ISSN 1553-9768 Spring 2010 Volume 10, Edition 2

Journal of Special Operations Medicine

A Peer Reviewed Journal for SOF Medical Professionals

Volume 10, Edition 2 / Spring 10

Journal of Special Operations Medicine

ISSN 1553-9768

New TCCC Updates Inside

This edition's feature articles:

- 160th SOAR (A) Flight Medic Specialized Training:The Special Operations Aviation Medical Indoctrination Course
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Dedicated to the Indomitable Spirit & Sacrifices of the SOF Medic

Journal of Special Operations Medicine

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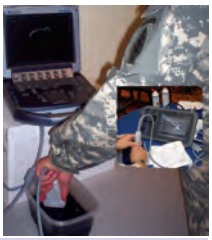
Fracture detection of the opaque study model via the SonoSite M-Turbo portable ultrasound. From The Ultrasound Detection of Simulated Long Bone Fractures by U.S. Army Special Forces Medics by CPT Jason D. Heiner, MD in this edition. Inset picture is from the Winter 2010 edition article *Portable US Empowers Special Forces Medics* by SSgt Jeremy Crisp.



From the Editor

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Lt Col Michelle DuGuay Landers

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Dedication

SFC BRADLEY S. BOHLE

SFC Bradley S. Bohle, 29, died on 16 September 2009 with two other Soldiers, after his vehicle was struck by an improvised explosive device, while conducting a mounted patrol in the Afghan city of Ghur Ghuri, in support of combat operations while serving with 7th Special Forces Group (Airborne).

A Special Forces medical sergeant, he deployed in support of Operation Enduring Freedom in July 2009 as a member of the Combined Joint Special Operations Task Force – Afghanistan. This was his second deployment to Afghanistan in support of the Global War on Terror. He also deployed twice to the Philippines.

Bohle, a native of Glen Burnie, MD, attended Glen Burnie High School for three years and graduated from North County High School in 1998. He enlisted into the U.S. Army as an Information Systems Operator. He was assigned to 2nd Bn, 8th Infantry Regiment, 4th Infantry Division (Mechanized). He later served with 112th Signal Bn (Airborne) and 4th Psychological Operations Group (A) before deciding to pursue the goal of becoming a Special Forces Soldier in 2006 by attending the Special Forces Selection and Assessment. He completed the Special Forces Qualification Course March 2008 and earned the coveted "Green Beret" as a Special Forces Medical Sergeant (18D). He was assigned to Co A, 3rd Bn, 7th SFG (A).

Bohle's military education includes the Warrior Leader's Course, Basic NCO Course, Survival, Evasion, Resistance and Escape Course, Basic Airborne Course, Jumpmaster Course, and Special Forces Qualification Course.

His awards and decorations include the Bronze Star Medal, Purple Heart Medal, Army Commendation Medal, Army Achievement Medal, Meritorious Unit Citation, Army Good Conduct Medal, National Defense Service Medal, Afghanistan Campaign Medal, Global War on Terrorism Expeditionary Medal, Global War on Terrorism Service Medal, non-commissioned officer professional development ribbon, Army Service Ribbon, Overseas Service Ribbon, NATO Medal, Combat Infantryman Badge, Senior Parachutist Badge, Driver and Mechanics Badge, and the Special Forces Tab.

Bohle is survived by his wife, three daughters, a sister, and his parents.

MEDIC RECOGNITITON

SGT Bryan C. Rippee, congratulations from the *Journal of Special Operations Medicine* on your selection as the 2009 USASOC Special Operations Combat Medic of the Year.

75th Ranger named USASOC Medic of the Year

Tracy A. Bailey
75th Ranger Regiment Public Affairs

Fort Benning, GA (USASOC News Service, 16 FEB 2010) – Braving a hail of automatic gunfire during an intense fire fight, SGT Bryan C. Rippee, less than 10 feet away from the tip of the enemy's weapon, assessed the situation, took charge and rapidly began treatment of the wounded.

The intense close-quarters gunfire exchange between militants and Rangers while clearing the compound had left one Ranger wounded and unresponsive in the center of the room. With gunfire and grenades continuing to cross the room, Ranger medic SGT Rippee exposed himself to enemy fire in order to suppress the enemy. Gaining fire superiority he noticed another Ranger also wounded.

"Someone once said the best medicine on the battlefield is fire superiority," says Rippee, underplaying the role he played. "As a medic, I am in a position to benefit the force and strive to be able to help in combat both as a medic and a Soldier."

He began treating the chest wounds while a Ranger assault element moved forward to neutralize the enemy threat with small arms and hand grenades. Rippee used his body to shield the casualty from the explosions and continued treatment.

As an emergency medical technician moved into the room Rippee directed him to assess and treat the severely damaged left arm of a second causality. He continued to direct care and treatment until additional medical personnel arrived.

CPT Andrew D. Fisher, 1st Ranger Battalion Physician Assistant, and a man who knows SGT Rippee well, had this to say of the Ranger medic that day.

"Recognizing the severity of the wounds, SGT Rippee rapidly began his initial assessment and treatment. At the risk of being engaged by the enemy, he took the necessary steps to secure and treat the casualty," he said. "I have deployed with SGT Rippee on all of his deployments and have witnessed many of his heroic and valorous actions…"

For that day in Iraq, he was awarded the Army Commendation Medal with Valor device. It was for this type of repeated selfless service and courage that, Rippee, a native of Riverside, CA and combat medic assigned to the 75th Ranger Regiment stationed at Hunter Army Airfield, was named the 2009 U.S. Army Special Operations Command Medic of the Year.

The nomination consisted of a two-page recommendation from the combat medic's supervisors and endorsement from the his chain of command. Eighteen nominee packets were submitted and reviewed by the Command Sergeant Major of U.S. Army Special Operations Command, Command SGM Parry Baer. While all the candidate's packets were strong, Rippee's consistent bravery and efforts as a combat medic in multiple actions seemed to set him apart.

SGT Rippee has been with the battalion since August 2007. Throughout his time in the 75th Ranger Regiment, Rippee has proven over and over his mettle as a combat medic both on and off the battlefield.

In the fall of 2009, serving with 1st Ranger Battalion in Afghanistan, while conducting a night time operation, a team of Rangers were critically wounded when they encountered an improvised explosive device. Rippee, who witnessed the event from about 40 meters away, ran into the unsecure blast area without regard for his own safety, and begin treating and conducting triage.

"My first reaction was to run like hell towards the explosion and the Rangers; I knew there would be a lot of casualties," said Rippee. "I bolted down the road through the smoke and dust and came upon a wounded Ranger and began assessing and treating him. We are trained to treat wounded Rangers by the severity of the wounds, not how bad the wounds look," said Rippee.

After the casualty collection point was established, Rippee assisted in the movement of the wounded and continued treating the Rangers until medical evacuation arrived.

In that encounter, Rippee, was credited with saving the lives of two of the six wounded. In another incident during that same rotation, a mid-air collision of two helicopters in route to a target compound instantly turned the assault mission into a combat search and rescue, as the remainder of the force quickly landed at the crash. Rapidly exiting the helicopter he was on, Rippee immediately ran to the burning wreckage.

With ammunition and fuel cooking off around him, and the screams of the injured trapped in the flaming aircraft piercing the night, Rippee and a Ranger squad leader pulled one of the survivors from the burning airframe, carrying him 40 meters then conducting the medical efforts that would save that Soldier's life.

For Rippee, who doesn't consider himself a hero, courage seems to be an ingrained trait, apparent to his fellow Rangers and supervisors.

"SGT Rippee is a devoted and extraordinary medic. His performance both in training and in combat are the epitome what a United States Army Special Operations Non-commissioned Officer should Be, Know and Do," said Fisher. "He is an immeasurable asset to our organization. His sense of ethics and discipline is beyond reproach."

Rippee's training includes Basic Combat Training, Advanced Individual Training—Combat Medic Course, Basic Airborne Course, Ranger Assessment and Selection Program and Ranger School. The Combat Medic Course is taught at Fort Sam Houston, Texas and provided Rippee with his EMT-Basic Certification and qualified him as a combat medic.

Following these courses, Rippee attended the Special Operations Combat Medic Course at Fort Bragg, NC. The intensive six month course teaches extensive training in anatomy and physiology, kinetics of trauma, advanced trauma skills and procedures, Trauma Combat Casualty Care, and combat trauma management.

He also completed a one month emergency room and EMT rotation at Tampa General Hospital and Tampa Fire and Rescue in Tampa, FL. Upon graduation, he received a certification as an Advanced Tactical Practitioner (ATP).

Rippee has deployed three times in support of the Operations Enduring Freedom and Operation Iraqi Freedom; twice to Iraq and once to Afghanistan.

His awards include the Ranger Tab and Parachutists Badge, Meritorious Service Medal, Joint Service Commendation Medal, Army Commendation Medal for Valor, Army Achievement Medal Army Good Conduct Medal, National Defense Service Medal, Afghanistan Campaign Medal, Iraq Campaign Medal, Global War on Terrorism Service Medal and Army Service Ribbon.

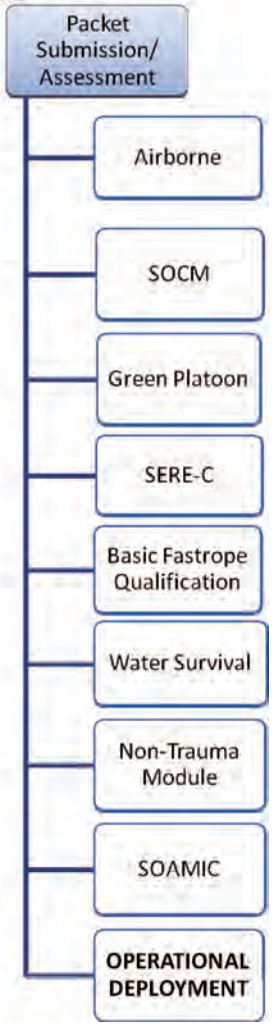
160th SOAR (A) Flight Medic Specialized Training: The Special Operations Aviation Medical Indoctrination Course

CPT L. Kyle Faudree APA-C, FP-C

As with any aspect of medicine, change is a necessary part of growth and development in order to adapt to an ever evolving world. This is even truer in the Special Operations medical community, as we are the developers of tactics, techniques, and procedures (TTPs) that are adopted by conventional forces and later the civilian medical community. Just as the Joint Special Operations Medical Training Center (JSOMTC) has changed its program of instruction (POI) to adapt to the Overseas Contingency Operations so has the 160th Special Operations Aviation Regiment (Airborne) (SOAR(A)) medical section. This has been accomplished through the gathering of lessons learned, the most recent analysis of wound pattern data, and evaluating trends seen during the over 700 casualty evacuation (CASEVAC) missions flown in support of Special Operations Forces (SOF). These casualties include Special Operations Soldiers, conventional forces working in support of SOF, Afghan/Iraqi SOF, local nationals injured during offensive operations, and military working dogs.

For many years the only POI offered in a schoolhouse environment that teaches aviation medicine has been the Flight Medic Course at Ft Rucker, AL. Although this course has produced some of the finest flight medics in the Army, it focuses on teaching medical evacuation (MEDEVAC) using the UH-60 platform. MEDEVAC doctrine allows conventional and non-conventional forces to have a 24/7, on-call evacuation that is capable of providing en-route care rendered by a National Registry Emergency Medical Technician - Basic (NREMT-B) with Advanced Cardiac Life Support (ACLS) training. Although there are some paramedics on these aircraft, they are exceptions to the rule. This platform is also unarmed and does not have the ability to infiltrate reinforcements to the objective in accordance with the Geneva Convention's Laws of War. In Afghanistan, the average turnaround time from MEDEVAC call to arrival for surgical care is 37 minutes, and is greatly limited by the tactical situation (i.e. troops in contact). Due to the inherent nature of assault operations, an Army Special Operations Aviation (ARSOA) aircraft is nearby either in the air or on the ground awaiting call for exfil. Although flight times vary greatly due to mission sets, the 160th averages 34 minutes total evacuation time (the longest unit casualty evacuation (CASEVAC) was flown by the author in OEF I, which took 4.5 hours round trip). The 160th SOAR (A) CASEVAC mission solely utilizes the Special Operations Combat Medic Advanced Tactical Practitioners (SOCM-ATP) assigned to the Regiment who have undergone rigorous training and preparation to receive the wounded Special Operator and provide life-saving care while in flight.

Fig 1.1
BMQ Progression



The CASEVAC mission flown by the 160th SOAR (A) has the unique capability of providing on call CASEVAC from an armed platform (either MH-47 or MH-60), and as such do not fly under the red cross of the Geneva Convention. On the aircraft is a Special Operations flight medic (SOFM) or medical officer assigned to the Regiment and is at a minimum "Basic Mission Qualified" (See Fig 1.1). SOFMs are graduates of Airborne School, the Special Operations Combat Medic (SOCM) Course, Green Platoon, Survival, Evasion, Resistance, and Escape-Level C (SERE-C), Dunker-Helicopter Emergency Egress Devise System (HEEDS) Water Survival, fastrope qualified, has successfully completed Combat Trauma Management training events, and the Special Operations Aviation Medicine Indoctrination Course (SOAMIC). As an organization we are also currently undergoing training and testing to become Flight Paramedic-Certified (FP-C) by the Board of Critical Care Transport. This certification has become a requirement along with becoming certified as a Nationally Registered Paramedic (NREMT-P) for progression to becoming "fully mission qualified," a process that takes two to three years after graduation from SOCM. The medic of the 160th is the premier provider of in-flight trauma/resuscitative care, not because of their specialized kit or SOF-specific helicopters; it is because they are specifically selected and trained for this, along with being adaptive, resourceful, and completely dedicated to ensuring the survival of the wounded Special Operations warrior.

To meet the unique training needs not offered elsewhere, the Regiment has developed the Special Operations Aviation Medical Indoctrination Course (ATTRS course number 6A-F23/300-F41, Special Ops Aviation Medic Indoctrination), which is a dedicated aerial casualty evacuation course with two weeks of aviation specific instruction. This course is primarily taught at Ft Campbell, KY; however, it has been performed at other locations including 3/160th SOAR (A) at Hunter Army Airfield, GA and 4/160th SOAR (A) at Ft Lewis, WA. There are three dedicated personnel at Ft Campbell to teach the course with overall supervision and product development performed by the Regiment Physician Assistant (PA). In addition to a dedicated staff, all outlying battalion senior medics are qualified to supervise and instruct the course with ancillary support and training materials provided by Regiment medical personnel. This is done to maintain consistency and to remain in compliance with the approved POI.

When the initial concept was developed by our section, it was decided that there should not be only a focus on the mission in the aircraft and should include teaching of routine aviation healthcare. The course begins, as with most U.S. military courses, with an introduction of staff and familiarization with the course outlines, objectives, and testing procedures. It provides 51 hours of lecture, and 29 hours of hands-on training during flight operations. (See Fig 1.2). When developing the course content, senior medics and medical providers were asked to focus on their areas of expertise and produce a learning tool that conveyed their lessons learned and their institutional knowledge. All aspects of training have been carefully reviewed and are constantly updated to line up with the long-term objectives of the Regiment Medical Section. Due to the very restrictive parameters set on aviators and subsequent consequences of providing care outside of these guidelines, in-depth classes on aviation medicine are taught. The emphasis is not on memorizing all the flight surgeon tasks, rather on developing an increased body of knowledge and awareness of the unique medical aspects of the aviation medicine environment.

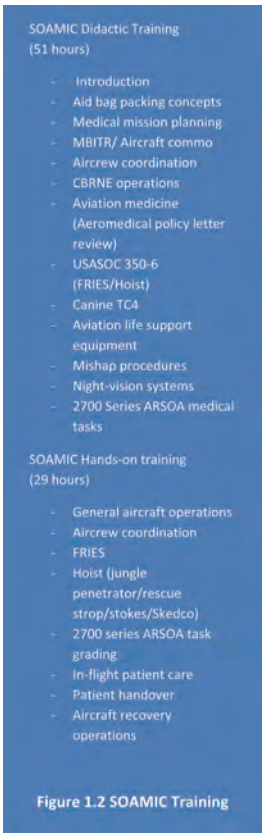


Figure 1.2 SOAMIC Training

Aircraft operations are at the heart of the course, with an emphasis on providing in-flight trauma/resuscitative care in the unforgiving environment of rotary wing aircraft. It is in this situation that the SOFM/medical officer often finds himself unable to use the senses that normally are critical to patient assessment such as auscultating breath sounds, difficult visualization while evaluating patients using NVGs, and difficulty in communicating with your patient. Due to the inherent nature of unit operations, the ability to operate under hours of limited visibility is paramount. This is accomplished by constant rehearsals and training on the CASEVAC equipment until it becomes automatic. There is also great emphasis placed on maximizing efficiency and economy of motion. One way that this is emphasized is

through blindfold drills, utilizing CASEVAC equipment, prior to flight training. Due to limited medical personnel on board ARSOA aircraft, the individual medical operator must be extremely proficient at his tasks and be able to adapt quickly during difficult situations. During the intense training of SOAMIC these concepts and tactics are constantly ingrained in the 160th Special Operations Flight ATP, helping make him the world's finest provider of in-flight resuscitative care to the wounded Special Operations warrior.

As our nation continues the fight against terrorism, and in its relentless pursuit of the enemy, we as Soldiers and healthcare providers will find ourselves in remote locations with little or no ancillary support. During these times some TTPs will work and some will not. Some equipment will be invaluable while others will prove themselves useless. It is the keen intellect and sharp mind of the Special Operations medical provider that will make the mission a success along with critical training, such as SOAMIC. It is our responsibility to give the SOCM ATP the tools in his armamentarium to provide the care that will save the lives of America's sons and daughters, both now and during the next initial entry mission. These SOFMs are truly saving lives at "The Tip of the Spear!"

Night Stalkers Don't Quit!

Patient transfer to CASEVAC platform with awaiting 160th Flight Medic.

Reinforcement of ground force medical skills prior to flight training.

Patient assessment being performed in a MH-47G during SOAMIC.

Hoist operations from a MH-47G.

The author, CPT L. Kyle Faudree is the Regiment PA for the 160th SOAR (A) and is stationed at Ft Campbell, KY. He is a prior Battalion senior medic at the 160th SOAR (A) and currently serves as the Regiment Medical Standardization Officer. He has over 40 months deployed as both a SOCM and Medical Officer in support of OPERATION Enduring Freedom and Iraqi Freedom.

The Ultrasound Detection of Simulated Long Bone Fractures by U.S. Army Special Forces Medics

CPT Jason D. Heiner, MD; CPT Benjamin L. Baker, DO; CPT Todd J. McArthur, MD

Department of Emergency Medicine, Madigan Army Medical Center, Tacoma, WA

Abstract

Introduction: U.S. Army Special Forces Medics (18Ds) operate in austere environments where decisions regarding patient management may be limited by available resources. Portable ultrasound may allow for the detection of fractures in environments where other imaging modalities such as radiography are not readily available or practical. **Objective**: We used a simulation training model for the ultrasound diagnosis of long bone fractures to study the ability of 18Ds to detect the presence or absence of a fracture using a portable ultrasound. **Methods**: The fracture simulation model is composed of a bare turkey leg bone that is mechanically fractured and housed in a shallow plastic container within an opaque gelatin base solution. Five fracture patterns were created: transverse, segmental, oblique, comminuted, and no fracture. After a brief orientation session, twenty 18Ds evaluated the models in a blinded fashion with a SonoSite M-Turbo portable ultrasound device for the presence or absence of a fracture. **Results**: 18Ds demonstrated 100% sensitivity (95% CI: 94.2% to 100%) in fracture detection and an overall specificity of 90% (95% CI: 66.8-98.2%) due to two false positive assessments of the no fracture model. **Conclusions**: Using a portable ultrasound device, 18Ds were able to correctly detect the presence or absence of a simulated long bone fracture with a high degree of sensitivity and specificity. Future studies are needed to investigate the clinical impact of this diagnostic ability.

Introduction

U.S. Army Special Forces Medics (18Ds) commonly operate in austere environments where decisions regarding patient management may be limited by available resources. In deployed or training settings, diagnostic equipment and evaluations commonly found in the hospital or clinic environment such as radiography or blood analysis may not be readily available. This lack of the preferred diagnostic tools may create a barrier to the assessment of a patient when the presence of a long bone fracture is being considered. However, newer generations of lightweight portable ultrasounds may allow for the detection of fractures in environments where other imaging modalities are impractical.

Ultrasound has demonstrated usefulness in the detection of long bone fractures. Cortical bone is not penetrated by ultrasound and can be differentiated from surrounding soft tissue. Sonographic discontinuities in the normally smooth cortical bone may indicate a fracture site.[1] The sonographic evaluation of long bones for the presence of a fracture can be accomplished by personnel with minimal ultrasound training and has the advantage of immediate clinical correlation during examination of the area of interest.[2,3] Because the ability to detect sonographic evidence of fractures is thought to increase over time and with practice, a recent fracture simulation training model was developed and evaluated by physicians.[4] We utilized this novel training model to evaluate the ability of 18Ds with minimal prior exposure to ultrasound to sonographically detect the presence or absence of simulated long bone fractures.

Methods

Simulation Model

The fracture simulation model was prepared as previously described and was composed of a bare turkey leg bone housed in a shallow plastic container within a firm gelatin matrix.[4] The bony diaphysis of each model was approximately 15cm in length and 1.5cm in diameter. A semi-opaque transverse fracture training model was prepared that allowed visualization of the underlying bone (Figure 1). Additionally, five study models made completely opaque by the addition of black food

coloring to the gelatin were prepared with differing fracture patterns: no fracture, segmental fracture, transverse fracture, oblique fracture, and comminuted fracture (Figure 1). At each fracture site there was approximately 3mm to 5mm of bony cortex displacement.

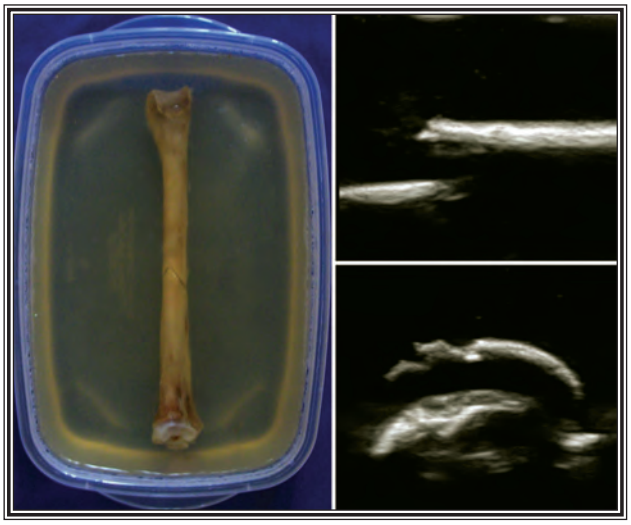


Figure 1: *The semi-opaque fracture detection training model (left) with corresponding longitudinal (top right) and transverse (bottom right) ultrasound images of the fracture site.*

Model Evaluation

This study was granted exemption from continuing review by our study site institutional review board. A convenience sample of twenty 18Ds was consecutively enrolled to participate in two study sessions at Fort Lewis, WA. Participants reported no or minimal previous familiarity with the practical use of ultrasound. Participants received a three minute standardized orientation and training session to familiarize them with the study protocol and the use of ultrasound for fracture detection. During this study session they practiced fracture detection via sonographic examination of the semi-opaque fracture model or a selected opaque study model. They then sonographically evaluated the five completely opaque models with a SonoSite M-Turbo portable ultrasound device (Sonosite, Inc., Bothell, WA) equipped with a 10-5 MHz transducer head (Figure 2). Participants were blinded to the true identity of the underlying fracture pattern and were presented the study models in an identical order. They were allowed an unlimited amount of time to complete their sonographic assessment and recorded their ultrasound impression of the presence of a bony fracture after examination of each study model.

Results

The sonographic evaluation of all five study models was completed by participants in five to ten minutes. All 18Ds correctly identified the presence of a fracture in the four fractured models and two false positive assessments of the non-fractured model were made. Across all fracture patterns, a final sensitivity of 100% (95% confidence interval: 94.2-100%) and a specificity of 90% (95% confidence interval: 66.8-98.2%) was observed in our study (Table).

Figure 2: *Fracture detection of the opaque study model via the SonoSite M-Turbo portable ultrasound.*

Discussion

It is not uncommon for U.S. Army Special Forces Medics to provide medical care in austere environments. The ability for an 18D to make accurate diagnoses for difficult decisions such as the initiation of patient evacuation can be challenging. Ultrasound may be a useful tool to assist in decision making in chal-

Table: *The correct identification of the presence or absence of a fractured model based on sonographic examination by 20 Special Forces Medics (with 95% confidence intervals of overall results shown in brackets).*

Fracture Model	Number correctly identified
No fracture	18/20 = 90%
Segmental fracture	20/20 = 100%
Transverse fracture	20/20 = 100%
Oblique fracture	20/20 = 100%
Comminuted fracture	20/20 = 100%

Overall sensitivity = 100% [94.2-100%]
Overall specificity = 90% [66.8-98.2%]

lenging environments that exist beyond the traditional hospital or clinic. Ultrasound has been used by non-physician providers such as 18Ds and paramedics in such ways as to detect the presence of a pneumothorax and assess the abdomen for intraperitoneal blood.[5,6] Sonography can also be used to identify the presence of long bone fractures and to visualize the successful reduction of long bone fractures.[6,7] Recent experience from Operations Iraqi Freedom and Enduring Freedom regarding extremity injuries has illustrated the frequent occurrence of long bone fractures.[8] Portable ultrasound has been shown to change the disposition of patients in austere environments.[9] While it is unknown what the clinical or operational impact of early sonographic diagnosis of a fracture may be, the opportunity for such an intervention certainly exists.

The cortical discontinuity that is seen on ultrasound and is suggestive of a fracture does not appear to be difficult to appreciate after a brief orientation to the architecture of the sonographic image. However, there is a paucity of literature describing the ability of non-physician providers to use ultrasound to detect fractures as well as a lack of knowledge as to how this ability may alter patient care. The ability to detect fractures with ultrasound does appear to increase with practice and it is possible that simulation models such as the one used in this study may offer relevant practice in this skill. Our study population of 18Ds demonstrated a high degree of both sensitivity and specificity in this skill as evaluated by this previously investigated training model using a portable ultrasound device. The unknown degree to how this skill may carry over to an actual injured patient warrants further investigation.

Notable limitations to our study do exist. The fracture model used in this study contained a larger degree of standard cortical displacement than the 1mm that may be suggestive of a fracture site, and it is possible that 18Ds may have been less proficient at identifying more subtle fractures. As not all participants practiced sonography on the semi-opaque model during the brief orientation portion of the study, it is conceivable that the learners who did utilize these semi-opaque models may have benefitted from additional learning due to the ability to correlate the sonographic image with the underlying fracture site. Also, an order effect may have also been present as participants were not presented the study models in a randomized fashion. Our population of study models also had a high prevalence of fractures with only one fracture-free model, and therefore it is possible that our results were biased toward the identification of abnormalities. The ultrasound probe and the ultrasound model are typical of the small, battery powered modern devices that are commonly used both in the hospital and in austere environments. However, it is possible that our results may be somewhat limited to the model of ultrasound machine that we investigated.

The differential consideration of a closed long bone fracture versus less severe musculoskeletal trauma can pose a diagnostic and evacuation dilemma for the austere provider such as a U.S. Army Special Forces medic. In our study, 18Ds demonstrated an accurate ability to detect simulated long bone fractures using a previously investigated training model and a practical portable ultrasound device. A training program for 18Ds in the use of emergent ultrasound in combat and non-combat conditions has been proposed.[10] Future ultrasound applications by 18Ds may include training to detect long bone fractures and future studies may assess how this sonographic ability effects patient care and supports the challenges of operational medicine.

Disclaimer

The authors have no conflicts of interest or financial relationships with SonoSite to disclose. The views expressed herein are solely those of the authors and do not represent the official views of the Department of Defense, the Army Medical Department, or the Journal of Special Operations Medicine.

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Fracture Detection in a Combat Theater: Four Cases Comparing Ultrasound to Conventional Radiography

William N. Vasios, APA-C; David A. Hubler, 18D; Robert A. Lopez, 18D; Andrew R. Morgan, MD

Abstract

Ultrasound (US) is rapid, non-invasive, simple, effective, and presents a viable and practical alternative to conventional radiography (CR) for the Special Forces Medical Sergeant (18D), particularly in the deployed setting. The authors present four cases that illustrate the ability of US used by the 18D to detect fractures in a combat theater. This success invites a debate as to what extent the Special Operations Forces (SOF) community should field US as it demonstrates a number of distinct advantages over the existing gold standard of portable conventional radiography.

Introduction

Utilizing portable ultrasound for the detection of fractures by the 18D in a combat theater or austere environment is a viable and practical option compared to detection with CR. 1st Battalion, 3rd Special Forces Group (Airborne) SFG(A) recently deployed to Afghanistan in support of Operation Enduring Freedom (OEF). Utilizing the Special Operators Clinical Level Ultrasound (SOLCUS) training outline proposed in the Fall 2008 edition of the JSOM,[1] a total of 29 18Ds received an average of 16.7 hours of US training prior to deploying. Over the course of the deployment, 109 patients were evaluated using nine portable US machines, of those, 39 were musculoskeletal (MSK) presentations. Of these 39, fractures were the most common indication.[2]

Training of SOLCUS focused primarily on a variety of applications that included the Focused Assessment with Sonography in Trauma (FAST), pneumothorax detection, and limited MSK examination. While utilizing US to detect fractures is not a novel idea in a hospital or emergency setting,[3-5] use at the 18D level is unique and recommended in patients with a high clinical suspicion.[6] In comparison to CR, the capability and portability of US make a strong argument for its use in the deployed setting. The following cases demonstrate the portable US's shared capability for fracture detection with CR in the hands of the 18D.

The four case studies presented in this article were selected from among the 39 MSK cases collected in the 3rd SFG (A) experience. In each of the cases, 18Ds collected the US images and in two of the cases they also collected the CR images of fracture sites. US did not necessarily change the outcome or management of these four cases since imposed control measures restricted the 18D from making management altering decisions without at least one of the following: 1) a gold standard test, 2) phone contact with a medical officer, 3) presence of an US-trained medical officer, 4) email of the image for review by an US-trained medical officer, 5) an empiric decision to evacuate for further evaluation independent of test result. These limitations prevented a more comprehensive analysis of the data, to include calculations of sensitivity and specificity.

Though it is not conclusive proof, these four cases demonstrate the 18D's ability to properly employ imaging techniques in an austere environment, correlate the two images, and correctly identify fracture pathology. In addition, the authors hope to demystify US images to other SOF medics by juxtaposing images with more familiar CR images of the identical fracture.

Case 1: Femur Fracture

Forty-one year-old local national (LN) male carried to the firebase clinic by his family in severe pain with swelling of his left thigh following a motor-

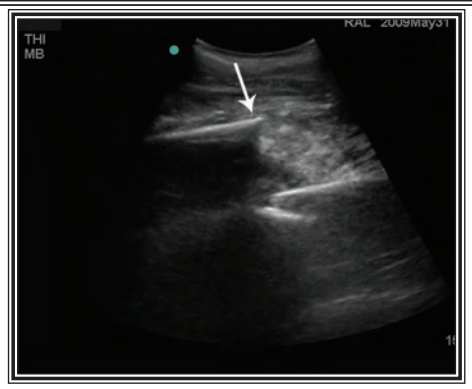

***Image* 1a**

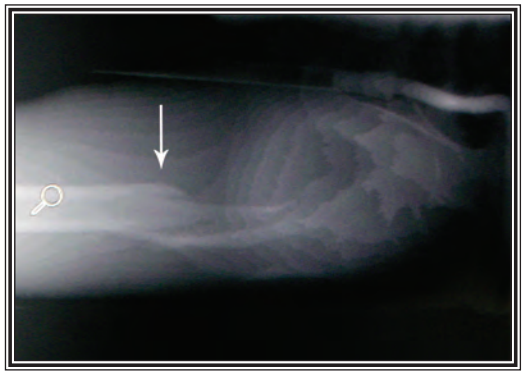

***Image* 1b**

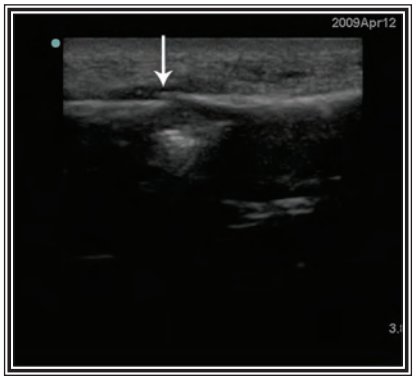

***Image* 2a**

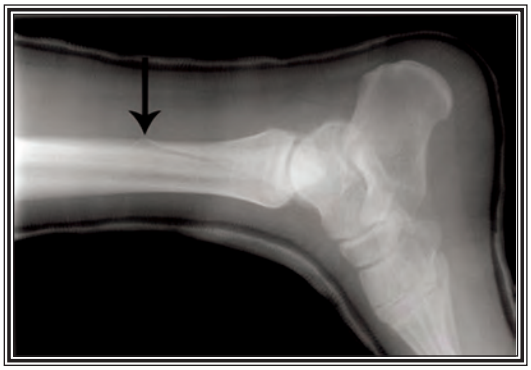

***Image* 2b**

cycle accident. The 18D performed the history and physical (H&P) and suspected a femur fracture. This 18D possessed both US and CR at his firebase clinic. The US confirmed the suspected femur fracture rapidly without further manipulation of the injured patient. (Image 1a) Once the patient's pain was controlled, the 18D used CR for comparison and confirmation. (Image 1b)

Case 2: Distal Fibular Fracture

Thirty-three year-old active duty (AD) male inverted his right ankle while operating an ATV in mountainous terrain. Upon return to the firebase, the visiting group physical therapist and 18D used the portable US to evaluate a suspected distal fibular fracture. (Image 2a) After diagnosing the fracture by US the patient was evacuated to the combat support hospital in Kandahar, where CR confirmed the findings for the orthopedic surgeon. (Image 2b)

Case 3: Phalanx Fracture (Left Index Finger)

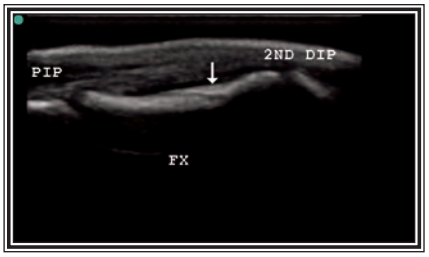

***Image* 3a**

Twenty-one year-old AD male injured his finger while moving equipment pallets. The Soldier presented to BAS for sick call where an 18D performed a H&P. The 18D used US to confirm the suspected fracture. (Image 3a) The patient was sent to the combat support hospital where CR confirmed his fracture. (Image 3b)

***Image* 3b**

Case 4: Tibial Fracture

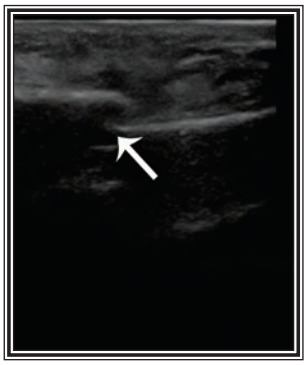

***Image* 4a**

Four year-old LN male presented to firebase clinic carried by his family. The H&P determined the child was a passenger in a motorcycle crash and could not walk or bear weight on his swollen left leg. The 18D used US to confirm a suspected fracture. (Image 4a) Once the pain was controlled the 18D confirmed the fractured tibia with CR. (Image 4b) Both US and CR images where sent to the orthopedic surgeon who accepted the patient transfer via ground transport to a Forward Surgical Team (FST) for repair.

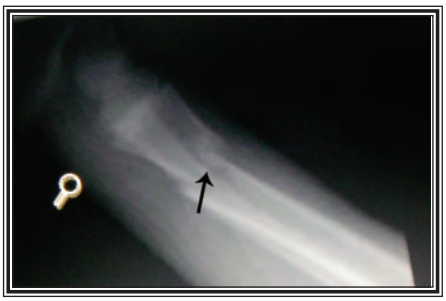

***Image* 4b**

Literature Review

The use of US to detect fractures is well described in medical literature. The traditional obstacles to US use by non-radiologists include: training, sensitivity, specificity, utility, and practicality especially at the non-physician level. These obstacles have been addressed, overcome, and described in recent literature. In an effort to introduce the scientifically validate non-physician capability to learn US, Monti, et al., demonstrated the ability of non-medical personnel to detect pneumothoraces in the porcine model following very brief preparatory instruction. They successfully detected 21 of 22 pneumothoraces with one false negative and 22 of 22 normal hemithoraces.[7] Banel, et al., described the ability of US to detect stress fractures of the metatarsal bones weeks prior to detection by CR.[8] Wong et al., described the utility of US for evaluating the successful reduction of pediatric forearm fractures.[9] Haddad-Zebouni et al., identified the need for an established protocol for limb fracture assessment with US and further describe US features to aid detection.[10] Finally, Dr. John Kendall, the Director of Emergency Ultrasound at the Denver Health Medical Center, Department of Emergency Medicine, Denver, CO, presented "Novel Use of Ultrasound in Trauma" to the Chicago Scientific Assembly, American College of Emergency Physicians in October 2008. His synopsis provided an excellent outline for future areas of training and utilization of US for the 18D.[11]

Discussion

Our community is in the early stages of exploring the role for US in SOF medicine. Musculoskeletal indications are just one of the many potential candidates for inclusion in future curricula. A recent study in SOF literature began exploring the concept of training 18Ds to use US to diagnose fractures. Heiner, et al., demonstrate 100% sensitivity and 90% specificity for 18Ds ability to detect long-bone fractures in a blinded study after a mere three minute block of instruction to the US novice.[12] There is great value in empowering 18Ds to maintain his unit's combat power by minimizing the number of unnecessary evacuations through the appropriate application of US in the austere environment. CR is the traditionally accepted standard in fracture detection in the conventional medical setting; however, US is more practical in the environment that the 18D typically operates due to its increased portability and minimal power requirements.

