



Summer 2016  
Volume 16, Edition 2

# JDOM

JOURNAL of SPECIAL OPERATIONS MEDICINE™



THE JOURNAL FOR OPERATIONAL MEDICINE AND TACTICAL CASUALTY CARE



## *Inside this Issue:*

- › Case Report: A Herpes Zoster Outbreak on the Sinai Peninsula
- › Case Report: Activation of Walking Blood Bank Based on Mechanism of Injury
- › Case Report: Anthrax Case Report Relevant to Special Operations Medicine
- › In Brief: Measures of Instructor Learning
- › In Brief: Tourniquet Effectiveness When Placed Over JSLIST
- › Comparison of Pneumatic Tourniquet Models
- › Single, Wider, and Paired Tourniquet Pressures
- › Field Sterilization in the Austere Environment
- › Simulation Versus Live Tissue for Training Trauma Procedures
- › Inner Ear Barotrauma
- › Effect of Cooling Shirt on Core Body Temperature
- › Integration of TECC Into the National TEMS Competency Domains
- › Letters to the Editor: AAJT Design and Testing and Field Electronic Medical Records
- › Ongoing Series: Clinical Corner, Human Performance Optimization, Infectious Diseases, Injury Prevention, Picture This, Prolonged Field Care, Special Talk, World of Special Operations Medicine, TCCC Updates, TacMed Updates, and more!

*Dedicated to the  
Indomitable Spirit  
and Sacrifices of  
the SOF Medic*

A Peer-Reviewed Journal That Brings Together the Global Interests of Special Operations' First Responders

# Committee on Tactical Combat Casualty Care Meeting

2–3 February 2016, Atlanta, Georgia:  
Meeting Minutes

## TUESDAY, 2 FEBRUARY 2016

**1. Chairman's Welcome:** Dr Frank Butler convened the meeting and welcomed the meeting participants. After reviewing the agenda, it was noted that there are no conflicts of interests among the attendees.

**2. Combat Medic Presentation:** SPC Drake Monticelli presented an improvised explosive device (IED) scenario.

Casualty #1 was the man who stepped on the IED. He suffered bilateral lower leg amputations. Four SOFT-T tourniquets were placed high and tight on his legs. The casualty was alert and oriented. The evacuation helicopter landed 42 minutes after the wounding occurred. The casualty was reported to have received 30 units of blood products at the medical treatment facility.

Problems encountered in treatment included:

- Three attempts at intravenous (IV) access and a humeral head intraosseous (IO) failed before a second humeral head EZ-IO was secured.
- Freeze-dried plasma (FDP) could not be reconstituted quickly, and IO administration failed.
- Tranexamic acid (TXA) was lost when the only glass vial available broke during opening.
- Getting a litter to the patient took 25 minutes.
- Blood products were requested with evacuation, but evacuation was delayed for a litter request that was not made.
- During an attempt to administer red blood cells (RBCs) during evacuation, the IO needle was pulled out.

The casualty survived his injuries.

Casualty #2 was a paramedic (PJ) who was injured responding to casualty #1. He suffered shrapnel injuries to his face.

Lessons learned ("Sustains") from this Operation were as follows:

- Wounds were rapidly identified and treated.
- Great team work and communication at point of injury and at treatment site.
- SOFT-T III tourniquet was rapidly and effectively placed.
- 10mg of hydromorphone were given intramuscularly without relief of pain.

- Rapid pain control was achieved with 75mg of ketamine given IO.
- The helicopter landing zone was changed en route to facilitate transport of the casualty.
- The casualty was well protected from rotorwash as the aircraft was landing.
- There were no breaks in communication; this resulted in a rapid evacuation.

Lessons learned ("Improves") from this operation included:

- The casualty wasn't placed in a Hypothermia Prevention & Management Kit until movement to casualty evacuation (CASEVAC) site.
- Pelvic stabilization was not performed.
- Only one fluid resuscitation site was established. On board, the flight medic tried to administer packed RBCs but only succeeded in pulling out the IO."
- Antibiotics were not administered.
- TXA administration was attempted but the ampule broke. A rubber-stoppered vial would have been a better choice.
- It took approximately 10 minutes to transfer the FDP and reconstitute. FDP infusion was slow because you cannot use infusion pressure techniques on the FDP glass bottle. The FDP stopped flowing into the IO site after half the dose was administered.
- The second casualty was not tracked to be on the helicopter right away. (The PJ who responded on the ground had shrapnel in his face, but was not initially recognized as a patient.)
- Better communication with evacuation personnel on 9 Line would have helped. Blood products were requested, but they would not launch the birds until they knew how many litters we needed. No litters were ever requested. That miscommunication cost 12 minutes to an already 30-minute response time."

