

Committee on Tactical Combat Casualty Care Meeting Minutes

6–7 September, 2017; San Antonio, TX

Dr Frank Butler; Dr Stephen Giebner

Wednesday, 6 September 2017

Chairman's Welcome: Dr Frank Butler, Chairman of the CoTCCC, called the meeting to order and had attendees introduce themselves. Dr Butler briefly reviewed the Committee's progress in prehospital combat trauma care since 2001, its current knowledge products, and performance improvement methodology. He then reviewed the agenda and asked for disclosures from the attendees. Several disclosures were noted. Dr John Holcomb has a financial interest in the Junctional Emergency Treatment Tool, one of the three CoTCCC-recommended junctional tourniquets. Dr Russ Kotwal and Mr Harold Montgomery consult for LynnTech, a company that manufactures blood analysis technology.

Mr Harold Montgomery received a special award from the Knowesis contracting company presented by Mr Scott Cooper. The award noted Mr Montgomery's remarkable contributions to the CoTCCC and the JTS during the short time that he has been on the team. The award consisted of a Knowesis coin, a Certificate of Excellence, and a cash bonus.

2. Combat Medic Presentation: SGT Adam Hartswick started his presentation by saying: "I am here to tell you about the worst day of my life and to let you know that I am alive today because of TCCC." His injuries were sustained in Afghanistan on 14 May 2013. There was a dismounted IED (dIED) attack outside of his base in Zhari province. He was the company senior medic and responded to an attack on the company's Second Platoon. He was not on the mission, but when he heard that his some of his unit's members had been injured, he jumped into the back of a responding Quick Response Force (QRF) vehicle and rushed to aid his teammates.

When he got to the point where the IED had detonated, he found the junior platoon medic and two other unit members dead. The company's EOD team leader arrived on scene, spoke a few words of reassurance to SGT Hartswick, and then was killed a few seconds later as he approached another IED. SGT Hartswick suffered minor injuries from that explosion but continued his duties as a medic, until another IED exploded shortly thereafter, causing devastating injuries to both of his legs. Dazed but conscious, he proceeded to apply C-A-Ts to both legs. Applying the tourniquet to the second leg was made very difficult by his missing index finger in one hand. His platoon leader, who had been trained in TCCC, ignored the danger presented by the possibility of more IEDs and came to SGT Hartswick's aid, tightening both of his tourniquets.

In what would later be recognized as the 2013 DUSTOFF Mission of the Year, DUSTOFF 68 landed at his position,

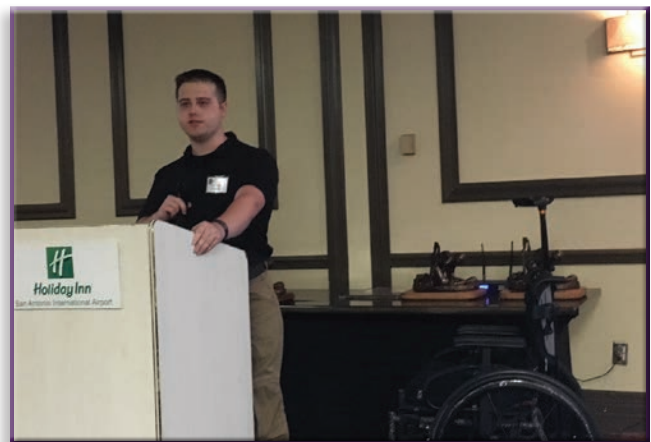
despite the potential for additional IEDs and rescued SGT Hartswick and another wounded Soldier and transported them to a Role 3 medical treatment facility.

Now, 3 years and 21 surgeries later, thankful for his second chance that he has been given, SGT Hartswick works tirelessly to train others in TCCC through his role as a TCCC instructor with Techline Trauma, training mostly law enforcement officers and SWAT teams—over 7000 individuals in 15 months. In his words: "I've seen it save lives."

In the question and answer period, SGT Hartswick remarked that he did not have any significant pain during his helicopter evacuation, despite the gravity of his wounds. He attributes this to the adrenaline produced by his wounding scenario.

He was very grateful that the first sergeant in his unit had insisted that unit members wear "Combat Diapers"—a protective garment that covered his urogenital area and prevented any damage to that region.

He also noted that his unit received outstanding TCCC training from their Medical Simulation Training Center (MSTC) and emphasized TCCC training, especially tourniquet application, during the unit's down time in theater. SGT Hartswick received a sustained standing ovation from the group.



SGT Adam Hartswick – combat medic presenter

3. Senior Leader Remarks: Brigadier General James Dienst is the director of Education and Training at the Defense Health Agency. In that capacity, he is directly responsible for three medical training commands that graduate more than 20,000 enlisted medical personnel annually and provide combat trauma and joint medical operations training to more than

260,000 DoD personnel each year. He welcomed the group on behalf of VADM Racquel Bono, the director of the DHA, and discussed the importance of caring for our nation's wounded as well as the pivotal role that DoD trauma training plays in that. He thanked the group at the meeting for their role in helping to improve trauma care in the US military.