Current fielding by the U.S. Army Special Forces Command (USASFC) Modified Table of Organization and Equipment (MTOE) authorizes one portable x-ray machine per line battalion headquarters support company. The current USASFC Table of Distribution and Allowance (TDA) Supplement 3 authorizes one portable ultrasound machine per line battalion headquarters support company.[13]

The 18D training course at the USAJFKSWCS at Fort Bragg, NC, dedicates nine hours to radiology training with US "orientation" training totaling less than one hour.[14] Follow on CR training at the Special Forces Group level is virtually non-existent due to proximity to hospital and clinical facilities negating the need to have their one x-ray machine set-up in the battalion aid station. However, US is readily available and utilized for virtually any patient at any time. It provides unlimited opportunities for practical training by the battalion surgeon or physician assistant to the 18D and does not have occupational hazards and regulations associated with radiation.

The portability of US over CR is self-evident. (Figure 1) Portable CR requires a standard pallet and significant coordination of air assets to navigate in theater while portable US can fit into a single hard case the size of a carry-on airline bag or a slightly modified aid bag weighing less than 25 pounds. (Figure 2) In addition to its size and weight, portable US has the power requirements of a modern laptop computer, without the requirement for a generator or electrical infrastructure as with CR. The minimal power requirement of portable US greatly increase its utility in austere and remote applications when compared to CR.

The cost for one portable CR is currently contracted at over $100,000 per machine. A portable US machine ranges from $3,000 for a small PDA-sized, hand-held machine to $40,000 for the laptop sized machine.

Figure 1

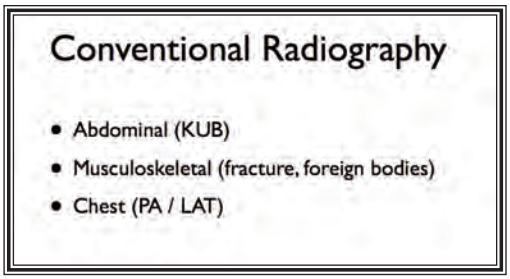

Figure 3a

Figure 2a

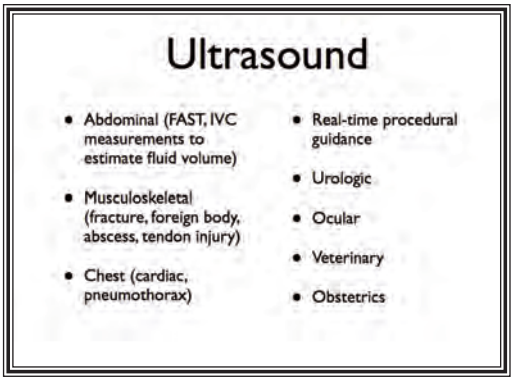

Figure 3b

Figure 2b

Figure 2c

Figure 2d

Figures 3 a&b show the shared capabilities between the CR and US. The staple uses of CR by the 18D are the two-view chest x-ray (CXR), abdomen, and MSK for fractures or foreign bodies. Many complications exist with each of these studies; principally, the overall lack of significant practical experience provided, during initial training and large gaps in exposure to intrinsic CR during deployments. While possible, it is not the norm, or current practice, to have CR at every firebase. Ultrasound voids most of the significant limitations and risks of CR through decreased radiation exposure while obtaining similar clinical information yielded by CR.

Conclusion

The authors acknowledge the target audience of the *Journal of Special Operations Medicine* and the potential influence this article will have on their opinion of SOLCUS and its potential role in SOF medicine. Our recommendations are directed specifically at current and future SOF battalion surgeons, physician assistants, and every 18D worldwide. The boundaries of SOLCUS remain undefined, but early indications strongly support further study within the SOF medical community. The ability to visualize, and record serial images of a patient's injuries is far too valuable to wait for others to pioneer. Utilizing US to detect fractures is only one example of many potential novel applications of US in combat. The authors hope this article inspires you to exploit this technology's fullest potential. Lean forward and seek specialized training as a supervising medical professional – it makes sense and has a place in the 18D armamentarium.

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Special Operator Level Clinical Ultrasound: An Experience in Application and Training

Andrew R. Morgan, MD; William N. Vasios, APA-C; David A. Hubler, 18D; Peter J. Benson, MD

Abstract

Over the past few decades, ultrasound has evolved from a radiology and subspecialist-centric instrument, to a common tool for bedside testing in a variety of specialties. The SOF community is now recognizing the relevancy of training medics to employ this technology for multiple clinical indications in the austere operating environment. In the Fall 2008 issue of *Journal of Special Operations Medicine* two of the authors described the concept of training SOF medics to employ portable ultrasound as a diagnostic aid. After over two years of concerted effort, the authors trained 29 out of 40 medics of a Special Forces battalion. Retrospective analysis of the quality assurance data for ultrasound studies conducted placed the 109 studies into six categories, allowing inference of trends in clinical indication for ultrasound exams as determined by the SOF medic-ultrasonographer. The resulting distribution suggests that indications for fractures and superficial applications are as prevalent as those for focused abdominal sonography in trauma (FAST) and pneumothorax exams. This analysis focuses on Special Operator Level Clinical Ultrasound (SOLCUS), an ultrasound training curriculum specifically for SOF medics, and helps appropriately prioritize its objectives. Despite the success of this experience, there are several issues requiring resolution before being able to integrate ultrasound training and fielding into the SOF medical armamentarium.

Background

While ultrasound (US) has only recently become of interest in Special Operations medicine, it has been a principal imaging modality in hospital-based medicine for four decades. In contrast to the radiation used in computed tomography (CT) and plain radiography, US uses high frequency sound to interrogate tissues and generate diagnostic images. In its infancy, US was the exclusive purview of specific medical specialties such as radiology, cardiology, and obstetrics and gynecology, but today it finds a role across primary care and clinical subspecialties.[1] The union of Special Operations medicine with US resulted from the combination of three elements: 1) a clinical body of knowledge – emergency ultrasound technique; 2) a technology – portable US; and 3) a clinician with an applicable capability gap – the SOF medic.

Emergency ultrasound (EUS) is a unique application of clinical US in an emergency department setting. In the last two decades the specialty of emergency medicine paved the way for novel applications with direct relevance to the treatment of acutely ill and injured patients. Emergency ultrasound exams are distinctly different from the broader category of diagnostic US, because they are performed rapidly, are limited in scope, and answer very specific clinical questions (e.g., Is there fluid in the abdomen, yes or no? Is this an abscess, yes or no? Is there a pneumothorax, yes or no?) Emergency ultrasound exams do not provide comprehensive surveys of the examined body part as in diagnostic US. In 2001 and again in 2008, the American College of Emergency Physicians (ACEP) issued a policy statement to formalize recommendations for the scope and training of emergency physicians in EUS.[2] The scope of EUS closely approximates the objectives of US in SOF, making it a logical framework model.

Advances in portable US technology permitted unprecedented mobility in a clinical setting and facilitated applying it to new venues. Momentum in emergency department applications for bedside US technology synergized with increasingly portable machines and enabled clinicians to discover additional practical uses in the emergent setting. While focused abdominal sonography in trauma (FAST) is the most familiar EUS exam, the convenience of portable machines allowed emergency physicians to take machines to the bedside of any patient and expand the horizon of US applications beyond the abdomen. Inevitably, Combat Surgical Hospitals and Forward Surgical Teams began to realize the power of US in austere settings and employ it where CT scan and x-ray are often unavailable.[3]

The last element in this equation is the SOF medic. More precisely, the impetus for this project was the Special Forces Medical Sergeants (18Ds) lack of a practical imaging capability at the Operational Detachment-Alpha (ODA) level. While these independent

providers receive limited training in plain radiography, portable versions of these machines are neither readily available nor are they practical for the modern SOF battlefield.[4] Our extraordinarily talented medics possess the aptitude to learn and apply this skill and combining portable technology with the imaging ability for EUS, logically fills this deficiency.

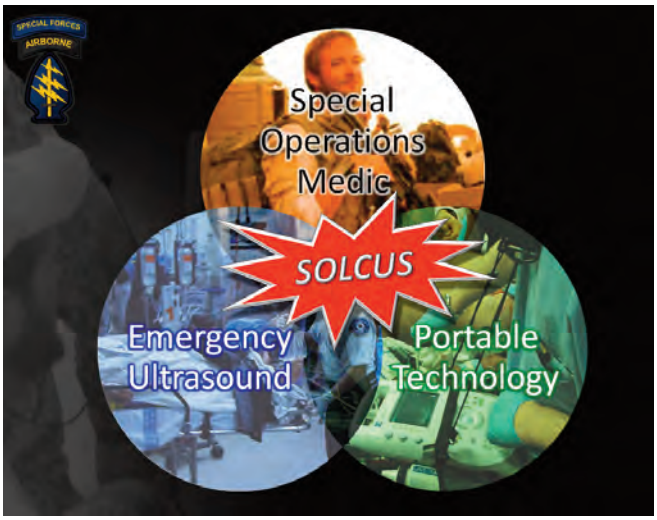

Figure 1: *Venn diagram showing the relationship between emergency ultrasound, portable ultrasound technology and the SOF medic to create the Special Operator Level Clinical Ultrasound concept.*

The confluence of these three elements unites the exceptional talents of the SOF medic, with modern portable US technology and the techniques of EUS applications to solve the imaging capability gap in the far-forward austere environment. Placing a portable US machine into the hands of a trained SOF medic is a medical force multiplier on the modern battlefield. For nearly two and a half years the medical staff of 1st Battalion, 3rd Special Forces Group (Airborne) has worked to catalyze this reaction and package this idea, a concept they have titled "Special Operator Level Clinical Ultrasound" (SOLCUS) and introduced in the Fall 2008 publication of the *Journal of Special Operations Medicine*.[5] The program title intentionally highlights the non-physician clinician applying US to the Special Operations-unique environment. This current article builds on the previous by reporting our experiences through an actual deployment to Afghanistan with this program.

Adapting Training to SOF Missions

The greatest challenge in implementing the SOLCUS initiative is the lack of precedent for training non-physicians. Ultrasound technicians, such as the registered diagnostic medical sonographer (RDMS), registered diagnostic cardiac sonographer (RDCS), and registered vascular technician (RVT) are currently the only non-physicians routinely credentialed to perform diagnostic US. Since their curriculum requires months of training and focuses on the technical aspects of collecting images, not on clinical application, these objectives poorly align with those of SOLCUS. As discussed previously, the scope of EUS provides the best match, making ACEP's US guidelines a reasonable start point for developing the curriculum model.[2] There is no evidence-based precedent validating a training program for non-physician clinicians although recent evidence in one study suggests that non-physicians can interpret US images following a brief block of instruction.[6]

Using the curriculum development model proposed in the Keenan article, the training program focused on:[5]

1. Analyze the operational mission set and develop corresponding learning objectives. Special Forces units are capable of tackling a diverse mission set, and our recent rotation to Afghanistan focused on foreign internal defense (FID), counterinsurgency (COIN), security force assistance (SFA), and direct action (DA).[7] This variety of missions included elements of offensive, defensive, and stability operations executed through both lethal and non-lethal effects.[8] The uniqueness and versatility of these missions mandated mission specific medical support. Realizing that this would encompass aspects of trauma, routine, and chronic care for U.S. Soldiers, host national military soldiers, and host national civilians in both fixed and mobile settings, the US curriculum objectives were tailored to meet those challenges through complementary skills. Specific examples of these skills are discussed in subsequent sections.

2. Establish medical officer oversight and create a cadre of US subject matter experts. Using resident expertise from US credentialed medical officers within the battalion, supplemented by the expertise of nationally recognized EUS experts, efforts initially focused on a core of five to six hand-selected medics with aptitude and motivation for this project. These US "champions" attended several courses in a TDY status to build proficiency through multiple exposures to formal courses.

3. Plan an introductory course for the general target audience. After developing a base of expertise among our 18Ds to serve as role models and anecdotes of success, a series of courses were held in the battalion through a contracted course and trained a more general audience to give a larger cohort their first introduction to the power of this technology.

4. Develop a skill proficiency plan and privileging criterion. This final phase is where the most opportunity for growth exists. As with initial training, no data exists to prescribe the number of exams that a non-physician clinician should complete before earning independent credentials and privileges without 100% quality assurance oversight. For the use of US during the deployment, a number of control measures were emplaced to provide remote supervision and feedback while our

medics operated with novice-level proficiency. As a majority of medics become SOLCUS trained there will be larger cohorts to cross-section for the degradation of US skills over time in this group.

Training Yields

After 26 months of concerted effort to train our battalion's medics, the authors exposed 29 out of over 40 18Ds to at least one session. During this period, these 29 medics attended anywhere from a single session up to seven separate sessions, each of variable length and format. For purposes of discussion, a "session" is any discrete US training course, of various composition, that could be as short as eight hours in a single day or as long as 24 hours over three consecutive days. The average number of sessions was 1.9 per medic. In terms of training hours, this translated to a range of 8 to 52 hours, with an average of 16.7 hours per medic. The American College of Emergency Physicians US guidelines recommend a minimum of 16 to 24 hours of didactics for emergency physicians pursuing a clinically-based pathway to US proficiency.[2] The modal number of hours in the trained cohort was eight hours (12 of 29 medics). The "champions," or medics specifically targeted for enhanced expertise based on particular aptitude and interest, yielded a range of 24 to 52 hours of instruction. In addition to these 29 medics, this program introduced SOLCUS to two physician assistants with no prior background in US.

Deployed Experience

In January 2009 the battalion deployed to Afghanistan with a complement of SOLCUS-trained medics. Though the standing authorization for US machines in a Special Forces battalion is one per battalion medical section, U.S. Army Special Forces Command acquired eight additional machines to deploy with 1/3 SFG(A) to test this novel concept.[9] The authors analyzed each ODA according to its assigned mission set, accessibility to higher-role care, and US skills of its respective medics to determine how to most efficiently distribute nine machines among nine separate firebase locations.

While the medics received initial didactics and hands-on training, at the time of deployment they had not accumulated sufficient proctored exams for the battalion's medical officers to consider them privileged for independent decision making. Since their training would be ongoing during the deployment, quality assurance was a paramount concern throughout this time period. Ideally novice ultrasonographers receive real-time feedback, but the geographic distribution necessitated mitigation of this shortfall with a number of control measures. Supervising medical officers instructed SOLCUS trained medics that since they were in training, they should *not* alter their clinical decision-making based upon an exam they independently performed unless they were proctored by a visiting medical officer credentialed in US, used a "gold standard" test, such as x-ray in the case of fractures, discussed the case with a medical officer by phone, or empirically decided to send the patient to a higher level of care for further evaluation. Each US-trained medic also received a written logbook with instructions to maintain a record of all patients US's performed with the requisite findings. In addition, each received a USB storage device to save images with the intent of allowing them to e-mail for review by a qualified medical officer, but the DoD ban on the use of USB data devices precluded this method early in the rotation.

Upon returning to the continental United States, the authors met with each medic to review their images and give formal feedback on technique and decision-making. Supervising medical officers compiled and tabulated the quality assurance data and categorized the cases to appreciate which indications our medics were finding to be most useful. These categories were:

- **Musculoskeletal:** Evaluation for fractures and some cases of tendon and muscle body tears.
- **Abdomen/Trauma:** Focused abdominal sonography in trauma (FAST), evaluation for pneumothorax and non-traumatic abdominal applications (the combination of the FAST exam with a scan for pneumothorax is called the extended-FAST (E-FAST)).
- **Superficial Applications:** Discriminating abscesses from cellulitis as well as detecting foreign bodies in wounds.
- **Special Applications:** A mix of more advanced applications that have potential relevancy to SOF medical practice, but should be reserved as advanced provider skills such as scans for fetal viability (other than first trimester), ocular foreign bodies and retinal detachment, obstructing nephrolithiasis, and some basic vascular studies.
- **Procedural Guidance:** Using real-time US for IV access or regional anesthetic blocks.
- **Miscellaneous:** Cases that were not interpretable from reviewing the images, the case log, or interviewing the medic/US operator.

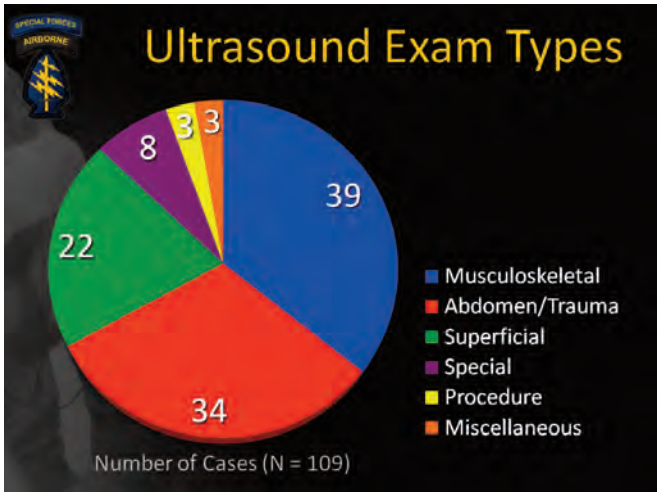

Figure 2: *Pie chart showing the distribution of ultrasound exam types (#'s of exams) by category.*

Discussion

Reviewing the distribution of these 109 quality assurance data points among the six categories reveals poignant utility trends. The most surprising observation is the predominance of musculoskeletal applications, of which fracture detection was the most common indication. Each course attended by our medics devoted some discussion of the potential uses for US in fracture detection, but the instruction was less emphasized since these courses focus on hospital-based EUS, rather than the austere environment peculiar to SOLCUS. Nevertheless, the numbers indicate that these medics took that seemingly insignificant application and highlighted its relevance to their practice.

The combination of musculoskeletal and superficial applications made up over half of the total case collection. While this may seem surprising at first glance, considering that musculoskeletal, dermatologic, and minor wound care complaints make up a significant proportion of a routine sick call log, it follows that our medics would record US applications with corresponding trends.

The second highest frequency category was abdominal applications, another unexpected outcome. Before collating this retrospective data, it was assumed that abdominal applications would be the most commonly studied anatomic region and that trauma would be the most common indication, accumulating higher numbers of FAST/E-FAST exams. While the medics recorded cases of FAST exams in blunt trauma successfully performed by these 18Ds, the reality of our mature theater was that most patients with penetrating or serious blunt mechanism were empirically evacuated. An abdominal US was unlikely to influence the evacuation decision in an environment with established MEDEVAC. However, for missions in immature theaters that lack readily available medical assets for either treatment or evacuation, the information provided by an E-FAST exam can provide critical information that could impact the allocation of scarce assets.

Procedural guidance numbers were understandably low since the curriculum only briefly covered these subjects. However, this category has the greatest potential for growth since indications like US-guided regional anesthesia have particular relevance to their practice. SOF medics already learn landmark-based regional anesthesia techniques in their initial training. The combination of this existing knowledge with evidence that US guidance decreases regional block complications, make this indication a logical target for deliberate development and future study.[10]

The more sophisticated indications in the "special" category may be reserved for more advanced courses and selectively introduced into a basic curriculum as we refine boundaries for SOLCUS. Several anecdotal experiences with exams in this category suggest benefits to SOF medics beyond pure clinical decision making and serve as rapport-building tools. For example, the assurance that a late trimester fetus has active fetal motion and cardiac activity is a potential skill that a non-physician healthcare provider can acquire, and while it may not always impact clinical care, instills a high degree of trust and reassurance in a host national patient receiving prenatal care for the first time. For SOF medics practicing in areas with underdeveloped or non-existent healthcare, the ability to use a diagnostic imaging device provides valuable clinical information, but also conveys a message to the host national patient that we are employing our most advanced technology to care for them. In short, US may provide intangible benefits to patient care in addition to tangible clinical data.

Detailed review of the complete case series indicated six cases (three musculoskeletal, two abdominal, and one superficial) that the authors believe, in the absence of control measures to ensure proper evacuation, US would have impacted the decision to evacuate to a higher level of care. The anecdotal experiences suggest that US has the power to provide information to obviate evacuation as well as justify the commitment of an evacuation asset to a high-risk situation.

To illustrate the decision making ability of a SOLCUS-trained medic, the efficacy of control measures, and the type of clinical scenario that warrants US as part of the clinical decision making process, consider this sample case: A SOLCUS trained medic at a remote firebase clinic treated an Afghan National Army soldier that negligently discharged his personal weapon into his left flank. The medic conducted his standard trauma evaluation and suspected that the wound was too lateral and too superficial to have entered the abdominal cavity, and as part of the evaluation at the firebase clinic, completed an E-FAST exam that confirmed the absence of pneumothorax or free fluid in the abdomen. He saved the images and, consistent with instructions, evacuated the patient to a Role II facility. There the general surgeon at this facility confirmed the negative E-FAST exam and the patient received local wound care before returning to duty a few days later.

While each of the 109 cases was subjected to at least one control measure, not every case received the benefit of each control measure, as exemplified in the case above. This would certainly have yielded more comprehensive results; however, the retrospective design and small sample size limited the value of the analysis. For example, the absence of confirmatory testing for every exam prevented the deduction of meaningful calculations for sensitivity and specificity. As a result of these constraints, the presented results suggest "how" medics used US, but provide only anecdotes of "how well" medics used US.

Conclusion

Within this generation, US has evolved from a radiology and subspecialist-centric instrument, to a com-

mon tool for bedside testing by a variety of specialties. The SOF community is now recognizing the relevancy of training our medics to employ this technology in our austere operating environment. This battalion's experience began with a training plan to teach a small list of applications relevant to their clinical practice and over the course of two years the authors were able to build a base of medics with basic proficiency in several relevant applications. The retrospective observation of this quality assurance data suggests that a formal SOLCUS curriculum should apportion instruction between E-FAST exams, basic fracture detection, and superficial applications with equitable effort. The authors believe procedural guidance possesses equal potential, but due to the lack of emphasis placed on it during this period, the data does not support this. In addition, our observations suggest that US has the potential to avert the urgency of evacuation as well as provide additional information to make cases more compelling for committing scarce assets. Despite the success suggested by these observations, this experience reveals a number of residual issues to focus future study:

- How will our community structure a standardized training program and who will execute it?
- What is the optimum number of didactic hours and clinical exams?
- What is the sensitivity and specificity for the various US applications in the hands of the SOF medical operator?
- What is the optimal sustainment plan?
- Since the responsibility of credentialing and privileging falls to medical officers, what should their education be if they do not already have the proper education from residency?
- What will be the basis of issue for portable US?
- Which machine best meets the community's needs?

May the challenge of these hurdles invigorate us as we expand the horizons of SOF medicine with these relevant US applications. This early experience strongly suggests that the alliance of SOF medic, portable US, and relevant clinical applications results in a medical force multiplier on the SOF battlefield.

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Injury Profile for Airborne Operations Utilizing the SF-10A Maneuverable Parachute

Travis G. Deaton, MD; Jason L. Roby, DO

Abstract

Purpose: The purpose of this investigation was to determine the injury profile of the steerable, SF-10A, static-line parachute. **Methods:** The investigation evaluated prospectively 972 low-level static-line training jumps for major injuries that required CASEVAC from the drop zone and for minor injuries that allowed the jumpers to continue with their training mission. **Results:** The investigation found overall injury rates to be 8.23 per 1000 jumps, with 2.03 per 1000 jumps requiring CASEVAC. **Conclusions:** Overall attrition rates of the steerable SF-10A parachute were below those of previously reported non-steerable parachutes, suggesting further evaluation is warranted of maneuverable parachutes in all military services.

Introduction

The U.S. military uses airborne forces to conduct decisive, short-notice, forced entry operations deep into enemy territory.[1] In Marine reconnaissance units, this special insertion technique focuses on the clandestine insertion of personnel in order to execute their primary mission. Although military parachuting makes up a small component of the overall combat mission, the potential for injury or attrition at the drop zone (DZ) could severely impact the ability of a reconnaissance team to complete their assigned task. Military parachuting programs are designed to maintain the highest degree of proficiency and safety, despite adverse conditions such as unknown terrain, low-light conditions, and high-wind environments. The ability to recognize injury profiles and reduce casualty rates allows for the preservation of the fighting force with the ultimate goal of mission accomplishment.

Military airborne missions vary from training jumps into a known daylight DZ, to night jumps with combat equipment into unfamiliar terrain. In addition, a variety of countries and the Services use several types of free-fall and static-line parachutes, making a comparison of injury profiles difficult. Injury rates for military parachuting are commonly reported as three to twenty-four casualties per thousand jumps,[2-8] a broad range that could significantly impact mission capability. Dupuy studied 162 World War II and 53 post-World War II combat operations and determined a 1% casualty rate for daytime airborne operations, and a 2% casualty rate for nighttime airborne operations.[9] In comparison, recent data collected from combat static-line airborne missions in Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF), by the 75th Ranger Regiment, showed a 12% injury rate among 634 jumpers, with 4% requiring casualty evacuation.[10] Given the relatively rare use of this unique insertion technique, injury profiles, and attrition rates for airborne operations are not consistent nor well documented.

The purpose of this study was to prospectively evaluate the injury profile of the SF-10A steerable round parachute, used by the U.S. Marine Corps and other Special Operations units, in static-line airborne operations. Table I outlines the specifications of the SF-10A, a commercial, off-the-shelf parachute designed for greater maneuverability and softer landings at high altitude.[11]

Table I. SF-10A Manuverable Troop Parachute System

Nominal Diameter	9.8 Meters
Number of Gores	28
Canopy Material	Low Porosity Nylon
Suspension Line Length	6.5 Meters
Suspension Line Tensile Strength	1780 N (400 lbs)
Time for 360 Degree Turn	4 Seconds
Assembled Weight	29 lbs
Maximum Exit Weight	400 lbs
Minimum Exit Altitude	500 ft AGL
Maximum Exit Velocity	150 KEAS
Rate of Descent (min/max weight)	10.5-15 ft/sec @ sea level

Patients and Methods

The study collected data prospectively for all injuries in military low-level, static line jumps conducted between October 2008 and January 2009 at Al Asad Air Base, Iraq, by a U.S. Marine Reconnaissance unit. The unit performed a total of 972 static-line jumps using the SF-10A parachute. The servicemembers were

medically qualified for airborne operations and previously attended the U.S. Army Airborne School. Of the 972 total jumps, 361 were performed as a transition course to the SF-10A parachute for jumpers who had not been exposed to this particular rig. The transition course consisted of a six-hour "ground school" followed by a slick jump (i.e., one with no combat equipment) at 2,500 feet above ground surface, a slick jump at 2,000 feet, and a combat equipment jump at 1,500 feet. Since these students were unfamiliar with the SF-10A parachute, the study considered them to be "inexperienced" jumpers. "Experienced" members, those who had previously completed the transition course, performed the remaining 611 jumps at 1,250 feet.

Aircraft used during the study varied depending upon availability. The C-130J fixed-wing aircraft performed the majority of the missions and accounted for 506 jumps. Marine Corps CH-53 helicopters accounted for 271 jumps. The remaining 195 jumps occurred from the tilt-rotor MV-22 Osprey. Jumpers performed all exits from the rear tailgate of the aircraft on all of the aviation platforms.

The study examined jumps into two separate DZs with similar characteristics. Both DZs measured 500 by 700 meters (1640 by 2300 feet) and were free from water obstacles or trees. The terrain was flat and consisted of hard-packed dirt with occasional small rocks. The perimeter was lined with fences and hardened concrete structures. Elevation at both landing zones was 600 feet above mean-sea level (MSL).

Daylight conditions were present for 505 jumps, while 467 jumps took place in low-light environments. With respect to gear configuration, the jumpers used combat equipment for 385 jumps, whereas the slick configuration made up the remaining 587 jumps. Table II shows a summary of collective mission profile data.

Table II. Low Level Static Line Mission Profiles	
Illumination	
Daylight	505 jumps (52%)
Lowlight	467 jumps (48%)
Experience Level	
SF-10 Transition Course	361 jumps (37.1%)
Prior Course Graduates	611 jumps (62.9%)
Altitude	
2500 ft AGL	60 jumps (6.2%)
2000 ft AGL	76 jumps (7.8%)
1500 ft AGL	225 jumps (23.1%)
1250 ft AGL	611 jumps (62.9%)
Aircraft Type	
C-130	506 jumps (52.1%)
CH-53	271 jumps (27.9%)
MV-22	195 jumps (20.1%)
Gear Configuration	
Slick	587 jumps (60.4%)
Combat Equipment	385 jumps (39.6%)

Uniforms and protective equipment were not controlled. Participants had their choice of desert camouflage uniform or desert flight suit for primary protection. The study plan required the jumpers to wear Modular Integrated Communications Helmets (MICH) with strobe lights attached to the posterior aspect of the helmet during low-light operations. Eye protection and glove use was compulsory, but brand and type differed among individuals. Elbow and knee-pads were optional and rarely used. Marine Corps combat boots, without the use of protective ankle braces, were required. Combat equipment, when configured, varied between individuals, with total weight of jumper and gear less than 400 pounds.

The study classified as injured any patient that presented to the military surgeon for care related to airborne operations, regardless of whether the surgeon placed them on a light or limited duty status. Demographic information collected on injured patients included age and experience level. The study also documented operational characteristics such as light level, aircraft used, gear configuration, exit altitude, and ground wind speed. Severity of injury was classified as "minor" if the patient was capable of performing a combat foot patrol despite their injury, and "major" if the patient required CASEVAC from the point of injury. The study noted the injury diagnosis and involved region of the body, as well as the estimated root cause of the incident.

Results

The study considered eight patients as injured during the series of 972 jumps using the SF-10A parachute. This translates to an overall rate of 8.23 injuries per 1000 jumps. Among the eight injuries, two were considered "major," resulting in a rate of 2.06 per 1000 jumps that required CASEVAC from the point of injury. Six injuries were considered "minor," allowing for a rate of 6.17 per 1000 jumpers to complete the training mission despite their injuries. While the jumpers wore reserve parachutes, none activated them during this particular series. No fatalities or significant malfunctions occurred.

The mean age of injured patients was 29.1 years. Four of the injured patients (50%) were between 20- and 29-years-old, three patients (37.5%) were between 30- and 39-years-old, and one patient (12.5%) was greater than 40-years-old.

Three of the injured jumpers (37.5%) were "experienced," having previously completed the transition course, while five of the jumpers (62.5%) were "inexperienced" with the SF-10A parachute.

Of the aircraft used when injuries occurred, three involved the C-130J (37.5%), three occurred with using the CH-53 (37.5%), and two with the MV-22 (25%). Five casualties occurred during low-light levels (62.5%), while three took place during daylight

(37.5%). Six of the injured (75%) wore combat equipment while two of the injured (25%) used the slick configuration. High wind speed (10+ knots) was present in the jumps with four injuries (50%), to include both major injuries. Wind speed was moderate (5-10 knots) in the jumps with two injuries (25%) and light (0-5 knots) in the jumps with the other two injuries (25%).

Location of the injury involved the upper leg or knee in four injuries (50%), the head or neck in three injuries (37.5%), and the ankle in one injury (12.5%). Root causes of the injuries for the casualties included improper parachute landing falls (PLFs) by four patients (50%), landing hazards for two patients (25%), improper exit technique for one patient (12.5%), and improper gear configuration for one patient (12.5%). Table III presents the injury summary profile.

Table III. Injury Profiles	
Overall Injury Rate	8.23 per 1000 (0.8%)
Major, Requiring CASEVAC	2.06 per 1000 (0.2%)
Minor, Completed Mission	6.17 per 1000 (0.6%)
Age of Injured Patients	
20-29	50.0%
30-39	37.5%
40+	12.5%
Injury by Experience Level	
Experienced	37.5%
Inexperienced	62.5%
Injury by Aircraft	
C-130	37.5%
CH-53	37.5%
MV-22	25.0%
Injury by Configuration	
Combat Equipment	75.0%
Slick	25.0%
Injury by Wind Speed	
10+ knots	50.0%
5-10 knots	25.0%
0-5 knots	25.0%
Root Cause of Injury	
Poor PLF	50.0%
Landing Hazard	25.0%
Exit Technique	12.5%
Gear Configuration	12.5%

Discussion

Although the overall injury rate of 0.8% in this particular series falls within previously reported rates of 0.2% to 2.4%, it is significantly less than the 12% injury rate published by Kotwal, et al., for recent low level, static-line combat jumps in OIF and OEF.[10] Several factors likely contributed to the difference in injury rates. Primarily, this study followed training missions that occurred without concern for the logistical and operational requirements of combat missions, not to mention the intangible psychological stressors related to "real world" missions. Also, the SF-10A parachute system is designed to increase the jumper's maneuverability and decrease the rate of descent (when compared to the T-10C, non-steerable parachute). This may have allowed SF-10A jumpers to avoid DZ on obstacles, steer the parachute into an upwind landing direction, and attain a better PLF position, resulting in fewer casualties. Of note, Kotwal's study reported no injuries for the jumpers who used a C-130 tailgate exit (versus the side-door exit technique). This is consistent with findings in prior studies of injury profiles,[4,7] and the authors believe the exclusive use of tailgate exits in this study likely contributed to lower casualty rates. Further investigation on the use of tailgate versus side-door exits could lead to significant reductions in the attrition rate during static line airborne operations.

Several studies examined environmental risk factors, such as wind, landing hazards, altitude of the drop zone, and light levels, that affect the risk of injury during airborne operations.[3,10,12-14] Half of the total injuries, and both injuries that required CASEVAC in this study, occurred with wind speeds in excess of 10 knots. While several studies documented the association between increased injury rates and increased wind speed,[4,14] there is also evidence that injury rates increase with winds *below* five knots due to poor PLF techniques in the absence of relative motion.[6,12] One possible explanation for the lack of low-wind injuries with SF-10A parachute is the ability to flare and control the amount of lateral movement with toggles on this new parachute.

Various studies closely linked illumination and visibility to injury rates. While attrition rates typically double during low light conditions,[4,9,14] military commanders of a reconnaissance unit are more likely to utilize night jumps due to the clandestine nature of their mission. During low levels of illumination, identification of landing hazards becomes difficult. In addition, judgment of lateral motion is impaired during low-light conditions, possibly affecting PLF techniques.

The increased risk of injury with high elevation DZs is likely multi-factorial.[7] The decreased air density above 5,000 feet (above MSL) requires aircraft to maintain a higher airspeed, resulting in a greater opening shock. This increased opening shock may rupture gores and panels in the parachute, lead to suspension line failure or cause traumatic injury to the jumper. The decreased air density also causes the rate of descent to increase. The SF-10A parachute with 400 pounds total weight increases from 15 feet/second at sea level to 17 feet/second at 9,000 feet MSL.[11] While an important consideration for operational planning purposes, this effect was not evaluated in this study design with a drop zone elevation at 600 feet MSL.

One must also consider the effect of total weight and combat equipment configuration. This study found a significant increase in injury rates and severity when jumpers wore combat equipment. For the SF-10A parachute, descent rates at sea level increase from 10.5 feet/second at 200 pounds total weight, to 15 feet/second at 400 pounds.[11] Since impact rate is known to increase with excessive weight, commanders should

ensure that airborne personnel wear only mission-essential equipment. From an ergonomic standpoint, the SF-10A parachute requires the jumper to shift the individual toggle controls from two hands to one hand at 100 feet above the ground in order to use the newly freed hand to lower the combat equipment prior to impact. After the jumper lowers the equipment, they place both hands back on the individual toggles to prepare for landing. Individual jumpers report perceptual narrowing with task saturation during a critical time in the landing sequence. Jumpers must practice this muscle movement and reinforce it through training in order to maintain the maneuverability characteristics of the parachute upon landing.

Several published articles have debated the usefulness of the parachute ankle brace (PAB) in preventing commonly reported ankle injuries.[3,4,15,16] The PAB was neither available nor required during our study. Although we suspect the maneuverability of the SF-10A parachute decreased the rate of ankle injuries, the one ankle injury we observed (0.1%) was well below the non-PAB injury rates of 0.5% previously published.

Conclusions

As military parachuting equipment and design continue to evolve, injury profiles and patterns must be re-evaluated and documented. These results should be presented to commanders during the planning process to assist with their operational risk assessment for inherently dangerous missions. Research and development should focus on known injury risk factors to procure equipment that decrease the rate of descent, decrease the weight of mission-essential gear, and increase the maneuverability of parachutes.

Current injury data from the various branches of military service are disjointed with sporadic reporting in the medical literature. All services should consider using a centralized data repository that tracks comprehensive injury profiles – not just significant mishaps or deaths. This evolving set of data will assist medical planners to best place limited medical assets in the unique and relatively rare case of combat airborne operations. The Services should place further emphasis on finding and type classifying a common, steerable, static-line parachute in hopes of decreasing overall injury and attrition rates.

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Special Forces Medic (18D) and Medical Planning

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As I retrace my journey through the Special Forces ranks as a Medical Sergeant (18D) and finally a Sergeant Major (18Z) in preparation for retirement, I find myself reading years of forgotten evaluations, citations, and awards. Some cause me to pause in an attempt to recall the particulars; others summon a smirk and laugh as I remember the fine men and women who played a very important role in making it happen. One particular Noncommissioned Officer Evaluation Report (NCOER) caused me to think, not that I had been immune to this before, but on this occasion, I was grappling with the words on the page. Had I truly been prepared to carry out the enormous strategic and operational scheme of maneuvers described before me? The words read:

> *"Supervises and manages field medical activities in a conventional or unconventional warfare environment. Advises and provides tactical and technical guidance to the Detachment Commander, indigenous and allied personnel. Responsible for the planning, execution, and supervision of cross-training of detachment members in medical skills. In an unconventional warfare environment, instructs medical personnel; manages guerilla hospitals and field evacuation nets; coordinates the operation, interaction, and activities of medical facilities within an area of operation; manages a battalion-size troop medical clinic and its administrative and logistical support. Establishes a base stock of medical supplies and equipment, using internal or external procurement, storage, security, and distribution of those items. Coordinates veterinary training and support for an area requiring animal transportation or use. When directed, conducts operational and intelligence planning, preparation, and execution of detachment missions."*

Had I successfully accomplished all of these tasks? And where along the way had I been trained to do so much, with what I believed to be so little? The first sentence, check … did that and got the T-shirt; second sentence, check … did that and got the T-shirt … I ultimately completed my reading and realized that along the way I had truly done all as stated — mission complete! What continued to eat at me was a nagging question of great importance, where was I trained to do all that? I then recalled my first Team Sergeant — a great mentor. He had taken me under his tutelage and instilled in me a sense of fear; the fear of letting one's teammates down and the fear of not having the answers when asked. Our relationship was far from adversarial, rather I understood my role as "the new guy" and the 18D on the team; I had to prove I was worthy! It became clear to me at this point that over the years I have had several mentors who took the time, and most importantly had the knowledge and ability to mentor me in a manner to make me a successful 18D.

