

UNITED STATES MARINE CORPS
FIELD MEDICAL TRAINING BATTALION
Camp Lejeune, NC 28542-0042

FMST 111

INTRODUCTION TO TCCC

TERMINAL LEARNING OBJECTIVE

1. Given T/O weapon, supplies, and a casualty in a tactical environment, perform Tactical Combat Casualty Care to reduce the risk of further injury or death using correct interventions. (HSS-MED-2002)

ENABLING LEARNING OBJECTIVES

1. Without references, given a list, **define TCCC and the goals and principles of TCCC**, within 80% accuracy, IAW CoTCCC Guidelines, and the Pre-hospital Trauma Life Support, Military Edition, Current Edition. (HSS-MED-2002a)
2. Without references, given a list, **define the three phases of TCCC**, within 80% accuracy, IAW CoTCCC Guidelines, and the Pre-hospital Trauma Life Support, Military Edition, Current Edition. (HSS-MED-2002b)

1. OVERALL OBJECTIVE OF TCCC

a. The overall objective of TCCC is to teach service members how to effectively treat combat casualties while preventing additional casualties and completing the mission at hand. The three phases of TCCC include Care Under Fire, Tactical Field Care and Tactical Evacuation Care. TCCC has been shown to be very effective in saving lives on the battlefield.

b. From its humble beginnings as a Naval Special Warfare biomedical research effort to a joint US Special Operations Command (USSOCOM) and Uniformed Services University of Health Sciences (USUHS) research project, TCCC has led a systematic review of all aspects of battlefield trauma care into a set of guidelines designed to combine good medicine with good small-unit tactics. For this reason in 2005, the United States Special Operations Command required TCCC training for all deploying combatants and not just medical personnel. The conflicts in Iraq and Afghanistan have enabled the US Military to make numerous advances in battlefield care. Our military presently has the best casualty treatment and evacuation system in history. TCCC is what will keep you alive long enough to benefit from it.

c. Today, and after nearly two decades of combat operations, the Committee on Tactical Combat Casualty Care and the Joint Trauma System continuously reviews casualty data, best practices, lessons learned, research projects and medical literature to produce a set of evidence-based, best-practice prehospital trauma care guidelines customized for use on the battlefield.

2. THE KEY ELEMENTS OF TCCC INCLUDE:

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. Good first responder care is critical. Up to 28% of combat deaths today are potentially preventable, so good battlefield care is paramount in avoiding preventable deaths. TCCC is different from civilian trauma care training you may have received in the past, but TCCC will give you the tools you need!

- Aggressive use of tourniquets
- Hemostatic dressings
- Aggressive needle thoracostomy
- Airway positioning
- Surgical airways for maxillofacial trauma
- Tactically appropriate fluid resuscitation
- IVs only when needed/IO access if required

- Improved battlefield triple-option analgesia
- Battlefield antibiotics
- Hypothermia prevention
- Combine good tactics and good medicine
- Scenario-based training

Combat medic/Hospital Corpsman input to guidelines

3. **MARCH PAWS.**

You must deal with your tactical situation and your casualties. You must make sure that it is tactically feasible for you to start treating your casualties. The sequence of care in tactical field care is compatible with the MARCH PAWS algorithm found in the USSOCOM Tactical Trauma Protocols.

- **M**assive Hemorrhage
- **A**irway Management
- **R**espiration
- **C**irculation
- **H**ypothermia / **H**ead
- **P**ain Management
- **A**ntibiotics
- **W**ounds
- **S**plinting

4. **THE THREE PHASES OF CARE IN TCCC ARE:**

- Care Under Fire (CUF) outlines strategies using limited medical equipment to render care at the point of injury while the first responder and the casualty are still under hostile fire.
- Tactical Field Care (TFC) provides casualty care guidelines once the first responder and the injured combatant are no longer under hostile fire.
- The Tactical Evacuation Care (TACEVAC) phase begins once the casualty has been transferred to a transport aircraft or vehicle. During this phase additional medical personnel and equipment may be available to provide augmented casualty care.