4. Senior Leader Remarks: Brigadier General John J. DeGoes is vice commander of the 59th Medical Wing, Joint Base San Antonio-Lackland, Texas. The 59th Medical Wing is the Air Force's largest medical wing, consisting of more than 8,000 personnel, seven groups, 11 medical facilities across the San Antonio metropolitan area, and multiple worldwide deployment sites. He thanked the group for the outstanding work that it has done in improving combat trauma care in the military. He also noted that the TCCC Working Group is very typical of high-reliability organizations, with an intolerance for failure. Brig Gen DeGoes remarked that the JTS move to DHA is a good one, since DHA is currently gaining increased power and responsibility in the Military Health System, and he pledged to provide whatever support that he can to the group's efforts.

5. Point of Injury Whole Blood: COL Andre Cap from the USAISR was presented with a Special TCCC Award in recognition of his ongoing innovations in the areas of injectable hemostatic agents and transfusion medicine, especially with respect to the use of whole blood to resuscitate casualties in hemorrhagic shock as early as possible in the continuum of care.

The central theme of COL Cap's presentation was that far-forward resuscitation with blood products saves lives. He discussed the recent mass casualty incident on the USS Bataan. The ship's walking blood bank program enabled them to transfuse the four casualties involved with 54 units of whole blood after all of the available red blood cells had been used. He noted that whole blood is more effective than blood components and that whole blood, transfused as soon as needed, can turn combat fatalities into lives saved. He provided guidance on two important aspects of type O low transfusions: 1) type O low transfusions from a walking blood bank require careful follow-up; and 2) Get a blood sample before transfusing, since large volumes of type O low blood may make it difficult to determine the casualty's underlying blood type.

COL Cap stressed the need for all combat units to develop a Type O Low program and that this will require support from the senior leadership in the DoD. Dr John Holcomb added that all medical treatment facilities that care for seriously injured trauma patients should be able to provide both prehospital and in-hospital resuscitation with whole blood—now!

6. Joint Trauma System Director Remarks: CAPT Zsolt Stockinger, the Director of the JTS discussed the ongoing transition of the JTS from the Army Medical Research and Materiel Command to the Defense Health Agency (DHA.)

CAPT Stockinger also highlighted the JTS effort to better define what constitutes a preventable death, since this is one of the most important metrics the JTS uses to guide its recommendations for improving combat casualty care. The preventable death project was undertaken at the direction of Dr Dave Smith, the acting Assistant Secretary of Defense for Health Affairs.

CAPT Stockinger also noted that the JTS is making a significant number of contributions to the combat trauma

literature and had 12 presentations at the Military Health Research Symposium. Another recent JTS effort has been a study that used DoDTR data to document what type and how many surgical procedures were performed by combat trauma surgeons in theater.

7. TCCC Update: Dr Frank Butler presented an update on TCCC issues. Among the topics covered were:

- A thank-you to Ms Danielle Davis and Mr Dallas Burelison for their assistance in meeting preparation.
- A farewell to departing CoTCCC members COL Jim Geracci and COL Peter Benson and a welcome to new CoTCCC members Col Chet Kharod, SFC John Lacroix, CDR Lanny Littleohn, and LTC Ethan Miles.
- A brief review of the history of TCCC for new attendees at the meeting.
- This year's TCCC award for outstanding contributions to the TCCC effort was presented jointly to LTC Ethan Miles, MSG (P) Curt Conklin, and the 75th Ranger Regiment for the outstanding leadership that has made the 75th Ranger Regiment synonymous with excellence in TCCC.
- Several recent leadership initiatives with respect to TCCC were reviewed, including Secretary of Defense James Mattis's 2013 letter to the Service Chiefs stressing the importance of TCCC training; the pending DoD Instruction on Military Readiness Training, including TCCC; and the 28 June 2017 directive from the Commanding General of the Marine Corps Education and Training Command that states that: "To mitigate the loss of lives and severity of injuries on the battlefield, all combatants and medical personnel on the modern battlefield must be proficient in the concepts of TCCC."
- In a letter dated 6 November 2017, General Joseph Votel, the current Commander of the US Central Command, established a requirement for all medical personnel (physicians, PAs, nurses, Medics, Corpsmen, and PJs) to be trained in TCCC for Medical Personnel (TCCC-MP) within 180 days of their deployment. All other personnel deploying to CENTCOM should be trained in TCCC for All Combatants (TCCC-AC).
- New CoTCCC social media initiatives and the TCCC Quick Reference Guide that have been developed and implemented through the efforts of Mr Montgomery.
- The new TCCC for Medical Personnel curriculum has been completed and includes the latest changes to the TCCC Guidelines, a number of very well-done videos provided through a DHA research effort, and the new TCCC Critical Decision Case Studies.
- Through the leadership of TCCC Working Group Members Dr Brad Bennett and COL Ian Wedmore, the Wilderness Medical Society conducted a 2-day TCCC preconference in 2016 prior to its annual summer meeting. In June of 2017, there was a special edition of "Wilderness and Environmental Medicine" dedicated to covering the TCCC topics presented by the 22 faculty members at the preconference.
- The latest change to the TCCC Guidelines was spearheaded by Dr Mel Otten and adds extraglottic airways (EGAs) as an option for airway management in Tactical Field Care. It also recommends the i-gel as the preferred EGA because its gel-filled cuff makes it simpler to use than EGAs with air-filled cuffs and eliminates the need for cuff pressure monitoring. The change notes that should an EGA with an air-filled cuff be used, the pressure in the cuff must be monitored, especially during and after changes in altitude.

