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)

Final Report, 30 May 2014

USCENTCOM Joint Theater Trauma System–Afghanistan

Samual W. Sauer, MD, MPH; John B. Robinson, MPAS, PA-C; Michael P. Smith, NREMT-B; Kirby R. Gross, MD

DoD Joint Trauma System, Defense Center of Excellence for Trauma

Russ S. Kotwal, MD, MPH; Robert L. Mabry, MD; Frank K. Butler, MD; Zsolt T. Stockinger, MD; Jeffrey A. Bailey, MD

USCENTCOM Command Surgeon

Mark E. Mavity, MD, MPH; Duncan A. Gillies II, MD, MPH

CHANGING OLD PARADIGMS

"Treat for shock, but do not waste any time doing it."

Fleet Marine Forces Manual

"A tourniquet is a last resort for life-threatening injuries. Tourniquets cut off blood flow to and from the extremity and are likely to cause permanent damage to vessels, nerves, and muscles."

AMEDDC&S Pamphlet No. 350-10

EXECUTIVE SUMMARY

Introduction

The United States has achieved unprecedented survival rates, as high as 98%, for casualties arriving alive at the combat hospital. Our military medical personnel are rightly proud of this achievement. Commanders and Servicemembers are confident that if wounded and moved to a Role II or III medical facility, their care will be the best in the world. Combat casualty care, however, begins at the point of injury and continues through evacuation to those facilities. With up to 25% of deaths on the battlefield being potentially preventable, the prehospital environment is the next frontier for making significant further improvements in battlefield trauma care. Strict adherence to the evidence-based Tactical Combat Casualty Care (TCCC) Guidelines has been proven to reduce morbidity and mortality on the battlefield. However, full implementation across the entire force and commitment from both line and medical leadership continue to face ongoing challenges.

This report on prehospital trauma in the Combined Joint Operations Area–Afghanistan (CJOA-A) is a follow-on to the one previously conducted in November 2012 and published in January 2013. Both assessments were conducted by the US Central Command (USCENTCOM) Joint Theater Trauma System (JTTS). Observations for this report were collected from December 2013 to January 2014 and were obtained directly from deployed prehospital providers, medical leaders, and combatant leaders. Significant progress has been made between these two reports with the establishment of a Prehospital Care Division within the JTTS, development of a prehospital trauma registry and weekly prehospital

This report in its entirety was reviewed by the US Central Command Communications Integration Public Affairs Office and the Operational Security Office on 30 May 2014 and was determined to have an "Unclassified" classification with no limit for distribution.

Report Documentation Page

Form Approved
OMB No. 0704-0188

1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED
01 JUL 2015	**N/A**	**-**

4. TITLE AND SUBTITLE	5a. CONTRACT NUMBER
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) Final Report, 30 May 2014	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER

6. AUTHOR(S)	5d. PROJECT NUMBER
Sauer, S. W. Robinson, J. B. Smith, M. P. Gross, K. R. Kotwal, R. S. Mabry, R. L. Butler, F. K. Stockinger, Z. T. Bailey, J. A. Mavity, M. E. Gillies, D. A., 2nd	5e. TASK NUMBER
	5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)	8. PERFORMING ORGANIZATION REPORT NUMBER
United States Army Institute of Surgical Research, JBSA Fort Sam Houston, TX 78234	

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S)
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release, distribution unlimited

13. SUPPLEMENTARY NOTES

14. ABSTRACT

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			
unclassified	**unclassified**	**unclassified**	**SAR**	**18**	

trauma conferences, and CJOA-A theater guidance and enforcement of prehospital documentation. Specific prehospital trauma-care achievements include expansion of transfusion capabilities forward to the point of injury, junctional tourniquets, and universal approval of tranexamic acid.

Observations and Discussion

TCCC Guidelines are widely, though not universally, accepted as authoritative "best practices" for prehospital trauma care; however, they are not directive policy. The high degree of variance among deployed unit medical personnel, both in terms of clinical training and operational experience, results in inconsistent application and enforcement of TCCC compliance across the force. Since our line commanders are dependent upon their unit medical personnel to inform their understanding, appreciation, and prioritization of medical support requirements, their TCCC commitment and command emphasis understandably varies, as well.

In the face of near-term resource constraints, without doctrinal and policy endorsement, the Services will continue to struggle to adequately and fully organize, train, and equip to meet TCCC Guidelines as the standard for prehospital care. A previous memorandum and recommendation by the Assistant Secretary of Defense for Health Affairs to train all combatants and deployed medical personnel in TCCC remains incompletely implemented across the Department of Defense (DoD). In contrast, US Special Operations Command (USSOCOM) and US Army Special Operations Command (USASOC) have codified TCCC compliance as policy and reduced prehospital case-fatality rates.

We must continue to embrace and explore emerging capabilities to deliver far-forward resuscitative care. Those capabilities that are both responsive and adaptive to the dynamic tactical landscape hold the greatest intrinsic value for our line commanders and their personnel. We must also ensure that our supporting organize, train, and equip functions have the agility to keep pace with these evolving standards of care.

We must increase the investment in our medical personnel to develop and retain true expertise in prehospital trauma-care delivery and oversight. These must become core competencies in the unique domain of operational medical support, and we must embrace new medical training paradigms that advance these skills. Finally, officer professional development for both line and medical leaders must emphasize the shared responsibilities for developing and enforcing robust unit commitment to lifesaving, prehospital trauma-care principles.

Findings

1. The lack of standardized TCCC capability may represent a causal factor for the increased number of Servicemembers killed in action and of preventable deaths, and the increased case-fatality rate seen in conventional forces when compared with Special Operations Forces (SOF).
2. Absent a validated joint requirement, which is captured doctrinally, the prevailing resource-constrained environment will challenge Services to fully organize, train, and equip to TCCC standards.
3. There is no evidence that the DoD or CJOA-A has policies or procedures in place to validate or enforce prehospital care within an organization. Service-specific doctrine requiring unit surgeons to each establish a standard of care allows for variant, nonstandard delivery of battlefield trauma care across the Force. Furthermore, even within a single command, rotation of unit surgeons introduces and magnifies discontinuity of unit trauma-care standards.
4. The requirements to perform and support prehospital TCCC could be standardized across Services (universally or at the Combatant Command level) with the specific means to achieve these train-and-equip standards left up to the respective Services.
5. As with elements of prehospital care, organization structures are highly variant, with a number of at-risk forces not having adequately manned/trained/equipped medical support.
6. Units with a tactical evacuation mission requirement should be task organized to be able to provide advanced enroute resuscitative care from the point of injury.
7. Robust training platforms exist for prehospital trauma care, though not all course training syllabi keep pace with current best practices. Sufficient information technologies exist to rapidly and widely disperse new TCCC Guidelines as they become immediately available.
8. Unit equipment sets and supporting medical logistics systems have not kept pace with evolving prehospital-care TCCC guidelines. Outdated items remain within the supply chain and newly required items have not yet been incorporated into standard configurations.
9. In the absence of a widely mandated policy that establishes TCCC Guidelines as the standard for prehospital battlefield care, and accountability for deviations from this standard, the degree of penetrance and acceptance of TCCC Guidelines will remain episodic and dependent upon individual (surgeon and Commander) commitment.
10. Neither line nor operational medical leaders are optimally prepared to recognize the importance of a

robust prehospital care system or equipped with the requisite knowledge, skills, or experience to build or sustain such a system within their unit.

New Recommendations

1. DoD establishes TCCC Guidelines as the DoD standard of care for prehospital care.
2. DoD conducts a Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel, Facilities, and Policy (DOTMLPF-P) assessment across Services to assess and implement TCCC Guideline capability.
3. DoD systematically review and correct all prehospital care doctrine across the spectrum to accurately represent TCCC Guidelines, with the doctrine specifically stating "in accordance with the current TCCC Guidelines published by the Committee on Tactical Combat Casualty Care" to ensure that the doctrine remains current.
4. Services immediately implement an aggressive transition initiative to update all relevant medical equipment sets and medical logistic policies to ensure units have TCCC Guideline-specified medical materials.
5. DoD establishes a Battlefield Prehospital Trauma Care Program Proponent (or equivalent structure) in the Defense Health Agency (DHA).
6. DoD develops and mandates a TCCC Accreditation, Certification, and Recertification program like Basic Life Support, Advanced Trauma Life Support, and Advanced Cardiac Life Support for all military personnel, with a requirement for biannual recertification and as based on level of ability and position (e.g., nonmedical first responder, nonmedical leader, medical provider, medical leader).
7. Services require and track TCCC certification for all prehospital medical personnel and integrate tracking into combatant force readiness reporting (e.g., Unit Status Reports).
8. Services incorporate TCCC Champion training into all basic and advanced officer and noncommissioned officer professional military development courses.
9. Services incorporate and mandate casualty management and hands-on practical exercises into all professional military development courses.
10. DoD updates the Joint Capability Requirement for Tactical Enroute Care to include the ability to provide advanced resuscitative care from the point of injury.
11. As military physicians are ultimately responsible for assuming the role of emergency medical services director for prehospital services if assigned to a combatant unit, the military Services should study and develop career, educational, and assignment tracks for operational medical corps officers, with emphasis upon prehospital care delivery.