**3. TCCC Training in the 75th Ranger Regiment:** MAJ Andy Fisher, 75th Ranger Regiment, briefed the Committee on developments in Ranger Tactical Combat Casualty Care (TCCC) training. Ranger First Responder (RFR) training is based on TCCC and taught to both medics and nonmedical personnel during Ranger Assessment and Selection Training. Currently, sustainment at platoon and company levels may not be robust or accurate. All Ranger Medics should become TCCC instructors. Moving forward, the RFR Program of Instruction

has been approved through the National Association of Emergency Medical Technicians (NAEMT) educational infrastructure as a qualifying course for TCCC certification using the Joint Trauma System TCCC curriculum. Identified limitations at present include the required 4:1 student to instructor ratio, and the \$10 charge per TCCC card.

**4. TCCC Update:** CAPT (Ret) Frank Butler, Chairman of the CoTCCC, reviewed items of recent interest in TCCC.

TCCC concepts continue to be adopted by an increasing number of civilian emergency medical systems and law enforcement agencies. There are frequent reports of lives saved with officer-applied tourniquets or hemostatic dressings. TCCC-based civilian courses include the NAEMTs Bleeding Control and Law Enforcement First Responder courses, the Tactical Emergency Casualty Care course, the Specialized Tactics for Operational Rescue and Medicine (STORM) course at the Medical College of Georgia, the Advanced Law Enforcement Rapid Response Training at Texas State University, among others.

The White House “Stop the Bleed” campaign is aimed at turning lay citizens who are present at trauma scenes into “immediate responders.” Immediate responders should be trained to use TCCC concepts, including tourniquets and hemostatic dressings, to save lives by controlling external hemorrhage as quickly as possible.

As presented during Hartford Consensus IV, civilian trauma leaders may be influenced by red/green charts similar to those used by the CoTCCC to track service individual first aid kit components. Readiness to accomplish first responder external hemorrhage control (as measured by tourniquets and hemostatic dressing issue and personnel trained in TCCC-based courses) could be quantified by these red/green charts. Additionally, outcomes in wounded officers and mass casualty incidents should be captured through registries, case series, and case reports. Officer and mass casualty fatalities should be subjected to preventable death analyses.

Dr Butler noted that the Hartford Consensus papers recommend that organizations in the civilian sector that are purchasing tourniquets or hemostatic dressings review the recommendations and evidence base for these devices as compiled by the CoTCCC and Department of Defense (DoD) research laboratories. With respect to tourniquets and hemostatic dressings, Dr Butler pointed out that in 2016, one can be either evidence-based or brand neutral, but not both.

The CoTCCC has suspended further discussion of adding the Abdominal and Aortic Junctional Tourniquet

(AAJT) to the TCCC Guidelines. There are research reports of adverse ischemic and reperfusion effects from 2 hours of abdominal aortic occlusion. The AAJT instructions for use state that it can be applied at the abdominal placement site for up to 4 hours. There are also no data at present that documents the safety of AAJT placement to control pelvic or junctional bleeding should the casualty also have a vascular injury proximal to the aortic occlusion site.

The CoTCCC has approved the addition of XStat compressed hemostatic sponges to the TCCC Guidelines. XStat has been shown to successfully control bleeding in a highly lethal bleeding model of combined subclavian artery and vein injury.

Inconsistency in TCCC training across the DoD continues to be a significant problem. Many “TCCC” courses—are not. There has been no standardization of TCCC training across the DoD. TCCC courses are taught both by DoD organizations and civilian training vendors. Incorrect messaging has been directly associated with adverse outcomes in casualties, while inappropriate training in some civilian courses puts both students and future patients at risk. Further, supervising physicians are often taught advanced trauma life support and not TCCC and do not have a knowledge of DoD-approved TCCC recommendations.

**5. Bulletized TCCC Guidelines:** Mr Harold Montgomery presented work he and other medics have done to create a simplified version of the TCCC guidelines for medics’ quick reference. They removed language on how and why to do things, and retained only language conveying what to do. This was done in response to input from the medics, corpsmen, and PJs noting that the TCCC Guidelines are now 14 pages long and that Combat medical providers need a reference document that conveys the needed information in a simpler, shorter format. Mr Montgomery also presented a concept for an algorithmic version of the medic-level TCCC guidelines. This concept was well received by the audience and will be developed further.

**6. IV/IO Medications in TCCC:** SOCM James Holmes (Tactical Medic Program Manager for the Naval Special Warfare Command) presented the work done by him and a CoTCCC working group to develop a simplified approach to the administration of IV/IO medications in TCCC. The impetus for this effort is that there has been little “how to” guidance in the TCCC curriculum on how to administer medications via IV or IO in the tactical setting. Additionally, training medics in IV medication administration is problematic in the hospital setting. IV medications are essential to optimal battlefield trauma care, but dosing errors may occur during the

chaotic environment that is present in most combat casualty scenarios, making this a focus area for TCCC. Improved training in this area is especially important for basic medics and corpsmen, who are not trained to the paramedic level. Proposed innovations in this area include simplifying guidance for administration (i.e., standardizing dose sizes, infusion times, medication concentrations, and so forth), minimizing IV administration system variation, and identifying a universal diluent. This topic will be addressed as a revision to the TCCC curriculum in the next annual update.

