

# Journal of Special Operations Medicine

A Peer Reviewed Journal for SOF Medical Professionals



## THIS EDITION'S FEATURE ARTICLES:

- Necessity of Medical Personnel on the Advance Party
- Tympanic Membrane Perforation in IED Blasts
- Casualty Wounding Patterns in Special Operations Forces in Operation Iraqi Freedom
- Veterinary Care System for Military Working Dogs – A Case Study
- Air Force Special Operations Command Special Operations Surgical Team (SOST) CONOPS
- Clinical Diagnoses in a Special Forces Group: The Musculoskeletal Burden

# Report Documentation Page

*Form Approved*  
*OMB No. 0704-0188*

Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.

1. REPORT DATE <b>2008</b>	2. REPORT TYPE	3. DATES COVERED <b>00-00-2008 to 00-00-2008</b>			
4. TITLE AND SUBTITLE <b>Journal of Special Operations Medicine, Volume 8, Edition 2</b>		5a. CONTRACT NUMBER			
		5b. GRANT NUMBER			
		5c. PROGRAM ELEMENT NUMBER			
6. AUTHOR(S)		5d. PROJECT NUMBER			
		5e. TASK NUMBER			
		5f. WORK UNIT NUMBER			
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) <b>Joint Special Operations University, 357 Tully Street, Alison Building, Hurlburt Field, FL, 32544</b>		8. PERFORMING ORGANIZATION REPORT NUMBER			
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)		10. SPONSOR/MONITOR'S ACRONYM(S)			
		11. SPONSOR/MONITOR'S REPORT NUMBER(S)			
12. DISTRIBUTION/AVAILABILITY STATEMENT <b>Approved for public release; distribution unlimited</b>					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT <b>unclassified</b>	b. ABSTRACT <b>unclassified</b>	c. THIS PAGE <b>unclassified</b>	<b>Same as Report (SAR)</b>	<b>132</b>	

# Journal of Special Operations Medicine

## EXECUTIVE EDITOR

Farr, Warner D., MD, MPH, MSS  
Warner.Farr@socom.mil

## MANAGING EDITOR

Landers, Michelle DuGuay, MBA, BSN  
Duguaym@socom.mil

## Senior Medical Editor

Vogelsang, Robert , DVM, MS, DACVS  
robert.vogelsang@socom.mil

## Assistant Editor

Parsons, Deborah A., BSN

## Contributing Editor

Schissel, Daniel J., MD  
(Med Quiz)

## CME MANAGERS

Kharod, Chetan U. MD, MPH -- USUHS CME Sponsor

### Officers

Landers, Michelle DuGuay, MBA, BSN  
Duguaym@socom.mil

### Enlisted

Gilpatrick, Scott, PA-C  
Scott.Gilpatrick@socom.mil

## EDITORIAL BOARD

Ackerman, Bret T., DO  
Anders, Frank A., MD  
Antonacci Mark A., MD  
Baer David G., PhD  
Baskin, Toney W., MD, FACS  
Black, Ian H., MD  
Bower, Eric A., MD, PhD, FACP  
Briggs, Steven L., PA-C  
Bruno, Eric C., MD  
Cloonan, Clifford C., MD  
Coldwell, Douglas M., PH.D., M.D.  
Davis, William J., COL (Ret)  
Deuster Patricia A., PhD, MPH  
Doherty, Michael C., BA, MEPC, MSS  
Flinn, Scott D., MD  
Fudge, James M., DVM, MPVM  
Gandy, John J., MD  
Garsha, Larry S., MD  
Gephart, William, PA-S  
Gerber, Fredrick E., MMAS  
Giebner, Steven D., MD  
Giles, James T., DVM  
Greydanus, Dominique J., EMT-P  
Godbee, Dan C., MD  
Hammesfahr, Rick, MD

Holcomb, John B., MD  
Kauvar, David S., MD  
Kersch, Thomas J., MD  
Keenan, Kevin N., MD  
Kirby, Thomas R., OD  
Kleiner Douglas M., PhD  
LaPointe, Robert L., SMSgt (Ret)  
Llewellyn, Craig H., MD  
Lorraine, James R., BSN  
Lutz, Robert H., MD  
Mason, Thomas J. MD  
McAtee, John M., PA-C  
McManus, John G., MD  
Mouri, Michael P., MD, DDS  
Murray Clinton K., MD, FACP  
Ong, Richardo C., MD  
Ostergaard, Cary A., MD  
Pennardt, Andre M., MD  
Peterson, Robert D., MD  
Riley, Kevin F., PhD, MSC  
Risk, Gregory C., MD  
Tubbs, Lori A., MS, RD  
VanWagner, William, PA-C  
Wedmore, Ian S., MD, FACEP  
Wightman, John M., EMT-T/P, MD  
Yevich, Steven J., MD

## TEXT EDITORS

Boysen, Hans  
Gephart, William, PA-S  
Hesse, Robert W., RN  
Peterson, Robert D., MD