Conclusion

History teaches that the lessons we have learned regarding combat casualty care may be lost if we fail to attend to them in the coming years. Even in a resource-constrained future, the Military Health System (MHS) has the necessary raw materials of personnel, organization, and experience to retain and refine our current best practices. With continued efforts aimed at (1) formalizing TCCC Guideline compliance across the force, (2) embracing evidence-based methods to continually improve upon these Guidelines, and (3) selecting, developing, and retaining operational medical personnel dedicated to prehospital trauma care, the MHS will ensure an organizational culture that fully embraces prehospital combat casualty care as a core competency.

CHANGING OLD PARADIGMS

"We succeed only as we identify in life, or in war, or in anything else, a single overriding objective, and make all other considerations bend to that one objective."

Dwight D. Eisenhower

SECTION 1. PURPOSE

Mission

To conduct a capabilities-based assessment of prehospital trauma care within the Combined Joint Operations Area–Afghanistan (CJOA-A) and provide recommendations to improve prehospital combat casualty care and injury survivability. The largest potential gains for improving survival among US combat casualties remain in the prehospital environment.

This report is not a standalone document. Both the methods used to develop this report and the content must be viewed in the context of the US Central Command (USCENTCOM) report by Kotwal et al. entitled "Saving Lives on the Battlefield," dated 30 January 2013. This report is an adjunct and follow-up assessment on the CJOA-A development and implementation of prehospital care 1 year from that document's initial publication. Our assessment occurred from 15 December 2013 to 20 January 2014. It was also conducted during the Afghanistan Campaign's retrograde process and concurrent "seasonal slowdown" of enemy activity. Subsequently, the results of this survey will also need to be viewed from that perspective.

Intent

To observe, discuss, record, and evaluate prehospital trauma-care tactics, techniques, and procedures conducted in the prehospital battlefield environment as obtained directly from deployed prehospital providers, medical leaders, and combatant leaders among the various US military services 1 year after the initial assessment.

The overall goal of this re-assessment is to provide recommendations that will reduce preventable combat death among US, Coalition, and Afghan forces to the lowest incidence achievable. Three primary areas of focus are to (1) identify best practices that can be cross-leveled among the force; (2) identify actionable areas of performance improvement that will optimize prehospital trauma-care timing, delivery, and casualty survivability; and (3) identify potential gaps in prehospital trauma care across the Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel, Facilities, and Policy (DOTMLPF-P) domain.

SECTION 2. METHODOLOGY

The assessment team comprised CJOA-A deployed personnel from the Joint Theater Trauma System (JTTS) Prehospital Division. This prehospital division was integrated into the JTTS as a result of the initial CJOA-A prehospital report recommendations to USCENTCOM. As this team is now an organic theater asset, the assessment was conducted over 45 days, allowing for the inclusion of more geographically isolated ROLE-1s.

Unique to this assessment was the decision to limit the assessment to conventional forces. There were three driving factors in this decision: (1) Conventional forces suffer the most casualties (including Afghanistan security forces); (2) US SOF have previously achieved demonstrable success in the area of Tactical Combat Casualty Care (TCCC); and, (3) thus, the team focused on organizations whereby the largest benefits could yet be realized.

The team focused on ROLE-1s and Tactical Evacuation Care (TACEVAC) organizations, as these organizations are the providers of prehospital care. Individual and group interviews were conducted with the spectrum of ROLE-1 healthcare providers. This included enlisted medical personnel, physicians, physician assistants, nurses, commanders, and Warfighters. In addition to unstructured dialogue, the team used specified questions regarding TCCC Guidelines, using the DOTMLPF structure to identify potential capability gaps in prehospital care delivery.

Primary Team, Prehospital Division,
Joint Theater Trauma System, USCENTCOM

Samual W. Sauer, MD, MPH; COL, MC, USA; Director, Prehospital Care
John Robinson, MPAS, PA-C; MAJ, SP, USA; Prehospital Coordinator
Michael P. Smith; SSG, US Army; Prehospital NCOIC

Support Team, Joint Theater Trauma System (JTTS) and Joint Trauma System (JTS)

Kirby R. Gross, MD; COL, MC, USA; Deployed Director of JTTS
Russ S. Kotwal, MD MPH; COL, MC, USA; Outgoing Director of JTS Trauma Care Delivery
Robert L. Mabry, MD; LTC, MC, USA; Incoming Director of JTS Trauma Care Delivery
Frank K. Butler, MD; CAPT, MC, USN; Director of JTS Prehospital Trauma Care
Zsolt T. Stockinger, MD; CAPT, MC, USN; Director of JTS Performance Improvement
Jeffrey A. Bailey, MD; Col, MC, USAF; Director of JTS

CJOA-A Assessment Locations of the ROLE-1s

Leatherneck	Lashkar
Shank	Sabit
Frontenac	Lam
Dwyer	Gah
Boldak	Qadam
Rushmore	Gamberi
Airborne	Kandahar
Shukvani	Ebbert
Spin	Bagram
Lightning	Pasab
Tokham	Walton
Boldak	Ghazni
Eredvi	Clark
Mehtar	

Note: The term "medic" is used throughout this document and generically refers to enlisted medical personnel of all services providing prehospital care. Service-specific branding and education-level titles are used when they are important to the message. The term "medical officer" generically refers to physicians and physician assistants. The term "Unit Surgeon" specifically identifies the officer designated as senior medical officer of a deployed line unit. The term "Warfighter" generically refers to all combatants regardless of Service.

Assessment Methods

Capability-Based Assessment (CBA) Questions

1. What is the standard of care for prehospital care in US Department of Defense Combat Operations?

2. Are the TCCC Guidelines the US Department of Defense Combat Operation prehospital standard of care?
3. Are the TCCC Guidelines doctrine?
4. What are the policies or regulations used to conduct prehospital quality assurance and quality improvement programs during US Department of Defense Combat Operations?
5. Are the TCCC Guidelines currently enforceable as a prehospital standard of care?
6. Is delivery of TCCC standardized across combatant organizations?
7. Does our current doctrine support the effective implementation of TCCC guidelines at the tactical and operational levels on the battlefield?
8. Are our tactical and operational organizations structured to support the delivery of prehospital care?
9. Does the current training structure support the effective delivery of prehospital care using a standard of care that is tactically and operational available across the spectrum of the battlefield?
10. Do our currently fielded tactical medical sets, kits, and outfits ensure the delivery of effective prehospital care using TCCC Guidelines?
11. Do our current medical logistics techniques comprehensively and effectively supply our forces and ensure adequate medical materials to provide prehospital care using TCCC Guidelines?
12. Are tactical, operational, and strategic Command Surgeons correctly empowered under a DOTMLPF-P integration to ensure the delivery of effective prehospital care using a standard of care?
13. Are our maneuver commanders and medical leaders adequately trained and educated to ensure the effective delivery of prehospital care using TCCC Guidelines across the battlefield?
14. Does the human capital management process assign the right leaders and technical experts to the right levels to ensure the effective delivery of prehospital care using TCCC Guidelines across the battlefield?

Responses to these questions and unstructured interviews were organized according to the DOTMLPF construct, as defined by the Joint Capabilities Integration Development System process, to identify and address gaps relating to the tactical and operational implementation of TCCC Guidelines.

DOTMLPF

- **Doctrine:** fundamental principles by which the military forces or elements thereof guide their actions in support of national objectives. It is authoritative but requires judgment in application. (current best thoughts on the methods by which we deliver prehospital battlefield trauma care).
- **Organization:** how we command/control the conduct of medical support operations
- **Training:** how we prepare our medical forces to conduct specified and implied tasks (basic training to advanced individual medical training, unit medical training with casualty care, and evacuation exercises)
- **Materiel:** All items necessary to equip, operate, maintain, and support military activities without distinction as to its application for administrative or combat purposes. (TCCC Guideline medical materials)
- **Leadership and Education:** how we prepare personnel to organize and lead medical support operations
- **Personnel:** Those individuals required in either a military or civilian capacity to accomplish the assigned mission (availability of qualified [technically and tactically/operationally proficient] personnel in the delivery of prehospital battlefield trauma care)
- **Facilities:** Real property entities consisting of one or more of the following: building, structure, utility system, pavement, or underlying land (medical training facilities for prehospital battlefield trauma care)

SECTION 3: OBSERVATIONS, DISCUSSION, AND FINDINGS

Notable Successes–One Year Later

It is appropriate to begin any discussion of current findings and observations with full acknowledgement of the many successes over the past year between Parts I and II of this report, and the efforts of all who have so diligently dedicated their time and energy to achieve so much over such a short period.