**7. Advanced Field Care:** Dr Butler discussed a concept that he designated as “Advanced Field Care.” Prolonged Field Care (PFC) is for the medic who is stranded with a casualty in circumstances that prevent evacuation. Advanced Field Care (AFC) is conceptualized as more than TCCC but less than damage control surgery, offering additional advanced interventions in prehospital settings and focusing largely on noncompressible hemorrhage. AFC is envisioned for use on ships, in submarines, by shock/trauma units, in Battalion Aid Stations, medical emergency response teams (MERTs), and in Special Operations Forces (SOF) Forward Operating Bases. Possible treatment options and diagnostic capabilities in AFC include:

- Fresh whole blood or 1:1 resuscitation
- ResQFoam
- REBOA (resuscitative endovascular balloon occlusion of the aorta)
- Chest tubes with possible reinfusion of shed blood
- Focused assessment with sonography for trauma (FAST) scans
- Assisted ventilation (SAVe II) with oxygen
- Lateral canthotomy
- Infrared scanning for intracranial hematomas

AFC could be used by providers at the paramedic level or above who are trained sufficiently to maintain procedural fluency in these procedures. Locations where AFC (which is basically a Role 1+ capability) is to be provided must be appropriately equipped. This approach would assist in the transition of a number of treatment modalities that are being developed under the Combat Casualty Care Research Program at the US Army Medical Research and Materiel Command.

**8. TCCC Mobile:** Dr Steve Steffensen, the Chief of Innovation for the Military Health System (MHS), updated the Committee on the progress of a new Defense Health Agency Innovation initiative focused on developing a platform to streamline the flow of TCCC information and provide maximum access to available resources. In the current world of TCCC training and education, various communities get TCCC content from public and military sources, some of which may be at

odds with actual TCCC recommendations. Additionally, medics and corpsmen have requested a TCCC knowledge product that provides a succinct overview of TCCC concepts in a format that can be supported by the personal smartphones that essentially all Combat medical providers now own and carry with them while deployed. TCCC Mobile will be tailored to medic preferences and will offer standard content across multiple communications platforms. The platform will provide a range of blended learning—informal and formal training materials, combined with instructional videos, pushed alerts to highlight changes in practice, and other informational resources. In Dr Steffensen’s recent survey of medics, the response to a proposed free TCCC app for mobile devices was 90% positive. Dr Steffensen and Ms Cynthia Barrigan have done outstanding work in securing MHS funding and executive sponsorship for the TCCC Mobile effort. It is anticipated that the initiative will be launched in June 2016. Mr Harold Montgomery, Mr Winn Kerr, MSG Curt Conklin, and SFC Danny Morrisette will serve as the medic collaborators in the design and development of this platform and its medical content. Another update will be provided at the 2016 Fall CoTCCC meeting.

Mr Montgomery and Mr Kerr then previewed a concept of an interactive website featuring bulletized TCCC guidelines with embedded links to explanatory text, videos, and so forth, which could possibly serve as a launching platform for the TCCC Mobile app. If this course of action is adopted and funding is approved, a website could be launched in the very short term. Audience feedback about the design and function of the proposed website was very positive. Dr Butler noted that the current TCCC websites that present the Committees’ knowledge products in the “TCCC Classic” format will be maintained until there is user consensus to migrate to an updated format.

**9. Proposed TCCC Guideline Change – iTClamp:** MAJ Kyle Faudree from the 160th Special Aviation Regiment briefed the group on the proposal before the Committee to add the iTClamp to the guidelines. The iTClamp is often described as a “chip clip” type of device designed for wound closure. The device costs \$78, weighs 1.3 oz, takes up 6 cubic inches of space, and has a 6-year shelf life. The clamp creates a fluid-tight seal and uses building hydrostatic pressure to tamponade the wound bed and promote clotting. MAJ Faudree pointed to 13 studies (five of them clinical) showing safety and efficacy of the device. He noted that the device is easy to learn, rapidly applied, and that the available literature indicates it is efficacious. Its proponents recommend using it as an adjunct to, not a replacement for, other hemorrhage control devices and hemostatic agents. MAJ Faudree also discussed the latest version of the recommended

language for the guideline change. The Chairman will call this proposal to a vote in the near future.

**10. Operational Medicine in the Submarine Force:** CAPT Matt Hickey, Force Medical Officer for the Submarine Force Atlantic, discussed injury and illness on submarines. TCCC has not had a major emphasis in the submarine force because combat trauma typically does not occur on board. Worldwide, there are approximately nine to 10 medical evacuations (MEDEVACs) from deployed submarines each month. The approximate proportions have generally been 25% psychiatric, 25% injury (mostly blunt trauma), and 50% “all other” causes. Independent Duty Corpsmen follow protocols to manage the most common submarine medical conditions. Very rare mass casualty events have been due to collisions, fires, or environmental malfunctions. CAPT Hickey noted that TCCC might have applicability in improving survival in the event of blunt trauma events or casualties that occur in submarine-based Sea, Air, and Land (SEAL) operations. Four ballistic missile submarines have been converted to support Naval Special Warfare missions. These missions can be supported as needed by embarked, smaller, mobile surgical units such as the Navy’s Expeditionary Resuscitative Surgical System, which have the capability to provide damage control surgery at a Role 2 level of care.