8. Time to Death in Noncompressible Hemorrhage: Dr John Holcomb shared some of his most recent work that highlights the importance of providing lifesaving interventions as soon as possible in casualties with noncompressible hemorrhage—including in the prehospital setting whenever possible. As a point of emphasis, he noted a factor VIIa study in which the mean time to drug administration was 5 hours—which is not optimal considering that most patients who die from hemorrhagic shock do so within 2 hours after injury. He discussed the recent article in the *Journal of Trauma* by Oyeniyi that examined the impact of a “bundle of care” for bleeding patients. This bundle consisted of:

- o “Identify the bleeding patient
- o Prehospital and hospital damage control resuscitation
- o Prehospital and hospital extremity and junctional tourniquets
- o Prehospital and hospital pelvic binders
- o Prehospital and hospital hemostatic dressings
- o Resuscitative endovascular balloon occlusion of the aorta
- o Coagulation monitoring with thromboelastography TXA for patients with significant fibrinolysis
- o Decreased time to operating room
- o Decreased time to interventional radiology
- o Goal-directed resuscitation with blood products as bleeding slows”

Through implementation of these steps, Memorial Hermann Hospital documented a decrease in deaths from hemorrhage—from 36% to 25% ($p < .01$).

Dr Holcomb also discussed the recent Harvin article that found that the mortality rate for hypotensive patients requiring a trauma laparotomy has remained unchanged over the past two decades at 46%. In discussing hemostatic interventions that can help stop bleeding faster, he cited the work done by Cantle et al. that examined 402 patients who underwent trauma laparotomies and found that 90% had their primary bleeding above the aortic bifurcation. This means that if REBOA is to be used in this setting, the balloon would have to be inflated in Zone 1 and the authors found that Zone 1 REBOA would have controlled bleeding in 87% of the patients in this study. The Abdominal Aortic Junctional Tourniquet, in contrast, would have helped only 8%. If the AAJT or the balloon in REBOA is inflated distal to the site of vascular injury, it is more likely to exacerbate NCTH than to control it. Dr Holcomb emphasized that REBOA could potentially be employed in the prehospital setting, since the only skill required for its use is the ability to gain femoral access. Zone 1 REBOA can only be used for 60 minutes before distal ischemia becomes a problem for the patient.

9. POI Whole Blood Use in 75th RR: LTC Ethan Miles is the Regimental Surgeon for the 75th Ranger Regiment. The Ranger Regiment has aggressively implemented the use of whole blood in caring for the casualties in the prehospital setting. Their “ROLO” (Ranger Type O Low Titer) program was established several years ago and was the prototype for such a program in the DoD. Everybody in the Regiment gets typed and screened, and those individuals who are found to be type O and have low anti-A, anti-B titers are then considered to be universal donors.

At this point, they have also started to field cold-stored type O low titer blood, thanks to the assistance of the Armed Forces Blood Program office in supplying that product. The Regiment has 11 cases of prehospital whole blood transfusions to date—all cold-stored WB units. LTC Miles noted that whole blood is a preferred resuscitation fluid over dried plasma and that they have not used dried plasma since January

of 2016. LTC Miles practical pointers for using whole blood far forward include:

1. Use 2 large-bore IV lines if possible
2. They have found good flow rates with the FAST-T
3. IO devices MUST be flushed with 20mL of saline or LR
4. They expedite TXA administration: 1g in 10mL, then 10mL flush
5. Ranger First Responders are very helpful in expediting transfusions.
6. Cold chain management is essential
7. Different resupply options are being evaluated
8. Train, train, train!

In the Question and Answer period, LTC Miles was asked what the difference is between the 75th Ranger Regiment and the rest of the military with respect to ensuring casualty survival. He enumerated four factors:

1. Will
2. Leadership
3. TCCC
4. Having physicians and PAs trained in TCCC.

10. TCCC Web Mobile and Social Media Projects: Mr Harold Montgomery, the Operational Forces Liaison for the CoTCCC and the JTS, discussed the importance of reaching out to the current generation of active duty combat medics in their preferred modes of communication—or, to quote, Monty: “Email is for old people.” Mr Montgomery provided an excellent perspective by noting that 80% of the US military is less than 36 years old and that everyone in this demographic volunteered to serve their country after the war on terrorism had started. An important observation is the requirement to adjust TCCC messaging and training to the communication and learning methods of the next generation of medics.