1. A preventable death review and analysis of combat-related fatalities is now conducted by a joint team from both the Armed Forces Medical Examiner and the Joint Trauma System (JTS). This effort is providing excellent feedback to the theater trauma surgeons at the ROLE-2 and ROLE-3 levels. This effort is also instrumental for identifying issues with prehospital care that would otherwise be missed due to the classification of a casualty as a killed in action (KIA). As this collaborative effort matures, this information will be further disseminated to prehospital providers and into the training organizations.
2. Implementation of a prehospital Combat Medic Trauma Conference that is for medics, by medics, and hosted by the JTTS in CJOA-A. This effort improves direct peer-to-peer communication about TCCC Guidelines, best practices, and practical solutions.
3. The JTS/JTTS implementation and deployment (via US Forces Afghanistan [USFOR-A] fragmentary order [FRAGO]) of the Prehospital Trauma Registry along with implementation of the CJOA-A TCCC Casualty Card and TCCC-After Action Report (AAR)

system to advance prehospital documentation and performance improvement.
4. The designation of the JTS as a DoD Center of Excellence and as the lead agency for Trauma Care and Trauma Systems.
5. The realignment of CoTCCC under the JTS to strengthen its role in providing best-practice prehospital trauma-care recommendations.
6. Implementation of the initiative to train and sustain all tactical evacuation medics as critical care flight paramedics.
7. The initial implementation of blood-product administration onboard tactical evacuation platforms within CJOA-A and now elsewhere within the CENTCOM AOR.
8. The deployment and distribution of junctional tourniquets to control noncompressible hemorrhage in the prehospital environment.
9. The expanded authorization of tranexamic acid (TXA) to include all deployed prehospital forces to control noncompressible hemorrhage in the prehospital environment.
10. The authorization of ketamine as a prehospital pain management therapy in accordance with TCCC Guidelines with clear Guideline indications to use low-dose ketamine as the battlefield analgesic of choice for casualties in severe pain/shock/respiratory distress, or at significant risk of these conditions.
11. Creation and manning of the deployed JTTS Prehospital Division (physician, physician assistant, and senior medic) with a JTTS Prehospital Care Director in CJOA-A filled by a hand-selected physician with knowledge and experience in point-of-injury (POI) prehospital combat trauma care.

The significant and critical successes over the past 12 years attributed to the JTTS and the DoD JTS are a direct result of their ability to capture data and information from POI onward to reduce morbidity and mortality through performance improvement initiatives and refinement of clinical practice guidelines. The prehospital elements of this data-capture capability have only been more recently achieved.

DOTMLPF Analysis

Similar to safety mishap investigations, rarely is a single event or circumstance in the mishap chain causative in and of itself. In contrast, from a systems perspective, any one of a number of those factors, if interrupted could disrupt the entire mishap chain and prevent a negative outcome. Prehospital battlefield trauma is equally complex and multifactorial. Recognition and correction of any of the following systemic discrepancies could achieve significant improvements in patient outcomes.

Doctrine/Policy

CBA Question #1: What is the standard of care for prehospital care in US DoD Combat Operations?

CBA Question #2: Are the TCCC Guidelines the US DoD Combat Operation prehospital standard of care?

1. **Observations**
   a. In 2013, a senior-level Unit Surgeon declined to establish the TCCC Guidelines as the standard of care for prehospital trauma care within CJOA-A for US Forces. The Unit Surgeon reported that he felt that standards of care and training standards should be determined at the Army Medical Department level. Further, having a USFOR-A FRAGO establish a standard of care would have no effect on stateside practices. It was also related that there was significant concern and hesitation over applying the term "standard of care" to the medic's scope of practice since it "implies a level of scrutiny will be applied to a bunch of 19 year olds with little training."
   b. As determined by data analysis from the JTS, the most common and prevailing prehospital method for treating pain in CJOA-A is the absence of treatment with a pain medication. Unlike hospitals or medical treatment facilities that have adhered to The Joint Commission's pain management standards since 2001, there is no specified or enforced prehospital pain management standard. This strongly suggests that the absence of a standard of care contributes directly to an absence of care, and, subsequently, undue suffering, morbidity, and mortality.
2. **Discussion**
   Since 2001, the Committee on Tactical Combat Casualty Care (CoTCCC) has continuously reviewed, updated, and published TCCC Guidelines based on up-to-date, evidence-based best practices for prehospital trauma care on the battlefield. The CoTCCC is a hand-selected 40-person organization comprising trauma surgeons, emergency medicine and critical care providers, and prehospital traumatologists with a vast amount of combat experience. The TCCC Guidelines are considered to be the state of the art by many military and civilian organizations throughout the world. Nevertheless, though doctrinally accepted and with TCCC training requirements across the Services, there remains no DoD or Service policy dictating the standard of care for prehospital combat casualty care. In the absence of mandated DoD standards, combatant commanders and medical leaders at all levels may and do establish their own standards, to include ignoring all or some of the TCCC Guidelines.
3. **Finding**
   The lack of standardized TCCC capability may represent a causal factor for the increased number of

Table 1 *Descriptive Analysis*

	ROLE-1s *n* = 26		
TCCC ASSESSMENT QUESTION	**"YES"**	**"NO"**	**"SOMEWHAT"**
TCCC Command Climate			
Does your unit commander understand the existence of TCCC Guidelines?	62%	31%	8%
Is TCCC incorporated into training, operations orders, rock drills, and mission execution?	81%	15%	4%
Is your unit's TCCC capability included in commander's update reporting/unit status report?	12%	65%	23%
USFOR-A FRAGO Compliance			
Has your unit implemented USFOR-A FRAGO 13-139 (TCCC AAR/TCCC Card)?	***77%***[1]	***23%***	***N/A***
Has your unit implemented USFOR-A FRAGO 13-217 (Junctional Tourniquets)?	65%	27%	8% (unsure)
Has your unit implemented USFOR-A FRAGO 13-079 (Assessment Blast Exposure, Concussions)?	***65%***	***35%***	***N/A***
TCCC/Combat Trauma Training			
Has your Medical Corps Officer completed C4?	69%	27%	4% (unsure)
Have your licensed prehospital providers (physician/physician assistants/nurses) completed TCMC or other similar service-endorsed course?	62%	27%	N/A
What percentage of your medics have completed BCT3 or other service endorsed similar course?	88%	8%	4%
Have nonmedical Servicemembers completed combat lifesaver training or other service endorsed similar training?	88%	N/A	N/A
Are there TCCC guideline skills in which you will not train medics?	***12%***[2]	***81%***	***N/A***
Are there any TCCC guideline skills you trained medics that supersede their standard training?	42%	58%	N/A
Do you participate in the Weekly Theater JTTS Trauma DCO Conference?	15%	85%	N/A
Are you aware of the ISR website that has the latest TCCC guidelines and best practice guidelines CPGs?	42%	58%	N/A
TCCC Medical Logistics			
Does your unit have adequate medical supplies required to perform all skills within TCCC guidelines?	50%	38%	12%
Do you have adequate IFAKs/CLS/WALK AID BAGS to conduct your mission?	92%	8%	N/A
Are you receiving medical equipment as requested?	38%	35%	27%
Do you have junctional tourniquets on hand?	***65%***[3]	***31%***	***N/A***
SAM JT	46%	54%	N/A
JETT	46%	54%	N/A
CRoC	4%	96%	N/A
What system is being used to order class VIII?			
DMLS	7%	N/A	N/A
DECAM	58%	N/A	N/A
Excel/Email	35%	N/A	N/A
What brand of chest seals are you using?			
Hyfin unvented	81%	19%	N/A
Halo unvented	73%	27%	N/A
H&H unvented	35%	65%	N/A
Bolin vented	42%	58%	N/A

(continues)

Table 1 *Cont.*

	ROLE-1s *n* = 26		
TCCC ASSESSMENT QUESTION	**"YES"**	**"NO"**	**"SOMEWHAT"**
Tranexamic Acid Capability			
Do you have TXA at BAS?	35%	62%	N/A
Do you have TXA in medics' aid bags?	8%	92%	N/A
TCCC Pain Management			
Are you using TCCC guidelines pain medications?[4]	42%	12%	46%
Fentanyl	69%	31%	N/A
Ketamine	50%	50%	N/A
Wound (Combat) Pill Pack	4%	96%	N/A
What pain medication do your medics carry?			
Morphine[5]	92%	8%	N/A
Fentanyl	35%	65%	N/A
Ketamine	12%	88%	N/A
TCCC Antibiotics			
Are you using TCCC guidelines for systemic antibiotics?	35%	15%	50%[6]
Moxifloxin	69%	31%	N/A
Cefotetan	27%	73%	N/A
Ertapenem	42%	58%	N/A
Type of Cricothyrotomy Kit			
H&H	58%	42%	0%
Tactical Crickit by North American Rescue	42%	58%	0%
Non-standard (homemade)	23%	77%	0%
Pelvic Binders			
Do you use pelvic binders for LE blast injuries?	62%	23%	15%

Notes: *During the assessment period, only a single ROLE-1 demonstrated full implementation of TCCC Guidelines. This was among all of the 23 geographic locations and 26 ROLE-1s within the Regional Commands visited.

