

TCCC Standardization *The Time Is Now*

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Trauma remains the leading cause of death in adults worldwide,¹ and a significant portion of those deaths occur within the first 6 to 24 hours after initial injury secondary to hemorrhage.^{2,3} The evolution of modern-day trauma care has witnessed revolutionary changes over the past century, with lessons learned from war providing the primary stimulus. Major advances in surgical vascular procedures and resuscitation techniques, such as whole blood infusion, prehospital hemorrhage control, and a resurgence of immediate and aggressive tourniquet use, are more recent developments.^{4,5} In addition to prehospital advances, the timing from injury to medical interventions also emerged as an important factor for positive outcomes. During the wars in Iraq and Afghanistan, under the Tactical Combat Casualty Care (TCCC) construct, trauma care and the enhanced capability to collect trauma information from the battlefield have resulted in a greater understanding of managing penetrating injuries, explosive injuries, and life-threatening hemorrhage. The fatality rate during Vietnam was approximately 14%; that has dropped to 9% during Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF).⁶ This improved survivability is widely attributed to two recent advances: rapid evacuation from the battlefield and early prehospital treatment. The purpose of our commentary is to emphasize that while great strides in prehospital care TCCC have been made in the past 14 years, the lack of institutional standardization is one of the remaining challenges of trauma care.

R. Adams Cowley, an Army veteran, is credited as the pioneer of the “Golden Hour” concept in the 1970s.^{7,8} The Golden Hour refers to the 60 minutes from time of traumatic injury to definitive care that can to greatly reduce the mortality of severe trauma. This concept led to the TCCC initiative, which was developed in 1996 by the Naval Special Warfare Community in partnership with the Uniformed Services University of the Health Sciences. This paradigm-changing concept was introduced in an article titled “Tactical Combat Casualty Care in Special Operations,” in the journal *Military Medicine*.⁹ Since 2001, the TCCC guidelines have been updated

as needed by the Committee on TCCC (CoTCCC), the prehospital arm of the Joint Trauma System (JTS). The CoTCCC was established at the Navy Operational Medical Institute in 2001, with funding from the US Special Operations Command. This 42-member group comprises trauma surgeons, emergency medicine physicians, combatant unit physicians, physician assistants, and combat medical educators. By charter, no less than 30% of its membership is made up of active or former Combat medics, corpsmen, and pararescue personnel. The CoTCCC has representation from all of the US Armed Services and, as of January 2016 [personal communication, CAPT (retired) Frank Butler], has 100% deployed experience among its members. The CoTCCC was relocated in 2007 to the Defense Health Board and, in 2013, came under the auspices of the JTS (Figure 1) to standardize the care and treatment across all of the US Armed Forces. This consolidation has saved countless lives on and off the battlefield.

Figure 1
The Committee on Tactical Combat Casualty Care emblem.



Practice guidelines and lessons learned from recent military conflicts around the globe that apply to TCCC are directly credited for increasing injury survivability.¹⁰⁻¹² The TCCC guidelines cover a broad range of prehospital procedures, from simple tourniquet placement to prehospital blood administration and performing surgical airways. These TCCC lessons learned also have potential benefits for civilian agencies. For instance,

civilian committees for prehospital care have embraced the TCCC concept for a wide range of civilian agencies, such as firefighters, emergency medical services (EMS), and tactical law enforcement activities.¹³⁻¹⁷ Examples of violence, such as those in Newtown, Connecticut; Boston, Massachusetts; and Aurora, Colorado, in addition to other recent events, such as in Paris, France, led to trauma similar to military conflict. In addition to civilian first-responder activities, governmental agencies other than the Department of Defense (DoD) have also adopted TCCC for federal security operations.¹⁸

TCCC is now widely accepted by the US Armed Forces, federal agencies such as Department of Homeland Security, and civilian prehospital care organizations. Active shooter events, such as the Navy Yard in Washington, DC, and the Columbine High School in Colorado, have driven civilian first responders and tactical law enforcement departments toward the TCCC construct. For instance, the Hartford Consensus,^{14,19} published in 2013, is a list of recommendations directly related to TCCC. Namely, that hemorrhage control should be a core function of law enforcement and the response to active shooter incidents requires a unified medical response involving all first responders and tactical personnel involved to minimize the loss of life.^{16,20} Collectively, the work of the American College of Emergency Physicians, the American College of Surgeons Committee on Trauma, the Federal Bureau of Investigation,¹⁹ and foreign armed forces²¹ makes it clear that the TCCC concept is quickly becoming the new accepted standard for all prehospital environments.