**11. Air Force Pararescue Capabilities Briefing:** MSgt Travis Shaw presented an overview of the organization and capabilities of the US Air Force (USAF) PJ community. PJs are not just Combat medics; they are Combat search and rescue specialists whose mission also includes providing medical care and performing recovery operations. Their medical training includes TCCC and paramedic certification, and contains many other elements of prehospital care as well. MSgt Shaw described the structure and missions of the USAF Rescue (Guardian Angel) units aligned under Air Combat Command and the Special Tactics Squadrons aligned under the Air Force Special Operations Command. He also presented examples of a variety of PJ capabilities, including tactical proficiency, collapsed structure rescue, confined space rescues, technical rescues, swiftwater rescue, open ocean rescue, and mountain/avalanche rescue. MSgt Shaw presented a selection of recent missions that illustrate the wide range of tactical emergencies to which PJs can effectively respond.

#### WEDNESDAY, 3 FEBRUARY 2016

**12. Medical Devices for Control of Noncompressible (Truncal) Hemorrhage:** Dr Bijan Kheirabadi from the US Army Institute of Surgical Research discussed exovascular and endovascular hemostatic devices. Exovascular devices include external compression devices (e.g., military

antishock trousers, the pelvic hemostasis belt, the AAJT) and intra-abdominal techniques (e.g., gases such as carbon dioxide and nitrogen, and hemostatic foams). REBOA was the only endovascular approach discussed. Dr Kheirabadi presented an overview of these devices’ mechanisms of action, efficacy, problems caused by their use, and current approval status under the Food and Drug Administration (FDA).

In summary:

- Significant progress has been made in developing new technologies for trauma resuscitation and control of noncompressible (abdominal and pelvic) hemorrhage in the emergency department or operating room.
- Translation of these technologies to the prehospital setting requires extensive operator training and may not be possible to implement safely.
- In a 2-hour application, the lower body ischemia produced by the AAJT caused significant metabolic derangements similar to crush syndrome that were life-threatening at the time of pressure release and tissue reperfusion (hyperkalemia and acidosis). Hyperkalemia treatment and cardiopulmonary support are necessary at the time of release of AAJT to overcome possible respiratory or cardiac arrest. The long-term effects of AAJT use and its potential damage on the abdominal organs (e.g., intestines, bladder, and kidneys) are unknown and are the subject of the current independent safety review.
- Experimental studies in swine showed that carbon dioxide insufflation reduced blood loss in nonlethal parenchymal bleeding (liver or splenic injuries) in 30-minute experiments. The optimum insufflation pressure was 20mmHg, which was produced with a portable insufflator.
- A more feasible approach is likely to be prehospital administration of blood or blood products along with hemostatic drugs or new synthetic polymers to restore plasma volume and stabilize blood clots so they remain intact during fluid resuscitation and help to minimize rebleeding.

Following the presentation, Dr Butler presented Dr Kheirabadi with a CoTCCC Special Award for his outstanding contributions to improving battlefield trauma care through his many research accomplishments in hemostatic dressings, chest seals, noncompressible hemorrhages, and junctional tourniquets.

**13. iGel as the Proposed CoTCCC Supraglottic Airway of Choice:** Dr Mel Otten presented the iGel supraglottic airway (SGA) to the group. In 2012, the CoTCCC removed recommendations for specific SGA devices from the TCCC guidelines because there are now a number of commercially available SGAs and there was no clinical evidence that any specific SGAs were superior to

others. To date, the King LT is the SGA most commonly trained in the military. However, it can be positioned too proximally, so that air does not flow into the trachea, and this has been noted to occur in combat casualties.

The iGel is another SGA option for the combat medical provider. Advantages of the iGel include the following:

- Smaller, lighter, and shorter than other SGAs
- Does not have an inflatable portion
- Does not require a syringe
- Cost is half approximately that of the King LT or laryngeal mask airway (LMA)
- Easier and faster to insert than other SGAs
- Minimal reported complications
- Easy to train
- Has a gastric port, an oxygen port, and easy access for fiber optic intubation

Multiple published studies have shown that the iGel performs well in comparison to other SGAs. One report found that the iGel was placed correctly 96% of the time with minimal training.

An area of concern with the iGel is the lack of information about how well it performs at low ambient temperatures. Dr Otten has had a very favorable personal experience with this device and concluded with a recommendation that the iGel should be named the preferred SGA in the TCCC Guidelines.