Since his arrival, Mr Montgomery has been helping the CoTCCC and the JTS with improving the outreach and the messaging to the new generation of young combat medics, Corpsmen, and PJs. A brief summary of his accomplishments in this area includes:

- Establishing a TCCC presence on Facebook, Twitter, Instagram, LinkedIn, and YouTube.
- Working with the DHA deployed medicine team to help develop a TCCC application that can be downloaded onto personal electronic devices and used in deployed environments when there is no Internet connectivity.
- Working with the DHA deployed medicine team to help establish an operational medicine website, with TCCC as the cornerstone of the site’s content. A key feature of this website is that it does not require a Common Access Card for access. Since it went live in November 2016, the cotccc.com website has had over 35,000 users from 174 countries. 50% of these users came from social media. As of September 2017, the cotccc.com website has transitioned to the www.deployedmedicine.com website and is the cornerstone of the mobile app “Deployed Medicine” that is now available for download.
- Developed a medic-friendly TCCC Quick Reference Guide to provide a concise yet comprehensive collection of the most important TCCC information.

The importance of this outreach to the new generation of military Medics was underscored by Mr Montgomery’s observation that one of the combat medics at a CoTCCC meeting 2 years ago mentioned that he had never even seen the TCCC Guidelines until that meeting.

11. Three Things I Would Change About TCCC: CDR Lanny Littlejohn is the Senior Medical Officer at the Naval Special Warfare Development Group. The “Three Things I Would Change About TCCC” presentations are an ongoing feature at CoTCCC meetings and are designed to offer trauma care experts an opportunity to identify areas in which TCCC could be improved. CDR Littlejohn is an emergency medicine physician with extensive operational experience, both in Special Operations and in support of USMC units.

His recommendations for things to consider changing about TCCC are as follows:

1. Fluid Resuscitation for Hemorrhagic Shock—CDR Littlejohn highlighted the importance of continuing to pursue the fielding of dried plasma across the force. Whole blood may be better but will be logistically impractical for many units and in many areas of operations. We also need to improve our training methodology for whole blood administration and add a standardized whole blood transfusion protocol as a TCCC knowledge product.
2. Improvisation—There should be an increased focus on improvisation in combat casualty care, for example in areas such as extremity tourniquets and junctional tourniquets.
3. Tension Pneumothorax—We need to relook at how we identify and treat tension pneumothorax in TCCC. There are too many needle decompressions being performed on our casualties. There is an ongoing change proposal for TCCC on that topic at the moment and CDR Littlejohn was immediately recruited to help the team that is authoring that change.

12. Joint Trauma System Preventable Death Review: Dr Jud Janak provided an update on the ongoing JTS effort to more precisely define when a combat death should be classified as “preventable.” Although the 2016 National Academies of Science, Engineering, and Medicine report on trauma care was entitled “Zero Preventable Deaths” and adopted that as its goal in trauma care, neither the civilian sector nor the DoD has a standardized, prospective system for classifying a particular injury or combination of injuries as either survivable or nonsurvivable. The initial step of this JTS effort has been to perform a review of the medical literature to identify and compare both civilian and military preventable death methodologies and reported preventable death rates in order to understand how preventable deaths are being reviewed and reported at present.

Dr Janak’s preliminary observations include:

1. There is considerable heterogeneity in the methodology used.
2. A decision will need to be made about whether to use an Expert Panel Review or a Trauma Scoring System Threshold—or a combination of the two.
3. Preventable combat deaths must also take prehospital considerations into account, which is a challenge considering the current poor level of documentation in prehospital care.
4. There is added complexity in battlefield trauma from non-medical considerations.
5. There should be an identification of what aspects of care could be improved and opportunities for improvement.

13. New Business

- Dr Howard Champion provided an introduction to the planned development of a DHA Integrated Medical Synthetic

Training architecture by PEO STRI that will help to list and classify training simulation methodologies in the DoD in order to help optimize how we train for trauma care.

- COL Jim Geracci gave the group an overview of the very successful TCCC training program that was used during his time as III Corps Surgeon and was organized around the Army’s Medical Simulation Training Center at Ft. Hood. He noted that III Corps is not Special Operations and that there is a disconnect between CoTCCC recommendations and how trauma care is being trained and executed in the conventional forces. COL Geracci’s approach at III Corps was TCCC for everybody: physicians, PAs, and Medics.
- Dr Peter Rhee shared some thoughts about new directions in the treatment of tension pneumothorax. He stated that needle decompression fails about 50% of the time using current techniques. He has been working on a prototype needle decompression system that uses a modified Veres needle with a 3mm lumen, a pop-up indicator that tells the provider when the needle enters the pleural space, and a one-way valve. Work is ongoing to finalize this system and have it cleared by the FDA for the treatment of tension pneumothorax.