1. JTTS data demonstrated 9% to 21% TCCC AARs and 8% TCCC Card compliance from August 2013 to January 2014.
2. Selected Observation: A Battalion Surgeon would not allow medics to give IV medications (narcotics and antibiotics) because he considered it too dangerous in his personal "bad experience with Pitocin in internship." At another location, a unit company grade commander would not allow medics to carry morphine outside the COP because "they are close enough to the aid station."
3. At the time of the assessment, there were 456 SAM JTs and 500 JETT junctional tourniquets obtained by JTTS and distributed in Theater. Because they had not been pushed forward from the some RC-Surgeon's offices to the ROLE-1s, many ROLE-1's did not have junctional tourniquets. Or, in one RC, they had been pushed forward and then recalled for redistribution when the USFOR-A JT FRAGO was published. CRoCs were ordered and fielded by some units (4%). Waste was also an issue. We found verifiably JTTS procured, distributed, and new-in-wrapper junctional tourniquets pending destruction at the Bagram AF REPAT burn pit less than 45 days after distribution.
4. This question assessed if medications were available at the ROLE-1 versus routinely issued and available to medics on patrol.
5. There are no published evidence-based studies regarding morphine intramuscular injection for trauma patients. Morphine is NOT a recommended battlefield analgesic in the TCCC Guidelines.
6. Represents the use of non-TCCC Guideline systemic antibiotics for combat casualties.

Servicemembers killed in action and preventable deaths, and increased case-fatality rate seen in conventional forces when compared with SOF.

CBA Question #3: Are the TCCC Guidelines doctrine?

1. Observations

TCCC Guidelines have not yet been codified within Joint Publication (JP) 4-02, *Health Service Support* (26 July 2012). The current Joint Theater Patient Movement CBA, led by the Joint Staff Surgeon, has within its 20 draft recommendations the development of a DoD policy and certification process for prehospital trauma care.

2. Discussion

The capstone JP1 Doctrine for the Armed Forces of the United States defines Joint Doctrine as follows: "Joint doctrine consists of the fundamental principles that guide the employment of US military forces in coordinated action toward a common objective. It provides the authoritative guidance from which joint operations are planned and executed." Since TCCC Guidelines

are a product of the CoTCCC, a DoD-sponsored entity under the USAISR, they have doctrinal validity in principle as well as practice. As such, they qualify as "Authoritative but not Directive," guidance. JP1 indicates that authoritative guidance is closely related to command authority that rests with the Geographic Combatant Commander or higher at the Services, US Special Operations Command, or the DoD.

3. **Findings**
   Absent a validated joint requirement, which is captured doctrinally, the prevailing resource-constrained environment will challenge Services to fully organize, train, and equip to TCCC standards.

CBA Question #4: What policies or regulations are used to conduct prehospital quality assurance and quality improvement programs in the DoD as demonstrated in CJOA-A?

CBA Question #5: Are the TCCC Guidelines currently enforceable as a prehospital standard of care?

1. **Observations**
   a. CENTCOM Regulation 40-1, Clinical Quality Assurance Programs (17 Oct 2012) does not mention quality assurance or quality improvement in the prehospital combat environment, limiting its application to medical and dental treatment facilities. Likewise, though not excluding medical care in the prehospital battlefield environment, none of the Services' quality assurance directive guidance instructions specifically address it either.
   b. There does not seem to be an official policy or regulatory requirement to conduct prehospital quality assurance and quality improvement in the DoD as demonstrated in CJOA-A. The Medical Lessons Learned (MLLs) efforts may provide some high-level or general oversight, but they lack the capability to provide feedback on a case-by-case or provider-by-provider basis. Nor are the MLLs captured and aggregated across the CJOA-A.
   c. As of August 2013, the JTTS does provide a prehospital trauma registry service. However, without published standards, the team cannot provide quality assurance in the absence of a benchmark against which to measure standard of performance.
2. **Discussion**
   As of August 2013, USCENTCOM's JTTS, with the support of a USFOR-A FRAGO, began collecting TCCC Cards and TCCC AARs from CJOA-A casualties. Compliance with this FRAGO requirement has varied from 9% to 23% from August 2013 to December 2013. Compliance was calculated using the USCENTCOM J-1 Casualty Tracker Report. This report was compared with TCCC AARs received by the JTTS. The low compliance rate precludes meaningful trend analysis, cost-effective research, directed procurement practices, and policy changes that could improve trauma-care delivery and, ultimately, reduce morbidity and mortality. The lack of established or defined standards of care and performance makes quality measurement and quality assurance challenging. Data collection, data analysis, and performance improvement are difficult to accomplish without a standard for care.
3. **Findings**
   There is no evidence that the DoD or CJOA-A has policies or procedures in place to validate or enforce prehospital care within an organization. Service-specific doctrine requiring Unit Surgeons to each establish a standard of care, allows for variant, non-standard delivery of battlefield trauma care across the Force. Furthermore, even within a single command rotation of Unit Surgeons introduces and magnifies discontinuity of unit trauma-care standards.

CBA Question #6: Is delivery of TCCC standardized across combatant organizations?

CBA Question #7: Does our current doctrine support the effective implementation of TCCC Guidelines at the tactical and operational levels on the battlefield?

1. **Observations**
   a. A current Division Surgeon, and future Regional Command (RC) Surgeon, related that his division medical leadership organized a standing committee of providers to review the TCCC Guidelines. They then decided if implementing the guidelines was appropriate for their organization. The surgeon further related that they decided to neither field nor authorize tranexamic acid (TXA) within their division due to their assessment of a perceived lack of efficacy and significant logistical requirements. Their decision to establish their own prehospital committee actually degraded their TCCC delivery capability in accordance with the guidelines.
   b. The Services use different medical sets, kits, and outfits across the spectrum of prehospital care delivery. A USMC Improved First Aid Kit (IFAK) is different than a USA IFAK.[1] Different medical materials are identified and used to treat the same trauma pathophysiology. There are educational and skill-based differences across the Services. Army Medics, Navy Corpsman, and Air Force Medical Technicians, along with Special Operations personnel, receive different levels of training, attend different courses, and are determined qualified under different standards.

1. At the time of this article's submission, the Services are preparing to field a Joint IFAK with many similar components. However, each Service is adding to or deleting items from the kits master inventory. See page 36 footnote comments.

2. **Discussion**
   The capability of combatant organizations to deliver prehospital care capability within the TCCC Guidelines is unpredictable and fragmented, as demonstrated by finding only one ROLE-1 in full compliance with TCCC guidelines. Frequently, the commitment to deliver prehospital care within TCCC guidelines was influenced by medical leaders' concerns of professional comfort based upon limited personal experience often derived from training and practice experiences outside of a combat environment.

   While the current doctrine strongly supports any organization of any size adopting TCCC Guidelines and implementing them as the standard of care, there is no requirement. Some leaders have seized this opportunity to improve prehospital care within their organizations and have implemented the TCCC Guidelines. Others, however, have failed to fully implement proven, life-saving protocols based upon limited experience or professional concern/comfort.
3. **Findings**
   The requirements to perform and support prehospital TCCC could be standardized across Services (universally or at the Combatant Command level) with the specific means to achieve these train-and-equip standards left up to the respective Services.

Organization

CBA Question #8: Are our tactical and operational organizations structured to support the delivery of prehospital care?

1. **Observations**
   a. "Orphan" units exist throughout the CJOA-A without organic licensed providers or medics. Within these organizations, general healthcare delivery is often provided through local area support by colocated medical units. For major bases and forward operating bases (FOBs), this is a reasonable and functional method. However, many of the orphan units also conduct operations outside of the bases. This means medics must be borrowed from other organizations, with some units not having medics on combat operations and subsequent degraded prehospital care for these units.
   b. During 2013, a US Medical Emergency Response Team (MERT) proof of principle was conducted with a USAF Tactical Critical Care Evacuation Team (TCCET) modeled after the demonstrably successful United Kingdom (UK) MERT in RC-South/Bastion. In-Theater training for the TCCET included predeployment and ride-along training with the UK MERT. Though staffed with adequate medical personnel and capability, the US MERT was not successfully integrated into combat operations, due to location and unit of assignment.
2. **Discussion**
   Units with a maneuver mission placing them at risk of direct contact with enemy forces need sufficient organic medical assets to provide rapid TCCC prehospital care at the point of injury. Adequate medical oversight with sufficient expertise and training must also be provided, either organic to the unit or by other arrangement, to ensure training is compliant with TCCC Guidelines and to identify and correct skill deficiencies.