Doherty, Michael C., MEPC, MSS  
Godbee, Dan C., MD  
Parsons, Deborah A., BSN  
VanWagner, William, PA-C

# Contents

Spring 08

Volume 8, Edition 2

## From the Editor 1

## Dedication 1

SSG Justin R. Whiting

## From the Command Surgeon 2

COL Rocky Farr USSOCOM

## Enlisted Corner 6

SOCM Glenn Mercer USSOCOM

## Component Surgeons 7

COL Dalton Diamond USASOC  
Col Timothy Jex AFSOC  
CAPT Jay Sourbeer NAVSPECWAR  
CAPT Stephen McCartney MARSOC

## TSOC Surgeons 13

COL Ricardo Ong SOCCENT  
LTC William John Gill SOCSOUTH  
COL Frank Anders SOCAFRICA  
COL Frank Newton SOCPAC

## USASFC Surgeon 18

LTC Peter Benson USASFC

## Medical Logistics 19

MAJ Kevin Cooper, Medical Logistics Officer

## Education & Training 23

COL Robert Vogelsang, DVM

## Lessons Learned 27

**Better Living Through Lessons Learned: Casualty Treatment and Evacuation Vignettes From Operation Iraqi Freedom (OIF) and Operation Enduring Freedom (OEF)**

CPT Scott M. Gilpatrick, APA-C, DMO; LTC Shawn Kane, MD, SFS, DMO

## Correspondence 39

## Current Events 40

- France, Britain honor U.S. woman who spied on Nazis (Spring Cover photo)
- Downloadable AFMIC Medic CD Now Available on the AFMIC Website
- Degree plan for 18D Soldiers announced
- E-mail Connects Doctors in Iraq with Experts in U.S.

## FEATURE ARTICLES

### Necessity of Medical Personnel on the Advance Party 48

George Horsley, NREMT-P, APA-C, MPAS; Keith Wilson, RN, MPH

## FEATURE ARTICLES continued

### Tympanic Membrane Perforation in IED Blasts 51

Patrick Depenbrock, MD, FS

### Casualty Wounding Patterns in Special Operations Forces in Operation Iraqi Freedom 55

Joseph Royal, DVM

### Veterinary Care System for Military Working Dogs – A Case Study 61

Robert Vogelsang, DVM; Cheryl Sofaly, DVM; Mark Richey,

### Air Force Special Operations Command Special Operations Surgical Team (SOST) CONOPS 68

Mark D. Ervin, MD, FS

### Clinical Diagnoses in a Special Forces Group: The Musculoskeletal Burden 76

James H. Lynch, MD, MS and Mark P. Pallis, DO, FAAOS

## Abstracts from Current Literature 81

## Book Reviews 89

- Memoirs of a Barbed Wire Surgeon
- From Warrior to Healer: 99 True Stories from a General to his Children
- The Dressing Station: A Surgeon's Odyssey and Contact Wounds

## Previously Published 92

- Needle Thoracostomy in the Treatment of a Tension Pneumothorax in Trauma Patients: What Size Needle? Imme Zengerink, MD; et.al.
- Chest Wall Thickness in Military Personnel: Implications for Needle Thoracostomy in Tension Pneumothorax COL H. Theodore Harcke, MC et.al.

## Educational Resources 100

## Special Operations Medical Reference Guide 102

## Human Performance Forum 115

## Med Quiz 120

### Picture This...

Walter Greenhalgh MD; Daniel Schissel, MD

## Meet the JSOM Staff 125

## Submission Criteria 126

# COVER

ISSN 1553-9768

Painting by Jeffrey Bass of Virginia Hall to pay tribute to one of the greatest spies of the Second World War, a little-known Baltimore woman who organized resistance and sabotage behind Nazi lines despite a prewar hunting mishap that left her with only one leg. Article in Current Events section of this journal. *Permission to publish the artwork on the JSOM cover was granted by the artist, Jeffrey W. Bass.*



## From the Editor

The Journal of Special Operations Medicine (JSOM) is an authorized official military quarterly publication of the United States Special Operations Command (USSOCOM), MacDill Air Force Base, Florida. The JSOM is not a publication of the Special Operations Medical Association (SOMA). Our mission is to promote the professional development of Special Operations medical personnel by providing a forum for the examination of the latest advancements in medicine and the history of unconventional warfare medicine.

**JSOM Disclaimer Statement:** The JSOM presents both medical and nonmedical professional information to expand the knowledge of SOF military medical issues and promote collaborative partnerships among services, components, corps, and specialties. It conveys medical service support information and provides a peer-reviewed, quality print medium to encourage dialogue concerning SOF medical initiatives. The views contained herein are those of the authors and do not necessarily reflect the Department of Defense. The United States Special Operations Command and the Journal of Special Operations Medicine do not hold themselves responsible for statements or products discussed in the articles. Unless so stated, material in the JSOM does not reflect the endorsement, official attitude, or position of the USSOCOM-SG or of the Editorial Board.