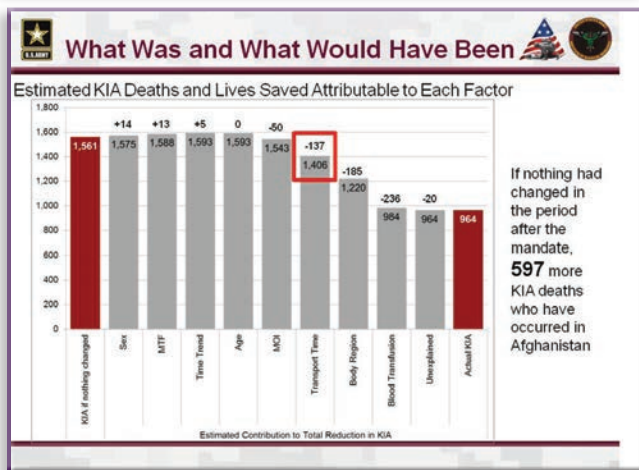
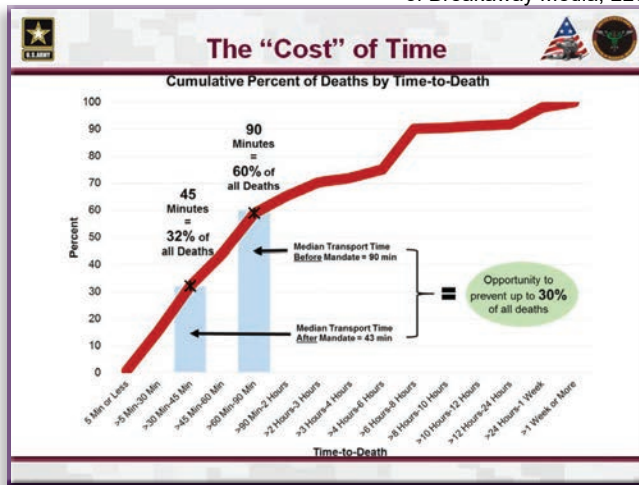
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14. Senior Leader Remarks: MG Brian Lein, the commanding general of the US Army Medical Command, shared his perspective that military medicine needs to increase its focus on combat casualty care. He thanked the attendees at the meeting for being one of the most effective groups in the DoD in advocating for advances in battlefield trauma care. But he also noted that it is the senior leadership in military medicine that needs to engage to bring about significant and lasting advances in combat casualty care throughout the US military. The health care benefit is important, but caring for our wounded warriors needs to be the top priority. MG Lein also noted that we are not training and using our combat medics in ways that best prepare them to treat the wounded on the battlefield. Likewise, trauma training for surgeons is not optimized at the present by providing them a robust trauma experience at Level 1 trauma centers. He also provided a cautionary note by saying that the current system is not prepared for a large scale conflict and that the DoD would run out of Role 4 CONUS trauma beds very quickly if there is a large-scale ground war in Korea.

15. TCCC: It All Adds Up: Dr Jeff Howard from the JTS discussed prehospital factors that affect survival. On 15 June 2009, then-Secretary of Defense Robert M. Gates mandated that combat casualties must be transported to a treatment facility with a surgical capability within 60 minutes. A recent article by Kotwal et al. in *JAMA Surgery* found that the KIA rate among US casualties with an ISS > 25 before this mandate was 16.0%. After 2009, the KIA rate dropped to 9.9%. The case-fatality rate was 13.7% before 2009 and 7.6% after that time.

While rapid evacuation to the care of a surgeon is unquestionably important in determining casualty outcomes, other factors may also influence survival. Dr Howard and colleagues conducted a secondary analysis of 4,542 battlefield trauma patients injured in Afghanistan from 1 September 2001 through 31 March 2014 using data in the DoD Trauma Registry.

These figures show: 1) “The Cost of Time”—the increase in fatalities among combat casualties over time; and 2) a graphic presentation of what the number of KIAs would have been expected to be with the injury patterns, transport times and elements of care prior to 2009. The incremental savings in lives are displayed for each of the following factors:



mechanism of injury (50); faster transport time (137); body region (185); prehospital blood transfusion (236); and unexplained (20). Collectively, the changes in injury patterns and improvements in care resulted in an estimated 597 American lives saved during this time period.

16. A Relook at the Abdominal Aortic and Junctional Tourniquet (AAJT): Dr Jonny Morrison, now an attending physician at the R. Adams Cowley Shock/Trauma Center in Baltimore, reviewed the emerging literature concerning the use of the AAJT to treat trauma patients in the prehospital setting. Dr Morrison reviewed the findings in the studies by Rall and colleagues at the 59th Medical Wing and Kheirabadi and colleagues at the USAISR. The findings can be summarized as follows: 1) the AAJT appears to be effective at controlling pelvic hemorrhage; 2) it is as effective as REBOA at occluding the abdominal aorta; and 3) it is associated with a similar reperfusion injury.

Two case reports of AAJT use were discussed. In the first, the device was applied for a casualty who was pulseless from hemorrhagic shock caused by bilateral lower extremity injuries despite tourniquet application. The AAJT was reported to cause clinical improvement and the patient survived. In the second case, the AAJT was used successfully to control bleeding from an injured axillary artery.