**14. Battlefield Medical Strategy:** COL Shawn Nessen, Trauma Consultant to the Army Surgeon General, reviewed the advancements in combat casualty care in the First World War, the Second World War, Korea, and Vietnam. He described advances in trauma care made during the conflicts in Iraq and Afghanistan, including the development of the Joint Trauma System, American College of Surgeons certification of Landstuhl as a trauma center, improvements in the use of blood products to include their location further forward on the battlefield, use of Forward Surgical Teams, reduction in prehospital death from potentially survivable injuries through the application of TCCC principles, and the development of new prosthetics and orthotics. COL Nessen presented several representative case reports of casualties with very severe injuries and described their management.

In the future, military medical units must be able to maneuver and move with their supported units on the battlefield. Strategic concepts must focus on medical support early in theater opening, recognizing that the Combat Support Hospital is the center of gravity for medical care. In addition, Army medicine must be responsive to an ever-changing host of nonbattle contingency operations in new theaters of combat.

**15. Saving Lives on the Battlefield - Return to Iraq:** COL James Geracci, III Corps Command Surgeon, briefed the attendees on the nature of our current presence in Iraq. Much of our former medical capability there is gone, and Iraq is now a very austere theater. The recent return of US military units to theater is very limited; economy of force principles requires strict force manning limitations and necessitate non-doctrinal solutions. As there is no true medical hub and limited MEDEVAC capability in Iraq at present, damage control surgery must be provided very close to kinetic activity.

COL Geracci noted that some aspects of trauma care are working well at present:

- TCCC is the standard of care by both US Central Command and Task Force mandate.
- Operational leadership understands casualty care management and the need to have both medical and nonmedical combatants able to perform lifesaving interventions on the battlefield.
- The “Vampire” blood program: blood components provided during tactical evacuation
- Critical Care Flight Paramedic training
- There is TCCC penetrance into coalition forces.

COL Geracci also noted a number of opportunities to improve:

- Predeployment TCCC/trauma training is inconsistent at best.
- Prehospital and Role 2 documentation is not being reliably accomplished.
- TCCC equipping is still incomplete, especially with respect to junctional tourniquets and analgesics.
- Walking Blood Banks are not being used optimally.
- The theater trauma system is not robust. There is no “trauma czar” and there is a lack of damage control surgery/damage control resuscitation expertise far forward.

COL Geracci concluded by reinforcing the importance of “muscle memory” for TCCC and that TCCC should be mandated for every Soldier, medic, and leader. He further stated that all operational physicians and physician assistants (PAs) in III Corps and all resident physicians at Fort Hood are now required to be NAEMT-TCCC trained.

**16. Squad Overmatch TCCC Training:** COL Dan Irizarry, clinical advisor for the Joint Program Management Office for Medical Modeling and Simulation, described this blended training system designed to optimize both squad performance in TCCC and small-unit casualty response. The Squad Overmatch TCCC (SOvM-TC3) training project uses squad overmatch techniques and blended instruction technologies (moulage, manikins, virtual reality) to create integrated training in TCCC. He

also discussed the concept of an exportable TC3 training system (TC3X) designed to allow a medic to train 30 Soldiers, making use of all of these training modalities.

COL Irizarry's take-aways:

- Effecting lasting changes in the military requires sustained programs of record. Programs of record institutionalize capabilities and help to secure long-term funding.
- Institutionalizing optimal care of combat casualties on the battlefield requires program of instruction changes not in just what we teach, but also in how we teach. This applies not only to medical training programs, but throughout the enterprise.
- To change line officer thinking, you must use line officer processes.
- Lasting culture change occur through education, but can be sparked by technology.

**17. PHTLS TCCC-BASED COURSES:** Mr Mark Leuder is the NAEMT lead on their TCCC-based courses. TCCC-based courses offered by NAEMT include:

- B-Con (Bleeding Control) is a 2.5- to 3-hour course focused on tourniquets, hemostatic dressings, and airway control. It is intended for police and schools and is the foundational training course for the American College of Surgeons Hartford Consensus effort as well as the White House "Stop the Bleed" campaign.
- LEFR (Law Enforcement First Responder) is an 8-hour course designed for police officers that emphasizes external hemorrhage control (tourniquets and hemostatic dressings) as well as tactically appropriate responses to injuries sustained in a law enforcement environment.
- The NAEMT TCCC course uses the curriculum developed by the Joint Trauma System and is 16-hours long. This course is taught to US military units at their request, to civilian and government agencies, and to foreign militaries.
- TECC (Tactical Emergency Casualty Care) is a 16-hour course that is based on TCCC concepts but incorporates wording and scenarios more appropriate to civilian settings. Note that these courses adhere to the TECC guidelines published by the Committee for Tactical Emergency Casualty Care and may have some variance from the principles taught in military TCCC courses.

**18. PTSD in the Pararescue Career Field:** Lt Col Steve Rush, Medical Director for the Air Force PJs, presented key findings from a recent study conducted by a team Air Force psychologists.