This is where the crux of my question begins, and to some extent, I hope does not end. The 18D is a combat arms Soldier with extensive medical education and training in life-sustaining skills. He has the responsibility for healthcare of Special Forces Soldiers in operational situations worldwide. His skill set demands that he provide compassion, comfort, and care to the utmost of his ability – even though the situation may well require skills far beyond those of an unlicensed healthcare provider. The 18D employs conventional and unconventional warfare tactics and techniques in providing operational medical care and treatment. The actions of the SF medic not only saves lives and mitigates suffering, but to date it has also proven to be an effective tool to apply against growing insurgencies. The 18D is authorized to perform an extensive variety of clinical tasks in order to sustain and improve readiness through the preservation of health on the battlefield and in garrison. Whether he's far forward in an austere environment facing an agile and oftentimes elusive force, or using his tactical knowledge, he constantly contributes as all 18-series Soldiers do.

Optimizing the employment and capabilities of the SF medic requires constant modernization and advanced training to stay ahead of the challenges faced in both the present and future operating environments. Clearly the challenges faced are many and will fall into several categories: technical, tactical, didactic, strategic paradigm shifts, asymmetric, irregular, and unconventional-warfare or host-nation building etc. The 18Ds effectively function as medical operational planners at the Advanced Operational Base (AOB), Forward Operating Base (FOB), Combined Commands, Joint Staff, Combatant Commands, Component Headquarters of Combatant Commands, Joint Task Forces, or at the Service headquarters level in the absence of a

medical plans officer. With the increased number of Combined Joint Special Operations Task Forces (CJ-SOTF's) in support of Overseas Contingency Operations, and the downsizing of conventional health services support (HSS) in the areas of responsibility (AOR), SF is ushering in the needed capability to develop the 18D to respond to complex and routine issues such as: logistical support planning, casualty evacuation planning, abbreviated patient hold and casualty staging, familiarization, and proficiency in the concepts, procedures, and applications of joint and combined medical planning at the operational level of war. The senior 18D should understand and be able to apply HSS planning principles in the following focus areas: joint and combined operations by using the steps in contingency and crisis action planning, preparation of the medical services annex of OPLAN's (Annex Q), time-phased force deployment list (TPFDL) management, and medical workload estimates using the joint medical analysis tool (JMAT).

Although this is an enormous task and one which takes a lot of man-hours to grasp, in my opinion, these skills should be developed in the 18D as a required skill set. This is not to say that some 18Ds don't already perform these critical tasks, or that someone is not tasked to perform them within the SF community, but as a military occupational specialty (MOS), there is room for major improvements.

I was fortunate to have mentors who themselves had the experience and knowledge of HSS on the battlefield and in garrison. Of which, the former can't be taught nor simulated, and the latter should not be tested for the first time in emerging crisis. Operational medicine is a broad area to codify in absolute terms because it continues to evolve in today's SF community. Do we continue to subscribe to the idea of having 18Ds advice medical planning, or should we institutionally provide that training across the MOS, which will give all 18Ds the necessary tools to function as a medical planner? The SOF medic is by far the most celebrated medic in "Role 1" and by far the most adaptive at "Role 2" when applicable. However, systems are lacking in developing the 18D for staff level work, which directly impacts the efforts of medics at the point of injury.

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Abstracts from Current Literature

Major Depressive Disorder in Military Aviators: A Retrospective Study of Prevalence

Lollis BD, Marsh RW, Sowin TW, Thompson WT
Aviat Space Environ Med 2009; 80:734-7.

Abstract

Introduction: The occurrence of major depressive disorder (MDD) among military pilots and navigators poses questions with respect to medical care and waiver policy, but the prevalence of such disorders is unclear. We studied the epidemiology of MDD in a USAF aircrew population. **Methods:** The occurrence of MDD was determined for the period 2001-2006 using the USAF Aeromedical Information Management Waiver Tracking System, which records medical disqualifications and waivers for the entire population of both qualified and disqualified (grounded) USAF aviators. **Results:** The mean annual population of USAF pilots and navigators averaged 17,781 during the study period. The database yielded 51 cases of MDD, of which 8 were recurrent and 43 were single episodes. All of the recurrent cases were disqualified, while 18 of the single-episode cases (42%) received a flying waiver after being asymptomatic without medications for at least six months. Estimated annual MDD prevalence was 0.06% for the study population. In comparison, the annual prevalence of MDD is 6.7% in the general U.S. population, 2.8% among groups of executives and 4.1% among professionals. Odds ratios were 128 (68,238), 51 (27,96), and 76 (41,142) for the general population, executives, and professionals, respectively. **Discussion:** Annual MDD prevalence among USAF pilots and navigators was significantly lower than that of the general U.S. population. The difference may reflect lower aircrew vulnerability to depression because of selection and training processes or lower rates of self-report and treatment due to feared aeromedical and/or career consequences.

Neurological Symptoms After a Provocative Dive: Spinal DCS or Anterior Spinal Artery Syndrome?

Uzun G, Cakar E, Kiralp MZ, Carli A, Durmus O, Senol MG, Mutluoglu M, Uz O, Dincer U, Ozcakar L.
Aviat Space Environ Med 2009; 80:898-9.

Abstract

Reported here is a 37-yr-old professional diving instructor who had developed complaints of back pain and weakness in the lower extremities after diving. He was eventually diagnosed as having spinal cord decompression sickness along with a likely diagnosis of anterior spinal artery (artery of Adamkiewicz) syndrome. Additionally, since the transthoracic echocardiography revealed patent foramen ovale, we hypothesized that it might have been a potential route for gas bubbles to occlude the anterior spinal artery in this diver.

Whole-Body Vibration Effects on Bone Mineral Density in Women With or Without Resistance Training

Humphries B, Fenning A, Dugan E, Guinane J, MacRae K.
Aviat Space Environ Med 2009; 80:1025-31

Abstract

Introduction: Whole-body vibration exposure may translate into improved bone mass in young adult women. The primary focus of this study was to examine the effects of graded whole-body vibration or vibration exposure plus resistance training on bone mineral density (BMD), hematological measures for bone remodeling, and exercise metabolism in young women. **Methods:** There were 51 healthy active women [mean (SD) age, 21.02 (3.39) yr; height, 165.66 (6.73)cm; body mass 66.54 (13.39)kg] who participated in the intervention. Subjects were randomly assigned to whole-body vibration (WBV), whole-body vibration plus resistance training (WBV+RT), or control (CONT) groups for 16wk. **Results:** A repeated-measure ANOVA found no significant ($P < 0.05$) group differences in BMD at the completion of 16wk. A significant within group change was apparent for the WBV (2.7%

femoral neck) and WBV+RT (femoral neck 1.9%; vertebra 0.98%). WBV and WBV+RT experienced a significant ($P < 0.05$) 60% and 58% increase in adiponectin, 48% and 30% in transforming growth factor-β1, and 17% and 34% in nitric oxide with an accompanying 50% and 36% decrease in osteopontin, 19% and 34% in interleukin-1β, and 38% and 39% in tumor necrosis factor-α. **Conclusions:** The results indicate graded whole-body vibration exposure may be effective in improving BMD by increasing bone deposition while also decreasing bone resorption. Whole-body vibration may also provide an efficient stratagem for young women to achieve peak bone mass and help stave off osteoporosis later in life and provide a novel form of physical training.

Acute Otitic Barotrauma During Hypobaric Chamber Training: Prevalence and Prevention

Landolfi A, Torchia F, Autore A, Ciniglio Appiani M, Morgagni F, Ciniglio Appiani G
Aviat Space Environ Med 2009; 80:1059-62.

Abstract

Introduction: Barotitis media is known to be an adverse effect of altitude changes, but few studies have investigated this condition with respect to hypobaric chamber training and the resulting estimations of prevalence vary. **Methods:** In order to assess the prevalence of hypobaric chamber-related barotitis and evaluate a method of prevention, 335 healthy military pilots undergoing high altitude training were subject to clinical examination and tympanometry before entering the chamber. In order to minimize the risk of barotrauma, only subjects with normal preflight findings were cleared for altitude exposure. Barotitis media was diagnosed on the basis of ear pain and clinical findings according to Teed's classification. **Results:** Barotitis occurred in eight subjects; seven cases were monolateral and one bilateral; prevalence was 2.4%. **Conclusion:** The prevalence of barotitis after hypobaric chamber training is low in our study, suggesting that a pre-chamber medical check including clinical examination and tympanometry could be effective in identifying subjects at risk.

A Tribute to the U.S. Air Force Medical Service on its 60th Anniversary

Schwartz, N
Aviat Space Environ Med 2009; 80:1069-70

Abstract

Chief of Staff of the U.S. Air Force, Gen Norton Schwartz, delivered the following remarks, adapted for print, during a dinner celebrating the 60th anniversary of the USAF Medical Service on June 25, 2009, in San Antonio, TX. In commemorating the occasion, he remarked on the history of the USAF Medical Service and went on to commend those who serve today: "Courageous and dedicated medical professionals — who help pull the wounded off the battlefield, treat them en route, and provide sophisticated life-saving treatment and rehabilitation — underpin many incredible stories of survival by critically wounded personnel." He concluded by thanking those in the USAF Medical Service for their dedication.

Orofacial Injuries and Mouth Guard Use in Elite Commando Fighters

Zadik, Yehuda; Levin, Liran
Military Medicine, Volume 173, Number 12, December 2008, pp. 1185-1187(3)

Abstract

The incidence, etiology, and consequences of orofacial injuries during service were evaluated among active duty elite commando fighters in the Israel Defense Forces. Male fighters ($N = 280$) were interviewed. Orofacial injuries were reported by 76 (27.1%) participants, with tooth injuries as the most common: 40 (52.6%) suffered from dental fracture and 6 (7.9%) from subluxation/luxation. Overall incidence was 85.5 cases per 1,000 fighter-years. Most injuries occurred in an isolated training or operational field. Overall, 162 participants (57.9%) received a boil-and-bite mouth guard during recruitment, but only 49 (30.2%) used it regularly during training and sport activities. The prevalence of injuries among fighters who reported regular mouth guard use was smaller than among fighters who reported of no regular use (20.4% vs. 28.6%, respectively; $p < 0.001$). Commando fighters are highly predisposed to dental trauma, resulting in the interference of their continuous daily activity. Military healthcare professionals and commanders should promote mouth protection devices for high-risk populations.

The Relationship of Vitamin D Deficiency to Healthcare Costs in Veterans

Peiris, Alan N.; Bailey, Beth A.; Manning, Todd
Military Medicine, Volume 173, Number 12, December 2008, pp. 1214-1218(5)

Abstract

Vitamin D deficiency is often unrecognized and has been linked to many chronic diseases. Vitamin D supplementation has been shown to ameliorate these chronic diseases and may reduce the prevalence of some cancers. We analyzed the healthcare costs associated with vitamin D deficiency in Veterans in Northeast Tennessee. A retrospective electronic chart analysis of the relationship of 25-hydroxyvitamin D [25(OH)D] status to health care costs, services, and utilization was done in 886 veterans. The overall costs were higher by 39% in the vitamin D-deficient group. Vitamin D deficiency was associated with increased service utilization in many areas including more frequent emergency room and clinic visits as well as increased inpatient stay and inpatient services. The serum level of vitamin D was also related to healthcare costs, although to a lesser extent. Vitamin D deficiency is closely linked to increased healthcare costs in veterans.

Neuropsychological Issues in Military Deployments: Lessons Observed in the DoD Gulf War Illnesses Research Program

Friedl, Karl E.; Grate, Stephen J.; Proctor, Susan P.
Military Medicine, Volume 174, Number 4, April 2009, pp. 335-346(12)

Abstract

The U.S. Department of Defense invested 150 M to investigate undiagnosed Gulf War illnesses (GWI) and twice that amount in post hoc clinical management. No new disease syndrome was identified, but the research produced new understanding and awareness of important psychosocial and neurotoxicological interactions that represented a difficult and relatively untapped frontier in biomedical research, especially concerning chronic multisymptom illnesses. Some specific Gulf War issues such as effects of depleted uranium, Leishmania diagnosis and treatment, and pesticide and prophylactic drug interactions have been intensively investigated; remaining priorities for further investigation include: markers of neurologic change (e.g., neuroimaging, neuropsychological testing), interactions between psychological resilience and neurotoxicity, structure function relationships of neurotoxins with neurodegenerative disease potential, and predictors of individual susceptibility. The primary conclusions from the program are that no specific neurotoxic chemical has been identified that explains the chronic multisymptom illness observed but wellness of service members in future deployments may be better sustained based on continuing research on preexposure health baselining, fitness and health-damaging behaviors, and stress resilience. The many scientific discoveries and accomplishments of the GWI research effort have advanced military medical science, provided a solid basis on which to build future protections against health and performance risks to the warfighter, and improved the ability to respond to future deployment health issues.

Impact of Prior Operation Enduring Freedom/Operation Iraqi Freedom Combat Duty on Mental Health in a Predeployment Cohort of National Guard Soldiers

Polusny, Melissa A.; Erbes, Christopher R.; Arbisi, Paul A.; Thuras, Paul; Kehle, Shannon M; Rath, Michael; Courage, Cora; Reddy, Madhavi K.; Duffy, Courtney
Military Medicine, Volume 174, Number 4, April 2009, pp. 353-357(5)

Abstract

Objectives: The goal was to examine the impact of prior Operation Enduring Freedom/Operation Iraqi Freedom (OEF/OIF) combat deployment on reported psychiatric and somatic symptoms among National Guard/Reserve (NGR) Soldiers 1 month before deployment to Iraq. **Method:** 522 NGR Soldiers completed a survey assessing predeployment risk and resilience factors as well as current levels of PTSD, depressive, and somatic symptoms. **Results:** Overall, Soldiers reported few psychiatric symptoms present before deployment to Iraq. However, compared to Soldiers preparing for their first deployment to Iraq, Soldiers previously deployed to OEF/OIF reported more PTSD, depressive, and somatic symptoms. Previously OEF/OIF deployed Soldiers reported lower perceptions of unit social support, but reported no differences in perceptions of preparedness or concerns about family disruptions. Implications for interventions and training with military personnel before deployment as well as future longitudinal research directions are discussed.

Previously Published

Internal Decapitation - High Ligamentus Cervical Injury

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Permission to publish this presentation in the JSOM was granted by author

Foundation for Concept

The neck is particularly vulnerable to injury from motor vehicle accidents (MVAs), falls and blunt trauma. The potentially devastating consequences of secondary damage to the spine following the initial trauma include quadriplegia, respiratory device dependency, and frank death.[1,2,3,4] The initial injuries include a range of fractures and ligament, muscle, fascial, and vascular disruptions, the worst of which are the recently described "internal decapitation" injuries of the upper cervical spine.[5] The vertebrae, ligaments, muscles, tendons, fascia, skin, and other tissues of the neck, together with the head and the shoulders form a complex (head-neck-shoulder, HNS) in which all the components contribute to the integrity of this region.

Catastrophic secondary damage to the HNS complex with major neurological deterioration can occur post-primary injury in trauma victims.[4,6-8] It is estimated that up to 25% of spinal cord injuries are preventable and occur during the interval between the time of injury and admission to the hospital due to a lack of adequate spinal immobilization.[4,6-9] The exact nature of the injury is initially uncertain, and emergency medical responders traditionally have a low threshold of suspicion for injury to the HNS complex. Conventional wisdom is to follow protocols ostensibly designed to protect against further injury.

The Advanced Trauma Life Support (ATLS) protocol mandates assessing the airway, breathing, and circulation with proper manual in-line stabilization of the neck.[10] The intent is to prevent the devastating consequences associated with aggravation of an already unstable neck. Current protocols typically include placement of an extrication collar on any trauma victim suspected of an injury to the HNS complex.

Though millions of collars are applied annually to trauma victims, the actual available evidence on the effectiveness of extrication collars in preventing secondary injury to the HNS complex is limited and inconsistent. A collar may not significantly prevent potentially dangerous intervertebral motion when most of the intervertebral disc and ligamentous structures that connect the vertebrae are already damaged.[11-14]

The possibility that cervical collars can cause harmful distraction between vertebrae became a research focus after observing unmistakable head-to-neck separation associated with cervical collar application and a potential relationship to morbidity and mortality.[5] These observations raised the concern that cervical collar application and current trauma management methods in general may be contributing to some of the over 40,000 deaths from traumatic injury and the thousands of disabling spinal cord injuries that occur each year in the U.S.[15]

Goals of this Presentation

The purpose of this presentation is to demonstrate the direct mechanical effect of cervical collar application upon the HNS complex in the presence of a typical soft tissue, bone, and ligamentous dissociative injury to the upper cervical spine namely – internal decapitation injuries. This presentation focuses on the motion between the vertebrae and the occiput caused by application of a collar in the presence of an unstable cervical injury. We hypothesized that the routine application of rigid cervical collars can, in itself, create as much occipita-cervical distraction as has been observed in trauma victims who died of their injuries.

Literature Review

Many studies have provided some evidence that a cervical extrication collar can actually lead to severe complications in certain cases.[5,21-25] A critical analysis of these reports supports the concern that the application of a collar could potentiate severe damage, including a major spinal cord injury. This can occur at any level of the cervical spine, but seems to be most common at the atlanto-occipital junction or between the first and second cervical vertebrae.[26]

Concerns about the effectiveness of current spinal immobilization techniques with cervical collar application have also been raised in a multi-centered retrospective review in which trauma patients transferred to hospitals with no cervical collars fared better and had less neurological deterioration prior to hospital arrival than patients treated with collars as part of their immobilization.[38] There are several mechanisms by which a collar could compromise clinical outcomes. Undesirable side-effects of collars have already been documented, such as pressure ulcers, elevated intracranial pressures, obstructed CSF or venous flow, and difficult intubations.[23,39-41] Review of the data and images from previously published clinical studies on dissociative injuries and the results of this study provide convincing evidence that cervical extrication collar application can cause distraction between vertebrae and have the potential to cause harm.[5,21-22,42]

The statistics of mortality and morbidity in association with cervical dissociative injuries are daunting. In 2005,

there were 10.7 million motor vehicle accidents (MVA) resulting in over 43,400 deaths within 30 days of the MVA (National Safety Council, Itasca, IL, Injury Facts, annual, http://www.nsc.org). The actual cause(s) of death in these accidents varies, but forensic studies documented an incidence of cervical dissociative injuries as high as 94%, and believed them to be responsible for the cause of death in approximately one-third of the cases.[48] Almost half of the cervical injuries found in a consecutive series of 100 fatal accident victims were at the craniocervical region.[19] A recent literature review concluded that approximately 8% of unconscious or obtunded trauma patients who present to the emergency department may have a major injury to the cervical spine.[1] In survivors of trauma, severe injuries to the cervical spine were found in up to 3.7% (i.e., over 1000 patients in the U.S. per day from MVAs alone).[1,2] Preventable deaths following trauma occur due to a variety of factors, including inappropriate cervical immobilization.[49]

Furthermore, over 10,000 people suffer spinal cord injuries each year in the U.S., with 36% caused by MVA. The annual aggregate direct healthcare cost is over $3 billion.[50] Cervical immobilization is used on almost 90% of patients transported to an emergency room by ambulance, and there were approximately 18 million patients transported to emergency rooms by ambulance in 2006.[51,52] Optimization of cervical stabilization and patient management protocols could benefit many. It is clear that additional, high-quality scientific evidence is needed to validate management protocols that can reduce the number of preventable deaths and spinal cord injuries. Our current data provide a proof of mechanical concept that collar application creates a distractive mechanism that effectively pushes the head away from the body. This evidence in cadavers and the same effect seen clinically while following current trauma guidelines in treatment of trauma patients adds to the body of literature indicating that cervical collar application in itself may cause devastating clinical consequences.[5,21,22,42] [19,28,34,46,47]

Several other investigators reported that patients with massive damage to the upper cervical spine can survive the initial injury if appropriately managed.[5,33,34] Unfortunately, the optimum management protocol has yet to be established and validated. There are hundreds of published studies addressing methods for cervical spine stabilization, but none of them were considered to be high-level scientific evidence in a recent Cochrane Review.[35] It is inherently difficult to generate randomized controlled clinical studies for scientific evidence regarding the optimum approach to protecting the HNS complex in trauma victims particularly in the pre-hospital period. It is not surprising that a recent Cochrane review noted that there are no randomized, controlled trials that can be used to determine or compare the effectiveness of approaches to stabilizing the cervical spine in trauma victims. For lack of high-quality evidence, it had to resort to summarizing some of the low-level evidence that suggests various immobilization methods can reduce head or intervertebral motion in healthy volunteers. For example, some studies that assessed the effect of cervical collar immobilization found that strapping a volunteer to a standard short board was more effective than using a cervical collar alone when immobilizing the cervical spine.[36,37]

Observations of Clinical Cases

During the past four years, a significant number of patients were seen in local trauma centers in whom their clinical neurologic status changed after involvement of trained emergency and medical personnel were involved in their care.[5] Despite following existing standards of immobilization, stabilization, and device application, high cervical cord injuries were found in patient with high cervical ligamentus disruption. These cases presented complex management and ethical problems and led to the investigations presented in this manuscript.

Human Volunteers

Following approval from appropriate human studies boards, patients, human volunteers, and fresh human cadaver research was conducted to evaluate the hypothesis that cervical collar application might lead to significant head to neck dissociative injuries (internal decapitation type injuries). During collar application technique including in-line stabilization distraction was documented at the cervical injury site in every case. The head to neck distraction distances measured for all trauma patients was outside the 95% for normal displacement as measured in asymptomatic volunteers.

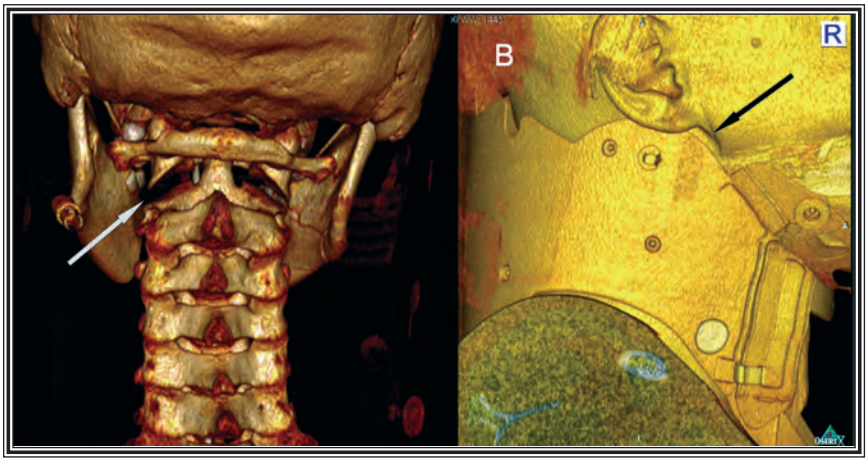
Fresh Human Cadaver Studies

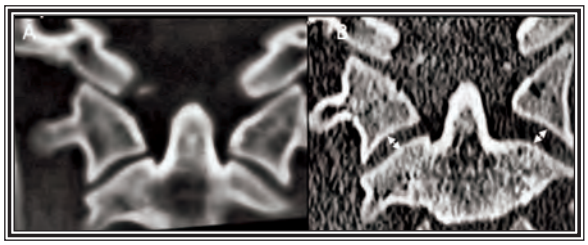
In fresh human cadaver studies, application of cervical collars caused abnormal increased separation, at the C1-C2 level in every case. Gross displacement of the cadavers head relative to the body was visually apparent and was consistent with the internal displacements observed in the CT images. Frank separation of the head and upper neck from the rest of the body was seen in every cadaver after a cervical collar was applied. This emphasizes that collar application includes a distractive mechanism of action such that pushes the head away from the body, resulting in stretching and translation of soft-tissues, including the spinal cord and vertebral arteries. There are not enough definitive clinical data in order to determine the amount and type of motion or sustained displacement that will result in neurologic deficit, but there is little room for doubt that the measured distraction could contribute to temporary or permanent neurologic deficit, or lead to death if it occurred in a trauma victim.

In addition to the axial displacement, extension, or flexion commonly occurs with application of a collar. This is manifest in the larger magnitudes and variations in the posterior canal measurements. The anterior canal measurements made from lateral fluoroscopic images were statistically equivalent to the measurements made at the facet joints from CT or AP open-mouth radiographs. The anterior fluoroscopic measurements for asymptomatic volunteers, trauma patients, and the fluoroscopically imaged cadavers, and the CT-based facet measurements are graphically illustrated in the figures.

The magnitude of head to neck separation seen in every cadaver in the presented study with application of a cervical collar is as alarming as that seen in our clinical trauma patients.[5] Current trauma guidelines may not adequately protect against this effect in the management of trauma victims.

The amount of intervertebral motion that was measured in the group 1 cadavers was nearly identical to that measured in our trauma patients, and the magnitude is similar to that of clinical reports of upper cervical dissociative injuries.[27-31]





Theses figures demonstrate patients with OCI (occipito-cervical dissociative injuries) with and without cervical collars and how the injury is augmented and made worse by collar application since that creates distractive forces that tend to push the head away from the shoulders and results in separation between the injured intervertebral segments.

Although some of those reported patients survived, the majority of the injuries resulted in death or disability.[27-31] Harris, et al. noted that all but one of the 23 patients who died of neck injuries had grossly abnormal occipital-vertebral relationships.[27] The magnitude of distraction measured at the basion-dens interval in these studies is similar to the axial distraction of the occiput from the spine that we measured in our cadavers.[27-30, 32]

Conclusions

The current presentation of our data supports several previous studies in suggesting that extrication collar designs can effectively push the head away from the shoulders resulting in grossly abnormal displacements between the occiput and the spine in the presence of a dissociative injury to the HNS complex. Although these collars are applied to millions of trauma victims each year with the intent of protecting against secondary injuries in the rare case of a serious cervical spine injury, it is in these very unstable spine injuries that the collars may be doing more harm than good. While no evidence was found in the literature to substantiate that cervical collars can truly prevent abnormal motion of a severely injured spine in a trauma patient, the current cadaver study provides supportive physical evidence that well-intentioned protocols may be devastatingly harmful.

Guidelines for cervical immobilization have changed over time from recommending in-line traction to recommending in-line stabilization. We applaud this move and suggest that definitive evidence based studies be conducted to assess optimal HNS complex stabilization techniques, their development and inclusion in future trauma guideline recommendations. These observations raise the question for a need of an entirely new concept of EMS and pre-operative cervical spine and head stabilization.

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Internal Decapitation
Survival After Head to Neck Dissociation Injuries

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Previously published in *Spine*, Volume 33, Number 16, pp 1744–1749. Permission to republish granted by Lippincott Williams & Wilkins

Study Design: Case series. **Objective:** To describe survival and outcomes after occipitocervical dissociation injuries. **Summary of Background Data:** Historically, occipitocervical dissociation injuries have a high rate of associated neurologic deficit with a relatively high incidence of mortality. **Methods:** Six patients with occipitocervical dissociation injuries are reported and their management and imaging findings reviewed. Possible contributory factors for survival are discussed. **Results:** All patients had upper neck and head dissociation injuries. The pattern of injury in all of these cases included a distraction type mechanism. All cases demonstrated soft tissue disruption in the zone of injury, which was consistent and apparent on all imaging studies. In these patients, the extent and severity of injury was more apparent on magnetic resonance imaging (MRI) than on radiograph or computed tomography scan. Management of these injuries included immobilization followed by surgery with particular care taken to avoid application of distraction forces to the neck. **Conclusion:** Patients with occipitocervical dissociation injuries may survive their injury and even retain neurologic integrity. Initial in-line head stabilization is emphasized to prevent catastrophic neurologic injury. The resting osseous relationships and vertebral alignment at the time of imaging evaluation may be deceivingly normal, and the damage often primarily or exclusively involves disruption of the perivertebral soft tissue structures. Prevertebral soft tissue swelling was apparent in all cases. For these injuries that involve primarily damage to the ligamentous structures, MRI seems to be the optimal test for revealing the magnitude of the injury. **Key words:** soft tissue spinal injury, MRI, head to neck dissociation, occipitocervical dissociation, upper neck injury.

Historically, occipitocervical injuries have been frequently recognized as catastrophic. If victims initially survive such injuries, then significant neurologic impairment often ensues. Despite the improved trauma care delivery system, there are only occasional case reports of successful management of these injuries.[1–3] We describe a case series of patients with occipitocervical dissociation treated at our facility over the past 12 months with more favorable outcomes, including resumption of functional activity in most cases. Lessons learned through their initial workup, assessment, and treatment are discussed.

Materials and Methods

Case Series

Six patients presented with occipitocervical dissociation. Neurologically, all patients were at least American Spinal Injury Association (ASIA) class D at the time of the initial evaluation. Transportation and initial life sustaining resuscitative treatment was successful in all cases. Tetraparesis occurred in 1 case after arrival to the hospital. Demographic data and trauma-related details are summarized in Table 1. The injury patterns in five cases were the result of high energy motor vehicle accidents. One case resulted from low energy trauma with underlying joint instability. The final event leading to medical evaluation included a distraction type mechanism of injury in all cases.

Clinical findings included limited painful guarding of neck motion in all cases and visible external soft tissue swelling about the upper neck that was apparent in two cases (Figure 1). Five patients arrived to the emergency department (ED) with a high level of neurologic function. Plain radiographs demonstrated either minimal or no evidence of skeletal injury or malalignment (Table 2). However, prevertebral soft tissue shadows were greater than normal. Computed tomography (CT) scan was more revealing, and with critical review, some abnormality was seen in all cases, although, most often the osseous abnormalities were subtle and underestimated the true extent of injury. The hallmark of these injuries was extensive soft tissue disruption of the upper cervical motion segments (Figures 2–4). The scope of the injury and implications relevant to extent of instability were easily recognized on magnetic resonance imaging (MRI), with specific imaging findings detailed in Table 2.

After appreciating the full extent of the injuries, all patients were surgically stabilized with internal fixation and fusion. Positioning of patients was done with extreme care to maintain in-line stabilization. The cervical spine was stabilized using a cervical collar and Mayfield tongs. Care was taken to maintain the head in-line with the torso and to prevent any excessive motion. Although no traction was applied, once the patients were anesthetized and lost their protective muscle tone, abnormal intervertebral distraction caused by the cervical collar in two patients was noticed (Figures 5 and 6). In these cases, removal of the cervical collar and compressive force on the head toward the torso was successful in reducing the deformity until the head was secured in the tongs and Mayfield holder. Surgical stabilization included a posterior occipitocervical fusion and instrumentation in all cases.

One patient suffered a complete neurologic paresis at the level of C1. This occurred sometime between intubation in the emergency room and weaning from sedation the following day. On arrival to the ED, the patient appeared to have a massive trauma burden and up to that point had been very noncompliant and agitated. For pain control and optimal

Table 1. Demographics and Trauma Related Details

Case	LOI	MOI	ISS	Surgical Procedure	COI	Sex	Age
1	Occiput–C1, C1–C2	Flexion distraction	29	Posterior instrumented fusion occiput to C3	MVA	M	31
2	Occipital condyle–C1, C1–C2	Distraction	27	Open reduction, posterior instrumented fusion occiput to C4	Autopedestrian accident	F	19
3	Occiput–C1–C2	Fall from height	NA	Posterior instrumented fusion occiput to C4	Fall from height	M	56
4	Occiput–C1–C2–C3	Distraction		C1–C3 posterior instrumented fusion and Minerva brace	MVA	M	45
5	Occiput–C1–C4	Flexion distraction	12	Posterior instrumented fusion occiput to C5	MVA	M	20
6	Occiput–C1–C2	Flexion distraction	75	Posterior instrumented fusion occiput to C4	MVA	F	20

LOI indicates level of injury; MOI, mechanism of injury; ISS, injury severity scale; COI, cause of injury.

management, this patient was intubated with in-line head stabilization while wearing a cervical collar. Cervical spine precautions were maintained throughout the hospital course. With diagnostic work up, in addition to solid organ abdominal injuries and a femur fracture, an occipitocervical injury was found. At this point, the cervical spine was further immobilized with sandbags and tape up to the time of the patient's cervical spine surgery. It was never determined when the actual neurologic injury occurred, but speculation was that distraction was more likely at fault than some form of rotation.

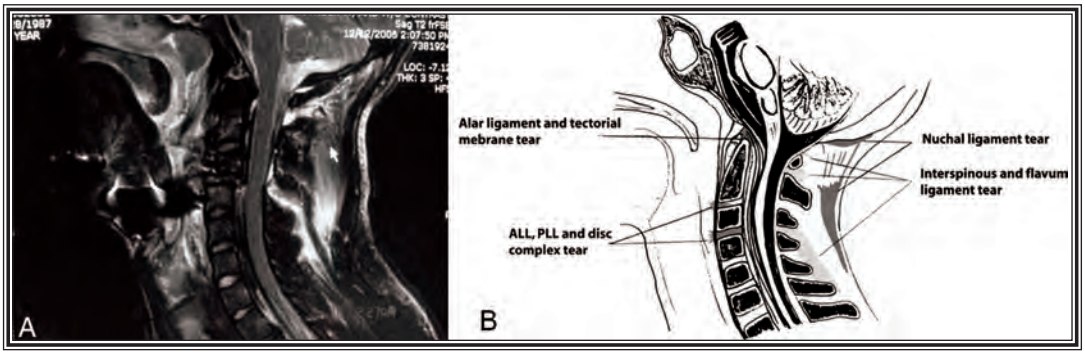

Figure 2. *A Sagittal STIR sequence MRI of patient no. 5 demonstrating extensive prevertebral soft tissue swelling and ligamentous injury at occiput to C4, including the ligamentum nuchae, interspinous ligaments, ligamentum flavum, posterior longitudinal ligament, intervertebral disc complex, and anterior longitudinal ligament (Table 2). Note esophageal rupture anterior to C3–C4. B Drawing of MRI on the left delineating the injured soft tissue structures and ligaments.*

Figure 1. *Posterior appearance of the neck in a 20-year old thin patient (patient no. 5) demonstrating significant soft tissue swelling on the lateral sides of the upper to middle neck.*

Discussion

In trauma victims, cervical spine injuries are not only common, but, because of their association with potentially poor functional outcomes, can also be very costly and functionally devastating. This particularly applies to unstable cervical injuries that can result in neurologic deficits and subsequent significant morbidity or even mortality. It is estimated that 10,000 new cases of spinal cord injury occur each year in the United States, of which 35.9% are caused by vehicle crashes with annual aggregate direct costs of $3.48 billion.[4]

Approximately 5% to 10% of unconscious patients, who present to the ED as a result of a motor vehicle accident or a fall, may have a major injury to the cervical spine.[5]

Proper stabilization of the cervical spine in a neutral position until the true extent of injury is diagnosed can minimize or prevent development of further neurologic sequelae and even death. Over recent decades, standardized protocols and advancing imaging technology have improved diagnosis, speed, delivery of care, and outcomes of cervical injuries. When symptoms are consistent with a cervical spine injury, or when trauma can potentially injure the cervical spine, the Advanced Trauma Life Support (ATLS) protocol mandates assessing the airway, breathing, and circulation with proper manual in-line stabilization of the neck, usually with a cervical collar and eventually a backboard.[6] Intubation may be required, again with emphasis on the appropriate protection of the cervical spine. These precautions continue through the emergency room evaluation until a specific injury is either ruled out or identified, and in some instances, may even extend into the critical care hospitalization period.

Less than 100 severe occipitocervical injury survivors have been reported.[1] The true incidence is uncertain and two series of postmortem evaluation of victims of motor vehicle collisions attributed death to occipitocervical injury in approximately 39% of the cervical injury cases studied.[7,8] Postmortem reports using optimal autopsy technique have documented that up to 94% of blunt trauma fatalities had traumatic injuries that included multiple lesions to the facet joints and the intervertebral discs. The lesions found in these studies were all unique for the traumatized victims, with no similar lesions found in any of the patients in the control group of nontraumatic deaths.[9] Interestingly all patients in our case series had MRI evidence of facet joint and ligamentous injuries despite fairly benign initial clinical and radiograph and CT scan findings (Table 2, Figure 2). Because the main features of these injuries seems to involve ligamentous and other soft tissue injury with subtle osseous abnormalities, a high index of suspicion is warranted and evaluation with MRI should be included when these injuries are suspected.

Figure 3. *Intraoperative picture taken during posterior dissection of patient no. 5 showing fragmentation and destruction of nuchal ligament seen during surgical dissection.*

Figure 4. *Intraoperative picture taken during posterior dissection of patient no. 5 showing rupture and avulsion of the interspinous ligament at C3–C4 as seen during surgical dissection.*

A crucial step in the management of patients with severe soft tissue damage to the neck is recognizing the need for an MRI, because it is the MRI that provides the most comprehensive appreciation of the injury. In the patients described in this report, the decision to order an MRI examination was based on general clinical suspicion including a history of high-energy trauma, visible external neck swelling, and subtle evidence of malalignment of the upper cervical spine seen on the CT examination. Any of these should raise suspicion of severe soft tissue damage and suggest careful review of CT findings whereas a cervical MRI should be considered for better appreciation of the soft tissue damage.

This small case series is not sufficient to validate objective measures of alignment. A validated method for detecting malalignment or other findings that represent a significant probability of severe soft tissue damage would be very valuable. Unfortunately, these conditions are likely very dynamic, and the position of the head and neck at the time of imaging may not truly represent the degree of potential malalignment.