**Content:** Content of this publication is not copyrighted. Published works may be reprinted provided credit is given to the JSOM and the authors. Articles, photos, artwork, and letters are invited, as are comments and criticism, and should be addressed to Editor, JSOM, USSOCOM, SOC-SG, 7701 Tampa Point Blvd, MacDill AFB, FL 33621-5323. Telephone: DSN 299-5442, commercial: (813) 826-5442, fax: -2568; e-mail [JSOM@socom.mil](mailto:JSOM@socom.mil). The JSOM is serial indexed (ISSN) with the Library of Congress and all scientific articles are peer-reviewed prior to publication. The Journal of Special Operations Medicine reserves the right to edit all material. No payments can be made for manuscripts submitted for publication.

**Distribution:** This publication is targeted to SOF medical personnel. There are several ways for you to obtain the Journal of Special Operations Medicine (JSOM). 1) USSOCOM-SG distributes the JSOM to all our SOF units and our active editorial consultants. 2) **SOMA members receive the JSOM as part of membership. Please note, if you are a SOMA member and are not receiving the subscription, you can contact SOMA through <http://www.trueresearch.org/soma/> or contact Jean Bordas at [j.bordas@trueresearch.org](mailto:j.bordas@trueresearch.org). SOMA provides a very valuable means of obtaining SOF related CME, as well as an annual gathering of SOF medical folks to share current issues.** 3) For JSOM readers who do not fall into either of the above mentioned categories, the JSOM is available through paid subscription from the Superintendent of Documents, U.S. Government Printing Office (GPO), for only \$30 a year. Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250-7954. GPO order desk -- telephone (202) 512-1800; fax (202) 512-2250; or visit <http://bookstore.gpo.gov/subscriptions/alphabet.html>. You may also use this link to send a email message to the GPO Order Desk — [orders@gpo.gov](mailto:orders@gpo.gov). 4) The JSOM is online through the Joint Special Operations University's new SOF Medical Gateway; it is available to all DoD employees at <https://jsoupublic.socom.mil/publications/index.php>. On the left you will have several tabs; you must first "log-in" using your SS#, DOB, and name; then go to "publications." Scroll down until you get to the JSOM and click on the picture. From this site, you can link straight to the Government Printing Office to subscribe to the JSOM. We are working with the JSOU to have a SOCOM-SG medical site; we will keep you posted as that progresses. 5) The JSOM can also be emailed in PDF format; if you would like to be added to the PDF list please send your request to [JSOM@socom.mil](mailto:JSOM@socom.mil).

We need Continuing Medical Education (CME) articles!!!! In coordination with the Uniformed Services University of Health Sciences (USUHS), we offer CME/CNE to physicians, PAs, and nurses. SOCOM/SG Education and Training office offers continuing education credits for all SF Medics, PJs, and SEAL Corpsmen.

JSOM CME consists of an educational article which serves to maintain, develop, or increase the knowledge, skills, and professional performance and relationships that a physician uses to provide services for patients, the public, or the profession. The content of CME is that body of knowledge and skills generally recognized and accepted by the profession as within the basic medical sciences, the discipline of clinical medicine, and the provision of healthcare to the public. A formally planned Category 1 educational activity is one that meets all accreditation standards, covers a specific subject area that is scientifically valid, and is appropriate in depth and scope for the intended physician audience. More specifically, the activity must:

- Be based on a perceived or demonstrated educational need which is documented
- Be intended to meet the continuing education needs of an individual physician or specific group of physicians
- Have stated educational objectives for the activity
- Have content which is appropriate for the specified objectives
- Use teaching/learning methodologies and techniques which are suitable for the objectives and format of the activity
- Use evaluation mechanisms defined to assess the quality of the activity and its relevance to the stated needs and objectives

To qualify for 1 CME, it must take 60 min to both read the article and take the accompanying test. To accomplish this, your articles need to be approximately 12 - 15 pages long with a 10 - 15 question test. The JSOM continues to survive because of the generous and time-consuming contributions sent in by physicians and SOF medics, both current and retired, as well as researchers. We need your help! Get published in a peer-review journal NOW! See General Rules of Submission in the back of this journal. We are always looking for SOF-related articles from current and/or former SOF medical veterans. We need you to submit articles that deal with trauma, orthopedic injuries, infectious disease processes, and/or environment and wilderness medicine. More than anything, we need you to write CME articles. Help keep each other current in your re-licensure requirements. Don't forget to send photos to accompany the articles or alone to be included in the photo gallery associated with medical guys and/or training. If you have contributions great or small... send them our way. Our e-mail is: [JSOM@socom.mil](mailto:JSOM@socom.mil).

