies in the hands of the one who provides the first care to the casualty.
- Corpsman, medic, or pararescueman (PJ)
- Combat Lifesaver or non-medical combatant
Trauma Care Setting
Tactical Trauma Care Setting – Shrapnel Wound in the Hindu Kush
Prehospital Trauma Care: Military vs. Civilian

- Hostile fire
- Darkness
- Environmental extremes
- Different wounding epidemiology
- Limited equipment
- Need for tactical maneuver
- Long delays to hospital care
- Different medic training and experience
Prior Medical Training

• Combat medical training historically was modeled on civilian courses
  – Emergency Medical Technician
  – Advanced Trauma Life Support
• Trained to standard of care in non-tactical (civilian) settings
• Tactical factors not considered
Different Trauma Requires Different Care Strategies

- It is intuitive that combat and civilian trauma are different, BUT…
- It is difficult to devise and implement needed changes.
- No one group of medical professionals has all of the necessary skills and experience.
- Trauma docs and combat medical personnel have different skill sets. Both are needed to optimize battlefield trauma care strategies.
- Tourniquets are one striking example of how battlefield trauma care has sometimes been slow to change.
“We believe that the strap-and-buckle tourniquet in common use is ineffective in most instances under field conditions…it rarely controls bleeding no matter how tightly applied.”
Over 2500 deaths occurred in Vietnam secondary to hemorrhage from extremity wounds. These casualties had no other injuries.
Tourniquets in U.S. Military Mid-1990s

- Old strap-and-buckle tourniquets were still being issued.
- Medics and corpsmen were being trained in courses where they were taught not to use them.
Factors That Might Have Changed Outcomes (82 Fatalities – 12 Potentially Survivable)

- Hemostatic dressings/direct pressure (2)
- **Tourniquets** (3)
- Faster CASEVAC or IV hemostatic agents (7)
- Surgical airway vs. intubation (1)
- Needle thoracostomy (1)
- RBCs on helos (2)
- Battlefield antibiotics (1)
Tourniquets – Beekley et al  
Journal of Trauma 2008

- 31st CSH in 2004
- 165 casualties with severe extremity trauma
- 67 with prehospital tourniquets; 98 without
- Seven deaths
- Four of the seven deaths were potentially preventable had an adequate prehospital tourniquet been placed
Tactical Combat Casualty Care in Special Operations

Military Medicine Supplement
August 1996

Trauma care guidelines customized for the battlefield
TCCC

- Originally a Special Operations research effort
- Trauma management plans that take into account the unique challenges faced by combat medical personnel
- Now used throughout U.S. military and by most allied countries
- TCCC has helped U.S. combat forces to achieve the highest casualty survival rate in history.
TCCC Approach

• Identify the causes of preventable death on the battlefield
• Address them aggressively
• Combine good medicine with good tactics
How People Die In Ground Combat
(From COL Ron Bellamy)

(Data based on the Wound Data Munitions Effectiveness Team (WDMET) during the Vietnam War between 1967 and 1969)

- 25% KIA - Surgically Uncorrectable Torso Trauma
- 10% KIA - Surgically Correctable Torso Injury
- 9% KIA - Exanguination From Extremity Wounds
- 31% KIA - CNS Injury
- 12% DOW - Largely Infections & Complications Of Shock
- 5% KIA - Tension Pneumothorax
- 7% KIA - Blast/Mutilating Trauma
- 1% KIA - Airway Obstruction
Potentially Preventable Deaths (232) Early in OIF and OEF

From evaluation of 982 casualties, and casualties could have more than 1 cause of death. (Kelly J., J Trauma 64:S21, 2008)
Preventable Death on the Battlefield: OEF and OIF

Eastridge 2012 Study:

- **4,596** U.S. deaths
- **87%** pre-hospital deaths
- **24%** of pre-hospital deaths were potentially survivable

What is the Cause of Death?

- Hemorrhage: 91% (n=888)
- Airway Obstruction: 7.9% (n=77)
- Tension Pneumothorax: 1.1% (n=11)

Physiologic Cause

Point of Wounding Care

Causes of preventable death on the battlefield today:

- Hemorrhage from extremity wounds
- Junctional hemorrhage (where an arm or leg joins the torso, such as in the groin area after a high traumatic amputation)
- Non-compressible hemorrhage (such as a gunshot wound to the abdomen)
- Tension pneumothorax
- Airway obstruction
Junctional Hemorrhage

These types of wounds are often caused by IEDs and may result in junctional hemorrhage.
Tension Pneumothorax

Air escapes from injured lung – pressure builds up in chest

Air pressure collapses lung and pushes on heart

Heart compressed - not able to pump well
Airway Trauma
Three Objectives of TCCC

- Treat the casualty
- Prevent additional casualties
- Complete the mission
TCCG Guidelines 1996

- Tourniquets
- Aggressive needle thoracostomy
- Nasopharyngeal airways
- Surgical airways for maxillofacial trauma
- Tactically appropriate fluid resuscitation
- Battlefield antibiotics
- Improved battlefield analgesia
- Combine good tactics and good medicine
- Scenario-based training
- Combat medic input to guidelines
Changes in TCCC: How Are They Made?