   The MERT concept is dependent upon a supporting airframe with sufficient vertical lift capacity (i.e., CH-47, CH-53, V-22) to move both the medical team and its equipment to the POI. Currently, there are no US MEDEVAC units with organic, heavy, vertical-lift capability. All heavy vertical-lift aircraft are assigned and operated by nonmedical aviation units. Thus, there are only designated but not dedicated airframes to support this capability. Currently, there is no extant joint capability requirement to deliver such advanced resuscitative care forward to the POI. There is increasing evidence that the provision of such early, advanced resuscitative care has positive effects upon both morbidity and mortality from battlefield trauma.
3. **Findings**
   As with elements of prehospital care, organization structures are highly variant, with a number of at-risk forces not having adequately manned/trained/equipped medical support. Units with a tactical evacuation mission requirement should be task organized to be able to provide advanced, enroute resuscitative care from the POI.

Training

CBA Question #9: Does the current training structure support the effective delivery of prehospital care using a standard of care that is tactically and operational available across the spectrum of the battlefield?

1. **Observations**
   a. Although medically contraindicated, two separate Army medic testing standards require patching (versus shielding) of a traumatized eye. A third testing standard, the US Army's Expert Field Medical Badge, requires the ability to determine that the eye trauma is limited to the supporting structures versus the globe, and then patch the eye.
   b. Several doctrinal publications within the Services state that a tourniquet is a choice of last resort and require a stepped approach to controlling life-threatening hemorrhage. TCCC Guidelines clearly state: "Use a CoTCCC-recommended tourniquet for hemorrhage that is anatomically amenable to

tourniquet application." The jointly written US Army Medical Department Center and School-published Emergency War Surgery Fourth United States Revision 2013 states, "Tourniquet may be the first choice in combat" and then also states "Do not avoid use of a tourniquet in order to save a limb and then lose a life!"

c. The 2013 version of the Emergency War Surgery Fourth United States Revision states, "Tourniquets should not be removed until the hemorrhage can be reliably controlled by advanced hemostatic agents or until arrival at surgery." However, the TCCC Guidelines state, "Reassess prior tourniquet application. Expose wound and determine if tourniquet is needed. If so, move tourniquet from over uniform and apply directly to skin 2–3 inches above wound. If a tourniquet is not needed, use other techniques to control bleeding." If educational and doctrinal publications cannot keep pace with TCCC Guidelines, then we should simply stick with the Guidelines as doctrine and not use indirect methods of communication.

d. Some medical officers have deployed without any TCCC training or the attendance at the Combat Casualty Care Course.

2. **Discussion**
   DoD-published guidance and teaching materials should not be in conflict with one another. Professional peer-reviewed medical journal articles are published frequently to inform and guide medical providers on the most current research and best evidence-based practices. It is generally expected that medical providers remain current with the most currently available evidence-based practice standards and use them in guiding their decision-making and care of patients. The TCCC Guidelines are changed in near-real time as new technology and evidence become available, typically every several months (there were four changes to the TCCC Guidelines in 2013), in contrast to published texts, which are typically updated every 3 to 4 years.
3. **Findings**
   Robust training platforms exist for prehospital trauma care, though not all course training syllabi keep apace of current best practices. Sufficient information technologies exist to rapidly and widely disperse new TCCC Guidelines as they become immediately available.

Materiel

CBA Question #10: Do our currently fielded tactical medical sets, kits, and outfits ensure the delivery of effective prehospital care using TCCC Guidelines?

CBA Question #11: Do our current medical logistics techniques comprehensively and effectively supply our forces and ensure adequate medical materials to provide prehospital care using TCCC Guidelines?

1. **Observations**
   a. Use of the United States Army Medical Material Agency (USAMMA) approved national stock number (NSN) Eye Injury First Aid found in sets, kits, and outfits (SKOs) throughout the Services is directly contraindicated by TCCC Guidelines and the recommendations of the DoD Vision Center of Excellence. It is also contraindicated by the most basic ubiquitously accepted trauma eye-care guidelines. Using this NSN item may actually increase the severity of the eye trauma and decrease the probability of optimal vision recovery. More than $260,000 was spent last year buying and fielding these kits to our combatant forces. This kit has been in the inventory since 1960.
   b. "Shield and Ship" has been a best practice guideline for traumatic eye injuries for over a decade in the US and the DoD. However, data from the JTS indicated we are only 40% compliant with this guideline. Besides issues with training and doctrine, the first level where eye shields are available by logistics doctrine is at the ROLE-1 Battalion Aid Station. There is no requirement (as evidenced by the doctrinal Modified Table of Organization and Equipment) to have eye shields at the POI where they are needed urgently to decrease further harm and save eyesight.
   c. The Army SKO for a ROLE-1 is the Medical Equipment Set Tactical Combat Medical Care (TCMC). This set is missing several critical medical materials necessary to provide TCCC Guideline capabilities. Missing items include medication delivery systems, pain control medications, and antibiotics. The set does list antibiotics that, arguably, could be equivalent to TCCC Guidelines.
2. **Discussion**
   Since TCCC Guidelines are not recognized formally as policy, organizations are not required and authorized to have, nor resourced with the necessary medical materials to provide TCCC. Nor is there an established mechanism to rapidly incorporate and sustain new materials across the logistics chain when mandated by evolving TCCC Guidelines (e.g., junctional tourniquets), into unit equipment sets. As a result, though TCCC materials are available within the system, medics must submit unnecessary justifications to order these materials.
3. **Findings**
   Unit equipment sets and supporting medical logistics systems have not kept pace with evolving prehospital care TCCC guidelines. Outdated items remain within the supply chain and newly required items have not yet been incorporated into standard configurations.

Leadership

CBA Question #12: Are tactical, operational, and strategic Command Surgeons correctly empowered under DOTMLPF-P integration to ensure the delivery of effective prehospital care using a standard of care?

1. **Observations**
   a. "We are not going to use ketamine in this RC. I had a patient who had a dissociative episode in my residency and I'm not going to have that in the field. The only person I have to please is my Division Commander," said one RC Surgeon.
   b. Ketamine is a CoTCCC approved, recommended, and preferred analgesic agent in accordance with the published TCCC guidelines.
   c. Intramuscular morphine is relatively contraindicated in patients with traumatic hypoperfusion and specifically contraindicated in patients with respiratory depression in the absence of resuscitative equipment. Many battlefield wounds produce respiratory depression through hypoperfusion, direct lung injury, blast and other mechanisms. Yet, the DoD systematically and regularly supplies morphine auto injectors to both medical and nonmedical combatants for the amelioration of pain on the battlefield.
   d. RC Surgeons and RC Headquarters may deploy with units they have never worked with, established and promulgated policy, lead or commanded before taking the battlefield. Subsequently, preparation and training of these deploying organizations is dependent on home station command structures.
2. **Discussion**
   a. Doctrinally, Command Surgeons as functional authorities are empowered through their Commanders to establish and enforce health-system support policies and standards of care. Inherent within that authority is the need for Command Surgeons to identify and bring forward those policies and standards that require command endorsement, and the willingness of those Commanders to act upon the best military medical advice of their Surgeons and commit the resources necessary to support such policies and standards.
   b. The medical literature shows that potentially survivable fatality rates can be reduced to 3% with the full commitment of unit leadership to train and adhere to TCCC Guidelines. In the absence of mandatory DoD or theater policy to comply with TCCC Guidelines, commitment of both Unit Surgeons and Commanders remains highly variant across the CJOA, and there is no mechanism of accountability for suboptimal outcomes when TCCC Guidelines are not followed.
   c. RC Surgeons have not consistently or effectively established prehospital quality assurance systems within CJOA-A subordinate organizations. USCENTCOM's Prehospital Directorate of the Joint Theater Trauma System is responsible for objective data collection and analysis, and observational reporting.
   d. RC Surgeons cannot effectively establish and promulgate medical polices for prehospital care in units where they have no technical or special staff leadership authority before entering the battle space.
3. **Findings**
   In the absence of a widely mandated policy that establishes TCCC Guidelines as the standard for prehospital battlefield care and accountability for deviations from this standard, the degree of penetrance and acceptance of TCCC Guidelines will remain episodic and dependent upon individual (Surgeon and Commander) commitment.

Personnel

CBA Question #13: Are our maneuver commanders and medical leaders adequately trained and educated to ensure the effective delivery of prehospital care using TCCC Guidelines across the battlefield?