- PJs report levels of exposure to combat and the aftermath of battle experiences that are comparable to other military personnel in both the combat arms and medical professions, but the PJ aftermath and medical exposures often occur in high-threat environments

like burning vehicles/airframes, enemy fire, confined space, structural collapse, and swift water.

- Prevalence of psychological symptoms among PJs (e.g., 11% posttraumatic stress disorder (PTSD), 1.5% depression, and 16% insomnia) is comparable to or lower than overall military estimates. A caveat about these numbers is that the study was not anonymous and the incidence of these disorders may be under-reported because of reluctance to disclose. Of note, approximately 30% of PJs who have deployed have chronic symptoms of combat stress but do not meet the criteria for PTSD.
- Risk factors identified for PTSD in order of importance are (1) intense exposure to medical injuries, death, and other "aftermath of battle" exposures; (2) the daily frustrations, inconveniences, and administrative aspects of military life; and (3) participation in combat actions.
- Combat exposure correlated significantly with increased occurrence of depression, whereas medically related exposures correlated with more severe PTSD symptoms. Removal and handling of dead bodies is the strongest predictor of PTSD severity.
- Unit cohesion and a sense of purpose and meaning were protective factors against both PTSD and depression.
- The incidence of mental health issues in reserve components is reported as 19%, twice that of the active component, at 8.5%.
- Another psychological occurrence in PJs and other combat troops is "burnout." Lt Col Rush described burnout as emotional exhaustion, feeling worn out because of your work, a sense of lack of personal achievement, the feeling that work is meaningless, and the tendency toward cynicism and depersonalizing those around you. Burnout is correlated more with the number of deployments that PJs experience rather than trauma experience or combat exposure.

Lt Col Rush outlined some measures that may help prevent and/or decrease the adverse impact of PTSD and depression in the PJ community:

- Advocate for embedded operational psychologists when feasible.
- Identify/select psychologists in and out of the Air Force who are most effective in the treatment of PTSD and depression in PJs.
- Destigmatize the emotional and psychological distress that is the norm for Servicemembers with combat experience.
- Address the issue of lost pay for men who can still operate but need treatment.
- Establish unit-based internal crisis response teams, peer counseling, and support.
- Develop other options for support for psychological health.

- Continue with research efforts in this area.
- Improve the mental health capabilities of PJ flight surgeons.
- Provide basic training for the Pararescue community leaders on how to identify and handle operators in need of care and support.

**19. TCCC Training Initiatives at DMRTI:** COL Kirby Gross and MAJ Walter Engle emphasized that the number one priority of the Defense Medical Readiness Training Institute (DMRTI) is reinforcing TCCC as the standard for point-of-injury care throughout the US Military. They noted that there is currently no standardization of TCCC courses in the DoD, which has resulted in wide variation in their content. This variation has been associated with adverse outcomes in casualties and has also resulted in students who participate in TCCC courses being subjected to inappropriate and potentially hazardous medications and procedures as part of their training. They also noted that, at present, not all military physicians and PAs obtain TCCC training. A Joint Trauma System White Paper sent to the service Surgeons General in September 2015 highlighted the current problems with TCCC training and recommended corrective actions to address these deficiencies.

COL Gross and MAJ Engle also discussed current DMRTI efforts to increase the quality and accuracy of TCCC training courses across the DoD. A strategic partnership between the NAEMT and the Military Training Network (MTN) would facilitate military organizations functioning as NAEMT-approved training sites. NAEMT became involved in TCCC training in 2009, when, at the request of the CoTCCC Chairman, they helped provide TCCC training for the Spanish Special Forces. The NAEMT has a robust educational infrastructure accredited by the Continuing Education Coordinating Board of Emergency Medical Services. NAEMT TCCC courses use the curriculum developed by the CoTCCC and provide to course graduates a TCCC certification card that is endorsed by the JTS, the CoTCCC, the NAEMT, and the American College of Surgeons Committee on Trauma.

Issues that still need to be addressed include identifying a funding source for the \$10 per student cost for NAEMT TCCC courses and agreement on the qualifications that military medics must have to be designated as TCCC instructors.

DMRTI is exploring a number of initiatives that may help facilitate TCCC training throughout the DoD:

- Using Joint Knowledge Online (JKO) for registration of TCCC students
- DMRTI training teams to provide the TCCC for the Medical Personnel course to requesting units

- JKO tracking of TCCC-MP (medical personnel) and TCCC-AC (all combatants) training for all Services
- DMRTI coordination with DoD Simulation Centers to create a Joint Simulation and Medical Modeling course to complement the approved Squad Overmatch Program being instituted by COL Irizarry at the Joint Program Management Office for Medical Modeling and Simulation

COL Gross and MAJ Engle also proposed that DMRTI provide a TCCC Handbook to TCCC course students. The Center for Army Lessons Learned has a TCCC Handbook that could be updated for this purpose. (Chairman's note: This is an excellent suggestion and has been taken for action by the CoTCCC. The TCCC Handbook will be medic-driven and will present TCCC information in a more succinct format than present TCCC knowledge products.)