Dr Morrison and his colleagues published a study in *Shock* in 2014 that found that approximately 20% of severely injured UK combat casualties had injuries with hemorrhage in the abdomen or pelvic junctional region. These casualties might benefit from treatment with the AAJT, but there is

concern about the potential for exacerbation of hemorrhage at bleeding sites proximal to the site of aortic occlusion with the AAJT. Similar concerns apply to Zone III REBOA.

17. Management of Suspected Tension Pneumothorax in TCCC: Dr Frank Butler discussed the pending proposed change to the TCCC Guidelines on the management of suspected tension pneumothorax in the prehospital setting. Recent literature on that topic was reviewed, as were clinical findings from the JTS Performance Improvement Process and the Armed Forces Medical Examiner Autopsy Review series. The working group preparing this proposed change will use this information to answer the relevant questions listed below:

- When should a tension pneumothorax be suspected?
- What device should be used for needle decompression (NDC)?
- What anatomical site is the preferred location for NDC?
- What technique should be used for NDC?
- How can the medic tell if the NDC has been successful?
- What should be done if the initial NDC is not successful?
- What should be done if the initial NDC is successful, but symptoms recur?
- What should be done if repeated NDC fails to produce improvement in the casualty?

The working group for this proposed change will continue their review and use the information to draft a proposed change to the TCCC Guidelines on this topic.

18. TCCC Maritime: CAPT Jose Acosta is a trauma surgeon, the former Commander of Naval Medical Center San Diego and now the Third Fleet Surgeon. In discussing how TCCC applies to ships at sea, he reviewed a number of historical examples of shipboard mass casualty events:

- USS Franklin
- USS Stark
- USS Cole
- USS Fitzgerald

He noted that shipboard casualties entail significantly different epidemiology of wounding and death, as exemplified by this quote from the *VFW Magazine* in 2013 about the 37 fatalities in the USS Stark casualty incident: "Most who died did so in their bunks—burned or suffocated. The crew's quarters became an inferno, reaching 400 degrees." A *Journal of Trauma* report on the 17 fatalities that resulted from the terrorist attack on the USS Cole categorized 15 of the 17 deaths as "unsurvivable." Of note, three of the fatalities who were classified as unsurvivable died from drowning. In the 2017 USS Fitzgerald collision, all 7 of the resulting fatalities were found by the Armed Forces Medical Examiner System to be caused by drowning. CAPT Acosta concluded that there is presently an opportunity to integrate maritime casualty concepts into TCCC and that casualty training in the US Navy must be kept current and relevant.

19. TCCC Curricula 2017 and PHTLS 9: Dr Stephen Giebner, the CoTCCC Developmental Editor, reviewed the progress on the 2017 updates to the TCCC for Medical Personnel (MP) and the TCCC for All Combatants (AC) curricula.

This year's update is based on the on the TCCC Guidelines dated 170131 and has 229 files, comprising 2.22 GB of material. It includes changes 16-02 (Pelvic Binders) and 16-03 (TCCC Guidelines Comprehensive Review and Update) as well as the newly developed TCCC Critical Decision Case Studies.

The updated TCCC Curricula have been mailed to DoD schoolhouses and are available on the following websites:

- <https://deployedmedicine.com/>
- <http://www.naemt.org/education/TCCC/tccc.aspx>
- <https://www.jsomonline.org/TCCC.html>
- <http://www.specialoperationsmedicine.org/Pages/tccc.aspx>
- <http://www.cotccc.com>

TCCC students should now all receive an electronic copy of the TCCC Quick Reference Guide (developed by Mr Harold Montgomery) that contains an abbreviated synopsis of the TCCC Guidelines, the TCCC Clinical Algorithms, and other TCCC reference information requested by user Medics, Corpsmen, and PJs. The TCCC QRG can be downloaded at: <https://deployedmedicine.com/market/11/content/87>

Work on the Ninth Edition of the PHTLS textbook is ongoing. TCCC will have 13 chapters contributed by members of the CoTCCC or the TCCC Expert Panel:

- Introduction to TCCC
- Care Under Fire
- Tactical Field Care
- Tactical Evacuation Care
- TCCC Scenarios
- Aeromedical Evacuation
- Joint Trauma System
- Triage in TCCC
- Injuries from Explosives
- Management of Burns in TCCC
- TCCC Casualty Response Planning
- Medical Support of Urban Operations
- Ethical Considerations for Combat Medics

Both Dr Giebner and Dr Butler expressed their appreciation to all of the individuals who are helping with these chapters.