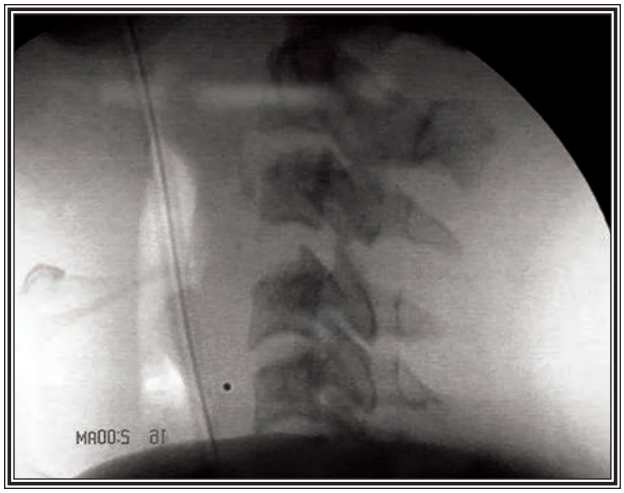

Figure 5. *Intraoperative fluoroscopic picture of patient no. 5 taken once the patient was anesthetized and lost his protective muscle tone. Although no traction was applied and care was taken to maintain the head in-line with the torso and to prevent any excessive motion, the abnormal intervertebral distraction caused by the cervical collar at C3–C4 is noticed which measures four times the normal adjacent caudal disc.*

Our working hypothesis is that application of uncontrolled traction to the head and neck could lead to devastating complications in the presence of severe distractive soft tissue injuries in the upper cervical spine. Although this study does not provide definitive evidence for management guidelines, we believe that a history of high-energy trauma, visible external swelling, or subtle evidence of malalignment of the upper cervical spine should raise suspicion of severe soft tissue damage. In such cases extra steps to avoid any application of uncontrolled traction to the head/neck in the initial

resuscitative efforts (*i.e.*, collar application and intubation) should be employed as these can lead to a good outcome even with injuries that can otherwise result in permanent neurologic injury or death.

Table 2. Imaging Findings

Case	X-ray	CT	MRI
1	No osseous abnormality seen	Craniocervical subluxation – minimal anterior translation of the occipital condyle over C1 on the left C1–C2 facet joint widening (7 mm) 15 mm soft tissue swelling between C1 and the orotracheal tube	T2 hyperintensity at atlanto-occipital and C1–C2 junction with: Ligamentum nuchae edema/tear at the skull attachment Interspinous ligament rupture of the C0–C1 and C1–C2 C0–C1 and C1–C2 joint injuries with joint widening and effusion Apical and cruciform ligament, tectorial membrane edema/tear T2 hyperintensity with enhancement around C1 lateral masses, anterior arch, and odontoid process with C1–C2 subluxation Prevertebral soft tissue edema Normal spinal cord
2	Small chip avulsion fragment proximal to the occipital condyle	Small chip fragment adjacent to occipital condyles at the clivus without apparent subluxation	T2 hyperintensity at atlanto-occipital and C1–C2 junction with: Tectorial membrane rupture between occiput and C1 Interspinous ligament rupture between C1–C2 Occiput-C1 joint capsule rupture and avulsion fracture with periarticular soft issue edema bilaterally Transverse ligament insertion avulsion
3	C1–C2 subluxation	Widening of the atlanto-dens interval of 8-mm with odontoid deviation to the left. Significant prevertebral soft issues swelling	Edema and contrast enhancement of the paraspinal muscles bilaterally and prevertebral fascia and ALL from occiput to C5–C6. Disc herniation at C5–C6 with superior migration on the left.
4	Unremarkable	C1–C2 Widening and anterior translation of facet joints 5 mm C2–C3 Widening and asymmetry of facet joints	T2 hyperintensity at atlanto-occipital and C1–C2 and C2–C3 junction C1–C2 and C2–C3 facet joint capsule rupture and excessive joint fluid Apical ligaments and C0–C1 fluid and capsule rupture
5	2.5 mm retrolisthesis of C3 with respect to C2 and C4 20 mm prevertebral soft tissue swelling	Retrolisthesis of C3 with multiple vertebral body avulsion fracture fragments anterior to C2–C3 disc space, 3-mm widening of C3–C4 facets bilaterally with widening of the interspinous processes at that level	ALL, PLL, bilateral facet joint capsule ligaments and the interspinous ligament disruption at C3–C4 T2 hyperintensity with apparent complete rupture of the ligamentum nuchae from the occiput to C4 Interspinous ligament rupture from the occiput-C1 ,C1–C2,C2–C3,C3–C4 Rupture posterior atlanto-occipital membrane and ligamentum flavum from the C1–C4 PLL and ALL rupture at C2–C3 Esophageal rupture Soft tissue edema surrounding the posterior,lateral, and anterior neck soft tissues.
6	25-mm prevertebral soft tissue swelling between C1 and the endotrachael tube. No other bony abnormality seen	Left occipital condyle fx Avulsion fx of the clivus displaced inferomedialy from the cranio-occipital articulation. Cranio-occipital articulation widened 6 mm bilaterally. 3-mm widening of the C1–C2 articulations. 6-mm translation of the occipitoatlantal and C1–C2 facet joints	Left occipital condyle fx with craniocervical dislocation ligmentum nuchae is edematous but intact Rupture of occipito-atlantal and C1–C2 joint capsules Rupture posterior atlanto-occipital membrane and ligamentum flavum C1–C2. Tectorial membrane rupture Diffuse edema of the spinal cord with contusion at C3–C4. Paraspinal musculature edema posteriorly and prevertebral fascia edema and widening anteriorly occiput to C4

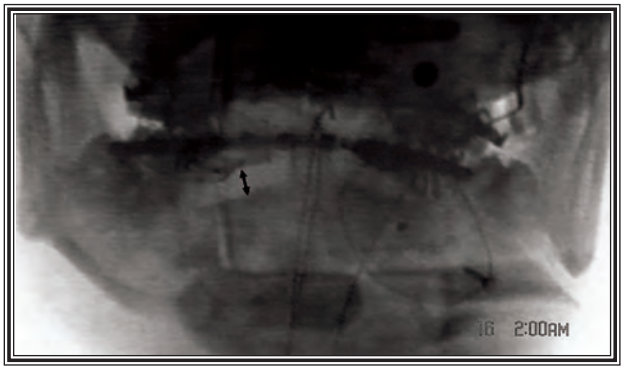

Figure 6. *Intraoperative fluoroscopic picture of patient no. 5 taken once the patient was anesthetized and lost his protective muscle tone. Although no traction was applied and care was taken to maintain the head in-line with the torso and to prevent any excessive motion, the abnormal intervertebral distraction caused by the cervical collar at C1–C2 is noticed (black arrow).*

In the current series, five out of six patients who presented with good neurologic status had no worsening of their neurologic injury and retained a high level of function. One patient suffered a complete spinal cord injury. In this series, all patients were managed similarly in terms of immobilization and evaluation. Patients that required intubation urgently were intubated before knowing the extent of the cervical spine injuries.

It was evident in retrospect that for these injuries, the amount of protection afforded by active muscle control was remarkably substantial, and this stability was completely abolished once the patient was placed under anesthesia. In all cases, during patient positioning for surgery, the head and neck were maintained in compression during attachment of the Mayfield tongs. Despite active effort to maintain compression, in some instances, further adjustments in compression had to be made to optimize anatomic alignment in the Mayfield holder. It was also noted that there was always visibly more distraction in the zone of injury when the patient was asleep than when they were awake, whether prone or supine. Thus, fundamental preoperative management of these injuries is in stark contrast to subaxial cervical injuries, which often require traction for initial reduction and stabilization.

Although this is but a small case series, it helped us appreciate the vital contribution of the paraspinal muscles of the upper cervical spine, which seem to be more essential for stability here than in other areas of the spine. Once this muscle tone is eliminated, these patients become substantially more vulnerable to harmful distractive forces. This is particularly true at the occipitocervical junction where there is relatively little bony coupling and where there is no disc. Stability at this level depends almost entirely on the ligaments and the muscles and is easily subject to adverse translational and/or rotational forces in all six degrees of freedom. Thus initial in-line head stabilization and immobilization is of crucial importance to the survival and treatment of these patients.

The established standard of care from the ATLS protocol mandates the application of a cervical collar and/or in-line stabilization of the cervical spine. However, like many established practices, spinal immobilization has never been studied in controlled, randomized trials.[10] Manual in-line stabilization has been supported by less rigorous investigations, including studies in uninjured volunteers,[11,12] patients in the immediate postmortem period with documented injuries,[13] cadaveric models,[14] and case series.[15–19] Recent data suggest

that manual in-line stabilization may increase subluxation at unstable segments.[20] The available literature suggests that direct laryngoscopy and orotracheal intubation is unlikely to cause dangerous cervical spine movement and that manual in-line stabilization does not limit the movement that does occur during intubation.[21] Traction is not an acceptable alternative, because it is ineffective for stabilization and causes significant distraction.[11–13,20] This calls for a clear understanding that true in-line stabilization should be secured in all planes and particular effort should be made to avoid traction or rotation.

Application of cervical collars should take this into consideration as well. Excessively large collars or those strapped tightly around the neck may cause distracting forces that push the head away from the torso. Because traction may be deleterious in the truly unstable upper cervical injuries, cervical collars may have the potential of aggravating the injury by the distractive forces they apply on the spine. It is important that these braces maintain in-line stabilization with minimal traction until the exact nature of the cervical injury is understood.

In summary, although occipitocervical dissociation is a potentially lethal injury, survival is possible, and may be improved by carefully managing the upper cervical spine during the initial evaluation period. This necessitates *in situ* stabilization of the cervical spine with proper sizing and fitting of cervical collars and careful management during the evaluation process. This becomes even more important when patients have no protective muscle tone, either as a result of head injury or from sedation.

Key Points

- Survival after occipitocervical dissociation injuries is rare, but possible with retention of neurologic integrity.
- History of high-energy trauma, visible external neck swelling, and subtle evidence of malalignment of the spine seen on the CT examination should raise suspicion of severe soft tissue cervical damage and an MRI should be considered.
- Initial in-line but nondistractive stabilization should be applied in the emergency setting when cervical spine injury is suspected.
- Proper sizing and fitting of cervical collars, and careful management during the initial emergency evaluation process can prevent aggravation of distractive cervical spine injuries.
- The extent and severity of such injuries particularly the associated cervical soft tissue injury is understated on plain radiographs and CT whereas it is most apparent on MRI.

Acknowledgments

The authors thank Mrs. Merle Husband and Mrs. Lilia Roman for their valuable assistance.

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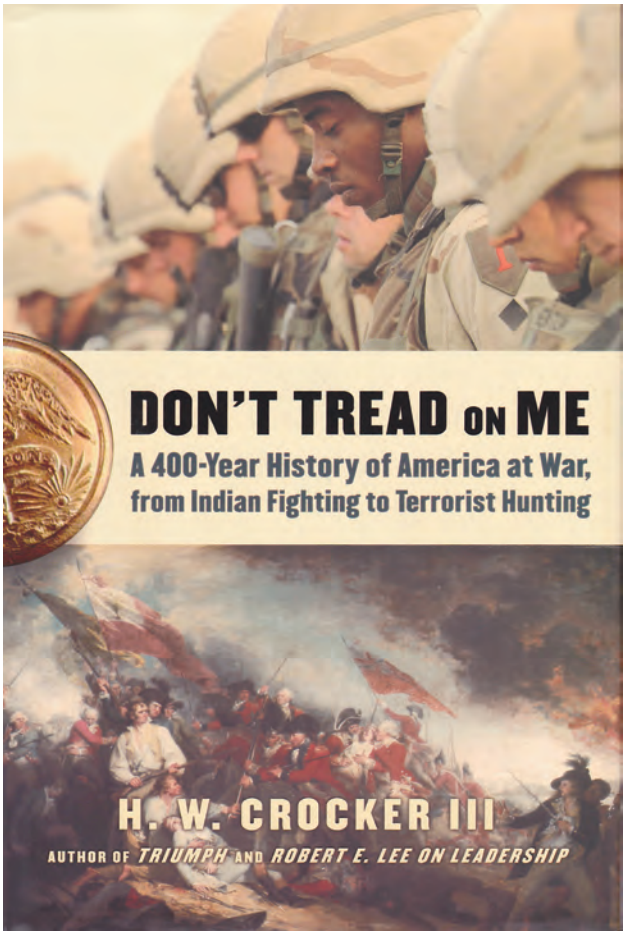
Book Reviews

Don't Tread on Me: A 400-Year History of America at War, from Indian Fighting to Terrorist Hunting

By H. W. Crocker III; MAJ W. D. Thompson
ISBN13: 9781400053636 ISBN10: 1400053633
Publisher: Random House Publication Date: September 2006 Pages: 452

Review by LTC Craig A. Myatt



H. W. Crocker III is the author of *Triumph: The Power and the Glory of the Catholic Church, A 2,000-Year History* and *Robert E. Lee on Leadership: Executive Lessons in Character, Courage, and Vision*, as well as the prize-winning comic novel, *The Old Limey*. He has worked as a journalist, speechwriter for the governor of California, and book editor. He lives near the battlefields of Northern Virginia.

This is one of my all time favorite books. It rarely ever leaves the cache of books I keep on my side of the bed and when it does, I will invariably pull it out for a partial re-read at some point during the year. H. W. Crocker III irreverently captures the spirit of our great nation and the men who have been fighting our wars since before the French and Indian War. If you are looking for politically correct references to our former and current enemies, forget it. You will not find it here.

As addressed in the prologue, "The Summons of the Trumpet," this is not a blow-by-blow account of every battle and campaign in which the United States was involved. It does not discuss technological innovation and its effect on the military, nor does it seek to describe obscure new factoids of American military history through an exhaustive search of previously undiscovered papers. Rather, it is an argument of American history based on American wars. This book effectively argues that America is a country of practical, independent minded people, shaped largely by our experiences in carving a nation from the wilderness. Americans are ambitious and well meaning – we naturally carve out an "empire of liberty;" we also are equipped with bravery, ingenuity and guts – all necessary traits forged as we moved from seaside settlements on the east coast westward. The book does a superb job of reminding today's fighting men of this: *Nemo me impune lacessi t*- "no one crosses me with impunity."

Crocker's book opens with the gentle art of scalping. The puritans, those nice, friendly, with the Indians, turkey eating folk in those great hats – had reached their limit after King Phillip's War in 1675. Opposed to maypoles and portrayed constantly throughout elementary school history as being at peace with the "friendly" Indians, they struck back at the raiding tribes of the Northeast, eventually planting King Phillip's head on a pole in Plymouth. The Indians got the message – for now.

And so it starts … a rollicking adventure through America's wars. Through the French and Indian War with a great description of George Washington as a Lieutenant Colonel, (and whose actions in Great Meadows, Pennsylvania in 1754 outraged the French who were always easily outraged) was a precursor to the actual start of the

French and Indian War in 1756; to Major Robert Rogers, who led Rogers' Rangers, but who died as a drunkard in an English prison. It continues through our war for independence, started against an empire we would not play second fiddle to, all the way to through the 1800s until the present day.

Crocker does a great job of describing Lieutenant Stephen Decatur, who snuck into Tripoli Harbor, split some pirate skulls and snuck out again, earning a promotion as the youngest ever U.S. Navy Captain. This action of course was a pre-game workup to the main event in the war against the Barbary Pirates – U.S. Marine Captain Presley O'Bannon's splendid expedition across a thousand miles of desert that resulted in an end of piracy against United States by several nations on the Barbary Coast.

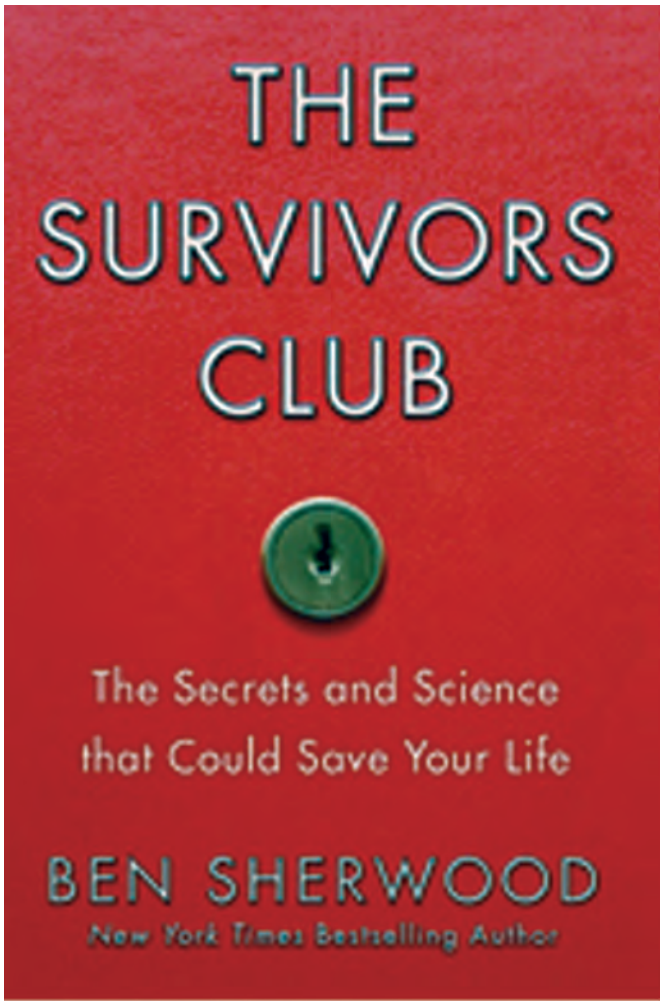
And so it goes on. My favorite story is that of young Lieutenants Douglas MacArthur and George Patton, out for some outdoor amusement in northern Mexico, chasing down Pancho Villa's cronies. Patton, after raiding a Villa general's home and having gunned down the general, strapped the dead Villaist to the hood of his car and drove back to camp.

This is a must read, if not for the great, but little known stories of our American military history, then for a reminder of our roots and what makes the American fighting man so deadly an opponent. We as Americans are practical, unpolished, and giving to a fault, yet also deadly when crossed. Crocker does a superb job of explaining this and giving tribute to the men who over the last 200-plus years have carved out this nation and protected liberty worldwide. Don't Tread on Me. *Nemo me impune lacessit.*

The Survivors Club: The Secrets and Science that Could Save Your Life

By Ben Sherwood
New York, NY: Hachette Book Group. 2010. ISBN: 978-0-446-58024-3.

Review by William J. Gephart



Although this otherwise excellent book touts itself as revealing some of the "science" behind survival, I will warn the reader up front that this book is pretty light on science. Readers will be disappointed if they expect any more than a brief overview of what some researchers have discovered in their study of survival, and what some psychologists hypothesize about the mind's workings during a survival situation. The science in this book is definitely written for the layperson, i.e., for readers with no more than a high school science background consisting of perhaps biology and chemistry – or even less.

On the other hand, this book should still be a fascinating read for most in the SOF community, especially if one has had any type of survival, evasion, resistance, and escape (SERE) training, and/or been in a survival-type situation. The author reviews several vignettes covered during SERE training (e.g., Terry Anderson's 2,454 days, mostly blind-folded and chained to a wall in Lebanon), or reported in the news media (e.g., The female "Central Park jogger" who was beaten, raped, and left for dead, but who survived and thrived, despite suffering Class IV hemorrhagic shock and having a core temperature of 85 degrees).

While these "case reviews" are interesting, the author also includes several more well-documented incidents that are not so familiar to most of us. One is a formerly suicidal man who survived a 240-foot jump off the Golden Gate Bridge – unlike the over 1,250 "successful" jumpers from that bridge.

Aside from these generally interesting vignettes – most of which include a *very* basic overview of either anatomy or physiology/pathophysiology – the book includes references to some of the carbohydrate *versus* placebo studies of SOF students in SERE school. Other familiar references include the so-called "Rule of Threes" - that one can live three minutes without air, three hours in extreme weather without shelter, three days without water, three weeks without food, etc.

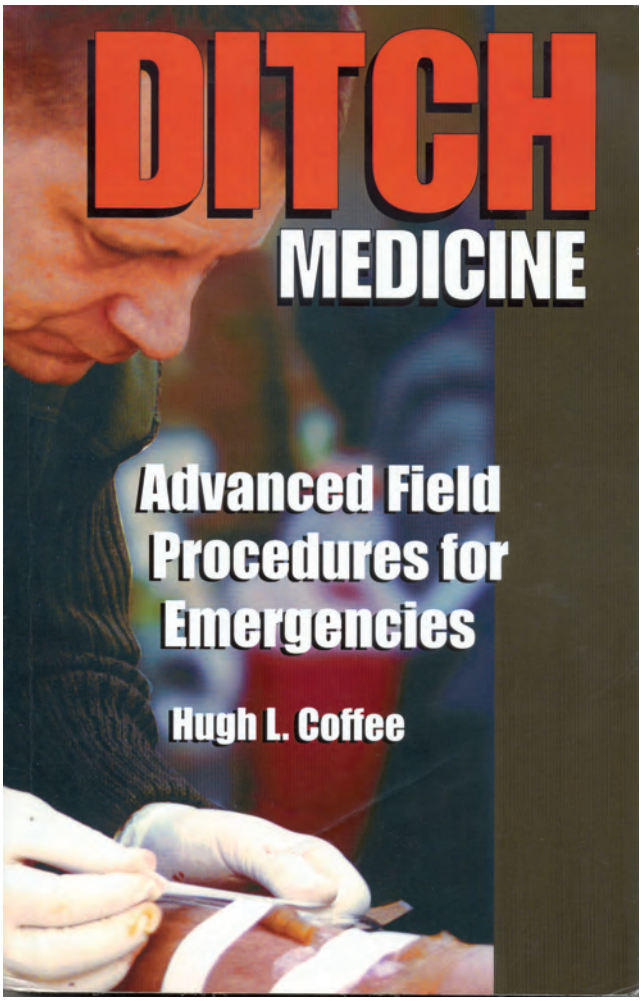
While the author's strong point is certainly not his science background, some of the greatest value he brings to the book is his fame as an executive producer of ABC's *Good Morning America*, which gave him personal access to interview the survivors mentioned above. He also interviewed many other famous survivors – such as Nando Parrado, of *Alive* fame, who survived a plane crash at 12,000 feet (roughly 4,000 meters) for 72 days in the Andes and finally walked 45 miles (~70 km) through frozen, mountainous terrain, leading directly to the rescue of his few other fellow survivors.

In short, this book is "light" intellectual reading for anyone in the SOF community. Furthermore, it is a "must-read" for SOF medical folks who do *not* have a strong science background. The appendices at the back of the book are especially useful since they include guidance for more detailed reading on most of the subjects that the author only covers lightly.

Ditch Medicine: Advanced Field Procedures for Emergencies

By Hugh L. Coffee
Boulder Colorado: Paladin Press. 2002. ISBN 13: 978-1-58160-390-3.

Review by LTC Craig A. Myatt



Concise and well illustrated, *Ditch Medicine: Advanced Field Procedures for Emergencies* is a book worth reading for a quick review of basic and advanced procedures for medical treatment in field and combat environments. Authored by Hugh Coffee, the text presents topics appealing to any combat medic trained as an advanced tactical practitioner. The latest edition of the text, released approximately nine years following initial publication in 1993, is somewhat out-dated. Yet, it remains extremely useful as a companion text to the 2008 *Special Operations Forces Medical Handbook, 2nd edition*.

The lure to Coffee's book is that it provides straightforward instruction in field trauma first-aid and initial medical treatment in hostile environments. That instruction includes the basics of blood loss management, such as clamping blood vessels and grasping forceps, wound closure, suture removal, chest decompression and drainage, airway management, amputations, and burn treatment. The target reader is the pre-hospital care provider, referred to by Coffee as the PHCP.

In the military health system, the PHCP can be any survivalist with limited, or constrained, access to Level II and III medical care or higher. Preferably, the PHCP has at least minimal medical lifesaving training to provide initial care in a hostile operating environment. Thus, the PHCP includes anyone ranging from a motivated layman working in isolation to a certified combat life saver, corpsman, advanced tactical practitioner, or licensed physician.

If one accepts the premise that psychological fitness can be developed using the same principles as physical fitness, then Coffee's discussion of nutritional and emotional support in the course of PHCP initial patient care and stabilization will resonate well for the perspective reader. Coffee emphasizes a holistic approach in providing immediate nutritional and emotional support to enhance an injured patient's regenerative powers following stabilization. What Coffee does not cover in his discussion of assessment and treatment following patient stabilization is detailed discussion on alterations in consciousness. The current incidence of traumatic brain injury in military personnel leaves the reader anticipating at least some discussion on mental status or acute concussion evaluations.

The relevance of gathering early information on neuropsychological function for follow up assessment after potential head injury is growing stronger in current military operations. Coffee's holistic approach in providing immediate nutritional and emotional support to enhance an injured patient's regenerative powers following stabilization in a hostile environment is a positive step in the right direction. In the end the reader anticipates that if Coffee, with his extensive background as a paramedic, is working on a future edition, or second volume, of *Ditch Medicine* that he will provide selective discussion on the usefulness of a PHCP evaluating patients for altered consciousness and suspected concussion.

From the Command Surgeon

Virgil "Tom" Deal, MD
COL, USA
Command Surgeon
HQ USSOCOM

Greetings to all from the Tampa office. Even though we're approaching the peak of the annual Florida "Pollen Celebration," it's a great time to be on the SOCOM team. The work that the SOF medical team is doing downrange not only is the stuff of legends, it is a legend. I've recently attended a couple of major meetings focusing on trauma treatment and I can tell you that there is a keen awareness of the miracles that you're all performing on a daily basis. The contributions of SOF medicine in the development of trauma treatment on today's battlefield have been quietly woven into the fabric of current practices, tools, and meds for several decades. As I type, you're continuing to question, plan, and innovate so that tomorrow's care will be even better.

Let me run through a little of what's occupying the radar here in the rear: I was fortunate to hear a presentation at the American College of Surgeon's trauma meeting by one of the authors whose work on cervical spine injuries we'd reviewed in the TCCC committee. His presentation and one of his published articles are in the Previously Published section of this issue. If you're not up to speed on recent thinking about C-spine stabilization in the field, I'd encourage you to give it a careful read. If reading it gives you a bright idea on how to better safeguard the injured C-spine while getting a casualty out of a damaged vehicle, we're all ears.

Regarding two of the chief clinical concerns from these conflicts, there are two directives (DTMs) making their way around on mental health guidelines and TBI issues. Any feedback on how you're implementing those is always appreciated. The guidance for TBI is focused on early identification and on preventing cumulative damage from multiple blast exposures. With further biochemical markers of injury and dynamic means of imaging being actively researched, these clinical fields may soon look a lot different.

We're continuing to work with the trauma community to refine what's going to be in the textbooks on pre-hospital fluid resuscitation. There is no doubt in my mind that with your understanding of the basics of low volume resuscitation, SOF medics are making the right choices daily on if, when, and where to use what IV fluids. We're hoping to soon be able to add freeze-dried plasma to your list of tools.

If you didn't catch the recent news, the Air Force's Wilford Hall Medical Center has successfully transplanted a hand. We're closely following the work that's being done there as well as in civilian centers on transplants, which may well hold a great deal of benefit for some of our own. Where stem cell research may end up making a contribution to casualty care remains to be seen, but there are at least a few applications that may have direct benefit to casualty care.

I'll wrap up with that, but let me ask that when you see a task or mission that needs a better widget than the M1A1 widget that you're currently issued, or you experience some clear gap in capabilities, let us know, either directly or through the lessons learned pipeline. Our Biomedical Steering Committee tries to meet quarterly and focuses on facilitating research that is of most direct benefit to you and what you all do.

For the courage, competence, and dedication that you bring to these fights, Thanks and God Bless!

COMPONENT SURGEON

USASOC

Peter J. Benson, MD
COL, USA
Command Surgeon

As USASOC forces continue at the forefront of operational engagement around the world, the USASOC Surgeon's office remains committed to fielding the best trained and equipped Special Operations medical providers in the world. For over 50 years the U.S. Army's Special Forces Medical Sergeant (18D), and now the Special Operations Combat Medic (SOCM) have been the models that other forces have tried to achieve. The selection, training, equipping, and fielding of these independent providers are a proven and effective system. But that system cannot and must not be static. New developments in clinical techniques for trauma management and medical care, technological innovations, and changes in mission or operational employment all require that the system be adaptive.

Given constrained resources for class space, training time, and funding – it is absolutely vital that a continuous process for evaluation and effectiveness shapes the medic training courses. It is critical that Army Special Operations Forces (ARSOF) medics and professional providers stay engaged in the process by submitting Lessons Learned, After Action Report (AAR) comments, and constructive input. Lessons Learned should be entered in the Joint Lessons Learned Information System (JLLIS). Additionally AARs or comments can be forwarded to the USASOC Surgeon's Office by e-mail, or through the 18D website. Feedback on training, equipment, and operations from the Medic-Operator is central to keeping the training system valid to the fight. It's easy to complain about the "system." I challenge all providers to take the harder road and to work to improve it by providing constructive recommendations. This means taking an active role in improving training subjects, simulations, equipment sets, and tactics, techniques, and procedures (TTPs). The USASOC Surgeon's Office, in concert with the Special Warfare Center, and the Special Warfare Medical Group, will work toward a formalized process to enhance feedback into the ARSOF medic generation system.

The ongoing effort in Afghanistan and Iraq – and in other theaters – will continue to require the full spectrum of ARSOF medical skills, from combat trauma management in the austere environment, to non-kinetic medical engagement with Civil-Military operations – and everything in between. All USASOC medics and credentialed providers need to fully understand the role that Health Service Support operations play in the strategy and be fully competent and vested in the operational planning process. The USASOC medical community is the leader in the application of HSS in Counterinsurgency, Unconventional Warfare and Foreign Internal Defense for SOCOM and the Department of Defense. All should fully understand the ARSOF and ARSOF medical doctrine and capabilities, as well as its limitations, to ensure that providers are fully utilized in their proper roles, and remain the leaders in SOF medicine for the nation.

Sine Pari

COMPONENT SURGEON

AFSOC

Bart Iddins, MD
Brig Gen, USAF
Command Surgeon

Previous articles focused on Air Force Special Operations Command (AFSOC) Surgeon's priorities 1 through 6; this article focuses on **Priority 7:** Maintain competency, improve and sustain clinical skills currency, and enhance proficiency for all AFSOC medical personnel. The JSOM Winter 2009 edition provided the complete priority list. For detailed reviews of Priorities 1 through 3, refer to JSOM's Spring 2009 edition; Summer 2009 edition for Priority 4; Fall 2009 edition for Priority 5; and see the Winter 2010 edition for Priority 6.

The obvious goal of all military healthcare personnel is to maintain the highest levels of competency and clinical currency in order to provide the finest medical care in both the in-garrison and in combat and/or austere environments. Healthcare professionals uniformly agree that competency and clinical skills currency are critically important; however, this consensus is less than uniform when regarding how to define, measure, sustain, and enforce clinical skills currency and proficiency. Consequently, for the purposes of this article and for AFSOC/SG's Priority 7, competency and currency are defined based upon the *Air Force Doctrine Document (AFDD) 2.4.2. Health Services*. This doctrine document states: "Competency (*e.g.*, initial education, credentials, certifications) and currency (recent experience practicing in the area of competency) are basic fibers of readiness woven throughout medical readiness education and training."

Major (Dr.) Jonathan Letterman, Medical Director, Army of the Potomac, wrote, "It is the interest of the Government, aside from all the motives of humanity, to bestow the greatest possible care upon its wounded and sick, and to use every means to preserve the health of those who are well …." In other words, governments must be unequivocally committed – morally, ethically, and in their national interests, to ensure its military members receive nothing less than the very best medical care. It is safe to say that if Major Letterman were alive today, he would be gratified to see that the United States of America heeds his advice and devotes enormous financial, materiel, and personnel resources to ensure its armed forces receive world-class, state-of-the-art medical care regardless of the environment, location, challenges, or circumstances. Regarding the provision of medical care to members of the armed forces, Major Letterman stated further, "When medical officers consider this subject attentively, all their high and important duties will naturally occur to them." While many "high and important duties" are self-evident, the duty to maintain competency and currency must receive continuous, unfaltering attention.

Those we serve have the legitimate expectation that all U.S. military medical personnel are competent and current. In regards to competency, this expectation, or perhaps more correctly, this assumption, is almost uniformly correct. The armed services maintain robust programs and mechanisms in order to ensure competency. These competency assurance programs and mechanisms are highly regulated and routinely inspected by military and civilian agencies. Rare lapses occur, but taken as a whole, military healthcare competency assurance programs possess an enviable record. Currency, on the other hand, is more subjective and attempts made to quantify clinical currency requirements for the plethora of medical specialties, medical disciplines, paraprofessionals, and ancillary medical support personnel are daunting. Nonetheless, objective clinical currency requirements have been defined for many medical career fields, but this is a work in progress and more remains to be done. Furthermore, once appropriate, objective, and measurable clinical currency criteria have been established, there re-

mains the challenge of accessing a patient population that provides the sufficient number and mix of patient encounters and cases that are necessary to meet the established currency requirements.

AFSOC is aggressively tackling this currency dilemma in multiple ways: First, AFSOC incorporated objective and measurable clinical currency criteria for all operational medical career fields (officer and enlisted) into published AFSOC instructions and policies. These clinical currency requirements are enforceable and were derived from USAF instructions/policies, Air Force Medical Service policies, USAF Surgeon General Specialty Consultants, Air Force Medical Operations Agency, and various subject matter experts. Second, AFSOC is attaching operational medical teams to military medical centers and to major civilian medical centers in order to ensure access to patient populations that will provide the patient encounters and cases necessary to meet, or preferably exceed, all clinical currency requirements.

All members of the armed services of the United States of America are serving the cause of freedom. Furthermore, all past, present, and future servicemembers are called upon to make significant sacrifices on a daily basis. Many members of this company of heroes additionally sacrifice their health, their bodies, or their lives. These courageous, selfless public servants and defenders of freedom deserve, and have earned, medical care that is second to none. They deserve to be cared for by medical personnel who are at the top of their game. However, this is absolutely impossible without maintaining clinical competency and clinical currency! As a result, competency and currency must be at the forefront of the "high and important duties" for all military medical personnel. No other requirements, other than operational deployments, should trump the requirement to be clinically competent and clinically current – period! It is a profound honor and solemn duty to deliver medical care to our sick, injured, wounded, and unfortunately, sometimes fatally wounded/dying brothers - and sisters-in-arms; consequently, we must always be at the top of our medical game – anything less is unacceptable! Heed the words of Benjamin Franklin, "By failing to prepare, you are preparing to fail." Obviously, failure is not an option!

COMPONENT SURGEON

NAVSPECWARCOM

Gary Gluck, MD
CAPT, USN
Command Surgeon

Happy Birthday Naval Special Warfare (NSW) Command; you were 23-years-old in April!

Though NSW units have been around since World War II, NSW Command, as an Echelon II headquarters command, has existed for a significantly shorter period of time. Since its inception on April 16th, 1987, NSW Command has made profound strides in standardizing its medical programs and capabilities across the component commands. Casualty tracking is one example of a function that the component command level historically handled. Each component maintained a casualty-tracking database – without continuous or direct oversight by NSW Command. With the advent of the U.S. Special Operations Command (USSOCOM) Care Coalition, and through development of their casualty tracker program, all NSW component commands now utilize the Care Coalition Casualty Tracker. The benefits of utilizing this tracking program span all echelons of NSW and these will be listed in the next paragraph.

First, the component commanders have ready access to the latest updates regarding their casualties. Next, Commander, NSW Command, and the USSOCOM Surgeon's Office have direct awareness and continuous oversight of NSW casualties without reaching out to the components for the latest information. Just as critical, the Care Coalition staff has direct visibility and oversight, thus ensuring casualties receive the optimal attention and benefits they deserve.

The DoD has implemented a long list of new computer-based medical programs since the beginning of Overseas Contingency Operations, and NSW Medicine has been no exception to that trend. Although the Armed Forces Health Longitudinal Technology Application (AHLTA) and the Composite Health Care System (CHCS) have been around for many years, we are now all deeply familiar with the Medical Readiness Reporting System (MRRS) and Electronic Deployment Health Assessment (EDHA) programs. These are fully integrated now into our everyday business practices to give our Commanders real-time readiness data, and to facilitate our deployment readiness efforts.

The next computer-based medical program in our sights is the Immediate Post-Concussion Assessment and Cognitive Testing (ImPACT) for traumatic brain injury (TBI) baseline testing and post-injury evaluation. Mandated by the Assistant Secretary of Defense (Health Affairs), the Automated Neurocognitive Assessment Metrics (ANAM) has been used with varied satisfaction across the Special Operations Forces (SOF) community. Thanks to our colleagues at USASOC, COL Benson and COL Lutz, we were introduced to the benefits of utilizing ImPACT in meeting the requirements of ANAM testing.

ImPACT is a commercial product that was customized for SOF to evaluate risk factors for Post Traumatic Stress Disorder (PTSD), and provides a useful screening tool for PTSD and TBI. Any medical provider with a computer that has internet access can administer the ImPACT soon after injury to help guide proper medical care and the disposition of the injured SOF warrior. We are currently working with the ImPACT organization and the U.S. Army Special Operations Command (USASOC) to facilitate our implementation of this useful tool across the NSW Force.

To master these various computer-based medical programs and provide Echelon II support for our subordinate commands in utilizing these programs, my office is in the process of hiring a full-time medical information management specialist (MIMS). The MIMS will be the primary administrator of computer-based medical programs across NSW, and will facilitate improved management of future computer programs. Additionally, the MIMS will provide continuous oversight of NSW component, individual medical readiness and electronic deployment health assessment compliance as well as maintenance of the NSW Force Medical Office computer-based (portal) website.

The Tactical Athlete Program (TAP) is moving along at a brisk pace. We have already hired a large portion of our human performance and sports medicine experts. As we plan for operational funds to support this program, we are also developing plans for the Tactical Athlete Centers (TAC) at the component command level. We greatly appreciate the outstanding support from the USSOCOM Surgeon's Office and the Commodores and their respective staffs to further our TAP efforts. With every passing day, we come closer to creating an environment that maximizes warrior performance, enhances career longevity, and minimizes injuries. We are fortunate to have acquired some of the world's leading subject-matter experts who are actively developing mission-specific exercise and nutrition protocols for our units and individual operators.