5. **UNDERSTANDING COMBAT CASUALTY CARE STATISTICS.***

a. The objective of the above mentioned paper was to develop standardized terminology and equations that produce the best insight into the effectiveness of care at different stages of treatment. These equations were then applied consistently across data from the WWII, Vietnam and the current Global War on Terrorism (OIF/OEF). Three essential terms were clarified:

- (1) The Case Fatality Rate (CFR) as percentage of fatalities among all wounded
- (2) Killed in Action (KIA) as percentage of immediate deaths among all seriously injured (not returning to duty)
- (3) Died of Wounds (DOW) as percentage of deaths following admission to a medical treatment facility among all seriously injured (not returning to duty).

b. Using this clear set of definitions, the equations were used to ask two basic questions:

- What is the overall lethality of the battlefield?
- How effective is combat casualty care?

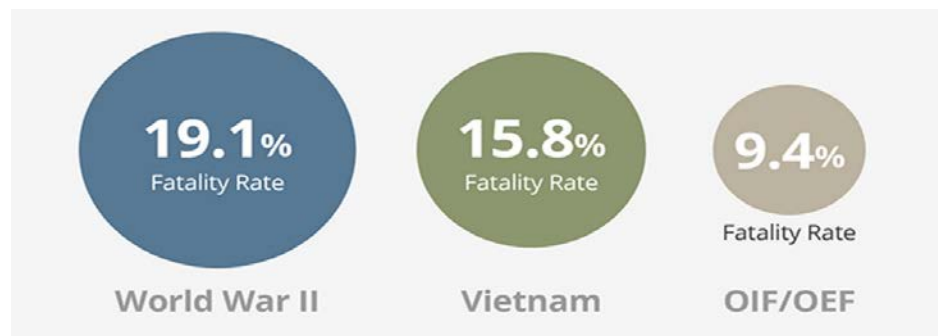


Figure 1. Key Chart

*(John B. Holcomb, MD, Lynn G. Stansbury, MD, Howard R. Champion, FRCS, Charles Wade, PhD, and Ronald F. Bellamy, MD. *The Journal of TRAUMA*, Injury, Infection, and Critical Care J Trauma. 2006;60:397–401.)

c. Based on a comparison of statistics for battle casualties from 1941-2005, the U.S. casualty survival rate in Iraq and Afghanistan has been the best in U.S. history.

- WHY ARE WE DOING BETTER?
 - Improved Personal Protective Equipment
 - Tactical Combat Casualty Care
 - Faster evacuation time
 - Better trained Corpsmen, medics

6. **DEATH ON THE BATTLEFIELD***

a. Most battlefield casualties died of their injuries before ever reaching a surgeon. As most pre-medical treatment facility (pre-MTF) deaths are nonsurvivable, mitigation strategies to impact outcomes in this population need to be directed toward injury prevention. To significantly impact the outcome of combat casualties with potentially survivable (PS) injury, strategies must be developed to mitigate hemorrhage and optimize airway management or reduce the time interval between the battlefield point of injury and surgical intervention.