Lt Col Michelle DuGuay Landers

# Dedication



**SSG Justin R. Whiting**



Staff Sergeant Justin R. Whiting, 27, was killed in action on Jan. 19 when his vehicle was struck by an IED while conducting combat operations 16 kilometers south of Mosul, Iraq. He was a Special Forces medical sergeant assigned to Company B, 3rd Battalion, 5th Special Forces Group (Airborne).

He has had two previous combat tours to Iraq in 2004 and 2005 with 3rd Bn., 5th SFG(A), and was on his third combat tour in support of Operation Iraqi Freedom and the Global War on Terrorism.

Whiting was born in Texas and his military records list his home of record as Tennessee. He volunteered for military service and enlisted in the Army on Dec. 15, 1999. He would go on to earn the coveted "Green Beret" in 2000.

Whiting's military education includes, the Special Operations Target Interdiction Course, the Survival, Evasion, Resistance and Escape Course, Basic Noncommissioned Officer's Course, Warrior Leaders Course, Basic Airborne Course, and Special Forces Qualification Course.

His awards and decorations include, the Bronze Star Medal, two Army Commendation Medals, two Army Achievement Medals, two Army Good Conduct Medals, National Defense Service Medal, Iraq Campaign Medal, Global on War on Terrorism Expeditionary Medal, Global War on Terrorism Service Medal, two Noncommissioned Officer Professional Development Ribbons, Army Service Ribbon, Combat Medical Badge, Parachutist Badge, and Special Forces Tab.

Justin is survived by his parents, sister, brother, two step-brothers, and his grandparents.

# From the Command Surgeon



WARNER D. "Rocky" FARR  
COLONEL, U.S. ARMY  
Command Surgeon  
HQ USSOCOM



I have just returned from the Joint Special Operations University (JSOU) at Hulbert Field, FL. We had a USSOCOM Surgeon's Conference, a Biomedical Initiatives Steering Committee (BISC) meeting, and several of us taught in the JSOU's Joint Special Operations Medical Officers Orientation Course, which was in session that week also. Thanks to Lt Col John McAtee for running his last JSOMOOC course! His successor will move the course to Tampa and most probably increase its frequency. Please send me any comments on future course content and other recommended changes.

This was our first opportunity to get the USSOCOM Surgeon, MCPO Glenn Mercer, my Senior Enlisted Advisor (SEA), COL Wyatt, Deputy SOCOM Surgeon, and much of my office together with all the newly minted Theater Special Operations Commands (TSOC) Surgeons, SOCOM Component Surgeons, Component SEAs, and other key staff members. We attempted to help find solutions for synchronizing and prioritizing SOF health service support operations for SOCOM components and TSOCs. The respective component and TSOC surgeons discussed their current operations, future operations, key issues, concerns, and initiatives. This was the first time we have had all of the above together to talk common problems and solutions since the TSOC surgeons have arrived on station in their respective TSOCs.

Key issues from the TSOC Surgeons, Component Surgeons and Command Surgeon Staff:

## a. AFSOC (Lt Col Mark Ervin):

- Recommended the Special Operations Surgical Team (SOST) and Special Operations Critical Care Evacuation Team (SOCCET) as the "standard" for joint SOF level II requirements in the future.

- Recommended, and all concurred, that we need a Joint SOF surgical advisory board to oversee future actions.
- Recommended joint fill of current SOST and SOCCET shortages with sister component personnel and/or other service personnel and/or National Guard Special Operations Detachments (SODs). May also need a SOCOM COS memo to USAF.
- Requested assistance in obtaining Unfunded Requirements (UFR) money for training SOST and SOCCET personnel annually. Will pursue COA with HQ USSOCOM J7, USASOC, and JSOMTC. In addition, when we get funding for Command Medic Certification Program (CMCP), we may be able to APOM this requirement.
- Highlighted the need for Lessons Learned (LL) for level II requirements, to include post-911, "early war" LLs.

## b. MARSOC (CAPT Steve McCartney):

- Reorganization of MARSOC and new document (TO) coming out which will increase Medic authorization shortages and increase SOCM and ADSOCM training requirements. This equates to 56 8403s and 9 8427s. Medical readiness a big issue.
- Need help in "selling" the TCCC acquisition program to the MARSOC G8 and Command Group, MARSOC zeroed out POM 10-15 TCCC funding.

## c. USASOC (COL Tom Deal):

- Provided a good update on the health of Army SOF and issues related to combat stress, PTSD, and MTBI.
- Discussed Warrior Transition Process as well as Demobilization issues.
- Highlighted the level II shortage issue and discussed USASOC growth in the Sustainment Brigade (Special Operations) (ABN).

**d. NAVSPECWARCOM (CAPT Jay Sourbeer):**

- Discussed combat stress on the force in association with OPTEMPO and how to address with their limited mental health assets ... coined the phrase that all WARCOM redeploying personnel get a “check-up from the neck-up”.
- Working better access for SEAL family members due to uniqueness of their husbands PERSTEMPO. They are looking at family clinics on the east and west coast.