Designing NSW's best "downrange" medical model is a continuous effort. We have seen several changes in how NSW provides combat medical care over the last decade. With the conversion of Hospital Corpsmen (HM) to the SEAL and Special Warfare Combatant Craft (SWCC) rates, we are feeling the secondary effects of those changes. With this conversion, NSW lost the ability to sustain the Independent Duty Corpsman (IDC) skill set for the SEALs and SWCCs. Questions that we are asking our colleagues across NSW include: Does our current SEAL/SWCC Medic Model provide the optimal care for our needs? Does NSW need SEAL/SWCC Independent Duty Medics (IDM) to offer the broad range of skills that our Operators need down range? What will be the training pipeline and refresher training requirement?

I consider it my staff's greatest and most important challenge to ensure the most efficient and advanced medical care for our Operators, both in garrison and in the most austere and isolated environments. The answer isn't always to add more and varied personnel to make up for missing skill sets. The best solution is often the simplest solution. We need one medical provider who can perform the function of Operator, combat trauma medic, and independent duty practitioner with primary care skills and experience. This "new" entity won't replace the need for basic SEAL and SWCC combat medics, but it will add a new pool of more advanced "master medics" who will be able to better support disaggregated NSW operations, and may continue on a medical career path toward becoming a physician, physician assistant, or other healthcare provider. Additional initiatives for us include delineating NSW-specific sustainment training opportunities and requirements for our HMs and IDCs.

Although these course changes will take time to develop, we will "never rest" while we develop the world's finest medical model for our Operators, both in-garrison and while forward-deployed.

Until next time, keep up the great work!

COMPONENT SURGEON

MARSOC

Anthony M. Griffay, MD
CAPT, USN
Command Surgeon

It is hard to believe my first year as the MARSOC Surgeon has passed; time sure can fly. There is a model called the Five Stage Model of Group Development that is frequently used in business to evaluate the processes groups and teams go through. The five stages are: Forming, Storming, Norming, Performing, and Adjourning, and I can honestly say, with the exception of the last one, this year MARSOC has gone through them all. The command is performing at full speed in the Central Command Theater and around the world.

However, in our haste to reach stage four and begin performing, we unfortunately neglected some parts of the first three stages. Now we have begun the painful process of revisiting all four stages and on some days there is no doubt we are functioning in all four stages simultaneously; nevertheless things are moving forward. As an emergency medicine doctor, I do admit I have trouble from time-to-time accepting the glacial speed of change here at the 30,000 foot level, but in the last quarter we have made significant progress in validating the number of Corpsmen needed within MARSOC. We are finally making the necessary changes to the MOS distribution of Corpsmen to support the new formation of the Command better. The Command and I are working with Quantico to resolve these manpower issues, to include getting the right amalgam of personnel to support the mission CONUS and OCONUS. Of course there is a big difference in getting Quantico to agree to a change and actually putting a body on the ground. This difference is what requires the hard work and dedication of the guys on the ground, and it is this difference that my office and Master Chief Saelua have been tirelessly working to fix.

Outside of the manpower issues for the most part little has changed this quarter. We continue to push for more Corpsmen training opportunities like language, critical care transportation, and tropical medicine; while at the same time trying to increase the capabilities of the entire medical support section. We have recommendations and proposals for surgical, evacuation, preventive medicine, humanitarian, and disaster assistance teams, as well as trying to push forward our veterinarian and dentist. My command and I are working with Quantico to resolve these manpower issues, to include getting the right amalgam of personnel to support the mission CONUS and OCONUS. So for now, we continue to move forward; unperceivably forward, but forward none the less. As always our hearts and prayers go out to those deployed and those killed or wounded in the defense of our country and way of life. God Bless.

TSOC SURGEON

SOCPAC

Frank J. Newton, MD
COL USA
Command Surgeon

Earlier this year, the J07 at Special Operations Command, Pacific had the opportunity to participate in a non-lethal Joint Combined Exchange Training exercise (JCET) in Sri Lanka. Following the end of a 30-yr civil war last May with the Liberation Tigers of Tamil Eelam (LTTE), and the aftermath of dealing with the Tsunami of 2004, the Sri Lankans were very interested in participating in further training on disaster planning and medical humanitarian assistance. As a result, the United States conducted a medical outreach activity with the Sri Lankans in their Eastern Province of Kuchchaveli. Our U.S. Special Operations Forces (SOF) participation significantly contributed to the Chief of Mission's goals for this exercise.

In most countries within the Asia-Pacific, one of the top priorities is improving security and civil-military relationships. In this column, I will briefly discuss how we can effectively use "soft power" to increase the population's trust and confidence in their civil and military organizations. Joseph Nye of Harvard University in his book, *Bound to Lead: The Changing Nature of American Power, 1990*, coined the phrase "soft power," which he defined it as a country's ability to get what it wants by attracting rather than coercing others.

My medical planner, Maj Tim Christison, USAF, and I joined Naval Special Warfare Unit 1 (NSW-1) for humanitarian assistance exercises in Eastern Sri Lanka. NSW-1 conducted explosive ordinance disposal and tactical combat casualty care training while we presented two concurrent five-day seminars that we repeated during a second week. Maj Christison has credentials as a Certified Emergency Manager (CEM) through the International Association of Emergency Managers (IAEM), and was well qualified to host the disaster planner's seminars. Co-locating the seminars made it possible to present some topics pertinent to planners and clinicians in a combined forum. Examples included psychological aspects of a disaster and public health implications of a disaster. Fifty-five Ministry of Health (MoH) and military officers and NCOs completed these seminars. Senior defense officers requested that discussions on suicide awareness, post-traumatic stress reactions/disorder and the traumatic effects of blast injury be included in clinician's seminars. We incorporated these topics into the medical humanitarian assistance seminar. In post-seminar critiques, attendees stated that these presentations were very helpful.

We also included a medical outreach program as a capstone exercise. This was a variation on a theme of the medical seminar introduced in the Winter 2010 *JSOM* by MAJ Shawn Alderman's article on *Medical Seminars: A New Paradigm for SOF Counterinsurgency Medical Programs*. We determined that the Ministry of Health's medical officers in the Eastern Province of Kuchchaveli were the key stakeholders. In a collaborative effort with the Sri Lankan MoH, Special Operations Command, Pacific assisted them in planning and conducting a medical outreach exercise. This resulted in sustainable capacity building by emphasizing education, working within the local government's health department, and training 139 participants as Health Volunteers from the "grass roots" within the Eastern Province of Kuchchaveli.

I had several meetings with MoH individuals after arriving in Sri Lanka. We agreed to a basic concept of a two-day medical seminar followed by village health assessments and medical treatment of selected individuals in their homes. The MoH provided twelve health promotion topics on common

preventive medicine subjects for the lay public. MoH personnel-physicians and nurses provided PowerPoint briefs in Tamil at the Kuchchaveli MoH municipal building to the 139 women and men (~90% women) who participated in this three-day event. They represented all 25 villages of the Kuchchavili Province. The team targeted five of the poorest villages from this province for scripted assessments, and visited approximately700 families. The medical seminar was a remarkable success given the large number of Health Volunteers trained who received supervised experience interviewing families and gathered specific health demographics. Five MoH physicians participated in the medical outreach, providing direct patient care in villagers' homes. The MoH also received an enduring educational model for training more Health Volunteers. A significant number of Muslim families in these villages received government-sponsored health interventions that fostered goodwill.

Recommendation to the reader: Whenever possible, revise the MEDCAP concept to reflect the many valuable benefits of the medical seminar format, namely capacity building; enduring benefit; promoting the local medical infrastructure; economical implementation; quickly providing commanders with detailed demographics and access to a broad area of operation; and Wins Hearts and Minds. The Combatant Commander's (COCOM's) engagement plans should incorporate this concept when appropriate as another mission-enhancing Operation, Activity or Action (OAA).

Medical Outreach should address the community's health needs and be appropriate to the level of care that can be realistically and competently sustained. Such activity should build confidence in the host nation's capacity to deliver this essential public service. Ideally, capacity building should be targeted to fill gaps in knowledge and skill that are preventing the delivery of appropriate healthcare. The host nation civil authority remains responsible for the program and should establish the priorities for the medical outreach efforts. When engaging military medical personnel, the host nation should establish the standards and curricula for any training and mentoring undertaken.

SOCPAC Sg and MoH physican making housecall, Sri Lanka

Students attend MEDSEM in Sri Lanka

MEDSEM graduate Sri Lanka

Special Forces Surgeon

USASFC

LTC Andrew Landers, MD
COL, USA
Command Surgeon

Spring greetings from Ft. Bragg, NC. As the seasons change so do the requirements for Special Forces around the globe. We recently completed assignments for the summer 2010 transition. I want to thank those that have served the Regiment with distinction and are now moving on to spread their knowledge to the rest of the Army. I also want to issue a challenge to the newcomers: learn fast, adapt, and leave things better than how you found them.

There are many changes occurring daily. First, we say goodbye to my Senior Enlisted Advisor, MSG Ware; he has decided to move up to the same position at USASOC, under the tutelage of COL Benson. I want to thank MSG Ware for carrying me in his rucksack for the past nine months; he has been a tremendous asset to USASFC (A) and will continue to serve with distinction at USASOC. With departures, come arrivals, I would like to welcome SSG (P) Mike Paul to the USASFC (A) Surgeons Office. SSG (P) Paul is now the medical operations/readiness NCO. His contact information is paulm@ahqb.soc.mil, office number- 910-432-6577. Also, MSG Rick Hines will join the team in June as the new Senior Enlisted Advisor.

USASFC (A) is proud to announce a new initiative, the Tactical Ultrasound Program. The current plan is to distribute one ultrasound per Company, with one additional at Battalion, and two machines at Group (one for the physical therapist). The main emphasis of this program is to have portable, lightweight, and advanced imaging capabilities far forward. Ultrasound is the best means to achieve this goal. The focus must be on training since the instrument is useless unless we properly train how to use it. CPT Bill Vasios will be joining the USASFC (A) Surgeons Office and be in charge of the Tactical Ultrasound Program. CPT Vasios will sign in during early July and hit the ground running. Working with the manufacturer and your availability, we will work initial training for your section as the machines become available. We hope to have the first shipment by mid-summer. Priority will be to those Battalions that are in the queue to deploy. We will also have a one day training seminar at SOMA as part of the ARSOF Medic Conference. This will be a focused, hands-on approach to ultrasound. I feel that this added tool will be of great benefit to the Regiment with lifesaving implications.

Lastly, I want to thank everyone for their tremendous dedication and hard work during these dynamic times. Special Forces are in more locations in greater numbers than any time before in our history. Stay focused on the health of the force, be flexible, and stay informed; and always remember to send in your lessons learned for the betterment of the Regiment.

De Oppresso Liber!

USSOCOM Psychology

LTC Craig A. Myatt, PhD, HQ USSOCOM Psychologist

Commentary on Fundamental Approaches in the Treatment of Suspected Mild-to-Moderate Traumatic Brain Injury

The increased incidence of mild-to-moderate traumatic brain injury (concussion) in military personnel throughout Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF) generated heightened concern over the past several years regarding the use of mental status and acute concussion evaluations in the military health system (MHS). That heightened concern remains in place and is instrumentally important in enhancing the role of psychologists supporting the MHS. The relevance of gathering early information on neuropsychological function for follow up assessment after potential head injury is growing stronger in current military operations. The proactive role taken by military leadership to enhance the capacity for gathering early information on neuropsychological function after potential head injury offers Servicemembers greater access to psychology support capabilities.

Servicemember assessment following apparent, or suspected, head injury is now more systematic than ever before. The summarized guideline on "Primary Care Management of Concussion (mTBI) in a Deployed Setting" is an example. Additionally, simple checklists that allow rapid assessment for monitoring and referral are currently available and clearly outlined in emerging Department of Defense (DoD) policy. The HEADS evaluation, for instance, is a rapid review of symptoms associated with head injury: Headaches (Yes/No); Ears ringing (Yes/No); Amnesia or altered consciousness (Yes/No); Double vision or dizziness (Yes/No); and something feels wrong or is not right (Yes/No). In conjunction with normal unit reporting following a potential head injury that might warrant medical evaluation, a "Yes" response to any of the listed symptoms in the HEADS evaluation is an indication for medical referral and psychology consultation.

With concussion suspected, initial medical evaluation includes application of the MACE (Military Acute Concussion Evaluation). Outcomes on the MACE may then affect decisions within clinical practice guidelines. An effective mnemonic for documentation is CNS: Cognitive score (on the MACE); Neurologic exam (normal or abnormal); and Symptoms (none or at least one). The use of neurobehavioral assessments is not limited to any one tool.

In fact, DoD DTM 09-033 (Directive-Type Memorandum 09-033) indicates that there is no one neuropsychological assessment tool that is recommended over any other. Later this year DTM 09-033 is scheduled to convert to a DoDI (Department of Defense Instruction). The key determinate in the use of a neuropsychological assessment tool is that it evaluate at minimum the following five domains affected by concussion: (1) Attention; (2) Memory; (3) Processing speed; (4) Executive functioning; and (5) Social pragmatics. The ImPACT (Immediate Post Concussion Assessment and Cognitive Testing), the ANAM (Automated Neuropsychological Assessment Metrics), and the RBANS (Repeatable Battery for the Assessment of Neuropsychological Status) are three neuropsychological assessment tools that have been used in contemporary operating environments to evaluate the five domains affected by concussion.

Psychology support capabilities are expanding such that the role of psychologists in the MHS working in direct conjunction with other healthcare providers is becoming more of an established norm. The expanding role of psychologists is both multi-disciplinary and multi-functional. Clinical, operational, and organizational psychology consults are critically important in supporting military leaders, supervisors, and healthcare providers as they weigh decisions regarding assessment, treatment, and follow-up services offered to Servicemembers involved in incidents leading to suspected, or confirmed, concussion.

Primary Care Management of Concussion (mTBI) in a Deployed Setting

TRAUMATIC EVENT OCCURS ~Concussion Suspected~
1. Administer MACE **HISTORY only**—Questions I-VIII (page 1).
2. Confirm concussion (Assessed by medic or higher) must meet both criteria:
   a. Head Injury Event (blast, fall, motor vehicle accident, head impact).
   b. Alteration of Consciousness (dazed, confused, or loss of consciousness).
3. Ask unit if they've noticed any post concussive problems in the individual.

Meets criteria for concussion? — No → Evaluate for other condition

Yes ↓

Concussion Examination (Level 1 or above)
1. Evaluate for Red Flags [a]
2. Perform Neuro Exam, evaluate for Amber Flags [b]

Are Red Flags [a] present? — Yes → Urgent referral to Level 3, Obtain CT Scan.

No ↓

Are Amber Flags [b] Present? — Yes → Is it more than 7 **days** post-injury? — Yes → **EVAC to designated Level 3** for specialty evaluation and rest away from unit → Is it more than **14 days** post-injury? — Yes → EVAC to Level 4; No → **Primary Care Management** (Level 1 or above)

Is it more than 7 days post-injury? — No → **Primary Care Management** (Level 1 or above)

Primary Care Management (Level 1 or above)
1. Manage and document symptoms [c]
2. Profile – 3 days light duty and REST
3. Repeat Concussion Examination in 1-3 days

Are Amber Flags [b] Present? — No ↓

Perform Exertional Testing [e]

Positive symptoms with exertional testing? — Yes → Complete MACE **EXAMINATION** (Questions IX-XIII); No → Complete MACE **EXAMINATION** (Questions IX-XIII)

Complete MACE **EXAMINATION** (Questions IX-XIII) → MACE = 24 or less (impaired)? — Yes → Rest for 24-48 hours. Repeat MACE Examination (Use alternate MACE Form). → MACE = 24 or less (impaired)? — Yes → Consult with a Psychologist or other behavioral health provider for disposition.[f]; No → Provide Education. May Return to Duty. Follow up as necessary.

MACE = 24 or less (impaired)? — No → Provide Education. May Return to Duty. Follow up as necessary.

Document in Electronic Medical Record

[b] Amber Flags (Persisting beyond initial traumatic event):
1. Confusion
2. Slurred speech
3. Unusual behavior
4. Unsteady on feet
5. Weakness
7. Vertigo/Dizziness
8. Headache

[f] Psychology Consult
1. If a psychologist or other provider can conduct neurocognitive testing at the current location, refer the patient for testing.
2. If no neurocognitive test available at current location, contact the nearest psychologist to discuss the best option. Subsequently, the psychologist in conjunction with the provider and patient's Command will weigh the costs and benefits of transporting the patient for further testing versus further rest in place.

[a] Red Flags:
1. Progressively declining level of consciousness
2. Progressive declining neurological exam
3. Pupillary asymmetry
4. Seizures
5. Repeated vomiting
6. Clinician Verified **GCS** < 15
7. LOC Greater than 5 minutes
8. Double vision
9. Worsening headache
10. Neurological Deficit: Motor or Sensory
11. Cannot recognize people or disoriented to place
12. Neurological Ataxia

[c] Primary Care Management:
1. Give educational sheet to all mTBI patients
2. Headache management - use Acetominophen
3. Avoid tramadol, narcotics, NSAID's, ASA, or other platelet inhibitors until cleared for RTD
4. Consider Neurology referral or evacuate to higher level if clinically indicated
5. Screen for anxiety and depression
6. Document concussion diagnosis in EMR [d]

[d] *ICD-9 Codes*
850.0 concussion w/o LOC
850.11 Concussion w/ LOC ≤ 30 min
850.12 Concussion w/ LOC 31-59 min
E979.2 Injury from terrorist explosion blast

[e] Exertional Testing Protocol
1. 65-85% Target Heart Rate (THR = 220-age)
   -using push-up, step aerobic, treadmill, hand crank
2. Assess for symptoms (headache, vertigo, photophobia, balance, dizziness, nausea, tinnitus, visual changes, response to bright light or loud noise)

Guideline Only/Not a substitute for clinical judgment

Version:30APR08

TCCC Updates

Tactical Combat Casualty Care (TCCC) comprises a set of trauma care guidelines that have been customized for use on the battlefield. Begun as a USSOCOM Biomedical Research project in the mid-90s, TCCC is now used widely throughout the U.S. Department of Defense and by coalition partner nations in the current Middle Eastern conflicts. Updates and revisions to TCCC are made as necessary by the Committee on TCCC. This group is a working group of the Defense Health Board, which is the senior external medical advisory body to the Secretary of Defense. The CoTCCC meets quarterly and additionally as needed to perform this function.

The following are some topics of interest discussed by the Committee on Tactical Combat Casualty Care held 9-10 February 2010.

TCCC Special Award **Dr. Frank Butler**

A CoTCCC Special Award was presented to SFC Jeremy Williamson. SFC Williamson is retiring from the 75th Ranger Regiment after a distinguished career in the Army. He is the medic shown in the TCCC logo and was awarded a plaque acknowledging this and thanking him for his distinguished career as a Ranger medic.

The Rangers have long been leaders in the development and implementation of TCCC and SFC Williamson has been a major contributor to that effort.

USAISR Fluid Resuscitation Conference **COL Lorne Blackbourne**

This conference was sponsored by the U.S. Army Institute of Surgical Research (USAISR) on January 8-9 in Dallas to look at two questions with respect to prehospital fluid resuscitation for combat casualties: 1) Are we currently doing as well as we could be in this area? 2) What new developments in fluid resuscitation are on the horizon?

The conference speakers addressed fluids in three broad categories: 1) FDA-approved resuscitation fluids; 2) oxygen-carrying fluids; and 3) procoagulants. Speakers reviewed the available data and latest research in each of these areas.

It was noted at the conference that there have been relatively few advances in prehospital fluid resuscitation in the last decade. There is currently a lack of reliable data coming in from the battlefield on the success of the current TCCC fluid resuscitation protocol that calls for a hypotensive resuscitation with Hextend approach. Major points from the conference were:

- there was little support from the conference attendees for the large-volume crystalloid prehospital resuscitation strategies that are used by many civilian emergency medical systems;
- there was no finding from the group that TCCC should consider modifying its current fluid resuscitation protocol at this point in time;
- the number one research priority for the DoD in the area of prehospital fluid resuscitation should be reconstituted dried plasma because of its sustained increase in intravascular volume, clotting factors, and buffering effect. Dried plasma is not FDA-approved at present.

A Flight Medic's Experience in OEF **SSG Emmett Spraktes**

SSG Spraktes is a flight medic for the California Highway Patrol and also for 2nd Plt, C Co, 1/168th MEDEVAC (CA National Guard). He presented a casualty scenario in which he cared for three combat casualties.

A 16-man Army dismounted patrol was ambushed near Asadabad in eastern Afghanistan. The unit was taking small-arms and RPG fire and sustained three casualties. One had a gunshot wound to the abdomen and was hypotensive and tachycardic with altered mental status by the time SSG Spraktes arrived and was lowered down to the scene on a hoist under enemy fire. He initiated treatment and then helped to hoist the critical casualty back into the dustoff helicopter while he remained on the ground with the other two casualties (one with a grazing gunshot wound to the right hip, the other with a possible right ankle fracture.) All three casualties survived.

SSG Spraktes' observations, comments and lessons learned included: 1) anticipate a significant shock when someone on the ground first touches the hoist hook on a helicopter; 2) flight medics must be able to perform hoist rescue procedures; 3) MEDEVAC pilots need to be highly skilled and able to fly under very demanding conditions; and 4) flight medics need to be trained to a higher level than they currently are – his recommendation was EMT-Paramedic.

TACEVAC Care Issues **CW2 Jason Penrod**

CW2 Penrod is a MEDEVAC pilot who was also assigned to 2nd Plt, C Co, 1/168th MEDEVAC in Afghanistan. He stated that what the U.S. military does currently in theater in terms of aeromedical evacuation skills and equipment (from point of wounding to level II or III) is below the U. S. civilian standard, which calls for a minimum of a flight paramedic level of training. In his experience, when the DoD is able to deploy in-flight medical personnel who are civilian flight medics, with equipment in the platform commensurate with their skills, the quality of care rendered during TACEVAC improves significantly. He stressed that highly skilled providers are needed from the point of wounding throughout the continuum of care.

CW2 Penrod made the following additional points: 1) documentation of TACEVAC care in Afghanistan has been poor, but is improving; 2) Reserve and National Guard flight medics often have very little interaction with the flight surgeons who are supposed to oversee their professional development; 3) DoD standards for flight medics should be raised to those in the civilian sector to ensure that casualties are well-cared for during MEDVAC and CASEVAC; 4) military flight surgeons who oversee flight medics often have minimal training and experience in trauma; 5) there is a formal process improvement effort in the civilian sector for in-flight care but none in the military for MEDEVAC and CASEVAC care; 6) there is a lack of standardized care protocols for in-flight care in the military as compared to the civilian sector; and 7) the Commission on Accreditation of Medical Transport Services (CAMTS) is the civilian EMS parallel to JCAHO and needs to have a counterpart in the DoD.

The following additional comments were made by meeting attendees:

- There are large disparities in flight medics' training and capabilities. This is one of the biggest problems that we have in theater at present.
- All SOF medics are trained to an EMT-P equivalent level; he doesn't like turning casualties over to someone trained only to an EMT-B level for transport after care has been initiated by SOF medics.
- Suggested assigning ICU nurses and respiratory therapists to dustoff crews in addition to EMT-Ps.
- Civilian paramedic courses may not reflect contemporary battlefield trauma care concepts, particularly in the area of prehospital hemorrhage control.
- Career progression is a problem for 68W medics (including flight medics) – there is an expectation that senior individuals will assume an admin/leadership role.

TCCC Update **Dr. Frank Butler**

A MARADMIN message was recently published which directed implementation of the 2008-2009 changes to the TCCC Guidelines throughout the Marine Corps. It also directs TCCC training for individual Marine combatants.

As noted in the minutes from the November 2009 meeting, Joint Theater Trauma Service records had identified three recent casualties in which prehospital surgical airways were performed incorrectly. Additional feedback from one of the casualty's unit medical officer revealed that the surgical airway was performed at night, during an engagement, by a former 18D medic who worked under the supervision of a wounded unit medic. The casualty had a shattered jaw from a gunshot wound to his face and was combative. Landmarks on the casualty's neck were difficult to identify due to soft tissue swelling. Though the procedure had complications, the cricothyroidotomy did provide a definitive airway and the casualty survived – the lesson being that an evaluation on the success or failure of a medical intervention performed on the battlefield must include a clear understanding of the tactical context.

The new TCCC curriculum presentation entitled "Direct from the Battlefield" (TCCC lessons learned) will be updated on an ongoing basis by the Chairman based on key points noted in the JTTS Trauma Telecons and other in-

formation flowing from theater. The current version of this presentation will be reviewed by CoTCCC members in tomorrow's internal session.

The DHB Core Board was briefed on the TCCC guideline changes pertaining to burn care on 13 November 2009. They wanted to see how the burn changes fit into the other TCCC guidelines and to have more time to consider the proposed change. This issue will be revisited at their next meeting on 1 March. After the briefing on the CoTCCC's recommended battlefield trauma care research priorities, the DHB requested an inclusive brief on the DoD medical research program.

The National Association of EMTs is proceeding with its TCCC training program. The first course will be taught at the Defense Medical Readiness Training Institute next month.

The Marine Corps is currently considering replacing the TK4 tourniquet in its Individual First Aid Kit (IFAK) with either the CAT or the SOFT-T tourniquet.

In the recent mass casualty shooting at Fort Hood, an officer's life was saved by a 68W Army medic. She was wounded in both thighs, and was showing signs of shock despite the attempts of bystanders (including physicians) to control the hemorrhage with direct pressure and improvised tourniquets. The medic had a Combat Application Tourniquet (CAT) with him and applied it to the officer's leg, successfully controlling the hemorrhage. There have been reports from theater of CATs breaking when used. Investigation revealed that counterfeit CATs have been showing up on the battlefield. Ordering CATs through the DoD supply system by the assigned NSN (6515-01-521-7976) instead of by description should eliminate this problem.

Injured globes are still sometimes not being shielded by first responders. Tactical eyewear can be used for this purpose if there is no eye shield in the IFAK. Routine use of tactical eyewear also needs more emphasis.

There were reports at the January USAISR Fluid Resuscitation Conference that the TCCC hypotensive resuscitation with Hextend protocol is often not being used by medics in the field. Assuming that this is true, the question becomes "why not?" Do the medics not have Hextend in their kits? Is there just not enough time to start IVs in the field? Are they following recommendations from other trauma courses to continue to use a large-volume crystalloid approach to prehospital fluid resuscitation? As noted previously in the minutes, there was no recommendation to change the current TCCC fluid resuscitation guidelines from the conference. In a recent study by Proctor at the University of Miami, Hextend was used per TCCC guidelines for initial resuscitation of trauma patients in the emergency department with enough success that Ryder Trauma Center has now made it the standard of care for initial resuscitation. No coagulopathy was seen with Hextend use so long as the maximum infused volume was 1000cc, as called for by the TCCC Guidelines.

A recent article in the *New England Journal of Medicine* reported an association between early treatment of pain with morphine in combat casualties and a reduced incidence of PTSD. In this study, the IV morphine was given in the emergency department. This finding reinforces the importance of early and effective battlefield analgesia and raises the question of why IV morphine or oral transmucosal fentanyl citrate (OTFC) is not being used at the point of injury or during transport to the medical treatment facility.

A greater incidence of spinal injury is being seen in TCCC as the use of IEDs with greater explosive power becomes more prevalent. In the period from July - December 2009, there were 119 casualties with blunt force spinal fractures. Many of these individuals had multiple fractures of the spinal column. Fourteen of the casualties also had spinal cord injuries with neurological deficits. The information available does not reveal whether the spinal cord injuries occurred at the time of wounding or during subsequent treatment and transport.

TCCC Equipment Overview **Maj Brandi Ritter**

Maj Ritter presented an analysis by the Defense Medical Materiel Program Office (DMMPO) of the trauma care equipment contained in service IFAKs and combat medical sets. There are significant differences between the various equipment sets and many do not have key TCCC-recommended items. The most complete equipment sets are those issued to Special Operations medics and combatants, although none of the kits had all the recommended items. These lists will be reformatted to focus more sharply on critical equipment items and re-presented at the next meeting.

TCCC in Naval Surface Forces **CAPT Scott Flinn**

CAPT Flinn reviewed several casualty scenarios that have occurred in the past on surface vessels. On the USS Stark (missile strike in 1987), there were 37 fatalities and 35 wounded. On the Samuel B. Roberts (mine ex-

plosion in 1988), there were 29 wounded, 10 seriously. On the Cole (suicide bomb in the port of Aden in 2000), there were 17 deaths and 37 wounded. In major casualty events aboard ships, there will be a different epidemiology of wounding than is seen in ground combat. Penetrating trauma, blast, blunt force trauma, crush injury, fire, smoke inhalation, and drowning may all play a role as causes of injury and death. Despite mass casualties, the first priority is to save the ship. There may also be men and women overboard who require rescue.

CAPT Flinn reviewed current TCCC training and equipment policies for surface forces. There is a three-day TCCC training course that is taught to Surface Warfare and USMC Independent Duty Corpsmen. Training in burns, smoke inhalation, and blast injury is added to the standard TCCC curriculum. There is also now shipboard training for all hands in basic TCCC lifesaving skills. The 2008 Naval Surface Forces Authorized Medical Allowance List (AMAL) review added necessary TCCC equipment to ships' AMALs. This equipment is preplaced in various locations throughout the ship, since fire, flooding, and structural damage may render some areas on the ship inaccessible in a casualty scenario.

MANAGEMENT OF SUSPECTED SPINAL INJURY IN TCCC **Dr. Keith Gates**

The primary concern in the management of casualties with possible spinal injury is prevention of subsequent injury to the spinal cord itself with the secondary neurological deficits that may ensue.

Pathologic movement of the injured bony skeleton of the spinal column and/or the associated soft tissue structures produces the potential for catastrophic spinal cord injury. (Hadley 2002) Spinal immobilization (SI) can reduce movement of the unstable spine and is routinely undertaken in trauma victims suspected of having unstable spinal injuries to reduce the likelihood of their sustaining neurological deficits. Spinal injury occurs by the two major mechanisms of blunt and penetrating trauma. The American College of Surgeons Advanced Trauma Life Support curriculum does not differentiate between penetrating and blunt trauma in its treatment protocol.

Spinal immobilization is time consuming; however, and requires multiple individuals to perform properly. While widely utilized and taught, the effect of spinal immobilization on mortality and neurologic injury in trauma patients is uncertain. A recent Cochrane review of 4453 papers potentially related to this topic found no randomized, controlled trials to validate the use of spinal immobilization or to document its success in improving outcomes. (Kwan 2001) While not supported by Class I or Class II evidence, SI is based on sound anatomical and mechanical considerations and is supported by many years of clinical experience in trauma management. The basic principles of SI have not changed substantially since their inception and require a C-collar, a long spine board, straps or tape, and a head restraint device. The first step is to provide manual in-line stabilization immediately. If the neck is not in the neutral position, an attempt should be made to achieve alignment. If the patient is awake and co-operative, he or she should actively move their neck into line. If unconscious or unable to co-operate, this is done passively. If there is any pain, neurological deterioration, or resistance to movement, the procedure should be abandoned and the neck splinted in the current position.

Tactical trauma care has traditionally focused on penetrating trauma as the prevalent mechanism of injury based on historical wounding data from armed conflicts. Because penetrating trauma has a very low incidence of spinal cord injury resulting from casualty movement, trauma management guidelines developed for the tactical environment have had a primary emphasis on moving the casualty to cover rapidly to avoid further injury from hostile fire. (Butler 1996) Studies have noted that most victims of penetrating trauma to the neck suffer cord injury from the initial mechanism and rarely from subsequent manipulation. (Arishita 1989) For penetrating trauma, prehospital SI has not been found to be beneficial and may actually complicate care. (Brown 2009) A recent paper by Haut found that for penetrating trauma patients, prehospital SI was associated with twice the mortality seen in non-immobilized patients. (Haut 2010)

The tactical provider must always consider the tactical context and the safety of both provider and casualty. SI as it is typically done in the civilian prehospital sector is time-consuming; it can delay movement of the casualty to a location of relative safety and cause both provider and casualty to be exposed to hostile fire for a longer period of time to accomplish an intervention whose benefit has not been documented.

For these reasons, spinal precautions have not been not been heavily emphasized previously in the Tactical Combat Casualty Care Guidelines, although the need for spinal precautions in blunt trauma casualties is part of the TCCC training curriculum. Due to the increasing number of IED attacks being seen in Iraq and Afghanistan however, blunt trauma is becoming more common as a mechanism of combat injury. Significant numbers of vertebral fractures, especially of the thoracic spine, are being reported. (JTTS – unpublished data) The recent development

and deployment of mine-resistant vehicles has resulted in a corresponding increase in the charge size and explosive force of the enemy's IEDs in an attempt to defeat the protective features of the new vehicles. Of all admitted casualties from OIF (n = 2404) and OEF (n = 2136) for July 2008 through June 2009, fully one third (39% in OIF and 35% in OEF) entailed mechanisms of injury that included a significant blunt trauma component. (JTTS – unpublished data) The primary blast component of roadside and under-carriage IEDs is not the most significant factor in injury causation. (Champion 2009) It is rather the very high G-forces and resultant high-magnitude compressive and flexion forces on the spine that produce the spinal injuries.

These new injury pattern developments require a reassessment of spinal protection guidelines on the battlefield. It has been argued in the civilian literature that considerable force is required to fracture the spine at the initial impact and that any subsequent movements of the spine are unlikely to cause further damage. (Kwan 2001, Hauswald 1998) Considering the unique mechanism and pattern of injuries being seen on the current battlefield, it is possible that the potential for iatrogenic cord damage could be reduced with the implementation of some basic, tactically-appropriate spinal precautions. These techniques must be developed taking into account such factors as incoming hostile fire, limited space, weight considerations, evacuation times, and rescuer manpower resources.

As noted previously in the minutes, in the period from July – December 2009, there were 119 casualties whose injuries included blunt force spinal fractures, many of whom had fractures at multiple levels of the spinal column. Fourteen of these casualties also had spinal cord injuries. Information on whether or not any of these spinal cord injuries were sustained during point-of-wounding care or subsequent transport of the casualty to a Level II or Level III treatment facility is not currently available.

Since the last CoTCCC meeting, which included a discussion of this issue, there has been a three-month effort by an ad-hoc working group led by Drs. Gates, Holcomb, Jenkins, and Otten on this topic. The group developed a modified spinal protection technique, called Spinal Motion Restriction (SMR) that could be used in tactical settings in lieu of civilian-based protocols and techniques. Spinal Motion Restriction would make use of the casualty's own individual body armor (IBA) to help protect the injured thoracic spine. The following changes to the TCCC Guidelines were proposed:

Care Under Fire: (new text in red)

3. Direct casualty to move to cover and apply self-aid if able. If casualty requires assistance, move him to cover. If mechanism of injury included blunt trauma (such as riding in a vehicle which was struck by an Improvised Explosive Device), minimize spinal movement while extricating him from the vehicle and moving him to cover. The casualty should be moved along his long spinal axis if at all possible while attempting to stabilize the head and neck.

Tactical Field Care and TACEVAC Care

Insert new #2: Use Spinal Motion Restriction techniques as defined below for casualties whose mechanism of injury included blunt trauma IF: a) they are unconscious; b) they are conscious and have midline cervical spine tenderness or midline back pain; or c) they are conscious but demonstrate neurologic injury such as inability to move their arms and/or legs, sensory deficits, or paresthesias. For these casualties, leave the Individual Body Armor in place and secure to protect the thoracic spine. The cervical spine may be protected by using a cervical stabilization device in conjunction with the casualty's IBA or by an additional first responder holding the casualty's head to maintain alignment with the back. Long or short spine boards should be used in addition to these measures when available.

Spinal Trauma in TCCC **LTC Bob Gerhardt**

LTC Gerhardt presented a pilot study done at USAISR that looked at the effects of the presence of IBA and kevlar helmets on spinal alignment in the supine position. Extension of the cervical spine is seen when the casualty is in the supine position if the IBA is in place, but the helmet is removed. He suggested that it may be best to leave the helmet on if IBA is left in place to help maintain spinal alignment. Additional studies of the mechanics involved are planned.

DISCUSSION OF PROPOSED CHANGE ON SPINAL PRECAUTIONS **Group**

The following additional points were made during the ensuing discussion on changing the approach to spinal precautions in TCCC:

- There are often numerous pouches and other items attached onto the back of the IBA and this battlefield configuration would be likely to produce more even neck extension for a casualty in the supine position than was seen the pilot study described by LTC Gerhardt above.
- IBA is typically removed during the initial examination of the casualty, and would have to be put back on in order to be used to provide SMR. This would require additional manipulation of the casualty.
- There is insufficient data at present to indicate that SMR is protective. It might even be harmful in some circumstances.
- To date, there are no reports at hand of spinal cord injury being sustained between the point of wounding and arrival at the first medical treatment facility.
- The increased incidence of spinal injury in theater may be an indicator of success in preventing death of the occupants from blast and penetrating trauma when Mine Resistant Ambush Protected (MRAP) vehicles are attacked with IEDs on the battlefield.

PRELIMINARY DATA - RANGER PREHOSPITAL TRAUMA REGISTRY **LTC Russ Kotwal**

LTC (P) Russ Kotwal from the 75th Ranger Regiment presented data and observations that have been developed from his ongoing analysis of the Ranger Prehospital Trauma Registry. Among his comments, findings, and observations were:

- An analysis of entrance and exit wound sites in KIAs and DOWs in the current conflicts was presented. A review of the mechanisms of injury (IEDs, GSWs, etc) for the Ranger casualties was also presented.
- LTC Kotwal and MSG Montgomery believe that the current helmets are good for ballistic protection, but poor for blast and blunt trauma protection.
- Their registry now contains 130 instances of oral transmucosal fentanyl citrate (OTFC) use in Ranger ca sualties. Their experience using OTFC as outlined in the TCCC guidelines is good. As a narcotic, OTFC is easier to control programmatically than morphine in that it is harder to disguise inappropriate use.
- The fatality rate was high among casualties who needed airway interventions.
- The Ranger Prehospital Trauma Registry (PHTR) is a command-directed line initiative, not a medical function. It does not feed into any other database, though such information sharing has proposed and is currently being discussed.