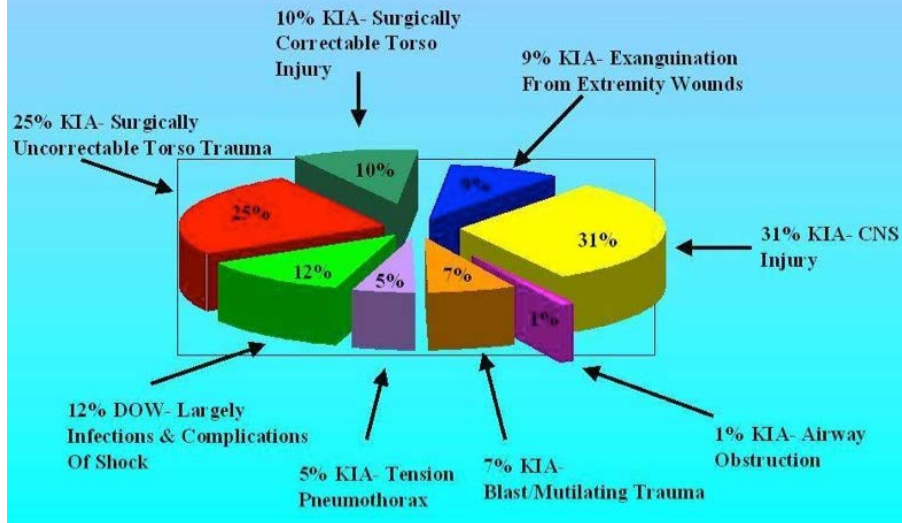
b. Understanding battlefield mortality is a vital component of the military trauma system. Emphasis on this analysis should be placed on trauma system optimization, evidence-based improvements in Tactical Combat Casualty Care guidelines, data-driven research, and development to remediate gaps in care and relevant training and equipment enhancements that will increase the survivability of the fighting force.

7. **A PROFILE OF BATTLEFIELD INJURY.** *

Traumatic combat injuries differ from those encountered in the civilian setting in terms of epidemiology, mechanism of wounding, pathophysiologic trajectory after injury, and outcome. Except for a few notable exceptions, data sources for combat injuries have historically been inadequate. Although the pathophysiologic process of dying is the same (i.e., dominated by exsanguination and central nervous system injury) in both the civilian and military arenas, combat trauma has unique considerations with regard to acute resuscitation, including (1) the high energy and high lethality of wounding agents; (2) multiple causes of wounding; (3) preponderance of penetrating injury; (4) persistence of threat in tactical settings; (5) austere, resource-constrained environment; and (5) delayed access to definitive care. Recognition of these differences can help bring focus to resuscitation research for combat settings and can serve to foster greater civilian-military collaboration in both basic and transitional research.

*Howard R. Champion, FRCS(Edin), FACS, Ronald F. Bellamy, MD, FACS, COL, US Army, Ret., Colonel P. Roberts, MBE, QHS, MS, FRCS, L/RAMC, and Ari Leppaniemi, MD, PhD, *The Journal of TRAUMA, Injury, Infection, and Critical Care*, J Trauma. 2003;54:S13–S19.

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

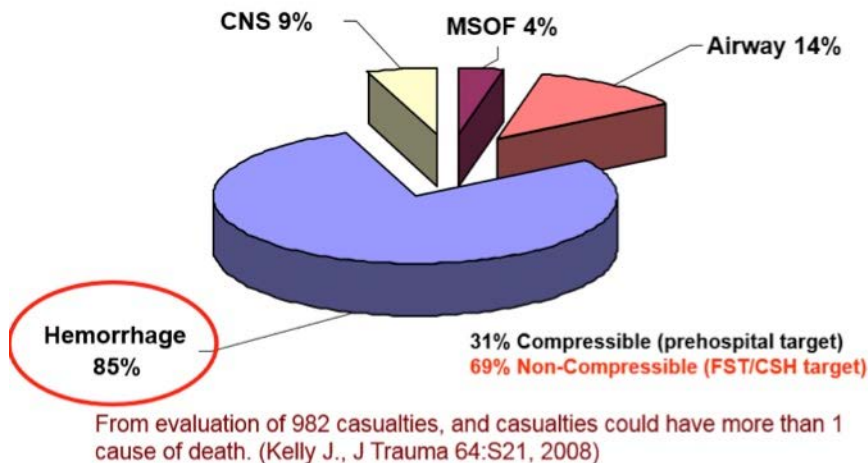


The Wound Data Munitions Effectiveness Team (WDMET) database suggests that exsanguination from extremity wounds accounts for more than half of the potentially preventable deaths in combat, thus the continued emphasis on hemostasis as the primary maneuver in combat casualty care and the research emphasis on agents that might provide a means of decreasing inaccessible or uncontrollable hemorrhage. Other potentially preventable deaths include simple airway obstruction and other sources of hemorrhage that are surgically remediable if such care can be provided in a timely fashion. We can use this data to help us understand what types of injuries are seen in combat and which may or may not be survivable. The causes of death for Soldiers who died in Vietnam demonstrates that a significant number of deaths occur from problems addressed by TCCC, including exsanguination from extremity wounds, airway obstruction, and tension pneumothorax .