**e. SOCPAC (LTC (P) Frank Newton):**

- Highlighted that TSOC SG offices require permanent authorizations for the SG, medical plans and operations and other key staff.
- Discussed the theater unique issues with Avian Flu and other force health protection issues.

**f. SOCEUR (LTC Rusty Rowe):**

- Contracting a PA to provide readiness support for SOCEUR and SOCAfrica personnel and contracting a Medical Plans and Operations Officer.
- Re-highlighted need for Surgical Team ISO SOCEUR and SOCAfrica.
- Need to continue the fight to grow and right-size the TSOC SG offices.

**g. SOCAFRICA (COL Frank Anders):**

- Still no decision on the location of AFRICOM and the TSOC on the continent, so they are in Stuttgart for now.
- Host nation medical support, evacuation lines, and medically hostile environment are still the major concerns for SG of SOCAfrica.
- Need to determine who the backfill for COL Anders is NLT August 08. Components to provide COL Farr with recommendations to be SOCAfrica Surgeon.

**h. SOCSOUTH (LTC John Gill):**

- Need backfill for SG position, NG or USAR, NLT June 08. Also need back-fill for LTC Chadwell NLT May 08 (USAF SPA).
- Still have issues with providing medical readiness support to SOCSouth personnel at Homestead vice SOUTHCOM clinic.
- Need support from USSOCOM HQ on numerous medical logistics issues. MAJ Pete Franco will deploy from Tampa to Homestead to provide support to this effort.
- Re-highlighted need to “fix” the JTD and JTMD for the Surgeon’s Office.
- Good AAR on recent SOUTHCOM Operation and how different medical units and assets can be brought together to provide required level I and II capability.

- Highlighted need for joint communication and better medical logistics as well as an operational fund.

**i. SOCCENT (LTC Ric Ong):**

- Requested required TSOC Surgeon’s Office manpower in POM 10-15 submission to CENTCOM and SOCOM.
- Re-highlighted Level II requirements issue, how they are doing it in OEF and OIF, and the need to have this capability on a JMD.
- Highlighted the fact that the GCC is taking risk, or causing SOF to take risks, by not providing TSOC SG staff.
- Discussed Theater Posture Plan and how that will affect SOF.

**j. SOCKOR (Maj Ronnie Tate):**

- Current medical plans cite the use of a level II capability, need to validate these units are available. Maj Tate is sending this to USSOCOM SG Plans.
- New SG coming on board, Dr. Rogers, will transition him asap.
- Discussed USFK Transformation in 2012 and affects on SOF.

**k. USSOCOM Medical Plans and Operations (LTC Mike Salamy):**

- Provided an update on the Level II staffing action.
- Discussed the GWOT/RWOT Joint Force Requirements Management.
- Described the USSOCOM strategic role, the rotational force PLANORD, and Joint Force Provider vs. Global Force Manager responsibilities and how TSOCs must use these processes to help fill capability gaps and obtain and sustain requirements.

**l. USSOCOM Medical Manpower and Resourcing (Lt Col Kevin Franke):**

- Must provide the P-11 Surgeon Manpower request (originally a SOCPAC action) to all TSOCs and they must submit requirement as soon as possible.
- Provided update to future of the Special Program Authorization (SPA) program and criticality of getting authorizations on TSOC JTDs.
- Discussion on the need for a “readiness officer” to provide medical readiness in the TSOCs; a PA is the right fill.
- Working with SORR to ID and validate TSOC SG requirements, then obtain authorizations.

**m. USSOCOM Medical Education and Training**



**(COL Bob Vogelsang):**

- Need all TSOCs to write an article for the JSOM.
- Discussed retesting of SOCM ATPs and how the responsibility to ensure each SOCM is retested, passes, and gets ATP card belongs to Components.
- The new USSOCOM 350-29 Medical Training Regulation is out for staffing at components soon.
- Gave a good update on the SOCOM Dog Program and Component responsibilities and how to get help if required.

**n. USSOCOM Medical Logistics and Acquisition  
(COL Jose Baez):**

- Reviewed POM 10-15 TCCC issue and how important it is for SGs to get in bed with the J/G/N/A-8s and fight for the program.
- Discussed the tie in of TCCC to the SOF Level II capability gaps and getting required equipment for the future.

**o. USSOCOM Performance Enhancement  
(Master Chief Glenn Mercer):**

- Provided the latest update on USSOCOM's Performance Enhancement Policy and the PES site on the command's SOF-net. (<https://sofnet.socom>).

[smil.mil/sites/SOCS/Human%20Performance/Lists/Announcements/Attachments/5/2008%20PES%20Policy.pdf](http://smil.mil/sites/SOCS/Human%20Performance/Lists/Announcements/Attachments/5/2008%20PES%20Policy.pdf).