NEW BUSINESS **Group**

HMCM Sine recommended that the CoTCCC do an evaluation of commercially available chest seals. There are two possible approaches. One is to outline the desired characteristics for a chest seal and see which of the available chest seals best meets the criteria established. The second option is to conduct comparative testing at USAISR or another research facility to obtain objective data that might help the CoTCCC to make a definitive recommendation about the best chest seal for use in TCCC.

Dr. Giebner provided an update on the status of the CoTCCC input for the Military Version of the Seventh Edition of the PHTLS Manual. All 12 TCCC chapters have been submitted and the editorial process is ongoing. The target publication date is September 2010.

Change to the TCCC Guidelines

Frank K. Butler, MD, CAPT, MC, USN (Ret),
Chairman,Committee on Tactical Combat Casualty Care Defense Health Board

A proposed change to the TCCC Guidelines regarding the management of burns in the prehospital combat setting was approved by the Committee on Tactical Combat Casualty Care at its November 2009 meeting. The proposed change was subsequently approved by the Trauma and Injury Subcommittee of the Defense Health Board (DHB) and then by the Core Board of the DHB at its meeting on 1 March 2010.

The updated TCCC Guidelines follow with the recently approved burn care material in red text. The change incorporates the new fluid resuscitation formula recommended by the U.S. Army Institute of Surgical Research (USAISR) called the USAISR Rule of Tens. This formula is simpler to use than previous burn fluid formulas and reduces the likelihood of over-resuscitation in burn casualties. Thanks to the Burn Center at the ISR and especially to LTC Booker King and COL Evan Renz for their assistance in authoring both the change to the Guidelines and the new chapter on "Management of Burn Injuries in TCCC" that will be included in the upcoming military version of the Seventh Edition of the PHTLS Manual.

The TCCC training curriculum has now been modified to reflect this change. Additionally, a new presentation has been added to the curriculum to address recent TCCC Lessons Learned from OEF and OIF. A pdf file with this new presentation is attached on this e-mail. The updated TCCC curriculum is available on both the Military Health System and the PHTLS websites at the links below:

MHS (http://www.health.mil/Education_And_Training/TCCC.aspx)

PHTLS (http://www.naemt.org/education/PHTLS/TCCC.aspx)

Thanks to Dr. Steve Giebner from the CoTCCC, Mr. Russell Carlson from the MHS Website and Ms. Corine Curd from PHTLS for their work in getting the new curriculum posted on these sites.

Tactical Combat Casualty Care Guidelines
November 2009

* All changes to the guidelines made since those published in the 2006 Sixth Edition of the PHTLS Manual are shown in **bold text**. The new material on burns is in red text.

Basic Management Plan for Care Under Fire

1. Return fire and take cover.
2. Direct or expect casualty to remain engaged as a combatant if appropriate.
3. Direct casualty to move to cover and apply self-aid if able.
4. Try to keep the casualty from sustaining additional wounds.
5. **Casualties should be extricated from burning vehicles or buildings and moved to places of relative safety. Do what is necessary to stop the burning process.**
6. Airway management is generally best deferred until the Tactical Field Care phase.
7. Stop *life-threatening* external hemorrhage if tactically feasible:
   - Direct casualty to control hemorrhage by self-aid if able.
   - **Use a CoTCCC-recommended tourniquet for hemorrhage that is anatomically amenable to tourniquet application.**
   - **Apply the tourniquet proximal to the bleeding site, over the uniform, tighten, and move the casualty to cover.**

Basic Management Plan for Tactical Field Care

1. Casualties with an altered mental status should be disarmed immediately.
2. Airway Management
   a. Unconscious casualty without airway obstruction:
      - Chin lift or jaw thrust maneuver
      - Nasopharyngeal airway
      - Place casualty in the recovery position

   b. Casualty with airway obstruction or impending airway obstruction:
      - Chin lift or jaw thrust maneuver
      - Nasopharyngeal airway
      - Allow casualty to assume any position that best protects the airway, to include sitting up.
      - Place unconscious casualty in the recovery position.
      - If previous measures unsuccessful:
      - Surgical cricothyroidotomy (with lidocaine if conscious)

3. Breathing

a. In a casualty with progressive respiratory distress and known or suspected torso trauma, consider a tension pneumothorax and decompress the chest on the side of the injury with a 14-gauge, 3.25 inch needle/catheter unit inserted in the second intercostal space at the midclavicular line. Ensure that the needle entry into the chest is not medial to the nipple line and is not directed towards the heart.

b. All open and/or sucking chest wounds should be treated by immediately applying an occlusive material to cover the defect and securing it in place. Monitor the casualty for the potential development of a subsequent tension pneumothorax.

4. Bleeding

a. Assess for unrecognized hemorrhage and control all sources of bleeding. If not already done, use a CoTCCC-recommended tourniquet to control life-threatening external hemorrhage that is anatomically amenable to tourniquet application or for any traumatic amputation. Apply directly to the skin 2-3 inches above wound.

b. For compressible hemorrhage not amenable to tourniquet use or as an adjunct to tourniquet removal (if evacuation time is anticipated to be longer than two hours), use Combat Gauze as the hemostatic agent of choice. Combat Gauze should be applied with at least 3 minutes of direct pres-

sure. Before releasing any tourniquet on a casualty who has been resuscitated for hemorrhagic shock, ensure a positive response to resuscitation efforts (i.e., a peripheral pulse normal in character and normal mentation if there is no traumatic brain injury (TBI)).

c. 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.

d. When time and the tactical situation permit, a distal pulse check should be accomplished. If a distal pulse is still present, consider additional tightening of the tourniquet or the use of a second tourniquet, side by side and proximal to the first, to eliminate the distal pulse.

e. Expose and clearly mark all tourniquet sites with the time of tourniquet application. Use an indelible marker.

5. Intravenous (IV) access
   - Start an 18-gauge IV or saline lock if indicated.
   - If resuscitation is required and IV access is not obtainable, use the intraosseous (IO) route.

6. Fluid resuscitation

   Assess for hemorrhagic shock; altered mental status (in the absence of head injury) and weak or absent peripheral pulses are the best field indicators of shock.

   a. If not in shock:
      - No IV fluids necessary
      - PO fluids permissible if conscious and can swallow

   b. If in shock:
      - Hextend, 500ml IV bolus
      - Repeat once after 30 minutes if still in shock.
      - No more than 1000ml of Hextend

   c. Continued efforts to resuscitate must be weighed against logistical and tactical considerations and the risk of incurring further casualties.

   d. If a casualty with TBI is unconscious and has no peripheral pulse, resuscitate to restore the radial pulse.

7. Prevention of hypothermia

   a. Minimize casualty's exposure to the elements. Keep protective gear on or with the casualty if feasible.

   b. Replace wet clothing with dry if possible.

   c. Apply Ready-Heat Blanket to torso.

   d. Wrap in Blizzard Survival Blanket.

   e. Put Thermo-Lite Hypothermia Prevention System Cap on the casualty's head, under the helmet.

   f. Apply additional interventions as needed and available.

   g. If mentioned gear is not available, use dry blankets, poncho liners, sleeping bags, body bags, or anything that will retain heat and keep the casualty dry.

8. Penetrating Eye Trauma

If a penetrating eye injury is noted or suspected:

a) Perform a rapid field test of visual acuity.

b) Cover the eye with a rigid eye shield (NOT a pressure patch.)

c) Ensure that the 400mg moxifloxacin tablet in the combat pill pack is taken if possible and that IV/IM antibiotics are given as outlined below if oral moxifloxacin cannot be taken.

9. Monitoring

   Pulse oximetry should be available as an adjunct to clinical monitoring.

   Readings may be misleading in the settings of shock or marked hypothermia.

10. Inspect and dress known wounds.

11. Check for additional wounds.

12. Provide analgesia as necessary.

    a. Able to fight:

    These medications should be carried by the combatant and self-administered as soon as possible after the wound is sustained.

    - Mobic, 15mg PO once a day

– Tylenol, 650mg bilayer caplet, 2 PO every 8 hours

b. Unable to fight:

Note: Have naloxone readily available whenever administering opiates.

– Does not otherwise require IV/IO access
– Oral transmucosal fentanyl citrate (OTFC), 800ug transbuccally
– Recommend taping lozenge-on-a-stick to casualty's finger as an added safety measure
– Reassess in 15 minutes
– Add second lozenge, in other cheek, as necessary to control severe pain.
– Monitor for respiratory depression.
– IV or IO access obtained:
– Morphine sulfate, 5mg IV/IO
– Reassess in 10 minutes.
– Repeat dose every 10 minutes as necessary to control severe pain.
– Monitor for respiratory depression
– Promethazine, 25mg IV/IM/IO every 6 hours as needed for nausea or for synergistic analgesic effect

13. Splint fractures and recheck pulse.
14. Antibiotics: recommended for all open combat wounds

a. If able to take PO:

– Moxifloxacin, 400mg PO one a day

b. If unable to take PO (shock, unconsciousness):

– Cefotetan, 2g IV (slow push over 3-5 minutes) or IM every 12 hours or
– Ertapenem, 1g IV/IM once a day

15. Burns

a. Facial burns, especially those that occur in closed spaces, may be associated with inhalation injury. Aggressively monitor airway status and oxygen saturation in such patients and consider early surgical airway for respiratory distress or oxygen desaturation.

b. Estimate total body surface area (TBSA) burned to the nearest 10% using the Rule of Nines.

c. Cover the burn area with dry, sterile dressings. For extensive burns (>20%), consider placing the casualty in the Blizzard Survival Blanket in the Hypothermia Prevention Kit in order to both cover the burned areas and prevent hypothermia.

d. Fluid resuscitation (USAISR Rule of Ten)

– If burns are greater than 20% of Total Body Surface Area, fluid resuscitation should be initiated as soon as IV/IO access is established. Resuscitation should be initiated with Lactated Ringer's, normal saline, or Hextend. If Hextend is used, no more than 1000ml should be given, followed by Lactated Ringer's or normal saline as needed.
– Initial IV/IO fluid rate is calculated as %TBSA x 10cc/hr for adults weighing 40-80kg.
– For every 10kg ABOVE 80kg, increase initial rate by 100ml/hr.
– If hemorrhagic shock is also present, resuscitation for hemorrhagic shock takes precedence over resuscitation for burn shock. Administer IV/IO fluids per the TCCC Guidelines in Section 6.

e. Analgesia in accordance with the TCCC Guidelines in Section 12 may be administered to treat burn pain.

f. Prehospital antibiotic therapy is not indicated solely for burns, but antibiotics should be given per the TCCC guidelines in Section 14 if indicated to prevent infection in penetrating wounds.

g. All TCCC interventions can be performed on or through burned skin in a burn casualty.

16. Communicate with the casualty if possible.

– Encourage; reassure
– Explain care

17. Cardiopulmonary resuscitation (CPR)

Resuscitation on the battlefield for victims of blast or penetrating trauma who have no pulse, no ventilations, and no other signs of life will not be successful and should not be attempted.

18. Documentation of Care

Document clinical assessments, treatments rendered, and changes in the casualty's status **on a TCCC Casualty Card.** Forward this information with the casualty to the next level of care.

Basic Management Plan for Tactical Evacuation Care

*** The new term "Tactical Evacuation" (TACEVAC) includes both Casualty Evacuation (CASEVAC) and Medical Evacuation (MEDEVAC) as defined in Joint Publication 4-02.**

1. Airway Management
   - a. Unconscious casualty without airway obstruction:
     - Chin lift or jaw thrust maneuver
     - Nasopharyngeal airway
     - Place casualty in the recovery position
   - b. Casualty with airway obstruction or impending airway obstruction:
     - Chin lift or jaw thrust maneuver
     - Nasopharyngeal airway
     - Allow casualty to assume any position that best protects the airway, to include sitting up.
     - Place unconscious casualty in the recovery position.
     - If above measures unsuccessful:
       - Laryngeal Mask Airway (LMA)/intubating LMA or
       - Combitube or
       - Endotracheal intubation or
       - Surgical cricothyroidotomy (with lidocaine if conscious).
   - c. Spinal immobilization is not necessary for casualties with penetrating trauma.
2. Breathing
   - **a. In a casualty with progressive respiratory distress and known or suspected torso trauma, consider a tension pneumothorax and decompress the chest on the side of the injury with a 14-gauge, 3.25 inch needle/catheter unit inserted in the second intercostal space at the midclavicular line. Ensure that the needle entry into the chest is not medial to the nipple line and is not directed towards the heart.**
   - b. Consider chest tube insertion if no improvement and/or long transport is anticipated.
   - c. Most combat casualties do not require supplemental oxygen, but administration of oxygen may be of benefit for the following types of casualties:
     - Low oxygen saturation by pulse oximetry
     - Injuries associated with impaired oxygenation
     - Unconscious casualty
     - Casualty with TBI (maintain oxygen saturation > 90%)
     - Casualty in shock
     - Casualty at altitude
   - **d. All open and/or sucking chest wounds should be treated by immediately applying an occlusive material to cover the defect and securing it in place. Monitor the casualty for the potential development of a subsequent tension pneumothorax.**

3. Bleeding

- **a. Assess for unrecognized hemorrhage and control all sources of bleeding. If not already done, use a CoTCCC-recommended tourniquet to control life-threatening external hemorrhage that is anatomically amenable to tourniquet application or for any traumatic amputation. Apply directly to the skin 2-3 inches above wound.**
- **b. For compressible hemorrhage not amenable to tourniquet use or as an adjunct to tourniquet removal (if evacuation time is anticipated to be longer than 2 hours), use Combat Gauze as the hemostatic agent of choice. Combat Gauze should be applied with at least 3 minutes of direct pressure. Before releasing any tourniquet on a casualty who has been resuscitated for hemorrhagic shock, ensure a positive response to resuscitation efforts (i.e., a peripheral pulse normal in character and normal mentation if there is no TBI.)**

c. 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.

d. When time and the tactical situation permit, a distal pulse check should be accomplished. If a distal pulse is still present, consider additional tightening of the tourniquet or the use of a second tourniquet, side-by-side and proximal to the first, to eliminate the distal pulse.

e. Expose and clearly mark all tourniquet sites with the time of tourniquet application. Use an indelible marker.

4. Intravenous (IV) access
   a. Reassess need for IV access.
      – If indicated, start an 18-gauge IV or saline lock.
      – If resuscitation is required and IV access is not obtainable, use intraosseous (IO) route.
5. Fluid resuscitation
   Reassess for hemorrhagic shock (altered mental status in the absence of brain injury and/or change in pulse character.)
   a. If not in shock:
      – No IV fluids necessary
      – PO fluids permissible if conscious and can swallow
   b. If in shock:
      – Hextend 500ml IV bolus
      – Repeat once after 30 minutes if still in shock
      – No more than 1000ml of Hextend
   c. Continue resuscitation with packed red blood cells (PRBCs), Hextend, or Lactated Ringer's solution (LR) as indicated.
   d. If a casualty with TBI is unconscious and has a weak or absent peripheral pulse, resuscitate as necessary to maintain a systolic blood pressure of 90mmHg or above.
6. Prevention of hypothermia
   a. Minimize casualty's exposure to the elements. Keep protective gear on or with the casualty if feasible.
   b. Continue Ready-Heat Blanket, Blizzard Survival Blanket, and Thermo- Lite Cap.
   c. Apply additional interventions as needed.
   d. Use the Thermal Angel or other portable fluid warmer on all IV sites, if possible.
   e. Protect the casualty from wind if doors must be kept open.

7. Penetrating Eye Trauma

If a penetrating eye injury is noted or suspected:

a. Perform a rapid field test of visual acuity.

b. Cover the eye with a rigid eye shield (NOT a pressure patch).

c. Ensure that the 400mg moxifloxacin tablet in the combat pill pack is taken if possible and that IV/IM antibiotics are given as outlined below if oral moxifloxacin cannot be taken.

8. Monitoring
   Institute pulse oximetry and other electronic monitoring of vital signs, if indicated.
9. Inspect and dress known wounds if not already done.
10. Check for additional wounds.
11. Provide analgesia as necessary.
    a. Able to fight:
       – Mobic, 15mg PO once a day
       – Tylenol, 650mg bilayered caplet, 2 PO every 8 hours
    b. Unable to fight:
    Note: Have naloxone readily available whenever administering opiates.
       – Does not otherwise require IV/IO access:
          – Oral transmucosal fentanyl citrate (OTFC) 800ug transbuccally
          – Recommend taping lozenge-on-a-stick to casualty's finger as an added safety measure.
          – Reassess in 15 minutes

- Add second lozenge, in other cheek, as necessary to control severe pain.
- Monitor for respiratory depression.

– IV or IO access obtained:
  - Morphine sulfate, 5mg IV/IO
  - Reassess in 10 minutes
  - Repeat dose every 10 minutes as necessary to control severe pain.
  - Monitor for respiratory depression.
  - Promethazine, 25mg IV/IM/IO every 6 hours as needed for nausea or for synergistic analgesic effect.

12. Reassess fractures and recheck pulses.
13. Antibiotics: recommended for all open combat wounds
    a. If able to take PO:
       – Moxifloxacin, 400mg PO once a day
    b. If unable to take PO (shock, unconsciousness):
       – Cefotetan, 2g IV (slow push over 3-5 minutes) or IM every 12 hours, or
       – Ertapenem, 1g IV/IM once a day

14. Burns

a. Facial burns, especially those that occur in closed spaces, may be associated with inhalation injury. Aggressively monitor airway status and oxygen saturation in such patients and consider early surgical airway for respiratory distress or oxygen desaturation.

b. Estimate total body surface area (TBSA) burned to the nearest 10% using the Rule of Nines.

c. Cover the burn area with dry, sterile dressings. For extensive burns (>20%), consider placing the casualty in the Blizzard Survival Blanket in the Hypothermia Prevention Kit in order to both cover the burned areas and prevent hypothermia.

d. Fluid resuscitation (USAISR Rule of Ten)
- **If burns are greater than 20% of Total Body Surface Area, fluid resuscitation should be initiated as soon as IV/IO access is established. Resuscitation should be initiated with Lactated Ringer's, normal saline, or Hextend. If Hextend is used, no more than 1000ml should be given, followed by Lactated Ringer's or normal saline as needed.**
- **Initial IV/IO fluid rate is calculated as %TBSA x 10cc/hr for adults weighing 40-80kg.**
- **For every 10kg ABOVE 80kg, increase initial rate by 100ml/hr.**
- **If hemorrhagic shock is also present, resuscitation for hemorrhagic shock takes precedence over resuscitation for burn shock. Administer IV/IO fluids per the TCCC Guidelines in Section 5.**

e. Analgesia in accordance with TCCC Guidelines in Section 11 may be administered to treat burn pain.

f. Prehospital antibiotic therapy is not indicated solely for burns, but antibiotics should be given per TCCC guidelines in Section 13 if indicated to prevent infection in penetrating wounds.

g. All TCCC interventions can be performed on or through burned skin in a burn casualty.

h. Burn patients are particularly susceptible to hypothermia. Extra emphasis should be placed on barrier heat loss prevention methods and IV fluid warming in this phase.

15. The Pneumatic Antishock Garment (PASG) may be useful for stabilizing pelvic fractures and controlling pelvic and abdominal bleeding. Application and extended use must be carefully monitored. The PASG is contraindicated for casualties with thoracic or brain injuries.
16. Documentation of Care

    Document clinical assessments, treatments rendered, and changes in casualty's status **on a TCCC Casualty Card**. Forward this information with the casualty to the next level of care.

10 MAR 2010 NAVY MEMORANDUM
SUBJECT: Policy Guidance on Updates to the Tactical Combat Casualty Care (TCCC) Course Curriculum

1. This policy memorandum provides guidance and establishes Navy Medicine policy and responsibilities for incorporating updates to the TCCC curriculum.
2. The TCCC curriculum is reviewed on a regular basis by the Committee on TCCC (CoTCCC). This group is comprised of subject matter experts in the fields of Surgery, Medicine, and Prehospital Care with extensive experience in theater. Proposed changes to the curriculum are researched with a review of any available scientific evidence for or against the proposal. After debate in an open forum, CoTCCC members vote on any changes. After being approved by the Committee, proposed changes to the TCCC Guidelines are then reviewed by the Trauma and Injury Subcommittee of the Defense Health Board (DHB) and the Core Board of the DHB. Once approved by all three groups, changes to the TCCC Guidelines are then posted on the Military Health System (MHS) Web site, http://www.health.mil/Education_And_Training/TCCC.aspx. The TCCC Guidelines are also published periodically in the Prehospital Trauma Life Support (PHTLS) Manual, which carries the endorsement of the American College of Surgeons Committee on Trauma, the National Association of Emergency Medical Technicians, and the PHTLS editorial board.
3. Once TCCC curriculum changes have posted to the MHS Web site, all Navy Medicine training sites are authorized to incorporate the changes as soon as possible to ensure that Navy servicemembers receive the most up-to-date information.

MAR 19 2010 MEMORANDUM from Charles L. Rice, MD
President, Uniformed Services University of the Health Sciences Performing the Duties of the Assistant Secretary of Defense (Health Affairs)

SUBJECT: Policy on the Use of Non-U.S. Food and Drug Administration Compliant Blood Products

This policy memorandum provides guidance on the use of and protocol for follow-up regarding non-U.S. Food and Drug Administration (FDA)-compliant blood products that are transfused overseas. This policy replaces the Assistant Secretary of Defense (Health Affairs) memorandum, "Policy on the Use of Non-U.S. Food and Drug Administration Licensed Blood Products," Policy 01-020, dated December 4, 2001, which is hereby rescinded.

The Department of Defense healthcare policy requires that beneficiaries receive medical treatment that meets or exceeds the established "standard of care," in regard to blood transfusion; this means that all transfused blood products must be FDA-compliant. Since U.S. personnel are deployed around the world and banked blood is perishable, it is not always possible to provide transfusion centers with FDA-compliant blood products.

The use of non-FDA-compliant blood is sometimes necessary to save lives and may be the only alternative during combat operations or mass casualty events. When non-FDA-compliant blood must be transfused, it carries the risk of transmitting infectious diseases. To mitigate this risk, proper controls must be applied to ensure every blood product collected in an emergency is retrospectively tested and proper follow-up of the blood recipient is accomplished. Patient follow-up also applies to U.S. patients transfused in host-nation healthcare facilities.

The policy set forth in this memorandum is limited to medica1 emergency situations for which FDA regulation (2I.C.F.R.6 10.40(g)) permits the release of blood products, properly labeled, prior to the completion of required testing. Such products must be labeled "For Emergency Use Only."

Management of Blood Donors:
1. When emergency blood collections are required, donors will be selected from among the following groups, in order:
   A. Donors who have been prescreened within the last 90 days by a Clinical Laboratory Improvement Amendments (CLIA)-certified laboratory using all the current FDA-required blood donor infectious disease screening tests.
   B. Donors who report being repeat blood donors in the past and have not been deferred for a transfusion-transmitted disease. (Donation cards may serve as evidence of past blood donation.)
   C. Donors who have not been prescreened with FDA-licensed tests, nor have been a blood donor in the past.
2. To the maximum extent possible, DoD Military Treatment Facilities (MTFs) and U.S. Navy vessels where appropriate will establish and maintain rosters of prescreened donors, and repeat the screening at regular intervals (not to exceed 90 days). Retrospective testing following an emergency blood donation may serve as a prescreen for a subsequent donation.

3. To the maximum extent possible, blood will only be collected from U.S. personnel: military, Department of Defense (DoD) civilians, DoD contractors, or beneficiaries (non-theater donation).
4. All prospective donors will be screened for eligibility on the day of donation using Armed Services Blood Program (ASBP)-approved donor history screening protocols and infectious disease rapid screening test kits approved by the ASBP Office (ASBPO) or Combatant Command. NOTE: The use of infectious disease rapid screening test kits is not equivalent to testing with FDA-licensed screening tests for donor eligibility.
5. Specimen sample tubes will be collected and labeled with a unique International Society of Blood Transfusion (ISBT) donor identification number at the time of blood donation and sent to a designated CLIA-certified donor testing laboratory for retrospective testing. Results of all prescreening and retrospective testing will be provided to the Combatant Command Theater Joint Blood Program Office (JBPO).
6. Donor collection information will be submitted to the Combatant Command Theater JBPO within 48 hours of collection. The required information will be determined by the Combatant Command JBPO, but should, at a minimum, include: the donor's full name, unique identifier/Social Security number, unique donation identification number, organizational unit assigned, date of donation, location of donation, unit disposition (transfused. destroyed), unit disposition date, and any testing results (rapid or retrospective) available.
7. All records of emergency blood donation must be maintained in accordance with ASBP, Military Department and/or Combatant Command policies.
8. Follow-up notification and counseling will be provided to any donor who tests positive on either the prescreen, rapid, or retrospective lest panels, as follows:
    A. Document, track, and follow-up blood donors with positive infectious disease testing results, regardless of whether the unit was transfused.
    B. The donor will be deferred from subsequent blood donations, notified of the test results, and offered counseling.
    C. A preventive medicine or infectious disease agency will be used to ensure all donors have been notified of their retrospective test results and the appropriate follow-up is completed (i.e. notification, counseling, and treatment referrals).

Management of Transfusion Recipients:

1. To the maximum extent feasible, a pre-transfusion blood specimen will be collected to establish a baseline for each of the current FDA-required blood donor infectious disease screening tests. If a pre-transfusion specimen cannot be obtained, a baseline blood sample should be collected as soon as possible post-transfusion.
2. Recipients will be notified prior to transfusion, if feasible, or as soon thereafter as possible, that non-FDA-compliant blood products will be or were given, of the reason for the transfusion, and of the necessary patient follow-up required. The notification will be documented in the patient's medical record and, if available, in a centralized electronic patient medical record or tracking system.
3. Follow-up infectious disease testing of U.S. patients will be conducted at intervals of 3, 6, and 12 months after transfusion. A preventive medicine or infectious disease agency will be used to ensure recipients have been notified and appropriate follow-up is completed (i.e., notification, counseling, and treatment referrals). Non-U.S. patients will be followed according to their respective medical policies.
4. Baseline and follow-up infectious disease resting samples will be sent to a CLIA-certified laboratory. Results will be documented and maintained in the patient's medical record and. if available, in a centralized electronic patient medical record or tracking system.

Responsibilities:

1. Military Department Surgeons General:
    A. Will assign responsibility for performance and oversight of the requirements of this policy to the appropriate subordinate agencies.
    B. Will ensure all Military Department medical elements comply with the provisions or this policy memorandum.
    C. Will ensure. to the maximum extent possible the continuity of follow-up testing if patient care transitions to a civilian or Veterans Affairs Medical Center.
2. Combatant Commands:
    A. Will formulate policy and procedures regarding transfusion of non-FDA-compliant blood products for use within their respective Combatant Command.
    B. To the maximum extent feasible, notify and offer counseling to blood donors collected in theater who test positive on either prescreen, rapid, or retrospective infectious disease testing.
    C. To the maximum extent feasible. notify transfusion recipients when non-FDA-compliant blood products are transfused.

D. Combatant Command policy and procedure must include all elements described in this memorandum, and should be staffed through the ASBPO to ensure coordination of efforts.

E. The Combatant Command JBPO should coordinate with the ASBPO for technical and quality assessments of host-nation blood supplies to determine FDA compliance.

3. ASBPO

A. Will establish international agreements with allies and coalition forces to share medical information, where applicable, to ensure:

(1) Notification to the appropriate foreign medical authority regarding any non-U .S. patient who receives non-FDA-compliant blood products in a U.S. MTF.

(2) Notification to the appropriate foreign medical authority regarding positive donor test results and/or post-donation information involving non-U.S. recipients.

(3) Notification to the Combatant Command JBPOs regarding any U.S. citizen who receives a blood transfusion in a host-nation healthcare facility.

B. Will work with Combatant Command JBPOs to ensure coordinated interface of ASBPO and Combatant Command efforts to track and manage non-FDA-compliant blood product transfusions.

C. Will determine screening/and testing qualifications of foreign blood supplies with approval of the Assistant Secretary of Defense for Health Affairs. Any blood product brought into a Theater of Operations by the North Atlantic Treaty Organization or other Allied countries, whose donor screening/and testing processes have been reviewed by ASBPO and are deemed comparable to U.S. standards, may to the extent authorized by FDA regulations, be declared exempt from notification and follow-up infectious disease testing as defined in this policy.

These guidelines shall be implemented within 90 days of the date of publication of this memorandum. Provide implementation documents to the Director, Armed Services Blood Program Office. 5109 Leesburg Pike, Falls Church, Virginia 2204 1-3258.

8 APR 2010 MEMORANDUM from GEN Martin E. Dempsey

SUBJECT: Improvements to Tactical Combat Casualty Care (TCCC) and the Combat Lifesaver (CLS) Course

1. Recent adaptations and improvements to TCCC and the CLS Course, in addition to other related initiatives have driven the need to revise descriptions of CLSs and CLS training sustainment outlined in AR 350-1, Army Training and Leader Development, 18 Dec 09.
2. The proposed revision (enclosure) applies lessons learned in combat to new tactics, techniques, and procedures associated with the CLS skill set including:

A. Cautioning leaders on the limitations and proper employment of CLSs.

B. Emphasizing the importance of maintaining and recording CLS recertification.

C. Providing sustainment training for non-CLSs.

3. In concert with these revisions, we are involved in several supporting initiatives to institutionalize improvements to TCCC and our CLS Course program of instruction.

A. We are working with the Army Medical Department to develop Web-based training for the new Warrior task "perform immediate lifesaving measures." This will be a certificate program required of all Soldiers not designated as CLSs.

B. We have teamed with the Readiness Core Enterprise to conduct a comprehensive review of unit CLS requirements. Specifically, we are evaluating the efficacy of the requirement for one certified CLS for each squad, crew, or equivalent-sized deployable unit. Given the criticality of TCCC on the battlefield, the current ratio of one CLS per squad may not be sufficient.

C. Finally, we are coordinating with the U.S. Army Medical Center and School to address training gaps in the current TCCC capabilities of our small unit leaders. We expect to introduce an additional task in Basic Officer Leadership - B and the Advanced Leader Course entitled, "coordinate tactical combat casualty care" for small-unit leaders. Recent analysis revealed Soldiers in the ranks of E-5 and above are not adequately trained in TCCC, nor are they familiar with the equipment in the improved first aid kit.

4. We request your cooperation in revising AR 350-1 to reflect these much needed revisions in addition to your support for the other key initiatives we are pursuing to improve the effectiveness of TCCC.

Recommended revision to paragraph G–12 (in blue underlined font):

G–12. Combat lifesaver training

a. Immediate, far-forward medical care is essential on a widely dispersed and fluid battlefield to prevent Soldiers from dying of wounds. Medical personnel may not be able to reach and apply lifesaving measures to all wounded Soldiers in a timely manner.

(1) Capabilities. The combat lifesaver is a non-medical Soldier ~~trained to provide lifesaving measures beyond the level of self-aid or buddy-aid~~ designated by his or her Commander for this role; certified in lifesaving skills; and equipped with an aid bag. A properly trained combat lifesaver is capable of stabilizing many types of trauma casualties and can slow the deterioration of a wounded Soldier's condition until medical personnel arrive; deciding the type and level of lifesaving effort appropriate to the tactical scenario (tactical combat casualty care [TCCC]); controlling bleeding by means of advanced technologies; controlling shock and hypothermia by means of advanced technologies; competent use of the improved first aid kit (IFAK); completing the TCCC Card; moving the casualty tactically; and properly treating Soldiers who have been exposed to explosive blasts. Functioning as a combat lifesaver is a secondary mission undertaken when the tactical situation permits. All Soldiers are now provided combat lifesaver training while in IET, and the opportunity to test for certification.

(2) Limitations. Combat lifesavers do not receive additional instruction in treatment of hot and cold weather injuries, treatment of stings and bites, cardiopulmonary resuscitation, or treatment of chemical, biological, radiological, nuclear, and high-yield explosives (CBRNE) injuries. These subjects are trained separately as indicated by mandatory training requirements in units (see table G-1) or by the unit's METL. Initiating intravenous (IV) fluids is no longer within the scope of practice for combat lifesavers.

(3) Employment and recertification.

(a) Each squad, crew, or equivalent-sized deployable unit will have at least one member certified as a combat lifesaver.

(b) Combat lifesavers ~~must be recertified every 12 months at unit level~~ 's certifications are valid for 12 months. The requirements for recertification are outlined in Interschool Subcourse 0873, Combat Lifesaver Course: Instructor Guide, Edition C (available on request through the link shown in paragraph G-12a(3)(e) below) . Commanders must record and monitor their Soldiers' CLS certification status in DTMS.

(c) Corps, divisions, and brigades will implement combat lifesaver training within their commands and designate a staff surgeon responsible for supervising their combat lifesaver programs. The primary instructor will be a medical NCO, 68W, current in CLS certification.

(d) Units without qualifying medical personnel will request training instructor support from the next higher command surgeon or local medical treatment facility.

(e) Combat lifesaver training will be conducted during ~~IMT~~ IET (BCT~~,~~ and OSUT~~, and BOLC~~) and in accordance with guidelines contained in this regulation and training materials provided by the Combat Lifesaver Program within the Army Correspondence Course Program (http://www.cs.amedd.army.mil/CLSP/). Student and instructor materials for ~~IMT~~ IET are published in the course POIs. Student and instructor materials for units and organizations are printed by the Army Training Support Center and shipped to the primary instructor. Unit training managers are not authorized to augment correspondence course material or change the length of the course. Training and testing will be conducted in accordance with the tasks, conditions, and standards established by MEDCOM; or, in the case of USASOC personnel, established by the USASOC DCS Surgeon.

b. Proof of combat lifesaver course completion will be placed in the Soldier's MPF or MPRJ in accordance with AR 600-8-104. Soldiers who successfully complete CLS in IMT will be issued certificates of training in accordance with this regulation and awarded course credit in RRS.

c. Unit personnel are not authorized to increase or delete items contained in the combat lifesaver aid bag. As an exception, USASOC surgeons are authorized to modify items contained in First Responder aid bags, in accordance with validated mission requirements and with approval of the USASOC Deputy Chief of Staff, Surgeon. All Class VIII supplies and materials required for combat lifesaver training will be requisitioned through normal supply channels.

d. In planning healthcare support to missions, Commanders must exercise composite risk management to ensure that appropriate levels of healthcare support are provided, i.e., that CLSs are not

employed in the role of 68Ws, and not in the treatment of minor illnesses and injuries. Army Regulation 40-3 charges the Commander of the medical treatment facility with responsibility for standards for pre-hospital treatment of injured and sick individuals.

e. Soldiers who are not designated as combat lifesavers must be trained and certified in the warrior task "Provide immediate lifesaving measures" within a year prior to deployment. This training must be recorded in DTMS.

G–4. Mandatory training in units

Add:

Table G–1
Mandatory training requirements in units

Subject	Reference	Proponent	Frequency
Perform Immediate Lifesaving Measures	AR 350–1	TRADOC	P

Appendix A
References

Section II
Related Publications

AR 40–3
Medical, Dental, and Veterinary Care

IS0873
Combat Lifesaver Course: Instructor Guide, Edition C

Educational Resources

JSOM Disclaimer Statement: The USSOCOM Surgeon's Office does not endorse any of the below listed private contractors who provide medical training nor does the USSOCOM Surgeon's Office vouch for the competence of the instructors providing the training. This listing of education opportunities is simply to help our readers in the event some would like to further their continuing medical education. This list contains both military and civilian (law enforcement) training opportunities.

CONTINUING EDUCATION UPDATE

Douglas M. Kleiner, PhD
Peer-Review Board Member and Text Editor, *Journal of Special Operations Medicine*
Adjunct Associate Professor, Wright State University School of Medicine, Division of Tactical Medicine

In addition to standard training, advanced training, and sustainment training, the opportunity for additional "specialized" training is more important than ever for the military combat medic. Our "lessons learned" and real-time data injury data from ongoing conflicts around the world has changed the way we practice medicine, and thus our need for updates, continuing education, and additional instruction.

The opportunities for continuing education in combat medicine, Special Operations medicine, and tactical emergency medicine has recently increased. Continuing education can come in a variety of forms, including conference attendance, self-study, and keeping current via professional associations (websites, newsletters, etc.). Continuing education does not have to include CEU credit opportunities, and does not have to be a typical "training" course.

Furthermore, there are many opportunities for further education and skill development in allied areas. A good example is the sharing of information and techniques between military combat medicine and civilian (law enforcement) tactical medicine. It has been the standard for several years now, for the of Special Operations Medical Association (SOMA) conference to include a civilian component, and it is not uncommon for military units to contract with civilian training agencies for tactical emergency medical support (TEMS) training.

Almost five years ago, two of the biggest civilian TEMS "organizations" ceased activity (CONTOMS and the International Tactical EMS Association [ITEMS]), which created a void for civilian tactical medicine continuing education. I am happy to report that CONTOMS has returned (now under the leadership of the Department of Health and Human Services), and has updated some of their curriculum. The International Tactical EMS Association has recently announced that they will soon return to a functioning status, as well. I look forward to the possible return of the CONTOMS and ITEMS Conferences, and the ITEMS "Medic-Up" Competition. Additionally, a new organization has started, as part of the International Tactical Officers Training Association (ITOTA): the International Tactical Rescue and Medicine Society (ITRAMS).

While these national organizations are important, there are also several state and local organizations that also provide outstanding training, and many of who provide mobile training teams. The North Carolina Tactical Medical Association http://www.nctma.net is one that stands out, but there are many others.

Still, there are many others out there that are not outstanding. Anyone can start a training company, and practice the see-one, do-one, teach-one method of instruction. Existing as a company does not ensure competence. Please research each company thoroughly, and determine the expertise of the instructors. Having qualified educators who are subject matter experts is always preferred. Being a good operator does not mean that someone is a good teacher. There is no substitute for **quality** training. If you have ever had bad training – you know that you can tell the difference!