20. TCCC Quick Reference Guide and Social Media Initiatives: Mr Harold Montgomery reviewed the newly developed TCCC Quick Reference Guide (QRG). The first edition of this new CoTCCC knowledge product includes:

- An abbreviated synopsis of the TCCC Guidelines
- The TCCC Clinical Algorithms
- A CoTCCC-recommended equipment list
- TCCC Casualty Card (DD 1380) and the TCCC AAR Forms
- Triage and Evacuation Categories—JTS Examples
- The Nine-Line Evacuation request format
- TCCC medication summaries
- Key TCCC references
- Conversion Guide

The QRG will be updated at least once a year. Future editions will add whatever additional information that our combat medical personnel tell us that they need to help them care for our country's combat wounded. Mr Montgomery requested that any combat medical personnel who had suggestions for additional material that should be included in the QRG contact him, but also noted that one of the goals of this document is to keep in brief.

Please note also that although this document has been copyrighted to protect it from intellectual property pirates, it is intended to be freely available for use by anyone who is using TCCC to help care for the wounded.

Mr Montgomery also discussed briefly his work to provide a listing of the tasks, conditions, and standards for TCCC.

This work was requested by both DHA and FORSCOM and is intended to provide the TCCC curriculum material in a format that is acceptable to military schoolhouses that train nonmedical personnel in basic military skills, including, but not limited to, TCCC. These newly developed lists correlate to the existing "TCCC Skill Sets by Provider Level" list.

21. Breakout Sessions: There were four breakout sessions at this meeting.

A. TCCC Maritime—chaired by CAPT Jose Acosta. His brief-back points from the breakout session included:

- There is not presently a need for TCCC maritime to be developed as an additional TCCC curriculum.
- Maritime-particular injuries such as near-drowning, smoke inhalation, electrocution, and burns could be covered with the addition of a maritime scenario to the scenarios section of the TCCC curriculum.
- There are gaps between the care recommended in the TCCC guidelines and the care that the services are prepared to render in prehospital settings for trauma victims.
- TCCC is foundational for everyone in the military and all should get the basic concepts that are contained in the TCCC curricula.

B. New TCCC Technology—chaired by Dr Mel Otten. His brief-back points from the breakout session included:

Dr Otten reviewed the informal but long-standing criteria that are used by the New Technology Subcommittee to evaluate new battlefield trauma care equipment proposed for use in TCCC. Equipment that is planned for fielding with combat medics, corpsmen, and PJs should:

- WORK—with evidence to prove it (ALWAYS FIRST)
- Be easy to apply/use
- Be easy to train
- Be able to be used quickly—time efficient
- Cause minimal complications
- Come in small packages
- Have a long-shelf life
- Be usable in harsh environments
- Use common accessories (batteries/plugs/etc.)
- Cause minimal risk with use
- Be consistent with best battlefield trauma care practices
- Be low cost

Dr Otten noted that we need more medics on this subcommittee. He also noted that decisions about new items of TCCC equipment must generally be made without the benefit of high-quality evidence.

C. TCCC Web/Mobile/Social Media—chaired by Mr Harold Montgomery. His briefback points from the breakout session included:

- The intent of this effort is to increase the availability of TCCC knowledge products to younger medics in formats that they are likely to use.
- The DHA research effort to produce short, topic-centric videos to be used in both the TCCC Curriculum and on the website will be ongoing over the next year.
- We need more individuals who would like to participate in TCCC videos.
- Planned features for the TCCC section of the Deployed Medicine website will include sections for medic questions and medic feedback on TCCC issues.

D. NAEMT TCCC Courses—chaired by Dr Frank Butler. His briefback points from the breakout session included:

- It is likely that the anticipated DoD Instruction on Medical Readiness Training (to include a requirement for TCCC training) will not specify that training be obtained through an NAEMT-certified training site. This means that quality assurance will remain a challenge.
- The JTS has identified significant quality issues in TCCC training in the past and addressed those in a white report that was forwarded to the service Surgeons General in 2015. This white report recommended the use of TCCC training courses that use the NAEMT educational infrastructure to help assure standardized, high-quality training and improved tracking of TCCC students.
- There are approximately 130,000 medical personnel in the active and reserve components of the DoD, according to DoD websites. This means that the \$10/student cost for these individuals to be trained through the NAEMT educational infrastructure would result in an estimated \$1.3 million to train all DoD medical personnel in the TCCC for Medical Personnel curriculum.
- It is presently anticipated that the TCCC for All Combatant training will be conducted at basic military schoolhouses and at combat units without working through NAEMT. This approach will save approximately \$25 million for initial TCCC-AC training, but increases the quality assurance challenge.
- Mr Montgomery is working with senior enlisted leaders to transform the TCCC-AC content into a DoD-schoolhouse friendly curriculum format to facilitate its use at Army training facilities.