We also heard from the Lessons Learned folks, Byron Shrader – he updated all the attendees on the current state of the LL program, with a bit of background, roadmap initiative (to improve current processes and resourcing), active collection capabilities, increased analytical capability, and how the office ties into the SPP, LRPP, JCIDS, and the Command and Staff. The awareness of the LL program and its capabilities needs to continue to grow within USSOCOM and externally in TSOCs, components, agencies, etc, as well. The resourcing of the LL Roadmap is critical to ensure that current and future issues in all commands are identified with possible solutions and DOTMLPF associated actions identified.

All around a great conference, thanks to all who helped make it possible and to those who attended.

Pictures below.



USSOCOM, Component and TSOC Surgeons

From Left to Right starting in Front: LTC Pete Benson (USASFC), LTC Ric Ong (SOCCENT), CAPT Jay Soubeur (NAVSPECWARCOM), COL Frank Anders (SOCAFRICA), COL Rocky Farr (USSOCOM), CAPT Steve McCartney (MARSOC), LTC Rusty Rowe (SOCEUR), LTC Rob Lutz (JSOC), COL Tom Deal (USASOC), LTC (P) Frank Newton (SOCPAC), LTC John Gill (SOCSOUTH), Lt Col Mark Ervin (AFSOC), Maj Ronnie Tate (SOCKOR).



Participants of the first USSOCOM Command Surgeon's Conference April 2008

## ENLISTED CORNER



SENIOR ENLISTED MEDICAL ADVISOR (SEMA)  
SOCM GLENN MERCER



With the exception of the recently commissioned Human Performance website, this last quarter has been light on new business and heavy on process execution. The Enlisted Council convened at several events in conjunction with the BISC, inaugural SG (April) conference, JSOMOOC, and AFSOC SG meetings. From a process standpoint, it appears that we have attained a rational tempo for face-to-face engagement in the Force. I make this assessment after a deliberate 30% reduction in the number of meetings that were being conducted each fiscal year. Electronic interface has proven “reliable enough” to meet the information demands. I share this with the Force to emphasize that our capital meetings in August and December are unusually decision heavy events that correspond with SOCOM’s fiscal rhythm. I want to encourage the NCOs that recently returned, or are taking a garrison assignment to attend the bi-annual sessions with their SEMA to express their views on strategic or operational issues

Recently, I was asked about the level of AAR input to the SOCOM Lessons Learned system and for the first time, I was able to respond that we are getting sufficient input to that system. At this rate of fill, we can state with confidence that our modification and requirements process has the requisite information.

I would like to devote a few paragraphs as a follow-up to my input into the Fall 2007 edition regarding the career progression and lack of SOF architecture of our officers. I received multiple bursts regarding the topic from both the old and new guard two quarters ago. When I refer to the cadre of senior medical leaders,

which are depicted in this issue, I am most concerned about who will be in that picture ten years from now. The more I consider this demand signal, the more I am convinced that if we are not advocates for change then no one else will be.

The most poignant communication came from the junior officers who are currently serving in SOF. There are many officers that aspire to remain in an indefinite SOF environment, but have absolutely no recourse when it comes to the utilization, residency, promotion precepts, and board certification dynamics dictated by the medical bureaus. I feel we have an employment and accession dynamic that is fundamentally flawed. In this case, it is not unreasonable to deduce that this has future implications at the tactical level.

It is evident that the positions within the community for senior leaders who are also medical or service corps officers are going to increase. It is also evident that no joint forward planning exists to mature and expose the house officer to the requisite duty assignments that enable him to be immediately competent in a SOF field grade assignment. This assessment is simply a direct observation that we are propagating transient staffing as our dominant baseline. I encourage readers from the lay, line, and specialist populations to engage in candid, attributable discourse about this issue.

In this quarter’s *HP Forum* I have presented a personal AAR on supplements that is drafted to generate questions and dialogue. I encourage you to share feedback, good, bad, or indifferent through the queries link on SOFNET.

## COMPONENT SURGEON



Dalton Diamond, MD  
COL, USA  
Command Surgeon

# USASOC



HOOAH! Spring is in the air in North Carolina. The daffodils, wisteria vines, and Bradford pear trees are in full bloom and the days are longer so we are not going to go to and from work in the morning and evening without ever seeing daylight. Oh yes, I saw the first snake of the new season last week as well.

In the Winter 08 edition of the JSOM, both CAPT McCartney and Col Jex mentioned the shortage of Level II far forward, surgical resuscitation available to SOF. All of the Component Surgeons have discussed this with our respective bosses and with COL Farr. The “Terrific Trauma Trio” of COL Tom Deal, LTC (P) Pete Benson, and LTC Jim Czarnik has made considerable headway with AMEDD Center and School, Directorate of Combat and Doctrine Development, in getting them to recognize that there is a significant capability gap and that the current force structure does not work for support of SOF. Information from the conventional forces indicates that even they are not deploying Army Forward Surgical Teams at full strength; but, rather, as split teams. While I agree with Col Jex that it would be ideal if we owned the assets, USASOC is currently working for an Army MEDCOM solution to support us. This is not going to happen in the short term so stay tuned.