**20. Three Things That I Would Change About TCCC:** Surgeon Captain Steve Bree, Royal Navy, is the British Liaison Officer to the Surgeon General of the Army. At the invitation of the CoTCCC Chairman, he offered his thoughts about the top three opportunities to improve in TCCC as he sees them. He prefaced his remarks by noting that his opinion of TCCC is very positive. He remarked that the TCCC effort has a "Team Sky" mentality that maintains "a relentless and open-minded search for every conceivable improvement."

CAPT Bree then presented the organization and manning of prehospital emergency medicine (PHEM) in the United Kingdom in the larger context of the UK National Health System. With respect to combat casualty care in the US Military, he asked: "Where are your prehospital emergency medicine physicians?" and noted that the accomplishments of the UK Medical Emergency Response Team (MERT) "shone brightly" in the recent conflict in Afghanistan but commented it was only a single asset against the large number of US medical evacuation platforms. CAPT Bree stated that TCCC skills should be progressive and extend past the paramedic skillset, and that the level of care should increase all along the evacuation chain. Although he acknowledged the US medical mission of caring for dependents and beneficiaries, he observed that this must be balanced against the need for a highly developed level of expertise in trauma care that focuses on our deployed mission. CAPT Bree considers the autonomy and authority of our senior enlisted medics and the dynamism of TCCC to be lessons that should be taken on board by the UK military.

CAPT Bree's top three recommendations for improving TCCC are (1) to add pelvic binders to the TCCC Guidelines for casualties with suspected pelvic fractures, (2) to establish the placement of physicians and medics



together in the prehospital combat environment as doctrinal and routine, and (3) to bring about greater placement of military medical personnel in civilian trauma centers and on civilian prehospital platforms.

Additionally, he observed that TCCC analgesia protocols are too conservative, that supraglottic airway devices must also be included in Tactical Field Care in addition to nasopharyngeal airways and cricothyroidotomy, that pediatric trauma care should be addressed, and that TCCC training should be more realistic and include “real-life injured” role players.

**21. The Role of Pelvic Binders in TCCC:** COL Stacy Shackelford briefed the group on the topic of adding pelvic binders to the TCCC Guidelines. She noted that pelvic fracture is a common and serious injury among the combat injured. Twenty-six percent of Servicemembers who died in Operation Enduring Freedom/Operation Iraqi Freedom had a pelvic fracture, and casualties with bleeding pelvic fractures and hemodynamic instability have up to a 40% mortality rate. Pelvic binding is the only prehospital intervention with which to address pelvic fractures; it may be helpful with venous bleeding but is probably ineffective against arterial hemorrhage. Commercially available circumferential pelvic compression devices include the Pelvic Binder, the T-POD, and the SAM Sling.

Col Shackelford then reviewed the following clinical questions with regard to pelvic binders and discussed the evidence on each:

- Does a pelvic binder stabilize pelvic fractures? Cadaver studies indicate it does.
- Does a pelvic binder decrease the bleeding from a pelvic fracture? There is evidence that it does.
- Does the use of a pelvic binder improve survival? The clinical evidence that it does is weak. Col Shackelford also noted that bleeding from some pelvic fracture patterns may not be reduced by pelvic compression.
- Who should get a pelvic binder? (1) Dismounted IED casualties with lower extremity amputations; (2) casualties with blunt trauma and systolic blood pressure (SBP) <100mmHg, or heart rate (HR) >100, or Glasgow Coma Scale (GCS) score of  $\leq 13$ ; or pelvic pain in the presence of a distracting injury
- Is there harm in applying a pelvic binder? A pelvic binder is unlikely to increase injury or bleeding when applied acutely, but longer use of a pelvic binder may cause pressure ulcers and there is some chance that a pelvic binder may make breathing more difficult.
- Which pelvic binder is best? There is weak evidence that the available commercial devices are better than the use of a sheet to reduce pelvic fractures. None of the commercial devices has so far been shown to be superior to the others.

- COL Shackelford recommends adding language to the TCCC guidelines that calls for a pelvic binder to be applied for cases of suspected pelvic fracture. This should include:
  - o securing the legs or binding the thighs together) as exemplified by:
    - Casualties with blast injury with amputation
    - Casualties with blunt trauma and
      - SBP <100mmHg, HR >100
      - GCS score  $\leq 13$
      - Pelvic pain or distracting injury