The Committee on Tactical Combat Casualty Care
Committee on Tactical Combat Casualty Care

- The prehospital arm of the Joint Trauma System
- 42 members from all services in the DoD and civilian sector
- Trauma Surgeons, Emergency Medicine, and Critical Care physicians, combatant unit physicians; medical educators; combat medics, corpsmen, and PJs
- 100% deployed experience
- Meet periodically; update TCCC as needed
Additional Interventions

- Hemostatic dressings
- Intraosseous infusion devices
- Hypotensive resuscitation
- Fentanyl lozenges for severe pain
- Ketamine as an analgesic option
- Junctional hemorrhage control devices
- Tranexamic Acid (TXA)
- Cric-Key for surgical airways
- Hypothermia prevention
- Management of wounded hostile combatants
TCCC: How Do We Know That it’s Working?
TCCC Early in the Iraq and Afghanistan Conflicts

• NOT widely used at the start of the wars
• Increased use by both Special Operations and conventional units beginning in 2005

The Drivers:
• Early reports of success with TCCC, especially TQs
• Holcomb study: “Causes of SOF Deaths 2001-2004”
• USAISR tourniquet study by Walters et al (2005)
• USSOCOM TCCC message - March 2005
• USCENTCOM tourniquet and hemostatic agents (HemCon) message - 2005
Preventable Combat Deaths from Not Using Tourniquets

  - 193 of 2,600
  - 7.4% of total combat fatalities
  - 77 of 982 (in both cohorts of fatalities)
  - 7.8% of total fatalities – no better then Vietnam
- Tourniquets became widely used in 2005-2006
- Eastridge – *J Trauma* 2012: OEF + OIF (to Jun 2011)
  - 119 of 4,596
  - 2.6% of total fatalities – a 67% decrease
Tourniquet Outcomes in TCCC Transition Initiative Report

- **Sixty-seven** successful tourniquet applications identified
- No avoidable loss of limbs due to tourniquet use identified

*Butler, Greydanus, Holcomb*

2006 USAISR Report

“TCCC: Combat Evaluation 2005”
“The adoption and implementation of the principles of TCCC by the medical platoon of TF 1-15 IN in OIF 1 resulted in overwhelming success. Over 25 days of continuous combat with 32 friendly casualties, many of them serious, we had 0 KIAs and 0 Died From Wounds, while simultaneously caring for a significant number of Iraqi civilian and military casualties.”

CPT Michael Tarpey
Battalion Surgeon 1-15 IN
AMEDD Journal 2005
“I am writing to offer my congratulations for the recent dramatic advances in prehospital trauma care delivered by the U.S. military. Multiple recent publications have shown that Tactical Combat Casualty Care is saving lives on the battlefield.”

Dr. Jeff Salomone
American College of Surgeons Committee on Trauma
Chairman of Prehospital Trauma Subcommittee
Letter to ASD Health Affairs
10 June 2008
“The new concept of Tactical Combat Casualty Care has revolutionized the management of combat casualties in the prehospital tactical setting.”

Critical Care Medicine
July 2008
USMC Casualty Scenario 2008

- CoTCCC gets input directly from combat medics, corpsmen, and USAF pararescuemen (PJs)
- 15 casualties - 4 tourniquets applied
- 3 lives saved - 4th casualty died from chest wound
Tourniquets – Kragh et al: Two Landmark Papers

- Published in 2008/2009
- Tourniquets are **saving lives** on the battlefield
- 31 lives saved in 6 months by tourniquets
- Author estimated 2000 lives saved with tourniquets in this conflict up to that date (2009)
- No arms or legs lost because of tourniquet use
What Do the Soldiers Say?

A recent U.S. Army Training and Doctrine Command survey of Soldiers in combat units found that TCCC is the second most valued element of their training, exceeded only by training in the use of their individual weapon.