Department of Defense Directive 3000.05, “Military Support for Stability, Security, Transition, and Reconstruction (SSTR) Operations” dated November 28, 2005, states that “stability operations are a core U.S. military mission that the Department of Defense (DoD) shall be prepared to conduct and support. They shall be given

priority comparable to combat operations and be explicitly addressed and integrated across all DoD activities.” The Directive also establishes the requirement to “ensure DoD medical personnel and capabilities are prepared to meet military and civilian health requirements in stability operations.” Furthermore, the Quadrennial Defense Review Medical Transformation Roadmap Initiative #3 directs a systematic analysis of DoD/ Military Health System (MHS) capabilities regarding medical civil-military/stability operations. Of course, civil-military operations (CMO) in general, and medical CMO in particular, are bread and butter activities for ARSOF. Our office is involved in two different medical CMO working groups, one at Department of the Army and the other at DoD, Health Affairs. I am not certain what the end product of this work will be but our intent is to make sure we protect our investment in medical CMO.

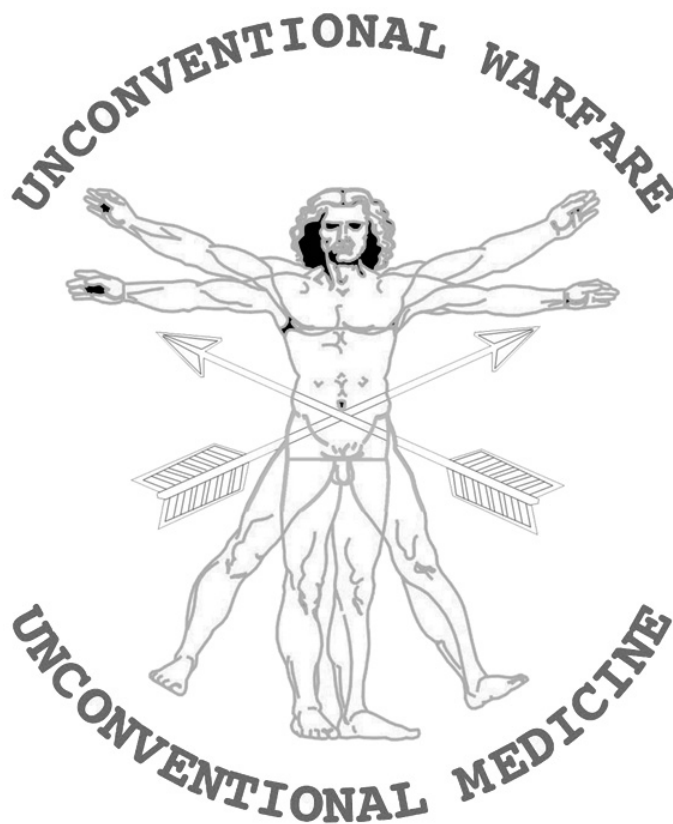
To give a boost to CPT Scotty Gilpatrick let me tell you what we are doing on the lessons learned front. The Special Operations Combat Medical Skills Sustainment Course (SOCMSSC) is the one place where all of our Medics (USASOC, AFSOC, NAVSPECWARCOM, MARSOC) show up on a regular basis, every two years. We have them as a captive audience for two weeks here at Ft. Bragg, so earlier this year, we began fielding a survey instrument to try to capture what is working for them and what is not. We don’t get a response from every Medic, but the number of responses per class is increasing. Once we get a critical mass of information, we plan to analyze the data and make distribution to SOCOM,

Component and TSOC Surgeons, and wherever else is appropriate.

Well, that's all the news from Lake Woebegone for this time. Thanks to all of you for the great work you

do and for the sacrifices you and your family make in defense of our nation and in the prosecution of the Global War on Terror.

*Sine Pari*



## COMPONENT SURGEON

# AFSOC



Timothy Jex, MD  
Col, USAF  
Command Surgeon



I'd like to thank all of those who participated in the AFSOC/SG conference we held here at Hurlburt Field in January. In addition to having virtually all of our units represented, I particularly appreciate the several TSOC Surgeons, senior representatives from the Air Staff and SOCOM, and the career field managers who briefed at the conference. The quality of the presentations was outstanding, and they sparked some excellent, candid dialogue. In my experience, poor communication is the primary source of friction between organizations, so the great discussions alone made this conference a complete success. As always, however, I ask for your input on improving the conference for next year ... yeah, better weather and lodging on the beach, I got that already.