CBA Question #14: Does the human capital management process assign the right leaders and technical experts to the right levels to ensure the effective delivery of prehospital care using TCCC Guidelines across the battlefield?

1. **Observations**
   a. Commanders[2]: Review of the US Army Infantry and Armor Basic Officer Leader Course (BOLC) and the US Marine Corps Basic Officer Course demonstrate that both include first aid training[3]; however, this is at the personal and buddy care level. It does not provide organizational delivery, responsibility, and ownership of the prehospital care delivery system. Additionally, the curriculum does not incorporate the tactical and operational executive level training of medical evacuation doctrine or emphasize how "time to a required capability" prevents fatalities and improves the case-fatality rate. It is also worth recognizing that US Army Command and General Staff College Courses have no medical operational subjects in the published curriculum. This is true of nonmedical enlisted leadership courses as well.
   b. All Leaders: Understanding and integration of prehospital care and TCCC tactics is incomplete,

2. Commander is used here generically. It is intended to represent all levels of nonmedical leaders among the combatant units.

3. First aid training that is not consistent with the TCCC guidelines.

inconsistent, and not part of many organizations' battle drills and tactical planning. Medical evacuation doctrine is not taught, provided, or even discussed in the curriculum of our Warfighters professional military education courses.

c. Medical leaders

1) The Army Medical Department (AMEDD) BOLC (for Health Professions Scholarship Program physicians) is 7 weeks long, while Infantry BOLC is 17 weeks. The Navy's Officer Indoctrination School is 6 weeks in Newport News, Virginia. The Navy Basic Medical Department Officer Course follows it, and is 12 hours of online training. The Navy's 2-week Advanced Medical Department Officer Course is designed to improve the hospital administration, competencies, and Bureau of Medicine management skills. The curriculum does not include operational medicine.
2) Many medical officers in the DoD do attend the Combat Casualty Care Course (C4), which focuses on battlefield (including prehospital) trauma care. However, TCCC Guidelines have been inconsistently and incompletely incorporated into the C4 training curriculum. Navy Medical Corps officers generally do attend the C4. Army Physician Assistants and Air Force Medical Corps officers may attend, but are not required to do so.
3) Medical Corps of the Army may attend the AMEDD Captain Career Course. However, the target officer is a Lieutenant Colonel, as the course is required for promotion to Colonel. Additionally, there is a systematic problem with a lack of Medical Corps officer seats in the class. The Navy has no formal professional military educational track for career progression after initial entry training.
4) Junior officer physicians and physician assistants are most often assigned as the senior staff medical members to tactical units (battalion or brigade surgeon) without any prior staff training or experience as a staff officer.
5) Medical Leaders. Most medical curricula are forced to train to time vs train to standard. None effectively focus on or develop prehospital care or oversight as specified competencies, particularly as it pertains to the systematic delivery of prehospital care. Some course offerings fail to target the appropriate audience of attendees to best ensure proficiency for those most likely to be assigned to operational medicine roles. Nor, are there structured career pathways to develop and sustain expertise in the realm of prehospital care and systemic oversight. A combined Aerospace Medicine and Emergency Medicine or operational medicine fellowship program could be one method to provide this skillset. Furthermore, the assignments process often fails to match those with the most relevant training and experience to these critical operational, prehospital roles.

2. Discussion

a. Commanders. The required importance of organizational standards and competencies in prehospital care are not formally taught to our Warfighters. Subsequently, line commanders must rely on the expertise, leadership, and advocacy skills of their assigned medical personnel. If non-medical leaders don't make battlefield trauma care a priority for their units, then it won't be a priority for their units. Only by demonstrating the value of evidence-based process improvements will we achieve the necessary support from line leadership as ultimately, they are responsible for enforcing the standard of care and requiring the standard of performance from their operational medics.

b. In order to effectively integrate the battlefield operations system of military health care into the battle space, Tactical Combat Casualty Care must be integrated at all levels within maneuver forces. This must occur within the Services' professional military education courses at all levels from initial entry training to the senior service academies.

c. Tactical Combat Casualty Care and medical evacuation doctrine is a method to sustain combat power with the battlefield operating systems of combat service support (CSS). Tactical and operations proficiency of the TCCC competencies is an asset to maneuver forces that must be integrated into the Warfighters common operational picture. To be effective, the TCCC must be part of a coordinated combined arms action.

3. Findings

TCCC and medical evacuation doctrine is not routinely trained, educated or integrated into the professional military education system. Nor, is the practice of TCCC or medical evacuation doctrine a formally evaluated competency of the individual Warfighters or leaders.

Operational medical leaders are not optimally prepared to recognize the importance of a robust, prehospital care system, or equipped with the requisite knowledge, skills, or experience to build or sustain such a system within their unit.

Facilities

1. Observations

None

2. Discussion

None

3. Findings

None

SECTION 4: RECOMMENDATIONS

New Recommendations

1. DoD establishes TCCC Guidelines as the DoD standard of care for prehospital care.
2. DoD conducts a DOTMLPF-P assessment across Services to assess and implement TCCC Guideline capability.
3. DoD systematically reviews and corrects all prehospital care doctrine across the spectrum to accurately represent TCCC Guidelines with the doctrine specifically stating "in accordance with the current TCCC Guidelines published by the Committee on Tactical Combat Casualty Care" to ensure that the doctrine remains current.
4. Services immediately implement an aggressive transition initiative to update all relevant medical equipment sets and medical logistic policies to ensure units have TCCC Guideline-specified medical materials.
5. DoD establishes a Battlefield Prehospital Trauma Care Program Proponent (or equivalent structure) in the DHA.
6. DoD develops and mandates a TCCC Accreditation, Certification, and Recertification program like Basic Life Support, Advanced Trauma Life Support, and Advanced Cardiac Life Support for all military personnel with a requirement for biannual recertification and as based on level of ability and position (e.g., nonmedical first responder, non-medical leader, medical provider, medical leader).
7. Services require and track TCCC certification for all prehospital medical personnel and integrate tracking into combatant Unit Status Reports.
8. Services incorporate TCCC Champion training into all basic and advanced officer and noncommissioned officer professional military development courses.
9. Services incorporate and mandate casualty management and hands-on practical exercises into all professional military development courses.
10. DoD updates the Joint Capability Requirement for Tactical Enroute Care to include the ability to provide advanced resuscitative care from the point of injury.
11. As military physicians are ultimately responsible for assuming the role of EMS director for prehospital services if assigned to a combatant unit, the military Services should study and develop career, educational, and assignment tracks for operational medical corps officers, with emphasis on prehospital care delivery.

Renewed Recommendations

1. DoD issues an instruction that command-directs an ongoing review and analysis of preventable deaths in CJOA-A as they relate to tactics, techniques, and procedures, tactical trends, personal protective equipment), evolving injury patterns, and operations tempo through a consolidated registry of findings from formal tactical investigations and theater-wide tactical operations interfaced with the DoD Trauma Registry.
2. Services and the Services' medical departments emphasize to line commanders that the priority and understanding of their tactical casualty response system is critical to preventing combat deaths. (e.g., 75th Ranger Regiment Casualty Response model).
3. Services and the Services' medical departments train all combatant unit personnel in basic TCCC initially, annually, and within 6 months of combat deployment (e.g., USSOCOM Directive 350-29 model). This should be a requirement for deploying to a combat theater.
4. Services and the Services' medical departments train all medical personnel (physicians, physician assistants, nurses, medics) in instructor-level TCCC courses initially and within 6 months of combat deployment. This should be a requirement for deploying to a combat theater.
5. Services integrate TCCC-based casualty response into battle drills, small unit tactics, and training exercises at all levels (e.g., 75th Ranger Regiment Casualty Response model).
6. Services and the Services' medical departments support enduring sustainment hands-on trauma training for all prehospital medical personnel (live tissue and trauma center rotations) (e.g., USASOC Regulation 350-1 model).
7. Services and the Services' medical departments emphasize contingency planning in both line and medical leader education to ensure evacuation capabilities in non-permissive environments.
8. Services, Services' medical departments, and deployed medical personnel minimize use of platelet-inhibiting drugs (e.g., aspirin, Motrin, other COX-1 nonsteroidal antiinflammatory drugs, selective serotonin reuptake inhibitors) in individuals who leave secure areas for combat missions in CJOA-A.

Funding, Disclaimer, Disclosure: This was an official assessment and report provided to the US Central Command. The authors have no conflicts of interest to report and they did not receive any external funding.

COL Sauer, MC, USA, is Deployed Director, Prehospital Care Division, USCENTCOM Joint Theater Trauma System–Afghanistan, Bagram Airfield, Afghanistan.

MAJ Robinson, SP, USA, is Deployed Coordinator, Prehospital Care Division, USCENTCOM Joint Theater Trauma System–Afghanistan, Bagram Airfield, Afghanistan.