These different organizations, however, are currently free to interpret and/or incorporate TCCC guidelines as they see fit for their particular organization or needs. The guidelines published by the CoTCCC are not uniformly applied across a disparate landscape of military, federal, and prehospital organizations. Thus, the interpretation of TCCC guiding principles varies widely from agency to agency. Naturally, this leads to an inconsistency from one agency's TCCC provider to the next. In turn, this lack of consistency is a threat to Service and agency interoperability at the trauma/prehospital level, which is a DoD priority.²²⁻²⁴

One way to prevent this current low rate of interoperability between agencies is to move TCCC training toward national certification. We see similarities between the current state of TCCC standards and the evolution of basic lifesaver (BLS), advanced cardiac life support, and pediatric advanced life support national certifications from the 1960s.²⁵ Like TCCC, BLS in the 1960s era was a qualification. Without overarching national guidance, BLS standards varied widely from region to region, with serious consequences to healthcare outcomes. To

overcome this disparity, the federal government enacted the Emergency Medical Services System Act of 1973,²⁶ resulting in both cardiopulmonary resuscitation (CPR) standards and training, and core standards for prehospital medical care. Once BLS was subsumed under the newly formed American Heart Association (AHA), standards were nationalized. In other words, a BLS provider under one EMS had the exact same education and skill sets as a BLS provider elsewhere in the United States. This consistency has significant advantages both locally (fire, EMS, and police responders) and nationally, when EMS personnel deploy to other areas of the country during disaster response. The same issues that were found with BLS at the national level (i.e., AHA and American Red Cross both have different standards for CPR) currently apply to TCCC: lack of coordination between agencies, and differing recertification requirements, resources, and funding.

Specifically, the benefits of TCCC standardization will be:

- Improved communication of best-practice prehospital trauma care guidelines to Combat medical providers, who, in turn, will be better prepared to render optimal care to our country's Combat wounded
- More precise feedback to key stakeholders; namely, the US Armed Services (e.g., the JTS, geographical Combatant Commanders, and the Defense Health Agency)
- Improved identification of education gaps for TCCC providers
- More easily identified casualty outcome trends across Services and other agencies
- Promotion and support of JTS and facilitation of the conduct of prehospital research and the JTS performance improvement process

In conclusion, the continuing improvement efforts to develop TCCC guidelines under the leadership of the CoTCCC have transformed battlefield trauma care in the US Military and greatly improved casualty survival.^{9,10,27} Additionally, the realignment of CoTCCC under JTS has been of great benefit to the functioning of the CoTCCC and to the transition of both its products and life-saving tactics, techniques, and procedures to our nation's warfighters.^{27,28} Much has been accomplished. As stated by Butler and Blackbourne,¹⁰ the US Military and coalition partners now have the best prehospital care and evacuation capabilities for managing combat trauma.

We believe for the next generations of TCCC providers, the gaps that need to be closed are (1) between the published TCCC guidelines and their implementation and execution, and (2) how the military certifies and recertifies its members and instructors to establish a national/DoD certification process. We have identified

the immediate need to develop a TCCC curriculum with a set of core training standards to aid in the national standardization of education, examination, certification, and recertification with an option to add situation and/or service-specific components. Accomplishing this task would be a revolutionary step forward in ensuring that TCCC, a time-tested methodology of tactical casualty care, would be a consistent and transportable skill set across services and other governmental agencies.

Using the model of the Military Training Network's agreement with the AHA as a baseline program, we propose that the solution to this lack of standardization is already in place. The civilian sector, namely the National Association of Emergency Medical Technicians (NAEMT), has already incorporated the DoD's TCCC course as part of the US prehospital trauma life support (PHTLS) program.²⁹ Therefore, the framework for standardization across Services and civilian agencies already exists. The struggle to bring consistency, quality, and competence to the delivery of prehospital Combat casualty care over the past 14 years of conflict has been a major factor in the US Military achieving the highest historical wounded survival rate during OEF and OIF. Despite paradigm-changing advances, adverse casualty care events directly attributed to inconsistent TCCC training still persists, as most recently highlighted by Col Kirby Gross, JTS Director.²⁴ Therefore, we conclude that a clear opportunity exists for CoTCCC and other governmental and civilian agencies (e.g., NAEMT and the PHTLS Executive Council) that have already adopted the TCCC construct to establish a strategic partnership with the central vision and overarching goals of developing national TCCC certifications applicable to all civilian services (fire, law enforcement, rescue), governmental agencies, and US Armed Services.

Disclosures

The authors have nothing to disclose.