Injury Severity and Causes of Death From Operation Iraqi Freedom and Operation Enduring Freedom: 2003–2004 Versus 2006*



Potentially Preventable Deaths (232) Early in OIF and OEF



8. TCCC AND INJURIES.

The opinion that injuries sustained in Iraq and Afghanistan have increased in severity is widely held by clinicians who have deployed multiple times. To continuously improve combat casualty care, the Department of Defense has enacted numerous evidence-based policies and clinical practice guidelines.

Overall causes of death were examined, looking for opportunities of improvement for research and training. In the time periods of the war studied, deaths per month has doubled, with increases in both injury severity and number of wounds per casualty. Truncal hemorrhage is the leading cause of potentially survivable deaths. Arguably, the success of the medical improvements during this war has served to maintain the lowest case fatality rate on record.



Summary and Take-Home Message

Prehospital care is the most important aspect in ensuring the survival of the casualty.

*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 first responder. Of the prehospital deaths, 24.3% were deemed potentially survivable. (n = 976)

Initial care may have to be provided by the combatant.

While hemorrhage remains the number one cause of death, the second most common cause (8%) of potentially preventable deaths was upper airway obstruction due mostly to direct injury to the airway structures of the face and neck. (n = 78)

TCCC has helped U.S. combat forces to achieve the highest casualty survival rate in history.

TCCC is different than civilian pre-hospital care. Battlefield considerations and conditions must be taken into account.

It is divided into 3 Phases (Care Under Fire, Tactical Field Care, and Tactical Evacuation Care).

Implementing the principles of TCCC has reduced preventable deaths on the battlefield



Summary and Take-Home Message

More recent data from Iraq and Afghanistan show hemorrhage is still the major cause of potentially preventable deaths. We are doing better than ever in regards to managing preventable deaths on the battlefield, but studies show we still have room for improvement.

*Joseph F. Kelly, MD, Amber E. Ritenour, MD, Daniel F. McLaughlin, MD, Karen A. Bagg, MS, Amy N. Apodaca, MS, Craig T. Mallak, MD, Lisa Pearce, MD, Mary M. Lawnick, RN, BSN, Howard R. Champion, MD, Charles E. Wade, PhD, and COL John B. Holcomb, MC, *The Journal of TRAUMA, Injury, Infection, and Critical Care*, J Trauma. 2008;64:S21–S27.)

REFERENCE(S):

Committee on Tactical Combat Casualty Care Guidelines, CoTCCC Guidelines, Current Guidelines

Joint Trauma Systems DODI 6040.47

Medical Readiness Training DODI 1322.24

Pre-hospital Trauma Life Support (PHTLS), Military Edition, Current Edition

DeployedMedicine.com

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Death on the battlefield (2001-2011): Implications for the future of combat casualty care. Brian J. Eastridge, MD, Robert L. Mabry, MD, Peter Seguin, MD, Joyce Cantrell, MD, Terrill Tops, MD, Paul Uribe, MD, Olga Mallett, Tamara Zubko, Lynne Oetjen-Gerdes, Todd E. Rasmussen, MD, Frank K. Butler, MD, Russell S. Kotwal, MD, John B. Holcomb, MD, Charles Wade, PhD, Howard Champion, MD, Mimi Lawnick, Leon Moores, MD, and Lorne H. Blackbourne, MD, *The Journal of Trauma and Acute Care Surgery*, J Trauma Acute Care Surg, Volume 73, Number 6, Supplement 5

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