**22. CoTCCC Action Items:** Dr Frank Butler reviewed ongoing and proposed CoTCCC action items.

**Current CoTCCC action items:**

- TCCC trademark issues. The Joint Trauma System is pursuing cancellation of a TCCC trademark inappropriately issued to an individual uninvolved with the US Military TCCC effort. The US Military conceived and published the term “Tactical Combat Casualty Care” and “TCCC” more than a decade before the trademark application.
- DOD-FDA Military Use Panel for Combat Casualty Care medications. The current FDA regulatory structure for medications is not well configured to support combat casualty care in the US Military. This issue has been noted in several published papers and pursuit of a solution to this situation is ongoing.
- Medical Rapid Fielding Initiative. There still not an organized DoD-level effort in place to accomplish the rapid fielding of newly recommended combat casualty care equipment and medications to deployed and deploying US military units. This expedited fielding should be accompanied by the collection of focused feedback on the performance of the newly fielded items. This need for such a program has been noted in several published papers and pursuit of a solution to this situation is ongoing.
- Prehospital Trauma Life Support (PHTLS) 9th edition, Military Version. Work on the next edition of the PHTLS textbook is underway. Any members of the group wishing to volunteer their help with this effort should get in touch with Dr Giebner.
- Improving the standardization of TCCC training in the DoD

**Proposed TCCC Guidelines changes coming to a vote:**

- iTClamp
- Pelvic binders in TCCC
- iGel as the TCCC SGA of choice

**Potential TCCC Guidelines Changes:**

- Higher initial dosing of ketamine
- Include casualty positioning recommendations for performing needle chest decompression

- Foley catheter balloon treatment of head and neck bleeding
- Other options for treatment of suspected tension pneumothorax
- Manual compression of the abdominal aorta for junctional hemorrhage if no junctional tourniquet is available and Combat Gauze is not working
- A review the use of C-collars and spinal immobilization in TCCC
- Traction splinting recommendations

**Future technology items:** (after FDA approval and/or more studies)

- ResQFoam
- Compensatory Reserve Index Monitor OR point of injury lactate monitoring OR tissue oxygen saturation monitoring
- AAJT

**TCCC Curriculum Updates for 2016:**

- IV medication skill sheet and practical
- Emphasize the need for IMMEDIATE administration of TXA for casualties with noncompressible hemorrhage

**Acknowledgments**

The authors gratefully acknowledge the ongoing efforts of all of the members of the CoTCCC and the TCCC Working Group to improve the battlefield trauma care provided to our countries' combat wounded. We also thank COL Lance Cordoni from the Army Capabilities Development and Integration Department for his assistance in recording the events of the meeting.

**Disclaimers**

The opinions or assertions contained herein reflect the events of the February 2016 CoTCCC meeting. They are not to be construed as reflecting the views of the Department of the Army or the Department of Defense.

**31 MAY 2016**

Stephen D. Giebner, MD  
CAPT, MC, USN (Ret)  
Developmental Editor  
Committee on TCCC

**1 MAY 2016**

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

**ENCLOSURE (1) – MEETING ATTENDANCE**

**CoTCCC Voting Members:**

Dr Jim Bagian  
COL Peter Benson  
Dr Frank Butler  
MSG Curt Conklin  
COL Jim Czarnik  
COL Erin Edgar  
MAJ Kyle Faudree  
Dr Doug Freer  
COL Jim Geracci  
COL Kirby Gross  
CAPT Matt Hickey  
SOCM James Holmes  
Dr Jay Johannigman  
Mr Win Kerr  
SFC Danny Morissette  
COL Shawn Nessen  
COL Kevin O'Connor  
LCDR Dana Onifer  
Dr Mel Otten  
Mr Don Parsons  
Mr Gary Pesquera  
Col Todd Rasmussen  
HSCM Glenn Royes  
Lt Col Steve Rush  
COL Samuel Sauer  
Col Stacy Shackelford  
MSgt Travis Shaw  
CAPT Jeff Timby  
HMCS Jeremy Torrisi  
CMDRCM Steve Viola

**TCCC Subject Matter Experts**

Dr Brad Bennett  
Dr Jeff Cain  
Dr Howard Champion  
Dr Warren Dorlac  
Dr Jim Dunne  
Dr Rocky Farr  
Dr Russ Kotwal

**CoTCCC Staff**

Dr Steve Giebner  
Ms Danielle Davis  
Mr Harold Montgomery

**Guest Presenters**

COL Steve Bree  
MAJ Andy Fisher  
COL Dan Irizzary  
Dr Bijan Kheirabadi  
SPC Drake Monticelli  
Dr Steve Steffensen

**Military Liaisons**

Lt Col David Carey  
COL Lance Cordoni  
Maj Kevin Cron  
MSG Mike Eldred  
Ms Elizabeth Fudge  
LTC Kyle Remick  
Ms Mary Ann Spott  
COL Ian Wedmore  
Mr Ed Whitt  
COL Mike Wirt  
CDR Rick Zeber

**Allied Liaisons**

COL Elon Glassberg  
LTC Kazumichi Yoshida

**Interagency Liaisons**

Mr Josh Knapp

**Additional Guests**

Ms Cynthia Barrigan  
Mr Thomas Bigott  
Ms Julie Chase  
Dr Gary Gilbert  
Dr Rick Hammesfahr  
COL Ian Lane  
Mr Jeff Luciano  
Maj Bill Lutin  
COL (Ret) Robb Mazzoli  
MAJ Heath Sheehan  
MAJ Marion Smith