22. CoTCCC Action Items: Dr Butler reviewed the pending CoTCCC action items.

a. Opportunities to Improve in TCCC

	Yes	No
Evidence-Based		
Continually Updated		
Strategic Messaging		
Medical Rapid Fielding Plan		
TCCC Training Standardized and Mandated		
Physician TCCC Training		
DoD-FDA Panel		
TCCC Documentation		

b. Pending Changes to the TCCC Guidelines

b.1. Management of Suspected Tension Pneumothorax

- Indications
- Device
- Site
- Steps to address failed NDC

b.2. Add an Advanced Field Care phase to TCCC

- REBOA

b.2. continued

- Whole blood
- AAJT?
- ResQFoam—when FDA approved
- Intubation
- Oxygen
- Chest tubes with suction
- What else?

c. Potential Future Changes to the TCCC Guidelines

c.1. Management of TBI

- Higher target systolic BP?
- TXA?
- Plasma?
- New evidence on combination hypoxia and hypotension
- Whole blood?
- Or at least plasma and RBCs
- Good O₂ sat less helpful if not enough red cells
- Valproic acid?
- What else?

c.2. Relook at iTClamp/Combat Gauze combination for scalp and cervical bleeding

- CASE REPORT: 44-year-old woman with 25 stab wounds to the chest and neck
- Arrived at the trauma center with a systolic BP of 70 and unresponsive.
- She was given 4 U PRBC and 6 U FFP to resuscitate her.
- There was severe bleeding from the base of the neck about 1cm above the clavicle through two incisions that were close together.
- Initially packed with Combat Gauze. Soaked through—ineffective.
- Repacked with Combat Gauze and then iTClamp used to close wounds.
- Worked. No other major bleeding sites identified. Survived.

c.3. Additional tourniquets included in TCCC?

- Tactical Mechanical Tourniquet (TMT)?
- SAM Extremity Tourniquet (SXT)?
- Others?
- Include negative evidence where appropriate

c.4. TXA use

- Slow IV push vs 10 minute infusion?
- Higher dose?
- No second prehospital dose?

c.5. CBRN section in the TCCC Guidelines?

- Or information report?
- Sarin first?

c.6. Replace moxifloxacin with levofloxacin?

- COL Clint Murray

c.7. Increase initial ketamine dose?

- MAJ Andy Fisher

c.8. Specify the two vented chest seals with laminar vents as the preferred equipment items for TCCC?

- Dr Bijan Kheirabadi

d. After FDA Approval and/or More Studies

d.1. ResQFoam

d.2. Compensatory Reserve Index Monitor, OR

d.3. POI lactate monitoring OR tissue O₂ sat

e. After USAISR Testing

e.1. AAJT

- 1-hr limit
- Bleeding sites above the aortic occlusion

Acknowledgments

The authors gratefully acknowledge the ongoing efforts of all of the members of the TCCC working group, our invited speakers, and other meeting attendees to improve the battlefield trauma care provided to our nations' combat wounded.

Disclaimer

The opinions or assertions contained herein reflect the events of the 31 January/1 February meeting of the CoTCCC. They are not to be construed as reflecting the views of the Department of the Army or the Department of Defense.



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CAPT, MC, USN (Ret)
Developmental Editor
Committee on TCCC

10 Jan 2018
Date



Frank K. Butler, M.D.
CAPT, MC, USN (Ret)
Chairman
Committee on TCCC

10 Jan 2018
Date

ENCLOSURE 1

**Attendance, CoTCCC Meeting
6-7 September 2017
San Antonio International Airport Holiday Inn**

CoTCCC Voting Members

Col Jeff Bailey
SGM F Bowling
Dr Frank Butler
MSG Curt Conklin
LTC Steve DeLellis
COL Brian Eastridge
Dr Erin Edgar
COL Jim Geracci
COL Kirby Gross
SOCM James Holmes
Dr Ken Kelly
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HSCM Glenn Royes
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Dr Warren Dorlac
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Dr John Gandy
Dr John Holcomb
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SGM John Sims USASOC
Dr Mary Ann Spott JTS
CSM Tim Sprunger MEDCOM
MAJ Craig Stachewicz DHA MEDLOG
Mr Ed Whitt OASD/HA
SGM Tony Williams FORSCOM

Speakers

CAPT Jose Acosta Speaker Maritime Care
COL Andre Cap ISR (local no funding needed)
Sgt Adam Hartswick Combat Medic
Dr Jeff Howard JTS
Dr Jud Janak Preventable Death Determination Project
Dr Jonny Morrison Univ of MD Shock and Trauma

Senior Leaders

Brig Gen JJ Degoes 59th Medical Wing
Brig Gen James Dienst J7 DHA
MG Brian Lein AMEDD C+S

Allied Liaisons

MAJ Robin Haufa Germany
MAJ Shuichi Kawano JSDF
LCDR Linda Roger Canada
Dr Geir Strandenes Norway

Invited Guests

Dr Paul Allen ISR
MSgt Shawn Anderson ACC
MAJ Walter Engle III Corps
SFC(P) Simon Gonzalez Regimental Senior Medic - 75th
Mr Craig Hall Techline Training
CPT Caitlin Howard EMS Fellow
Ms Pamela Lane Executive Director--NAEMT
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Ms Kathy Ryan ISR
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- › Focus on REBOA
- › Collapsible Tube Model of Bleeding Control
- › Resilience in SOF, Intramuscular TXA in Tactical and Combat Settings
- › SOF Risk Reduction: Integration of ESRTs
- › Prehospital Ketamine Use During OEF
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