CONFERENCES

Special Operations Medical Association Conference (SOMA)
www.trueresearch.org/soma

As from the beginning… The gathering of Special Operations Medical Association (SOMA) members is directed toward the education and training of the Special Forces/Special Operations Forces Medic, who often alone and unsupported, in perilous tactical or non-tactical circumstances, are responsible for the healthcare of the team and surrounding indigenous population (including non-combatant civilians). By providing this forum for military and civilian medical personnel from around the world to meet and exchange ideas, SOMA advances the science, technology, and skills of unconventional medicine which increases survivability, against the odds, for the people under their care of the Special Forces/Special Operations Forces Medic.

The SOMA meeting will be held 13 - 16 December, 2010 at the Tampa Marriott Waterside Hotel and Marina.
700 South Florida Avenue
Tampa, Florida 33602 USA
Phone: 1-813-221-4900
Fax: 1-813-204-6342
Toll-free: 1-888-268-1616

Conference registration is available on-line or in person.
On-line registration deadline: Midnight Tuesday, 30 November 2010.
Cancellation: All cancellations must be submitted prior to Tuesday, November 30, 2010.
If you have problems registering contact the webmaster@trueresearch.org, for other questions contact the a.bordas@trueresearch.org.

Once again, the VA will host the **Annual Blast Injury Conference**.
To register for the BLAST Conference, visit the SOMA on-line attendee registration page, https://www.trueresearch.org/soma/2010/attendee-registration.aspx
For information concerning BLAST Conference, contact Brent Concklin at Brent.Concklin@va.gov or 813-972-2000 Ext. 4194.

Abstract Submission

Potential presenters who would like to submit an abstract for poster presentation, please email Ashley Bordas at a.bordas@trueresearch.org for details. The deadline for submitting an abstract is Thursday, 30 September 2010.

Speaker and Potential Presenter

Should you have an interest in making a presentation at the 2010 SOMA Conference, please contact the 2010 Program Chairman, LTC Robert Harrington robert.dennis.harrington@us.army.mil, before September 17, 2010. LTC Harrington has the approval of the Board of Directors to accept or refuse presentations based on the theme of the 2010 Conference and the contents of the presentations as applied to the conference.

Author's Note: SOMA is widely regarded as the premier Special Operations Medical Conference in the country.

PROFESSIONAL ASSOCIATIONS

Special Operations Medical Association (SOMA)
www.trueresearch.org/soma

This organization is dedicated to the spirit of the Special Forces/Special Operations Forces Medic, and is for those practitioners, educators, administrators, researchers, and students who are either engaged or interested in med-

ical practices within the realm of the unconventional medicine environment. The organization has further been deemed to act as a conveyance for gathering and sharing information, presenting new ideologies, finding research collaborators, marketing and discussing public policy for our mutual causes, and to set a dialog for disseminating lessons learned.

The Association is organized exclusively for charitable, educational, and scientific purposes within the meaning of section 501.c(3) of the Internal Revenue Code. The primary objective is that of enhancing professional standards through continuing medical education of Special Operations medical personnel in the service of the United States of America Armed Forces.

Author's Note: SOMA is a well-respected not-for-profit professional association.

INTERNATIONAL TACTICAL EMS ASSOCIATION (ITEMS)
Web Site: Under Construction

Recognizing the need for a professional association dedicated to advancing the tactical emergency medical support (TEMS) discipline, the International Tactical EMS Association (ITEMS) was created in August of 1997. As a non-profit organization, it eventually served over 5,500 members in 12 countries.

Its mission statement was straightforward: "The International Tactical EMS Association, in cooperation with other law enforcement and emergency medical associations, will establish and maintain an organized network of law enforcement agencies, tactical officers, tactical medical providers, and other interested parties within the Special Weapons and Tactics community. This network will then be utilized to gather tactical emergency medical support – related information that can be disseminated to aspiring and established tactical medical providers and their teams. It is then, through the association's position as a central source of information, that the International Tactical EMS Association will contribute to a reduction in the morbidity and mortality associated with tactical training and special operations."

In 2007, due to an unanticipated series of events, ITEMS needed to suspend its operations for an extended period of time. The association has now been reactivated and is firmly committed to rebuilding our infrastructure, once again providing outstanding service to you and your agency, and contributing to the advancement of TEMS.

Jim Etzin, Executive Director
International Tactical EMS Association (ITEMS)
P.O. Box 504
Farmington, Michigan, 48332-0504
Office: (248) 476-9077
E-mail: TacticalEMS@aol.com

Author's Note: ITEMS is a not-for-profit professional association.

INTERNATIONAL TACTICAL RESCUE AND MEDICINE SOCIETY (ITRAMS)
http://www.itota.net

The International Tactical Rescue and Medicine Society (ITRAMS) is a networking community focused on coordinating the delivery of top-tier, outcomes-based education in the constantly evolving fields of tactical rescue and medicine.

The philosophy of ITRAMS is that mission focused rescue and medical skill sets belong in every first responder's essential task list. ITRAMS is an informational resource for not only those professionals directly involved in tactical rescue and medicine, but also patrol officers, tactical operators, tactical commanders, DoD personnel, and civilian medical directors.

Through a unique combination of multimedia communication strategies and diverse community penetration, ITRAMS provides its members with the best training and resources available to the community.

Author's Note: ITRAMS is a new, for-profit organization that is affiliated with a larger for-profit SWAT organization.

FEATURED TRAINING ORGANIZATIONS

TACTICAL MEDICS INTERNATIONAL
www.tacmedics.com

Tactical Medics International (TMI) specializes in tactical (law enforcement) medicine and military combat medicine, including Tactical Combat Casualty Care. TMI offers training and education, as well as operational medical support. TMI offers a variety of courses to the military. TMI also has an extensive list of modules to choose from and can custom-design any course to fit the end-user's needs.

While being subject matter experts in tactical emergency medicine, TMI also offers a variety of complimentary courses and modules in team health, and operational medical support (not just emergency techniques).

Combat Medicine for the Medic/Corpsman

This course is designed to give the medic the scientific background and skills to teach basic combat medicine to operators. While the medic possesses the medical skills to teach his fellow Soldiers lifesaving procedures, he benefits from a course that introduces teaching skills, scenarios for application, and other educational methods. This is a "train the trainer" and "tricks of the trade" course.

Advanced Combat Medicine for the Medic/Corpsman

This Advanced Combat Medic Course is designed at the medic level. The curriculum is based from the skills of USSOCOM Tactical Combat Casualty Care course (TCCC), the application of current medical treatments and equipment, lessons learned from recent and current conflicts, medical skills essential for today's combat medic (including those taught at the Special Forces Medical Sergeant's [18D] Course).

Enhanced Tactical Combat Casualty Care (TCCC-E)

TMI also offers an exclusive five-day "enhanced course" that includes Tactical Combat Casualty Care (TCCC). The enhanced version meets all of the requirements of the standard TCCC course, but also includes other important medical training. TMI offers many "blocks" of instruction to choose from. This allows military units to custom design a course that best fits their needs. It also allows for the unit to provide two additional days of important training to their personnel at little additional cost. In addition, the five-day course culminates with an extensive field training exercise where the students are able to integrate the learned concepts into military maneuvers specific to their unit (patrol, CQB, room clearing, waterborne ops, etc).

Special Operations Medical Sustainment Skills

The curriculum is based on the Special Operations Combat Medic Critical Task List, and includes: basic sciences, joint operational medicine, basic dental emergency procedures, environmental injuries, pharmacology, emergency cardiac care, clinical medicine, clinical skills, and trauma. The Advanced Cardiac Life Support (ACLS) course for emergency cardiac care, Basic Life Support Course (BLS) for cardiopulmonary resuscitation, pediatric education for Pre-Hospital Providers (PEPP) course for pediatric emergencies, and Pre-hospital Trauma Life Support for non-tactical trauma care will all be included and re-certified.

Sports Medicine for the Soldier/Athlete

Sports medicine for the Soldier/athlete is designed for anyone who is interested in the prevention, care, treatment, and rehabilitation of "athletic injuries." This course also addresses taping and bracing, injury evaluation, fitness, and nutrition.

Tactical Combat Casualty Care (TCCC)

TMI offers the three-day course in Tactical Combat Casualty Care (TCCC). TMI uses the most current USSOCOM-approved curriculum for tactical combat casualty care. This three-day course is designed for medics and non-medic operators.

Tactical Emergency Medical Support (TEMS) for Military

This TEMS course was originally designed for civilian SWAT medics, and not for military medics. However, to date, the TEMS course has been the single most requested course by both civilian agencies and military units. Many military units have provided this training to all levels of medics (including combat life savers, 68W, and 18D), and believe that many of the "civilian concepts" are useful as an adjunct to the military technique already taught.

Warrior Athlete Strength and Conditioning (WASC)

When developing a comprehensive strength and conditioning program, Operators must consider the physical demands of operational related activities. The WASC course is provides individuals with information to properly design, implement, and instruct military personnel in weight training and operational fitness. This is a three-day course that includes both lectures and hands-on techniques specific to military tasks. Topics include: basic exercise physiology, strength training principles, speed development, agility training, conditioning, program design, nutrition, assessment, sports injuries, speed, agility, plyometrics, circuit training, Olympic lifts, and working with implements.

Contact Information:
Tactical Medics International, Inc.
3948 Third Street South, Suite 132
Jacksonville Beach, FL 32250-5847
Phone (904) 887-8872
Fax (904) 212-1719
info@tacmedics.com
www.tacmedics.com

Counter Narcotics and Terrorism Operational Medical Support (CONTOMS)
www.trueresearch.org/contoms

The U.S. Department of Health and Human Services, U.S. Department of Homeland Security, and the U.S. Park Police, in cooperation with the TRUE Research Foundation for the advancement of military medicine, are pleased to announce the return of the Counter Narcotics and Terrorism Operational Medical Support (CONTOMS) Program. For nearly 20 years, CONTOMS has provided nationally-recognized, evidence-based courses in tactical medical support of law enforcement and military operations. CONTOMS is dedicated to providing a solid foundation of knowledge and skill for tactical medical providers supporting local, state, and federal missions.

EMT-Tactical (EMT-T), the cornerstone of the program, is a one-week, 56-hour continuing education module for personnel who are already trained at the EMT level or higher. Candidates must be sponsored by a bona fide law enforcement agency, military unit, or other specialized team.

The basic EMT-Tactical program is a 56-hour course that provides a foundation for medical personnel providing support to special response teams. The basic school integrates didactic, practical and field exercises to provide the student with the essentials of tactical emergency medical support (TEMS). Successful completion of this course results in certification of special competence. Course topics include: patient extraction and medical care in the tactical environment, forensic evidence collection, medical threat assessment and medical intelligence, wounding effects of weapons and booby traps, ppecial equipment for medical support, preventive medicine to ensure the health of your unit.

For question in relation to registration, please contact:
Ashley Bordas
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TRUE Research Foundation
8610 N. New Braunfels, Suite 705
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Phone: (210) 829-1239
Toll Free: (888) 329-1239
Fax: (210) 829-5513

For other information contact:
Denis FitzGerald
Denis.FitzGerald@hhs.gov
U.S. Department of Health and Human Services
Phone: (202) 205-5623

Specialized Emergency Response Training (S.E.R.T.) Group International
http://www.thesertgroup.com

Tactical Operations Medical Specialist: This course covers the skills necessary to provide emergency medical care in the austere environment. Consisting of classroom, skills stations, and very realistic scenarios this course will provide a new tactical medical operator with the training necessary to support a SPECOPS team during operations and training. Curriculum includes: tactical combat casualty care, role/responsibility of TEMS provider, medical threat assessment, ballistics, team health, buddy care, clan labs, dental care, pediatric trauma, entry/room clearing techniques, rescue techniques, and field training exercise

Special Operations Medical Provider: The course covers basic elements of providing operational emergency medical care in the austere environment. This offers the medical operator options for treating casualties in the tactical or combat environments. Curriculum Includes: tactical combat casualty care, medical threat assessment, ballistics, team health, buddy care, and rescue techniques

Pediatric Trauma in Tactical Operations: This course addresses the unique medical needs of the pediatric trauma victim. As noted in Operation Iraqi Freedom, kids pose a unique challenge to medical providers. Following the axiom that "kids are not small adults," this course will present assessment and treatment options for those children injured during tactical or combat operations. Curriculum Includes: kids and combat operations - a primer, the PALS paradigm, patterns of injury, treatment options, skills, and real world scenarios

Contact Information:
P.O. Box 371231
Reseda, CA 91337-1231
Ph: 866/500-5465

JTM Training Group
www.jtmlasvegas.com

The home-base of training occurs in Las Vegas, on Nellis AFB. One of the main attractions of training in the Las Vegas desert is that it duplicates the terrain in which U.S. Military Special Operations personnel currently deploy. The students train in the jagged cliffs of mountains and dry air of the high desert throughout the 8,000 square miles. Add that to the 300 average days of sunshine per year and this could be called the "perfect" location for war-fighting preparation.

With the USAF Fighter Weapons School and Red Flag exercises, Nellis AFB hosts numerous advanced fighter and ground training maneuvers over the course of any given year. With that being said, Nellis AFB, NV currently has the premiere infrastructure in place to house TDY military aircraft, personnel, and equipment that is necessary for JTM Training Group classes.

Intermediate Operator: Three-day weapons and tactics course

Constructed not for the individual, but for the team; the training objectives of the Intermediate Operator course are custom tailored to fit the needs of small groups that may operate in hostile environments. The thrust of this curriculum is to enable a group who must perform in unfriendly territory to defend themselves with stunning results. Survive to fight another day using individual skills and teamwork is this courses' proven goal.

Advanced Operator: Five-day weapons and tactics course

This specialty training course covers all of the up-to-date fundamentals and promotes an advanced training doctrine involving numerous skill sharpening drills to keep "teams" in the learning mode. The course is designed to cover and establish a baseline of proficiency for each student. Teams will then rapidly integrate into small elements with deeply embedded concepts of overland warfare. Attendees of this course will greatly improve their individual skills and team proficiency in various facets of ground movement and target engagement. Additionally, students will strengthen their understanding of the team concept with involved overland travel through non-permissive environments.

Contact Information:
Website: www.jtmlasvegas.com
Email: registration@jtmlasvegas.com
Phone: (702) 759-5075

K-9 DOWN
Web Site: www.k9down.com

K-9 Down is a highly specialized program designed for professional working dog handlers and emergency rescue personnel – anyone who may respond to canine health emergencies in the field. The course is tailored for police officers, firefighters, medics, search and rescue teams, military dog handlers, or other canine handlers with specialized training. The course is two days in length. A series of lectures are presented the first day on topics ranging from the normal canine physical exam to toxicities and heat exhaustion. On the second day, the group is divided and assigned to one of two half day sessions, which offer hands-on training in small group sessions. Please refer to the course schedule for more information. Although the instructors vary slightly, the same course content is provided at all three locations.

There is also an option for advanced medical training. This session is reserved for personnel who have previously attended the aforementioned K-9 Down session and desire further training, or if you already have advanced medical training in your current profession (i.e., physicians, tactical medics, paramedics, etc.). This advanced course is only being offered at North Carolina State University. Please click on the link to the NCSU website at http://www.cvm.ncsu.edu/conted/k9down.html for more information. Lectures include: health hazards, examination, iv/oxygen/transport, fluid therapy, heat stroke/hypothermia, smoke inhalation, burn wounds, gastric dilatation and volvulus (bloat), gun shot wounds/bandaging, poisoning, and emergency drugs. Laboratories include: vital signs, safe handling, transport technique, IV catheters, endotracheal intubation, bandaging/splinting/tourniquet, oxygen administration, stomach tube, and CPR

Registration Questions (NC):
Samantha Hartford
cvm-ce@lists.ncsu.edu
919-513-6421

Registration Questions (FL and NY):
Gail Moore
gail.m.moore@gmail.com
813-933-8944

Course Content Questions:
Dr. Rita Hanel
rita_hanel@ncsu.edu

Contact Information:
K-9 Down
4700 Hillsborough Street
Raleigh, NC 27606
Office: (919) 513-6421
Fax: (919) 513-6689
Web Site: www.k9down.com

CURRENT TRAINING ORGANIZATIONS

CERTAC
P.O. Box 354
Drake, Colorado 80515
Office: (970) 214-9355
Web Site: www.certac.com

CONTOMS
U.S. Department of Health and Human Services
8610 N. New Braunfels, Suite 705
San Antonio, Texas 78217
Phone: (202) 205-5623
Fax: (210) 829-5513
Web Site: www.trueresearch.org/contoms

Cypress Creek Advanced Tactical Team
c/o Cypress Creek EMS
16650 Sugar Pine Lane
Houston, Texas, 77090
Office: 281-378-0800 ext. 826
Fax: (281) 440-7677
Web Site: http://www.ccems.com

Direct Action Resource Center
6302 Valentine Road
North Little Rock, Arkansas 72117
Office: (501) 955-0007
Fax: (501) 955-0080
Web Site: http://www.darc1.com

Gunsite Academy, Inc.
2900West Gunsite Road
Paulden, Arizona 86334
Office: (928) 636-4565
Fax: (928) 636-1236
Web Site: http://www.gunsite.com

HSS International, Inc.
P.O. Box 50 / # 337
Lake Arrowhead, California 92352
Office: (909) 336-4450
Fax: (714) 242-1312
Web Site: http://www.hssinternational.com

Insights Training Center
P.O. Box 3585
Bellevue, Washington 98009
Office: (425) 827-2552
Fax: (425) 827-2552
Web Site: http://www.insightstraining.com

JTM Training Group
5546 Camino Al Norte, Suite 253
North Las Vegas, Nevada 89031
Phone: (702) 759-5075
Fax: (702) 545-0501
Website: www.jtmlasvegas.com

International School of Tactical Medicine
P.O. Box 2852
Palm Springs, California 92263
Telephone: (760)325-2591
Fax: (760)778-7929
Web Site: http://www.tacticalmedicine.com

Leomedicus
1950 W. Roscoe St.
Chicago, Illinois 60657
1(800) 272-0432
info@medicaltactics.com
Web Site: http://medicaltactics.com

“Medic Up” Tactical Medic Training Course
PO Box 144
Orefield, Pennsylvania. 18069
Office: (610) 295-7011
Web Site: www.medicup.com

Medical College of Georgia
AF-2044
1120 15th Street
Augusta, Georgia 30912
Office: 706-721-3548
Fax: 706-721-7718
Web Site: http://www.mcg.edu/ems/COM/index.html

National Tactical Officer’s Association
P.O. Box 797
Doylestown, Pennsylvania 18901
Office: (800) 279-9127
Fax: (215) 230-7552
Web Site: http://www.ntoa.org

Rescue Training, Inc.
9-A Mall Terrace
Savannah, Georgia 31406
Office: (877) 692-8911
Fax: (912) 692-1338
Web Site: http://www.emt.org

SERT Group International
P.O. Box 371231
Reseda, California, 91337
Office: (866) 500-5465
Fax: (818) 344-8099
Web Site: http://www.thesertgroup.com

Specialized Medical Operations, Inc.
P.O. Box 530520
Henderson, Nevada 89053
Office: (702) 617-1655
Fax: (702) 920-7635
Web Site: www.specmedops.com

Special Operations Tactical Training International
P.O. Box 830
Dover, Tennessee 37058
Office: (931) 232-6593
Fax: (931) 232-6542
Web Site: www.sottint.com

STS Consulting
PMB Box 176
1981 Memorial Drive
Chicopee, Massachusetts 01020
Office: (413) 531-8699
Fax: (413) 532-1697
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Fax: (336) 945-2289
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Jacksonville Beach, Florida 32250
Phone (904) 887-8872
Fax (904) 212-1719
Web Site: www.tacmedics.com

Team One Network
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Fredericksburg, Virginia 22406
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Fax: (540) 752-8192
Web Site: www.teamonenetwork.com

The Tactical EMS School
1309 Dawn Ridge Road
Columbia, Missouri 65202
Office (573) 474-2436
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Web Site: www.tactical-specialties.com

VETERINARY MEDICINE

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Fax: (919) 513-6689
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K-911 Emergencies, Inc.
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Fax: None
Web Site: www.k911emergencies.com

Disclaimer: The author is affiliated with Tactical Medics International, and is an instructor for CONTOMS. He has also taught for and/or been a student at several of the other courses.

Photographic & Measurement Comparison

Combat Application Tourniquet (GEN III vs. E-CAT)

This material (MATL) was first encountered several years ago in a depot in Afghanistan and thought to have been purged from the system. The MATL was then of obvious inferior construction and quite recognizable as a substitute for the real thing. Today the product is very difficult to distinguish from the C-A-tourniquet® down to duplicate markings and symbols. Although there is no direct evidence against these duplicate products, several reports indicate that they are of inferior design and may cause serious injury or death.

Executive Summary

Introduction:

1. The Element Cat (E-CAT) is a very carefully made counterfeit CAT tourniquet.
2. It is manufactured in Hong Kong for $8.50 (USD) per item.
3. There are no limits to the number that can be purchased.
4. They are available on the internet, and anyone can purchase them.
5. They were designed to look, feel and act like a CAT (GEN III).
6. They ARE a counterfeit tourniquet.

How can you tell the difference?

1. Once you know what to look for, it is easy to tell the difference between the two tourniquets.
2. However, a novice would easily mistake the "Fake" for the real CAT (GEN III).

Executive Summary

Differences on the Windlass:

1. The CAT (GEN VI) with the thicker windlass is much easier to identify and differentiate between the CAT GEN VI and the E-CAT.
2. The CAT (GEN III) windlass looks exactly like the E-CAT windlass. They are the exact length, nearly the same thickness at all measurable points:
3. The E-CAT windlass will fold back on itself without breaking; however, you cannot tighten the tourniquet with it.
4. The CAT (GEN III) cannot be flexed. The composite used in its manufacturing is ridged, and will break with excessive force. However, it will tighten the tourniquet.
5. Mold marks on the E-CAT are 2mm windlass are smaller than on the (CAT GEN III) windlass at 5mm. (Photo Slides follow)

Differences on the Chassis:

1. The CAT (GEN III) and the E-CAT have identical dimension chassis and component parts.
2. There are only slight differences in the thickness of the composite material.
3. The composite material on the E-CAT is very soft and pliable.
4. The composite on the CAT (GEN III) will flex, but it is more rigid, and durable. It can fail when stress too far.
5. The marking on the counterfeit (E-CAT) are identical to the CAT (GEN III)
6. Mold marks:

    1. On the back of the chassis there are four mold marks on both units.
    2. On the back of the CAT (GEN III) the mold marks are all 5mm in diameter.
    3. On the back of the E-CAT the mold marks are 4mm in diameter

Executive Summary

Differences on the Buckle:

1. The CAT (GEN III) and the E-CAT have nearly identical dimension buckles.
2. See the photographs (following) to illustrate the subtle differences.
3. The E-CAT has slightly squared corners on the buckle.
4. The E-CAT has (6) mold marks on the back of the buckle. (2) on the center bar, and (2) on each of two outside bars.
5. The CAT (GEN III) is more rounded on the corners of the buckle.
6. The CAT (GEN III) has (6) mold marks on the back of the buckle. (3) on each of the outside bars.

Differences in the Webbing material:

1. The CAT (GEN III) and the E-CAT have nearly identical width and thickness of nylon webbing.
2. See the photographs (following) to illustrate the subtle differences.
3. The E-CAT is stitched all around.
4. The E-CAT does not use any heat welding (appear as "dots" on the webbing)
5. The CAT (GEN III) is stitched, but also relies on heat welding in some spots.
6. The CAT (GEN III) has a date (M/D/Y) stamped in white toward the tip of the tourniquet (nylon).
7. The adjustment webbing is identical width and length for both tourniquets.

How to find the FAKE CAT:

1. Stitching only (no heat welding spots)

2. Back of buckle has (6) 3mm mold marks:

   a. 2 on the lateral bar.
   b. 2 on the center bar.
   c. 2 on the (other) lateral bar.

3. No markings (M/D/Y) on the tourniquet.

4. Mold marks on windlass are small, only 3mm.

5. Windlass is very flexible, bends and then snaps back.

6. The hook and loop used to secure the windlass into the windlass lock will likely drop off the windlass lock—the glue is dry and does not hold.

Measurements

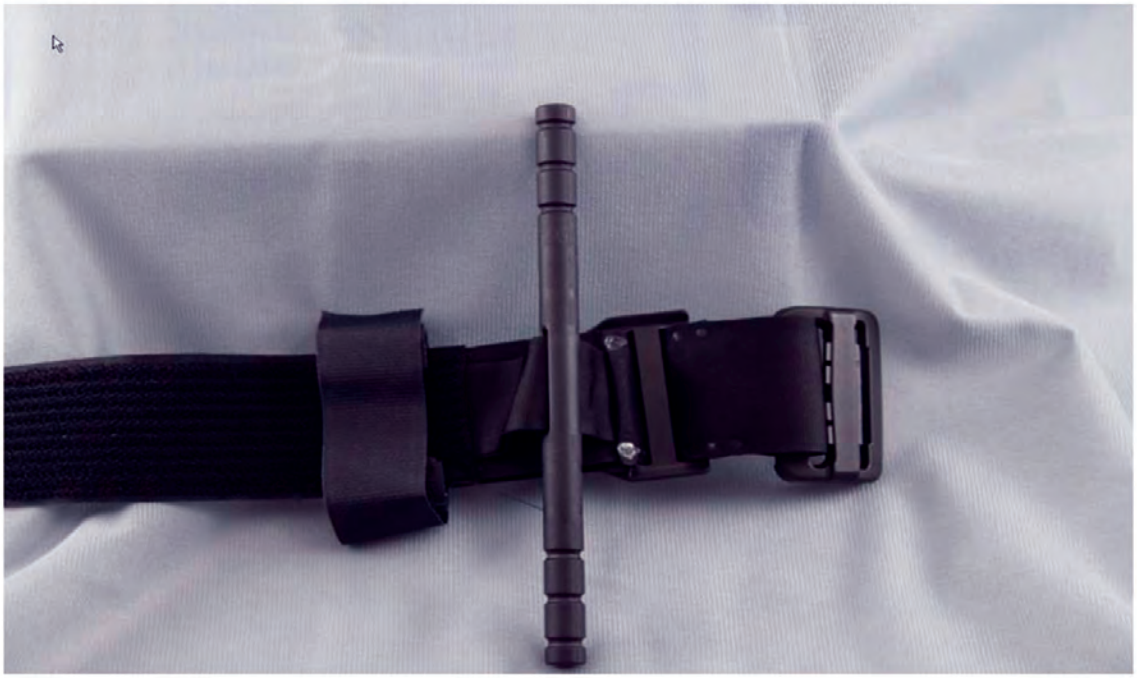
	Chassis (Thickness)	C-Buckle Width (1st) bar	C-Buckle Width (2nd) bar	Windlass Hook (Bottom)	Windlass Hook (Left)	Windlass Hook (Right)	Windlass (Center)	Windlass (L-End)	Windlass (R-End)	Front Buckle (Center)	Thread Tear (ft lbs)
GENIII CAT	1.70mm	3.6mm	6.1mm	1.71mm	1.75mm	1.73mm	9.09mm	9.27mm	9.36mm	1.67mm	11.9lbs
E-CAT	1.68mm	3.92mm	6.20mm	1.73mm	1.92mm	1.93mm	9.01mm	9.17mm	9.28mm	1.75mm	28lbs
GENVI CAT	1.73mm	3.77mm	3.83mm	2.25mm	2.38mm	2.37mm	11.33mm	9.34mm	9.32mm	1.71mm	12.5lbs

*Note: there is no measurable difference between

1. The length of the windlass for (GEN III and E-CAT), both are 14.8cm.
2. Chassis length is 9.0cm for both.
3. Chassis width is 3.8cm for both
4. Length of the tourniquets are the same.
5. Width of the nylon webbing is 3.8cm for both.
6. Width of the adjustment webbing is 2.5cm for both.

E-CAT

CAT (GEN III)



CAT (GEN III) vs. E-CAT

Package Comparison

CAT (GEN III) vs. E-CAT

CAT (GEN III)

Package from NARP, Inc. Looks nothing like the E-CAT package.

E-CAT:

Packaged in plastic bag with paper top.

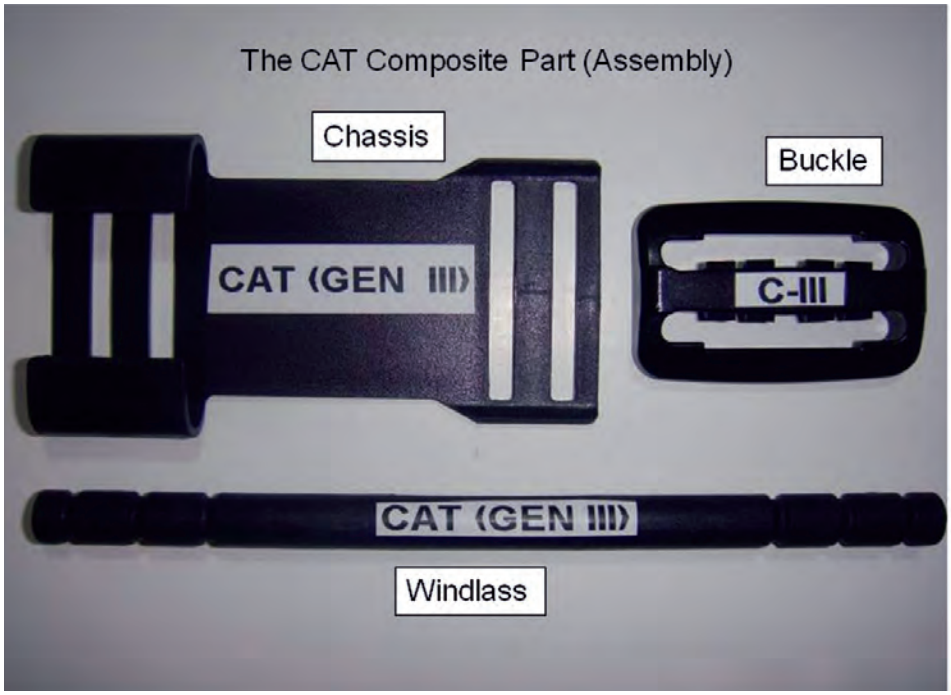
The sticker on the bag call the tourniquet the "Combat Application Tourniquet" and lists the NSN assigned to NARP.

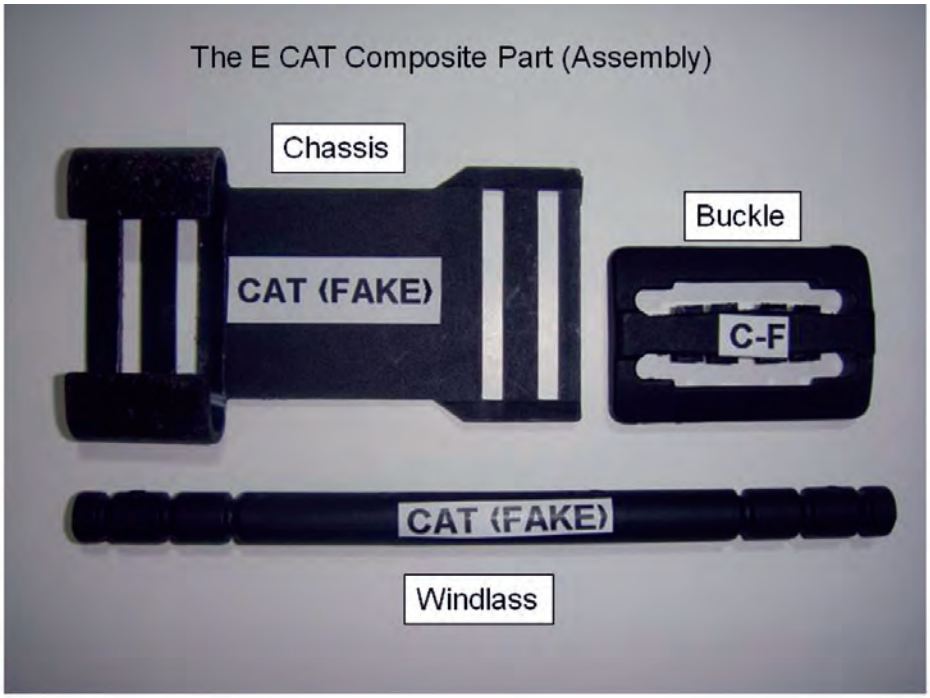
CAT

E-CAT

CAT (GEN III) vs. E-CAT

Chassis Comparison



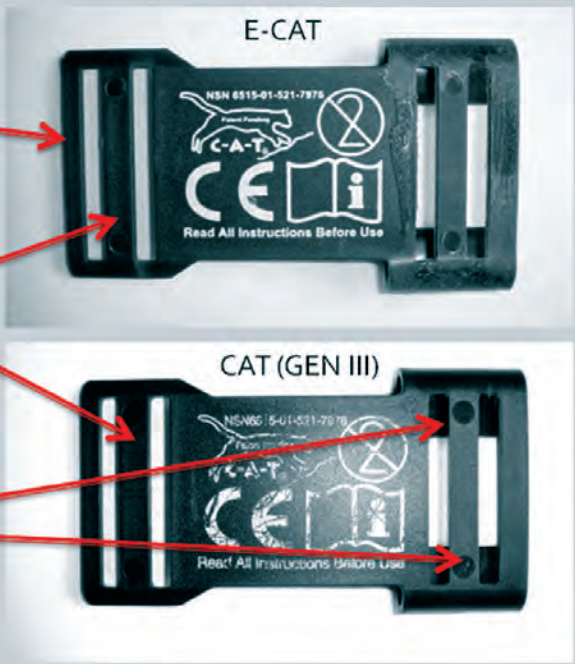


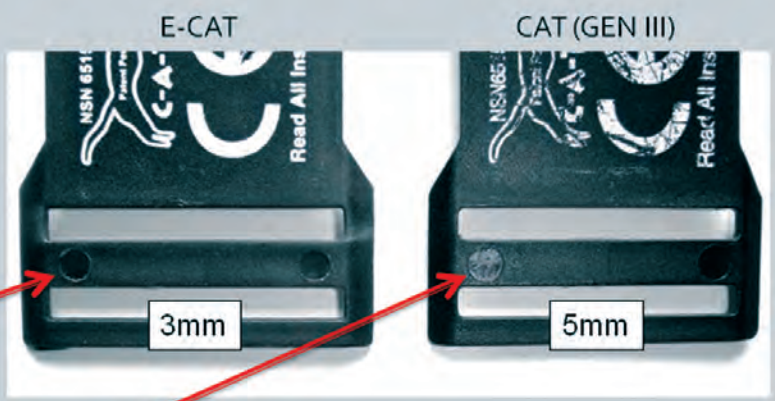
CAT (GEN III) vs. E-CAT

Front bars are the same

Back bars are the same

Mold marks on CAT (GEN III) are 5mm in diameter





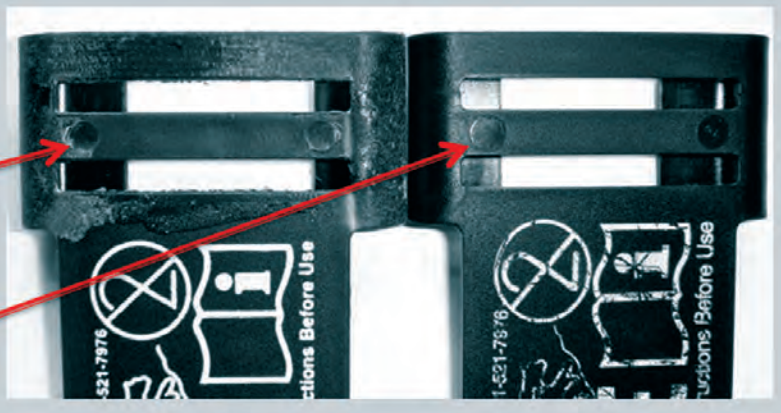
Notice the only discriminator is the size of the mold marks on the back of chassis

CAT (GEN III) vs. E-CAT

Notice mold marks (again)

3mm on E-CAT

5mm on CAT (GEN III)



E-CAT CAT (GEN III)

Notice E-CAT windlass lock is misshapen and slightly thinner.

E-CAT

Slightly misshapen, weaker composite.

CAT (GEN III)

Stronger more uniform composite.