SSG Smith, USA, is Deployed NCOIC, Prehospital Care Division, USCENTCOM Joint Theater Trauma System–Afghanistan, Bagram Airfield, Afghanistan.

COL Gross, MC, USA, is Deployed Director, Joint Theater Trauma System, USCENTCOM Joint Theater Trauma System–Afghanistan, Bagram Airfield, Afghanistan.

COL Kotwal, MC, USA, is Outgoing Director of Trauma Care Delivery, and Committee Member, Committee on Tactical Combat Casualty Care, DoD Joint Trauma System, Defense Center of Excellence for Trauma, Joint Base San Antonio–Fort Sam Houston, Texas.

LTC Mabry, MC, USA, is Incoming Director of Trauma Care Delivery; Director, Military EMS and Disaster Medicine Fellowship; and Committee Member, Committee on Tactical Combat Casualty Care, DoD Joint Trauma System, Defense Center of Excellence for Trauma, Joint Base San Antonio–Fort Sam Houston, Texas.

CAPT Butler, MC, USN, is Director of Prehospital Trauma Care; and Chairman, Committee on Tactical Combat Casualty Care, DoD Joint Trauma System, Defense Center of Excellence for Trauma, Joint Base San Antonio–Fort Sam Houston, Texas.

CAPT Stockinger, MC, USN, is Director of Performance Improvement, DoD Joint Trauma System, Defense Center of Excellence for Trauma, Joint Base San Antonio–Fort Sam Houston, Texas.

Col Bailey, MC, USAF, is Director of the Joint Trauma System, DoD Joint Trauma System, Defense Center of Excellence for Trauma, Joint Base San Antonio–Fort Sam Houston, Texas.

Col Mavity, MC, USAF, CFS, is Command Surgeon, Office of the Command Surgeon, USCENTCOM, MacDill Air Force Base, Tampa, Florida.

LTC Gillies II, MC, USA, is with the Clinical Operations Division, Office of the Command Surgeon, USCENTCOM, MacDill Air Force Base, Tampa, Florida.

Appendix 1: References

Butler FK, Hagmann J, Butler EG. Tactical combat casualty care in Special Operations. *Mil Med*. 1996;161:1–15.

Butler FK, Giebner SD, McSwain NE, et al. *Prehospital trauma life support manual* (7th ed, military version). St Louis, MO: Mosby/Elsevier; 2010.

Butler FK, Blackbourne LH. Battlefield trauma care then and now: a decade of tactical combat casualty care. *J Trauma Acute Care Surg*. 2012;73(6 Suppl 5):S395–S402.

Eastridge BJ, Mabry RL, 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–S437.

Kotwal RS, Montgomery HR, Kotwal BM, et al. Eliminating preventable death on the battlefield. *Arch Surg*. 2011;146: 1350–1358.

Kotwal RS, Butler FK, Edgar EP, 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;13:77–80.

Kotwal RS, Butler FK, Edgar EP, et al. Saving lives on the battlefield: a Joint Trauma System review of pre-hospital trauma care in Combined Joint Operating Area–Afghanistan Full Report. Comprehensive 49-page report provided to USCENTCOM by the Joint Trauma System on 30 January 2013.

Orman JA, Eastridge BJ, Baer DG, et al. The impact of 10 years of war on combat casualty care research: a citation analysis. *J Trauma Acute Care Surg*. 2012;73:S403–S408.

Appendix 2: Select Comments from the Theater

1. Despite the existence of an USFOR-A FRAGO, implementation of TCCC-AARs submission languished at 9% for US Forces casualties for over 5 months. Of note, the 9% was primarily USASOC and Joint Special Operations Command submission of prehospital documentation. Conventional forces were generally noncompliant. Compliance did not improve until the JTTS began tracking US casualties through the Defense Casualty Information Processing System USCENTCOM J-1 Casualty Tracker and back-briefing noncompliance to USFOR-A/IJC. When the JTTS directly contacted ROLE-1 leadership, it was commonly reported that they were unaware of the requirement. This suggests a lack of effective leadership and enforcement of policy to ensure medical systems comply with lawful orders. (JTTS Prehospital Director)

2. From August 2013 to January 2014, JTTS personnel directly engaged in the acquisition and distribution of junctional tourniquets (and other medical supplies) to ensure their availability to USFOR-A Warfighters conducting combat operations. The JTTS is not organized to conduct this mission but we recognized that the engaged forces did not have the requisite effort and support system to obtain these junctional tourniquets in a timely fashion on their own. (JTTS Prehospital Director)

3. The JTTS also conducted battlefield circulation and provided education and training on junctional tourniquets and TCCC Guidelines after recognizing the gravity of the situation. This is another unofficial duty and self-imposed mission of the JTTS that is the responsibility of deployed combatant organizations and their medical leadership. (JTTS Prehospital Director)

4. Recognizing the rarity of fully implemented TCCC Guidelines capability and prehospital care advocacy, the JTTS developed the "Ditch Medicine Award" for excellence in prehospital care delivery. (See http://www.dvidshub.net/news/120069/3-7-battalion-surgeon-awarded-lifesaving-medical-care#.UvZw1kJdWkQ) (JTTS Prehospital Director)

5. JTTS recommendations and prehospital medical information is being filtered, diluted, changed, or inaccurately conveyed to the end users by intermediate medical leadership. The information feels diluted or changed by higher echelon (e.g., do not order TXA when a ROLE-1 is collocated with a forward surgical team). (Army Medical Platoon Leader at ROLE-1)

6. Units can't order TCCC Cards through the medical system and it is left up to them to figure out how to get them. It needs to be a Class VIII item. It is the duty of the medical logistics system to obtain medical items and to standardize

the ordering and procurement process for units. The TCCC Card should be a requirement on the IFAK component list, the Combat Lifesaver (CLS) bag component list, and the Warrior Aid and Litter Kit (WALK) component list. (Army ROLE-1)

7. Regional Command Medical Logistic units required a Letter of Justification (LOJ) staffed through command for critical life-saving devices like the junctional tourniquet. (RC MEDLOG BN) (Through a Junctional Tourniquet IJC FRAGO, this issue was only temporarily resolved for 3 months.) (JTTS Prehospital Coordinator)

8. LOJs for medical supplies should not be required by Medical Logistics (MEDLOG) for supplies that you are required maintain. For example, everyone is required to carry a CAT tourniquet, but you need a LOJ if you are ordering more than one CAT tourniquet. (Army ROLE-1)

9. Medics should carry black permanent markers and fill out the patient cards. We have forgotten on a few occasions to fill them out and it leaves the evacuation team starting from scratch and having difficulties when considering medications potentially given but not confirmed through documentation. (Army ROLE-1)

10. In reference to MEDEVAC mission evacuation priority: Never downgrade patients (i.e. from urgent to routine). It is my one rule of thumb. We are not on the ground to lay eyes on the situation. If it turns out to be an unnecessary urgent triage, then troubleshoot it after the event during your AAR. (Army MEDEVAC Detachment)

11. We need small, compact phantom litters or equivalent for patrols. Phantoms litters are available and they are able to fit on a battle belt or chest rig with ease, they weigh 1 lb. and fold down to 1 ft.^{2} (Army ROLE-1)

12. We need to standardize the training for enlisted medical personnel and physicians across the DoD. This must include standardization of medical equipment in the IFAK, Aid-Bags, and vehicular kits. The injury doesn't change when you are wearing marine pattern (MARPAT). (USMC ROLE-1)

13. I noted an absence of IV fluid warmers. Two pocket hand warmers can keep a 500mL bag of fluid at approximately 80°F–85°F for almost 8 hours, and the warming process should start 1 hour prior to patrol. (Army ROLE-1)

14. TCCC AARs: AARs should be done as soon as possible after treating a POI patient. (Army ROLE-1).

15. Add to the IFAK the 14F catheter, Fox Eyeshield (JEDMED; www.jedmed.com), TCCC Card, Bolin Chest Seal (H&H Medical Corp.; gohandh.com), and nasopharyngeal airway. To the Medical Chest Sets add the 100mL sodium chloride (NaCl) bag for TXA administration in accordance with the TCCC Guidelines. (USMC ROLE-1)

16. Navy: We need TXA, 3% NaCl, mannitol, and a blood-product delivery system to be added to our Medical Chest Sets. (USMC ROLE-1)

17. We need two hand pumps for the SAM junctional tourniquet, and hand pumps should be fixed to the pneumatic disk, not removable. (CJSOTF ROLE-1)

18. A Battalion's CLS standard needs to be 100% of Soldiers trained. (Army ROLE-1)

19. A Commander would not authorize unit medics assigned to support a platoon on a nearby Combat Outpost to carry intramuscular morphine. His reasoning was they are close enough to the Unit FOB for evacuation and it is not needed. (Army ROLE-1)

20. Battalion Surgeon (Professional Filler System physician) would not give ketamine to his medics. He requested to see the data despite TCCC Guidelines, the medics "work under his license," and he had custody issues. (Army ROLE-1)

21. Battalion Surgeon would not allow medics to carry, hang, or mix IV medications including TXA and TCCC-recommended antibiotics because he once saw a nurse mix up a Pitocin (oxytocin) infusion incorrectly. (USMC ROLE-1)

22. Battalion Surgeon stopped trying to order replacement medical supplies, including chronic oral medications and trauma supplies, because the Regiment's medical supply told them they were retrograding and no more Class VIII supply orders would be honored. [Note: Unit was 4 months out from end of mission] (USMC ROLE-1).