Disclaimer

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References

1. Lopez AD, Mathers CD, Ezzati M, et al. Global and regional burden of disease and risk factors, 2001: systematic analysis of population health data. *Lancet*. 2006;367:1747–1757.
2. Demetriades D, Kuncir E, Murray J, et al. Mortality prediction of head Abbreviated Injury Score and Glasgow Coma Scale: analysis of 7,764 head injuries. *J Am Coll Surg*. 2004;199:216–222.
3. Perkins J, Beekley A. Damage control resuscitation. In: Savitsky E, Katz D (eds). *Combat Casualty Care: lessons learned from OEF and OIF*. Fort Detrick, MD: Office of the Surgeon General, Department of the Army; 2012:121–164.
4. Beekley AC, Sebesta JA, Blackbourne LH, et al. Prehospital tourniquet use in Operation Iraqi Freedom: effect on hemorrhage control and outcomes. *J Trauma Acute Care Surg*. 2008;64(2 suppl):S28–S37; discussion, S37.
5. Eastridge BJ, Jenkins D, Flaherty S, et al. Trauma system development in a theater of war: experiences from Operation Iraqi Freedom and Operation Enduring Freedom. *J Trauma*. 2006;61(6):1366–1372; discussion 1372–1373.
6. Goldberg MS. Death and injury rates of US military personnel in Iraq. *Mil Med*. 2010;175:220–226.
7. Osborn TM, Scalea TM. A call for critical care training of emergency physicians. *Ann Emerg Med*. 2002;39:562–563.
8. Cowley R. The resuscitation and stabilization of major multiple trauma patients in a trauma center environment. *Clin Med*. 1976;83:16–22.
9. Butler Jr F, Haggmann J, Butler E. Tactical combat casualty care in special operations. *Mil Med*. 1996;161:3–16.
10. Butler FK Jr, Blackbourne L. Battlefield trauma care then and now: a decade of Tactical Combat Casualty Care. *J Trauma Acute Care Surg*. 2012;73(6 suppl 5):S395–402.
11. Kotwal RS, Montgomery HR, Kotwal BM, et al. Eliminating preventable death on the battlefield. *Arch Surg*. 2011;146:1350–1358.
12. Eastridge B, Mabry R, Seguin P, et al. Death on the battlefield (2001–2011): implications for the future of combat casualty care. *J Trauma Acute Care Surg*. 2012;73(6 suppl 5):S431.
13. Callaway D, Smith E, Cain J, et al. Tactical Emergency Casualty Care (TECC): guidelines for the provision of prehospital trauma care in high threat environments. *J Spec Oper Med*. 2011;11:104–122.
14. Jacobs L, Eastman A, McSwain N, et al. Improving survival from active shooter events: The Hartford Consensus. *Bull Am Coll Surg*. 2015;100(1 suppl):32–34.
15. Jacobs LM. The Hartford Consensus III: implementation of bleeding control. *Conn Med*. 2015;79:431–435.
16. Jacobs L, Wade D, McSwain N, et al. Hartford Consensus: a call to action for THREAT, a medical disaster preparedness concept. *J Am Coll Surg*. 2014;218(3):467–475.
17. Aberle SJ, Lohse CM, Sztajnkrycer MD. A descriptive analysis of US prehospital care response to law enforcement tactical incidents. *J Spec Oper Med*. 2015;15:117–122.
18. Office of Health Affairs, Department of Homeland Security. First responder guide for improving survivability in improvised explosive device and/or active shooter incidents. 2015. <http://www.dhs.gov/sites/default/files/publications/First%20Responder%20Guidance%20June%202015%20FINAL%202.pdf>. Accessed 9 November 2015.
19. Pons PT, Jerome J, McMullen J, et al. The Hartford Consensus on Active Shooters: implementing the continuum of prehospital trauma response. *J Emerg Med*. 2015;49:878–885.
20. Jacobs L, McSwain N, Rotondo M, et al. Improving survival from active shooter events: the Hartford Consensus. *Bull Am Coll Surg*. 2013;98:14–16.
21. Tien H, Jung V, Rizoli S, et al. An evaluation of tactical combat casualty care interventions in a combat environment. *J Am Coll Surg*. 2008;207:174–178.
22. Sauer SW, Robinson JB, Smith MP, et al. Saving lives on the battlefield (Part II)—one year later: a Joint Theater Trauma System and Joint Trauma System review of prehospital trauma care in Combined Joint Operations Area-Afghanistan (CJOA-A). *J Spec Oper Med*. 2015;15:25–41.
23. Kotwal R, Butler F, Edgar E, et al. Saving lives on the battlefield: a Joint Trauma System review of pre-hospital trauma

- care in combined joint operating area—Afghanistan (CJOA-A) Executive Summary. *J Spec Oper Med.* 2013;13:77–85.
24. Gross KR. *Establishing a DoD standard for TCCC training.* Fort Sam Houston, TX; 2015.
25. Rockwood C Jr, Mann C, Farrington J, et al. History of emergency medical services in the United States. *J Trauma.* 1976; 16:299–308.
26. Emergency Medical Services System Act of 1973. In: 93rd Congressional Session ss, ed. Vol Public Law 93-1541973.
27. Butler F, Smith D, Carmona R. Implementing and preserving advances in combat casualty care from Iraq to Afghanistan throughout the U.S. military. *J Trauma.* 2015;79:321–326.
28. Butler F, Blackbourne L, Gross K. The combat medic aid bag 2025. CoTCCC top 10 recommended battlefield trauma care research, development, and evaluation priorities for 2015. *J Spec Oper Med.* 2015;15:7–19.
29. National Association of Emergency Medical Technicians. Tactical Combat Casualty Care. 2015. <http://www.naemt.org/education/TCCC/tccc.aspx>. Accessed 9 November 9 2015.

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