Windlass Lock (End view)

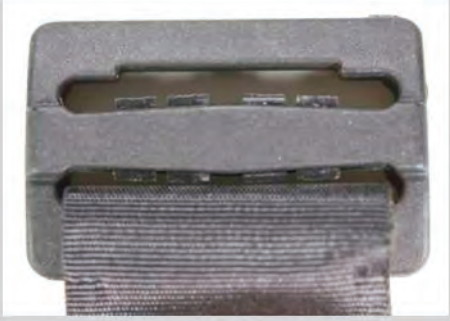
E-CAT CAT (GEN III)

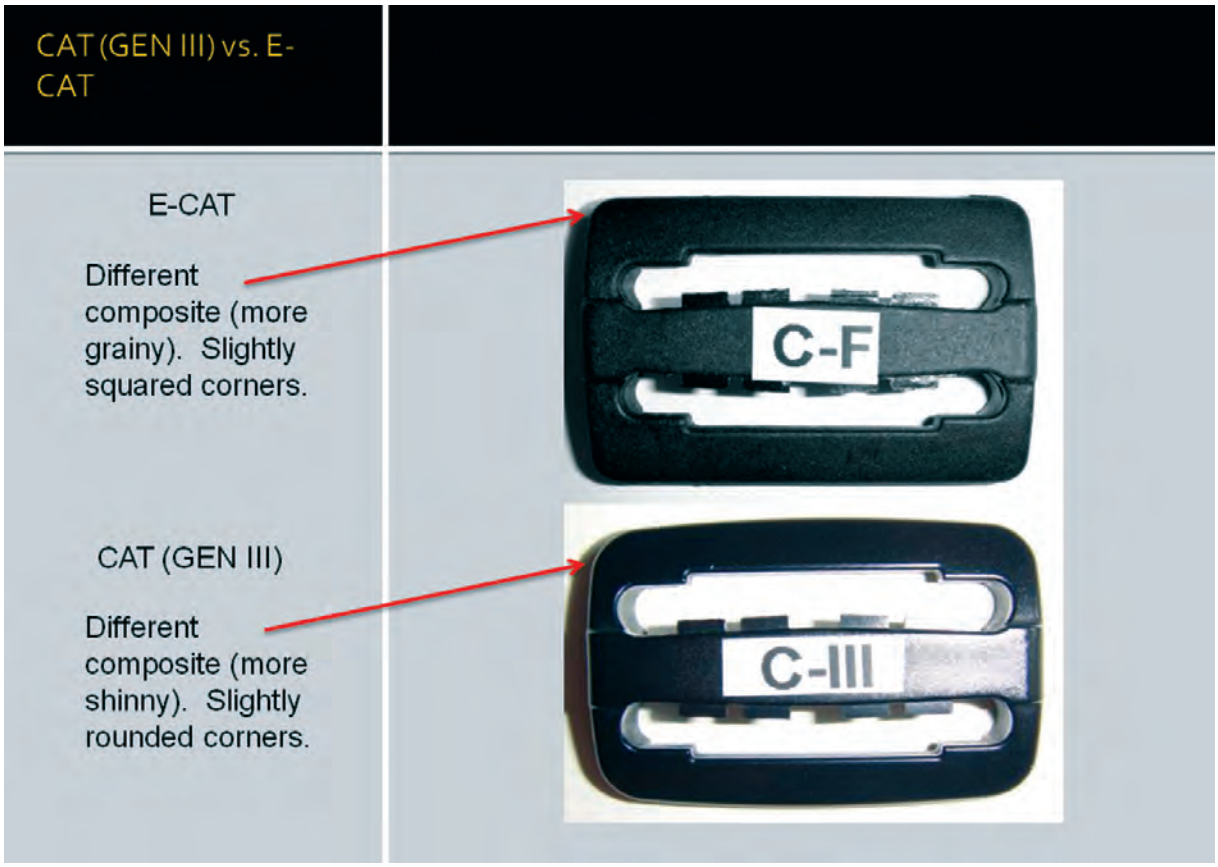
Chassis Comparison

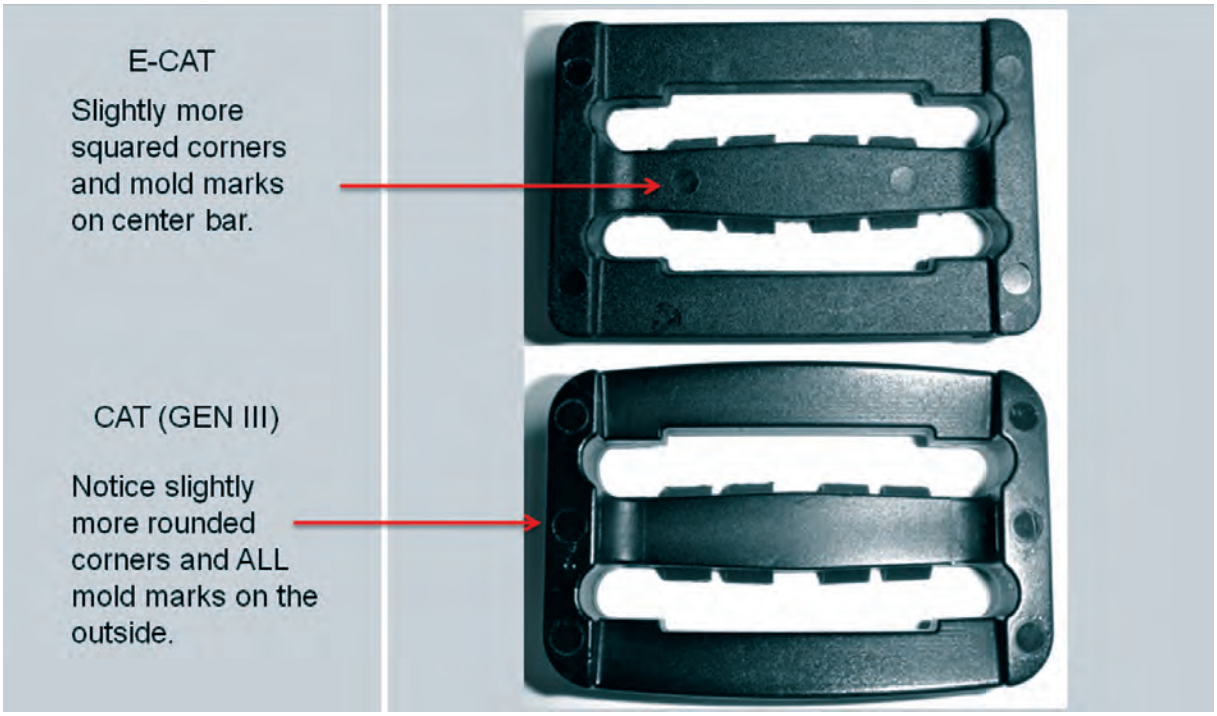
Windlass Lock (end view)

CAT GEN III vs. E-CAT

Buckle Comparison

CAT (GEN III) vs. E-CAT	
CAT (GEN III) Buckle (Back)	
CAT (GEN III) Buckle (Front)	
E-CAT Buckle (Back)	
Buckle (Front)	


CAT (GEN III) vs. E-CAT
E-CAT
Different composite (more grainy). Slightly squared corners.
C-F
CAT (GEN III)
Different composite (more shinny). Slightly rounded corners.
C-III

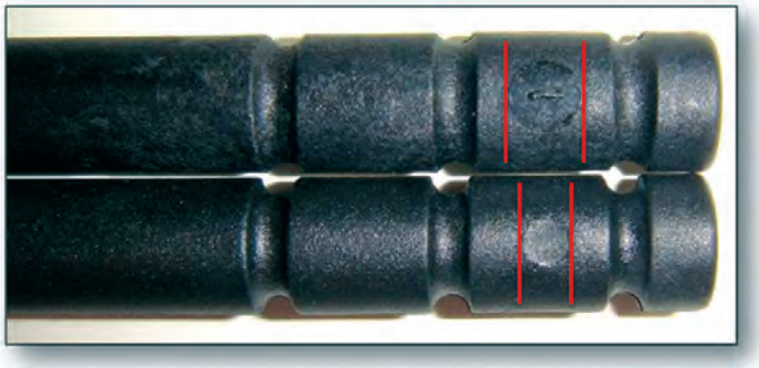

E-CAT
Slightly more squared corners and mold marks on center bar.
CAT (GEN III)
Notice slightly more rounded corners and ALL mold marks on the outside.

CAT (GEN III) vs. E-CAT

Windlass Comparison

Identical to the casual observer

Linear mold marks from core and cavity (mold) are identical on both tourniquets.

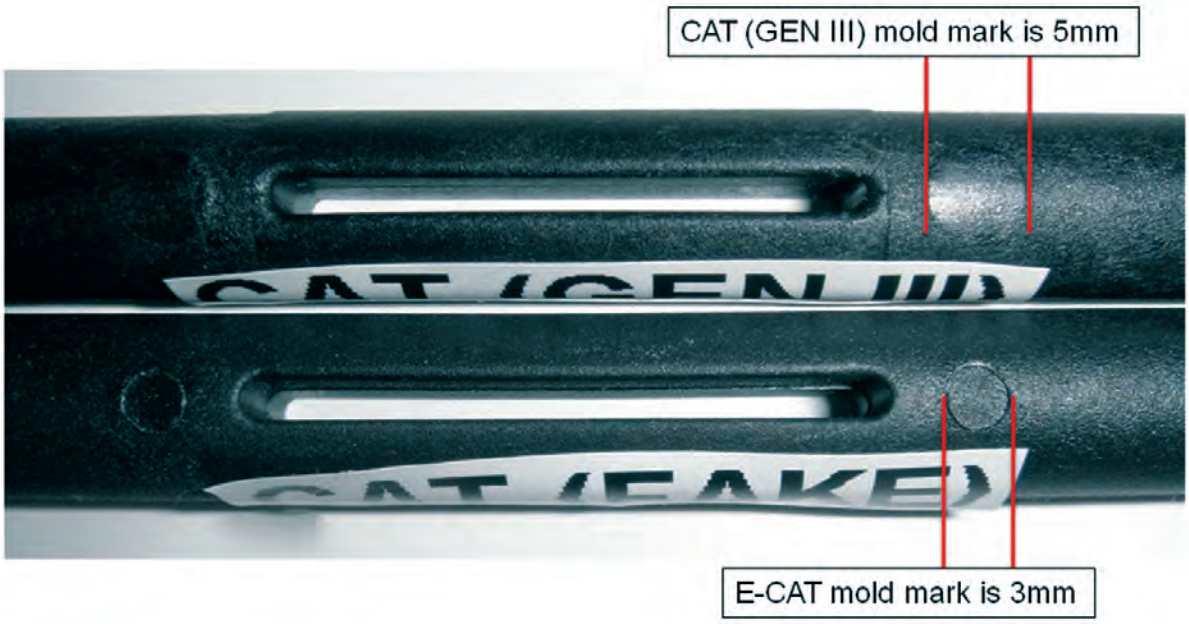


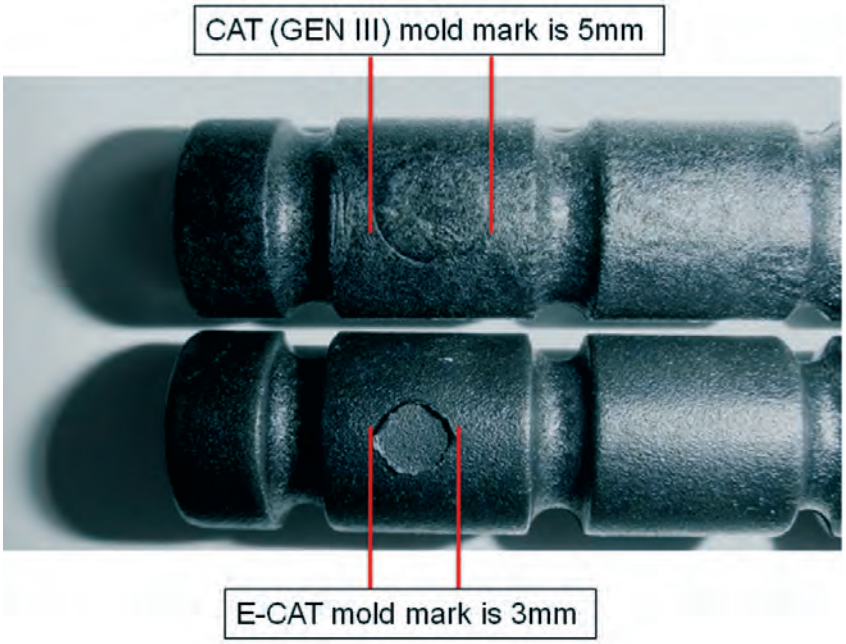
*Notice Mold Marks

CAT (GEN III)
5mm

E-CAT
3mm

Windlass Comparison





Windlass Comparison

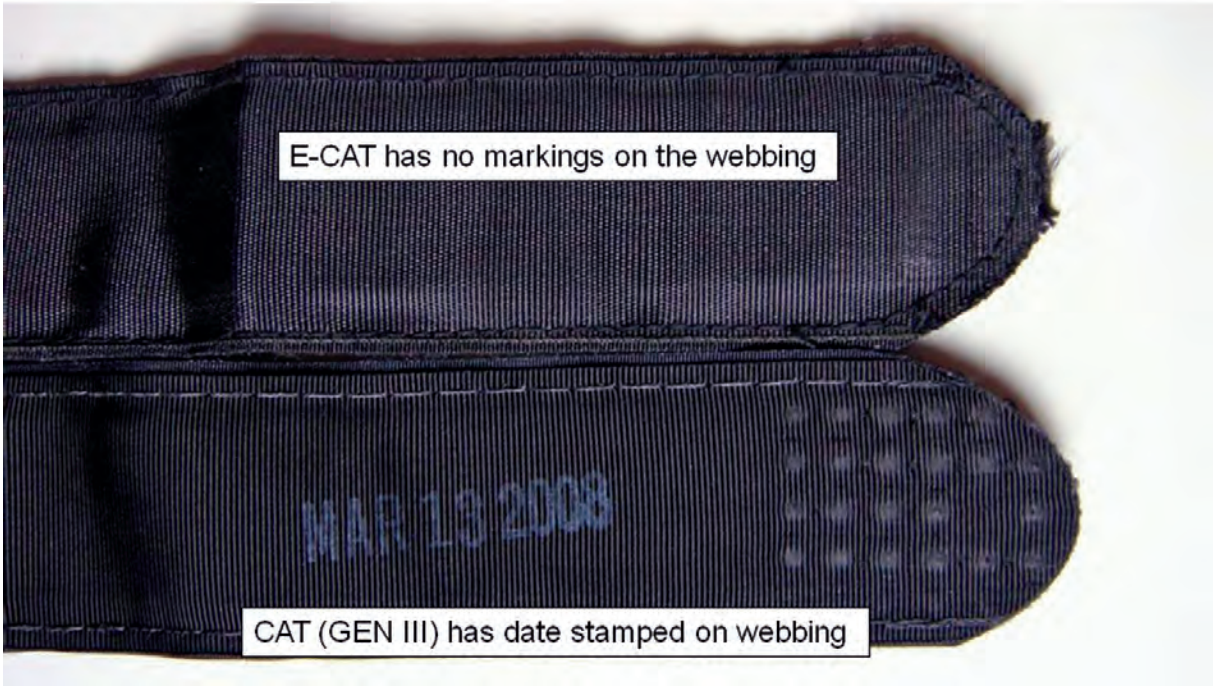
Small 2mm mold mark on CAT (GEN III)
End of windlass

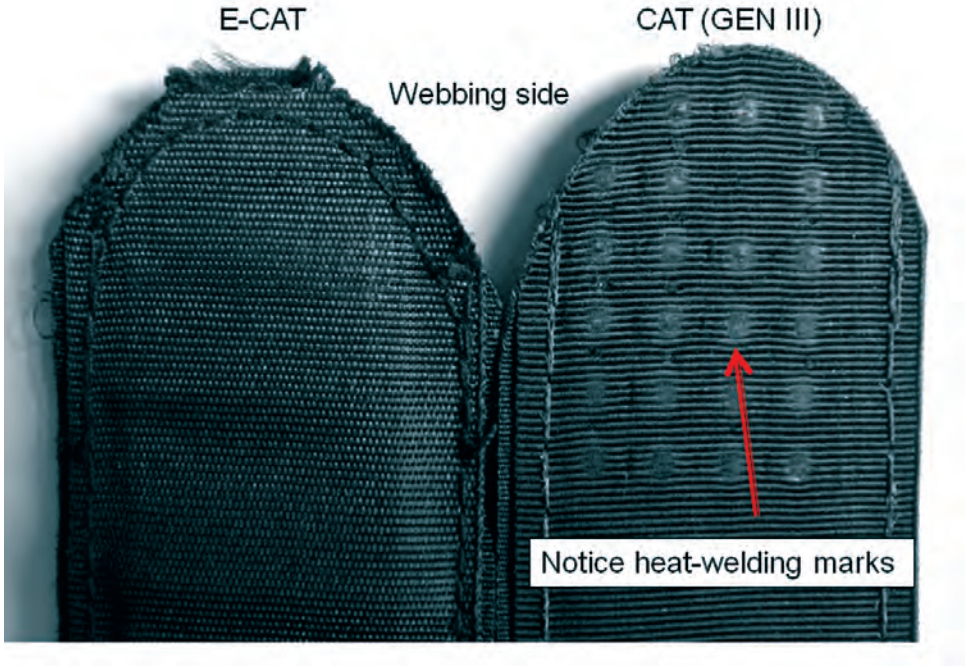
E-CAT

CAT (GEN III)

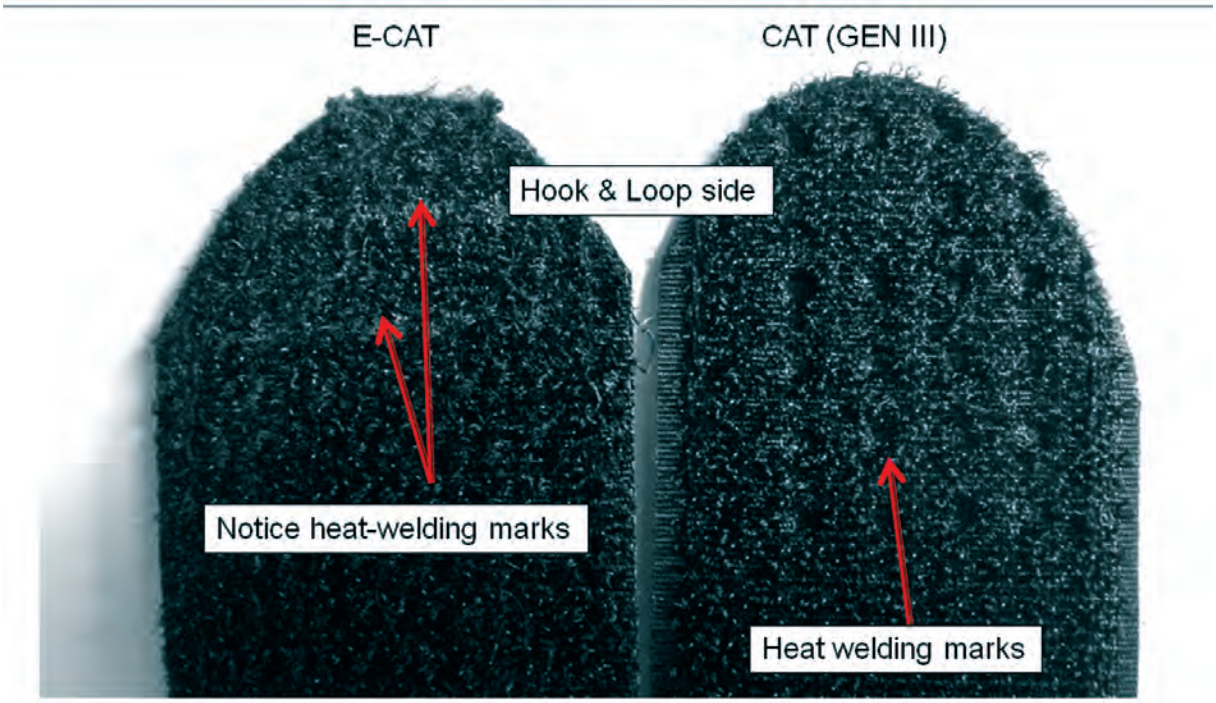
CAT (GEN III) vs. E-CAT

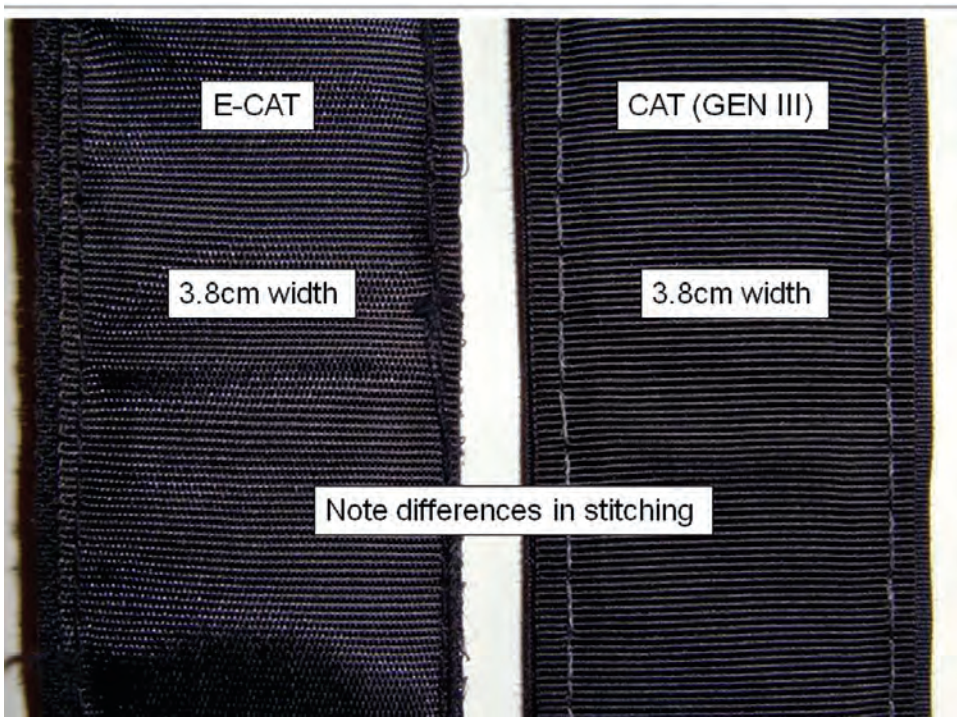
Stitching Comparison

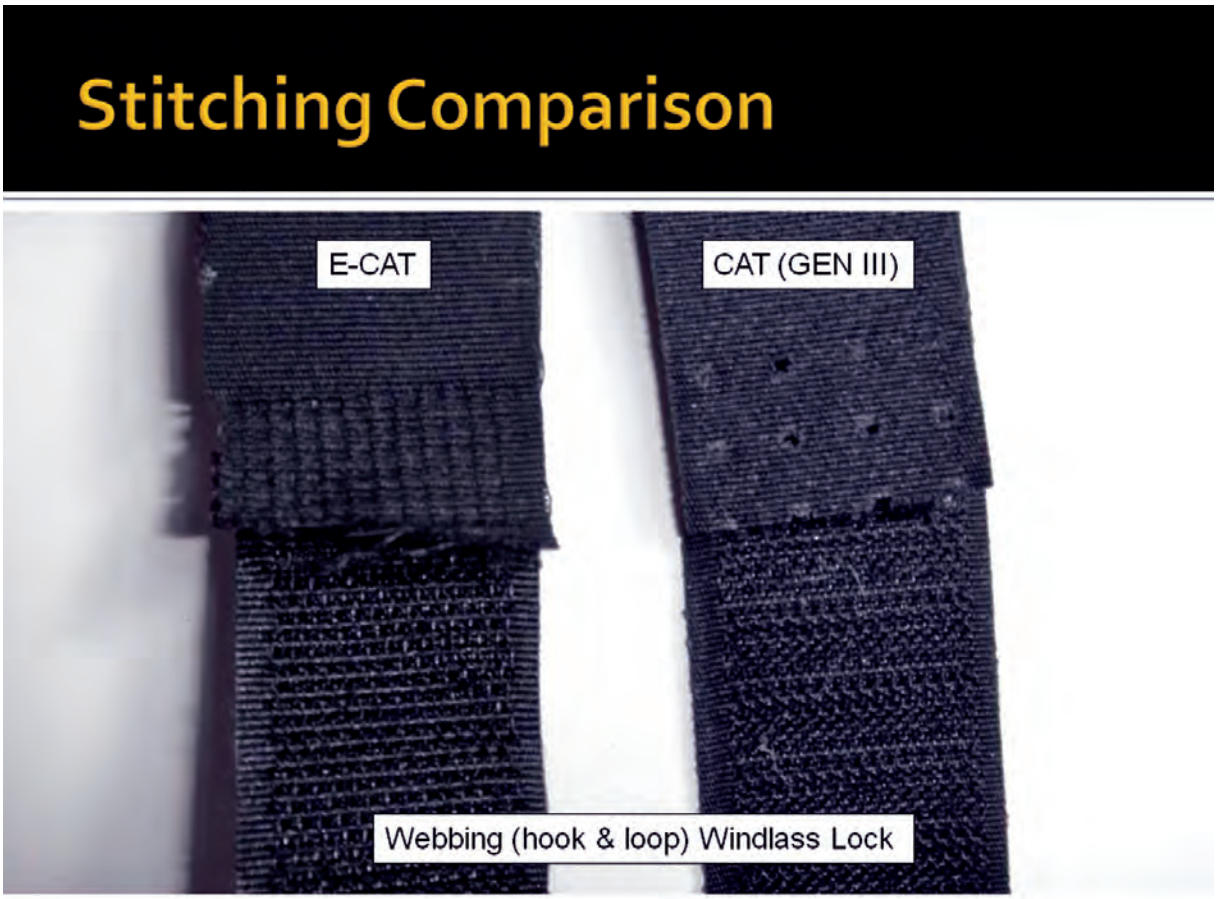




Stitching Comparison

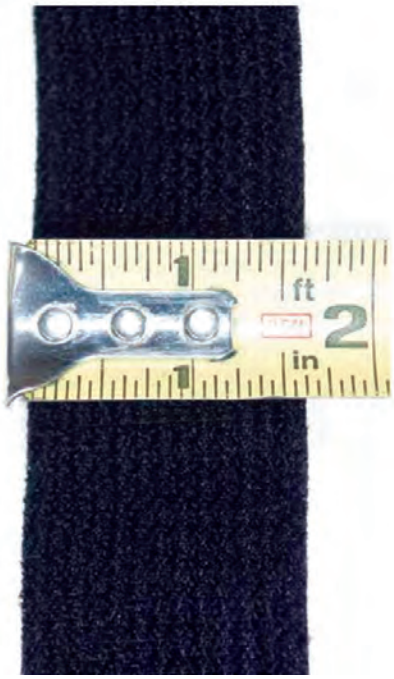





Stitching Comparison
E-CAT
CAT (GEN III)
Webbing (hook & loop) Windlass Lock

CAT (GEN III) vs. E-CAT

Webbing Comparison



E-CAT Packaging

(Manufacturer)
www.world-element.com

(Nomenclature)
Combat Application Tourniquet

(National Stock Number)
NSN 6515-01-521-7976

Clinical Pearls

Easy Filth Fly Abatement During Deployment

MAJ John Wayne Paul, PA-C

Filth flies have been, and will continue to be, a major preventive medicine issue during military exercises and operations conducted in warm weather. Not only have filth flies been implicated as disease vectors, especially in refugee and prisoner of war camps, but they can also be a tremendous nuisance, interfering with and degrading mission performance. Fly problems may develop around field messing facilities that have inadequate screening and this can result in unsanitary conditions making it difficult to protect food from fly-borne contamination. Likewise, field latrines constructed without adequate fly exclusion are virtually unusable. Further, in mass casualty situations, such as on battlefields and following natural disasters, flies will breed in corpses and wounds, if they are not controlled or excluded. For these reasons, fly control is often a major responsibility of utmost importance for preventive medicine personnel.[1]

Along with proper field hygiene, there is a simple solution that the SOF medic can use to easily capture/kill flies while deployed.

First, purchase some non-poisonous mouse glue that can be found in nearly every bazaar in the CENTCOM AOR. It costs about a dollar per tube. Also available by the gallon using NSN: 3740-01-420-9038.

Next, cut a piece of cardboard from a care package or an MRE box and spread the glue on using a circular motion with the tube. You can apply fly bait, but you really don't need to because it works just as well without it. Finally, place the cardboard in the area where the flies are. The picture below was taken only 20 minutes after placing the cardboard down. Once a fly lands on it, other flies are attracted to the trap. Within a day, it is usually full. In addition to the potential entertainment value of catching flies, it also helps catch other insects if you place the cardboard under a light at night. (Use caution with placement on the roof, as we unintentionally caught a bird that was attracted by the insects on the glue using this method.)

MAJ Johnny Wayne Paul, PA-C is currently deployed to the AOR and works for the SOCCENT Command Surgeon, COL Warner (Rocky) Farr.

References

1. http://www.afpmb.org/pubs/tims/TG30/TG30.htm

Lessons Learned

Dr. Bruce C. Arne

This 30 year old African American male was ejected from an open air vehicle during a chase that occurred in the early evening. The subject sustained multiple areas of road rash and abrasions to his face (figures 1 and 2), trunk, and lower extremities. Upon apprehension, the patient was taken to a Level 1 trauma center and teaching hospital for evaluation.

Figure 1

Figure 2

At presentation, the patient's chief complaint was generalized pain from having been ejected. His past medical history was otherwise unremarkable as reported from the transporting paramedics. A chest film and an abdominal ultrasound were administered after the patient was handed over to the trauma staff in the ED. Both studies proved to be negative for intra-abdominal bleeding, hemo/pneumothorax, fractured ribs, or widened mediastinum. His Glasgow Coma Score (GCS) was determined to be 15 and an exam of the abrasions to his face and head, trunk, and lower extremities was undertaken. The abrasions to the upper and lower extremities demonstrated full-thickness avulsions to the right lateral thigh and knee and the right shoulder. The area of desquamation to the right shoulder and lateral arm was approximately 5x7cm. The denuded area to the right lateral thigh and knee was approximately 5x9cm. There was no capsular involvement or ligament damage to the right knee from the skin avulsion. The head and neck exam revealed mild to moderate right-sided facial edema (figure 1) with similar skin avulsions to the right cheek area. His extra ocular movements were intact (EOMI) and his pupils were equal, round, and reactive to light and accomodation (PERRLA). There was no hemotympanum and no fractures to the facial skeleton were found on a limited physical exam by the ED staff. Plain films of the areas that contained the more siginificant lower extremity abrasions were taken and did not demonstrate any fractures. The patient was admitted for observation, pain control, antibiotics, and bacitracin to the abrasions.

The following morning, the patient complained of more significant right-sided facial pain than the previous evening. A bedside AP film of the head was taken to rule out and evaluate the patient for facial fractures. As can be seen in figure 2, a foreign body was found in the patient's face. In order to determine the foreign body's (what appeared to be a nail) location, a lateral cephalometric film (figure 3) and a sub-mental vertex (SMV or "jug handle") film (figure 4 & 5) were taken at the bedside.) Only after these views was it determined the nail was not embedded in bone, but was simply contained within the facial musculature. The hole

Figure 3

Figure 4

Figure 5

Figure 6

where the nail entered into the face was found, anesthetized using lidocaine with epinephrine, and removed at the bedside (figure 6). The patient was subsequently discharged later that afternoon with wet-to-dry acetic acid dressings over the abrasions (for the upper and lower extremities and the trunk) and bacitracin for an additional three days for the facial wounds, along with antibiotics and pain medicine.

The primary purpose of presenting this case is to demonstrate the peculiar radiological finding of the nail given the mechanism of injury (MOI). It also bears mentioning that, had the maxillofacial/ENT surgeon stopped the radiographic exam after obtaining only the AP film of the head, or obtained a CT scan, or scheduled the patient for the OR, many important assets would have been needlessly utilized. The secondary purpose of this case study is to demonstrate the need for a thorough evaluation when patients enter into the trauma pipeline at any facility. While the need for a complete facial plain film radiographic series in the ED can be debated, given the bed space issues at most trauma centers and downrange, it is understandable why the facial films were not taken in the ED. Perhaps the films should have been scheduled for the next morning due to the facial edema, but given that no obvious fractures were found on the initial exam, it is understandable why they were not ordered. What is also important to discuss is the need for a CT scan after the foreign body was found on the first AP plain film of the head.

For the SOF medics, evaluating the facial structures of wounded after an improvised explosive device (IED), grenade, high explosive, ammonium nitrate-fuel oil (ANFO) explosion, etc., or any event that has the potential to distort or mask the normal anatomy; it is important that during the secondary survey, manual evaluation for facial fractures/crepitus be performed. When fragments are sent in every direction during an overpressure event or explosion, and given the exposed nature of the area above the shoulders, bi-manual manipulation of the facial skeleton, maxilla, and mandible is a must to prevent secondary infections or sequelae from missed fractures or foreign bodies. Every patient with facial swelling such as the one presented in this case presentation, should be given the extra look to determine the nature of the swelling. Does the patient's presentation match the MOI? Could this patient have had

a dental infection prior to the ejection from the vehicle? Certainly, not all facial fractures can be palpated nor does every every facial fracture need fixation. Careful evaluation of the patient and the MOI needs to be taken into account when performing the physical examination.

By utilizing plain films at bedside, the treatment team prevented the expenditure of valuable resources including time, money, personnel, and physical facilities (e.g., CT scanner and the OR).

Dr. Bruce C. Arne did an anesthesiology residency at UNC- Chapel Hill prior to matching in a maxillofacial surgery program at UCSF-Fresno. He also did his general surgery at University Medical Center (UMC) as well. UMC is the only Level I trauma center in the Central Valley of California, as a result; it is very high traffic facility. He became involved with tactical medicine while in CA and since then has been involved with tactical medicine and its usage and dissemination in NC. Dr. Arne supports various local, state, and federal agencies during deployments and warrant service. He has worked with DHS in DC to develop the Homeland Security Intelligence Enterprise (HSIE), which is the integration of medicine into the intelligence community to evaluate information from a medical and tactical medical standpoint. He is also certified as a Disaster Medical Specialist. He is a team leader of his rapid assessment team (R.A.T.) and has worked very closely with tactical medics, SOF medics (Ft. Bragg and Camp Lejeune), fire/rescue, and police for training and in developing TTPs for call-outs and responses.

Meet Your JSOM Staff

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Prior to becoming the USSOCOM Command Surgeon, COL "Tom" Deal served in staff positions at USASOC, JSOC, 7th SFG, and XVIII Airborne Corps. He has commanded field and stateside hospitals and served as Chief of Surgery in the 86th Evac Hospital in ODSS and at Army and civilian community hospitals.

COL Deal obtained his medical degree from University of Tennessee College of Medicine, Memphis, Tennessee, 1974. He completeted his general surgery residency at Brooke Army Medical Center 1977-1981 and is certified by the American Board of Surgery.

COL Deal competed his Flight Surgeon's Course – 2003, Army War College – 1997, Command & General Staff College – 1994, AMEDD Officer Advanced Course – 1991, Military Free Fall School – 1977, Special Forces Officers Course – 1976, and Airborne School – 1975.

COL Deal has also completed Combat Casualty Care Leadership Course (C4A) –1991, Pre-Command Course, Fort Leavenworth – 1994, Senior Officer's Legal Orientation, Charlottesville -- 1994, Combatant Commander's Surgeons Course – 1996, AMEDD Pre-Command Course, Fort Sam Houston – 1998, Basic Life Support – current, Advanced Cardiac Life Support, Advanced Trauma Life Support, and Pilot, single engine, land, instrument.

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Lt Col Landers joined the Army Reserve in 1987 and served as a nurse in a Combat Support Hospital unit for three years before switching services in 1990 to become an Air Force C-130 Flight Nurse. She is currently an IMA reservist assigned to HQ AF Reserve Command/SG and is attached to the SOCOM/SG office where she has been in charge of management, production, publication, and distribution of the JSOM since its inception in Dec 2000. Lt Col Landers has a Bachelors in Nursing and a Masters in Business Administration/Management. Her 24 year nursing career includes being a flight nurse in both the military and private sector, 15 years of clinical experience in emergency and critical care nursing, as well as being an EMT and a legal nurse consultant. She also served as the military liaison to the FL 3 Disaster Medical Assistance Team (DMAT). Prior to the SG office, Lt Col Landers' experience at USSOCOM includes an assignment in the Center for Force Structure, Resources, Requirements, and Strategic Assessments.

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2. Secure permission before including names of personnel mentioned in your piece. Do not violate copyright laws. If the work has been published before, include that information with your submission.
3. Format articles to be single-spaced, eleven point Times Roman font, aligned on the left, and justified on the right. Double space between sentences.
4. **Important:** Include an abstract, biography, and headshot photo of yourself as part of the article.
5. Use a minimum of acronyms; spell out all acronyms when first used. Remember that your audience is inter-service, civilian, and international.
6. Put the point of the article in the introductory paragraph and restate it in the closing or summary. Subtlety is not usually a virtue in a medical publication.
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8. Cite all references in chronological order. **DO NOT insert footnotes or use roman numerals**. Give the full name of the journal, book, or website cited. Use the following style of citation when referencing a **Journal article** - Vogelsang, R. (2007). Care of the military working dog by medical providers. *Journal of Special Operations Medicine*, 7(2)(Spring):33-47. **Newspaper article -** Di Rado, A. (1995, March 15). Trekking through college: Classes explore modern society using the world of Star Trek. *Los Angeles Times*, p. A3. **Book article or chapter -** Giger, Urs (2000). Blood typing and crossmatching to ensure compatible transfusions. In John Bonagura Ed. Kirk's *Current Veterinary Therapy XIII Small Animal Practice*. Philadelphia, WB Saunders Co. 2000, p. 140-147. **Website -** Miles, D. (2004, Sep. 3), Military working dogs protect Forces, bases during terror war. Armed Forces Press Service. Retrieved July 1, 2008 from Defense Link website. Website: (http://www.defenselink.mil/news/newsarticle.aspx ?id=25393). If unsure, please contact us at JSOM@socom.mil.
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Special Forces Aidman's Pledge

As a Special Forces Aidman of the United States Army, I pledge my honor and my conscience to the service of my country and the art of medicine. I recognize the responsibility which may be placed upon me for the health, and even lives, of others. I confess the limitation of my skill and knowledge in the caring for the sick and injured. I promise to follow the maxim "Primum non- nocere" ("First, thou shalt do no harm"), and to seek the assistance of more competent medical authority whenever it is available. These confidences which come to me in my attendance on the sick, I will treat as secret. I recognize my responsibility to impart to others who seek the service of medicine such knowledge of its art and practice as I possess, and I resolve to continue to improve my capability to this purpose. As an American Soldier, I have determined ultimately to place above all considerations of self the mission of my team and the cause of my nation.

Pararescue Creed

I was that which others did not want to be. I went where others feared to go, and did what others failed to do. I asked nothing from those who gave nothing, And reluctantly accepted the thought of eternal lonliess ... should I fail. I have seen the face of terror; felt the stinging cold of fear, and enjoyed the sweet taste of a moment's love. I have cried, pained and hoped...but most of all, I have lived times others would say best forgotten. Always I will be able to say, that I was proud of what I was: a PJ It is my duty as a Pararescueman to save a life and to aid the injured. I will perform my assigned duties quickly and efficiently, placing these duties before personal desires and comforts.

These things I do,
"That Others May Live."

A Navy Poem

I'm the one called "Doc"... I shall not walk in your footsteps, but I will walk by your side. I shall not walk in your image, I've earned my own title of pride. We've answered the call together, on sea and foreign land. When the cry for help was given, I've been there right at hand. Whether I am on the ocean or in the jungle wearing greens, Giving aid to my fellow man, be it Sailors or Marines. So the next time you see a Corpsman and you think of calling him "squid," think of the job he's doing as those before him did. And if you ever have to go out there and your life is on the block, Look at the one right next to you...

I'm the one called "Doc".

~ Harry D. Penny, Jr. USN Copyright 1975

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