23. The TXA vial label states temperature storage should be between 59°F–89°F, which makes the medication unusable during the hot months in Afghanistan. (Army ROLE-1)

24. There are no 100mL NaCl bags in the Medical Chest Sets to administer TXA per TCCC Guidelines. (Army ROLE-1)

25. Need to add medical supplies into the Medical Chest Sets to support a Walking Blood Bank (fresh whole blood) plan for units that deploy to austere environments, such as in the beginning of the war. Add Walking Blood Bank to the TCCC Guidelines (Army ROLE-1)

26. No physiologic monitoring devices like the Propaq (ZOLL Medical Corp.; www.zoll.com/propaqmd) or Tempus (Remote Diagnostic Technologies Ltd.; www.rdtltd.com) are in the Medical Equipment Trauma for the Battalion Aid Station (Army ROLE-1).

27. There are several Chest Seals that can be ordered; however, the Army needs to identify the two best vented chest seals for ordering, and they need to be listed in the TCCC Guidelines. (Army ROLE-1)

28. Medics who come straight from advanced individual training have been trained not to give fluids to a casualty with traumatic brain injury. Fluids must be administered to gain a peripheral pulse in a pulseless casualty, per TCCC Guidelines. (Army ROLE-1)

29. Units must have Department of Defense Activity Address Code (DODDAC) issues corrected prior to deployment. Unit went 90 days without the ability to order supplies due to Unit DODDAC issues. (JTTS Prehospital Coordinator)

30. How do we get the TCCC AAR to the JTTS when the Internet (specifically, MS Outlook; Microsoft Corp.; www.microsoft.com) is not available? Handwritten documentation has proven to be ineffective, as it gets lost, damaged, or unreadable. (Army ROLE-1)

31. Our ROLE I PROFIS physician is a hematologist who has never been assigned to a line unit? Is this really the best provider for the Infantry? (Army ROLE-1)

32. 68Ws (Combat Medics) should be issued an Aid Bag with their initial issue from the Central Issue Facility, and they should be able to DX [direct exchange] it for the next updated Aid Bag the Army adopts. (Army ROLE-1)

33. Medics need to carry and be trained to sue Valium (diazepam) when carrying ketamine. The ketamine should come in a smaller vial (a one TCCC dose-volume) and should have the pop-seal device like the ketorolac vial has. (Army ROLE-1)

34. Medics are authorized to carry IV/IM ketorolac in trauma but not TCCC Guideline analgesia.

35. Add IV saline lock and IV Hextend back to CLS training, since now that the only lifesaving fluid needed to be carried is Hextend 500mL. This prevents hypotensive resuscitation problems by blowing clots with fluid overload. The medic relies on CLS with multiple casualties to initiate IVs to also give medications like antibiotics and ketamine. (JTTS Prehospital Coordinator)

36. After our briefing on the TCCC Guidelines and the recent FRAGOs, unit medics were not aware of the standards. They felt that the information they received was being diluted through the chain of information flow, or that the information was being changed, or they were not getting the information at all. (Army ROLE-1)

37. The Interservice Physician Assistant Program (IPAP) used to be "from the line to the line." Medics that grew up in the line units become the best PAs because they lived it and understood how a combat unit operates and what medics need to know. The IPAP now receives nonmedic officers and enlisted personnel and puts them and the Unit at a disadvantage. A dental technician became a PA and deployed straight out of IPAP and is the sole provider in an isolated FOB. He admits his inadequacies for combat. (JTTS Prehospital Coordinator)

38. A FOB in the retrograde process had no heat for the medic living area or the BAS for 3 to 4 weeks. The BAS got to 28°F, a bad scenario for potential trauma casualties. The leadership acknowledged the deficiency, but did nothing about it. (USMC ROLE-1)

39. TCCC instruction sites need to have the latest TCCC Guidelines. (Army ROLE-1)

40. Unit ordered the FAST-1 interosseous device and was told they will most likely not be receiving any. They also are not able to get Hextend. Each of the Corpsmen going out on patrol has one bag, but there are none in the BAS and, therefore, no resupply if the Hextend has to be used. They were told that as far as supplies go, they will only receive what they have on hand at Leatherneck because they are no longer allowed to order supplies due to Leatherneck closing down "soon." (USMC ROLE-1). (JTTS Note: The authors observed hundreds of new in-box TCCC medical supplies including FAST-1s and Hextend being burned at the Bagram retrograde yard).

41. Marines: Independent Corpsmen in an advisory mission ROLE to other militaries during deployment do not get medical supplies to support their mission because they are not in an organic marine unit. Only organic units get supplies as designed for that unit. Command did not buy medical equipment with Overseas Contingency Operations funds because they were too expensive. (USMC ROLE-1 minus)

42. Many units in Afghanistan deployed and found themselves subordinate to different Commands of other units. This makes the chain-of-supply system difficult to use, and the Command Unit standard operating procedure in regard to utilization of the medics interferes with the medical element to fulfill their mission (i.e., providing medics for guard duty). (Army ROLE-1)

43. MC4 computers automatically upload notes into Theater Medical Data Store. The system does not notify you if the notes do not upload. I know where to look, so I was able to correct the problem, but if someone does not know where to look, the notes would eventually be lost when the computer gets wiped before going home. (Army ROLE-1)

44. We need to focus medical training on the worst-case scenario, which was during the beginning of the war. Train and equip medics to operate when the evacuation times were greater than 2 hours. Medical needs to be in every Commander's top 4 priorities. Those Commanders that have had casualties or had Soldiers die understand this, but as new Commanders rotate in without that experience, the reality will diminish. (Army Infantry Battalion Commander)

45. Nonmedical Platoon Sergeants need to know the ROLE of the medic in his platoon, and should understand the TCCC Guidelines. This should be accomplished at the Senior Leaders Course. In the contiguous United States (CONUS), medics should rotate through trauma centers for realistic training to understand combat casualties. (Army 1SG)

46. I was at C4 (Combat Casualty Care Course) and Brigade Combat Team medical training earlier this week to see what the tourniquet training is like, and the regular tourniquets seem well integrated and mature. The junctional tourniquets are taught lightly and are not fully integrated nor as maturely used as regular tourniquets. Mostly there is an awareness gap, and the funding and lack of doctrinal enactment are the main sources of the awareness gap. I suspect that other teaching venues may vary as the onus seems to be on the key leaders. The services are being led by the small unit leaders. (John F. Kragh Jr, CIV MEDCOM, USAISR)

47. Using Afghanistan as an example, we must train as we fight for the most common worst-case scenarios, which are always in the beginning of the war. Units are more austerely located and isolated, and medical support is very limited. Evacuation times are lengthy and medics will need to hold onto casualties longer. All 68Ws, Corpsmen, and AF Medical Technicians entering the military need to be trained on all TCCC Guidelines interventions if we are serious about providing the best chance for combat casualties to survive at the point of injury. CONUS Medic training programs must mirror what medics do in combat, and must implement all the TCCC Guidelines as the standard of care in combat. Completion of the TCCC AAR and the Evacuation Patient Care Report (PCR) for combat casualties must be a part of the weekly Commander's brief for his unit, just as disease non-battle injury (DNBI) trends and deadlined vehicles are. (JTTS Prehospital Coordinator)

48. TCCC Guidelines should supersede a physician's opinion when it comes to developing, implementing, and ensuring an organization's TCCC capability. A physician's medical license is not threatened with the implementation of the TCCC Guidelines on the battlefield. All licensed providers at all levels need to be educated on this issue during their career and reminded of this point just prior to deployment. (JTTS Prehospital Coordinator)

49. The TCCC curriculum does make a point of individual providers treating individual patients as needed by the tactical situation. However, this doesn't mean that a provider should systematically and programmatically undermine a unit's lifesaving capabilities that are provided by the full implementation of the TCCC Guidelines. Especially when their decisions compromise the command's prehospital capabilities due to ignorance and subsequent inappropriate professional concerns. (JTTS Prehospital Director)

50. Unit medical training must be integrated into the unit mission training, just as performed by units during National Training Center and Joint Readiness Training Center rotations. This is realistic unit combat medical training. (Army ROLE-1)