COL Karen O’Brien
TRADOC Surgeon
CoTCCC Meeting April 2010
Eliminating Preventable Death on the Battlefield

- TCCC in the 75th Ranger Regiment
- All Rangers and docs trained in TCCC
- Ranger preventable death incidence: 3%
- Overall U.S. military preventable deaths: 24%
Conclusion

“For the first time in decades, the CF has been involved in a war in which its members have participated in sustained combat operations and have suffered increasingly severe injuries. Despite this, the CF experienced the highest casualty survival rate in history. Though this success is multifactorial, the determination and resolve of CF leadership to develop and deliver comprehensive, multileveled TCCC packages to soldiers and medics is a significant reason for that and has unquestionably saved the lives of Canadian, Coalition and Afghan Security Forces…..”
Hartford Consensus
2 April 2013

• Working group organized by American College of Surgeons Board of Regents and FBI
• In response to Sandy Hook shootings
• Excerpt from findings:

Life threatening injuries in active shooter incidents such as those in Fort Hood, Tucson, and Aurora are similar to those encountered in combat settings. Military experience has shown that the number one cause of preventable death in victims of penetrating trauma is hemorrhage. Tactical Combat Casualty Care (TCCC) programs, when implemented with strong leadership support, have produced dramatic reductions in preventable death. Recognizing that active shooter incidents can occur in any community, the Hartford Consensus encourages the use of existing techniques and equipment, validated by over a decade of well-documented clinical evidence.
MEMORANDUM FOR DIRECTOR, DEFENSE HEALTH BOARD

SUBJECT: Tactical Combat Casualty Care Training for Deploying Personnel, 2011-02

Please accept my appreciation for your continued efforts to provide the Department of Defense with constructive recommendations to help maximize the health, safety, and effectiveness of the U.S. Armed Forces. As we continue to seek opportunities to improve and standardize medical training, we have reviewed and will accept your recommendations related to “Tactical Combat Casualty Care (TCCC) Training for Deploying Personnel.” We will incorporate training guidance as described in your recommendation to facilitate uniform TCCC training throughout the Department.

The point of contact for questions regarding this action is Ms. Elizabeth Fudge. Ms. Fudge may be reached at (703) 681-8295, or Elizabeth.Fudge@dha.mil.
Defense Health Board

9 March 2015

Defense Health Board

Combat Trauma Lessons Learned from Military Operations of 2001-2013

March 9, 2015
Lesson 9: Effectively trained TCCC has a demonstrable effect on reducing potentially preventable causes of death on the battlefield.

Recommendation 9: TCCC shall continue to form the basis for battlefield trauma care and be integrated as the minimal accepted standard of training for all military members, initial enlisted medical training, and specialized enlisted medical training. In addition, TCCC sustainment training programs must occur on a regular basis, as the TCCC Guidelines are a “living” document and are regularly updated.
• All physicians, physician assistants, nurse practitioners, medics, corpsmen, parajumpers (PJs) and nurses in CJOA-A (Afghanistan) will be trained in TCCC

• Training will be done in accordance with current TCCC Guidelines (found on Joint Trauma System website)

• Curriculum to support this training is found on the Military Health System website

• Training is reportable to the chain of command

• Units will field equipment to perform TCCC
Phases of Care in TCCC: Timing Is Everything

• Casualty scenarios in combat usually entail both a medical problem and a tactical problem.

• We want the best possible outcome for both the casualty and the mission.

• Good medicine can sometimes be bad tactics; bad tactics can get everyone killed or cause the mission to fail.

• Doing the RIGHT THING at the RIGHT TIME is critical
TCCC Phases of Care

- TCCC divides care into 3 phases based on the tactical situation.
- During the gunfight, attention is focused primarily on eliminating the threat.
- As the threat decreases, increasing focus is applied to providing the best possible medical care for the casualties.
Phases of Care in TCCC

- Care Under Fire
- Tactical Field Care
- Tactical Evacuation Care
Care Under Fire is the care rendered by the first responder or combatant at the scene of the injury while he and the casualty are still **under effective hostile fire**. Available medical equipment is limited to that carried by the individual or by the medical provider in his or her aid bag.
Tactical Field Care

Tactical Field Care is the care rendered by the first responder or combatant once he and the casualty are no longer under effective hostile fire. It also applies to situations in which an injury has occurred, but there has been no hostile fire. Available medical equipment is still limited to that carried into the field by unit personnel. Time to evacuation to a medical treatment facility may vary considerably.
Tactical Evacuation Care

Tactical Evacuation Care is the care rendered once the casualty has been picked up by an aircraft, ground vehicle or boat. Additional medical personnel and equipment that may have been pre-staged should be available in this phase of casualty management.
Summary of Key Points

- Prehospital trauma care in tactical settings is very different from civilian settings.
- Tactical and environmental factors have a profound impact on trauma care rendered on the battlefield.
- Good medicine can be bad tactics.
- Up to 24% of combat deaths today are potentially preventable.
- Good first responder care is critical.
- TCCC will give you the tools you need!
Summary of Key Points

• Three phases of care in TCCC
  – Care Under Fire
  – Tactical Field Care
  – TACEVAC Care
Summary of Key Points

• TCCC – designed for combat
• NOT specifically designed for civilian trauma care, but may have applicability in certain settings
Questions?

Photo courtesy MSG (Ret) Harold Montgomery
75th Ranger Regiment