In the last issue of the JSOM, I briefly talked about our Special Operations Surgical Teams (SOST),

AFSOC's level II SOF surgical support teams. In this issue, Lt Col (Dr) Mark Ervin has followed up with a much more in-depth discussion of the development, design, and employment of these teams. Doc Ervin was a member of one of our SOST teams prior to his current assignment as my Chief of Operational Medicine. He has a wealth of experience and we hope others can benefit from the many lessons we've learned regarding these teams in the last few years. Please take the time to read his article. I know it's a little long, but there are no wasted words. In discussions with AFSOC line commanders, I have been told that in several recent instances, deployed operations have been curtailed due to lack of adequate SOF level II surgical support. We (the SOF medical community) need to push it up!



## COMPONENT SURGEON

# NAVSPECWARCOM



Jay Sourbeer, MD  
CAPT, USN  
Command Surgeon



The Naval Special Warfare Command Force Medical Office is responsible to provide advice to leadership and oversight as well as policy guidance to the force. Inherent in these responsibilities is to continually look beyond today's systems and processes to respond to changes, to enhance future vision, and to develop new initiatives.

Naval Special Warfare Force Medical is engaged on initiatives for forward deployed medical capabilities, combat stress management, family support, and forward resuscitative surgery. These efforts focus constrained resources on critical areas to sustain our community war fighting power.

Capitalizing upon an established strength of the Special Operations community, the newest initiative is the human performance initiative (HPI) under the lead of Naval Special Warfare Group TWO (NSWG-2). Commodore Heron is demonstrating this initiative as a means of giving his warriors an added edge over the enemy. The concept is to use science-based and validated techniques to fuse physical training and medical support in order to gain the highest increment of fitness for the human weapon system. This involves optimizing not only how and when you work out but when you rest and recover, and what, how, and when you eat. The command program is implemented by a HPI team to optimize individual human performance.

Naval Special Warfare Group FOUR has a similarly strong program dedicated to the development of their personnel. Like the NSWG-2 HPI Program, the participants are highly enthusiastic. Although human performance views are often intensely personal and tied to a local personality or school of thought, there is universal agreement on the high

level of commitment seen throughout the Naval Special Warfare community.

To bring HPI to the next level for the entire NSW Force will undoubtedly require a coordinated effort. This effort will involve community buy-in for resources, objective validation of best practices, and acquisition of professional HPI leadership and staff. Models for HPI can be found in the professional, collegiate, and Olympic athletic organizations, which use teams of coaches, trainers, and dietary specialists, often with doctoral level leadership and medical care. The best organizations also test their own science by independent validation. Of particular concern for the force medical officer is that rehabilitation and therapy will be performed by fully trained, licensed, and accredited medical providers.

The NSWG-2 program is well on the way to realizing many of these objectives, capitalizing on a wave of enthusiasm to carry through from today's programs to the envisioned Naval Special Warfare Human Performance Initiative. The other Naval Special Warfare groups already have a front site focus on the program and are preparing to roll into it on the left coast.

In programming resources, the focus is often put on equipment systems to create a program and the funding to get the job done. This initiative has a clear focus on the most important weapon system we own in NSW, the "Human Weapon System." We look forward to working with Naval Special Warfare Group TWO to take this initiative to the next level and to carry the process in the right direction.

## COMPONENT SURGEON



Stephen F. McCartney, MD  
CAPT, USN  
Command Surgeon

# MARSOC



The U.S. Marine Corps Forces Special Operations Command (MARSOC) celebrated its second anniversary this past February. Major General Hejlik and a small handful of senior Marine leaders began the stand up of MARSOC in a small unimpressive office in winter 2006.

Our second birthday also celebrated the formal ground breaking of the future MARSOC Headquarters at Stone Bay, Camp Lejeune, NC. Attending with MG Hejlik and Sgt Major Ingram at the ceremony, was a shovel-wielding Admiral Eric Olson, CDR USSOCOM, and a host of local and state political figures. A formal Dining In was held at Camp Lejeune's historic Officer's Club afterwards and the majority of MARSOC Medical had a chance to hear his words and be part of some most memorable group photos.

I attended the Military Health Systems symposium two months ago where the Assistant Secretary of Defense for Health Affairs gave the first Combat Medic of the Year award posthumously to MARSOC's Hospitalman Second Class Charles "Luke" Milam USN, who was killed during combat operations in Helmand Province, Afghanistan last fall. We still feel the pain of his loss.

"SOF for Life" rightly describes our other components but MARSOC does not have that moniker yet. Thus, we say goodbye to CDR David Krulak, MC, USN, a plank owner in MARSOC and our first Marine Special Operations Support Group Surgeon. Goodbye and thanks for everything David. Best of luck as Sen-

ior Medical Officer (SMO) on the big deck USS Stennis. His replacement is LCDR (sel) Mark Burger, MC, USN, an internist who is a former USMC officer. We also say goodbye this spring to LCDR Shelton Lyons, MSC, USN, who also is a MARSOC plank owner and is our Environmental Health Officer (EHO). LCDR Lyons wore many hats as we stood up in the summer of 2006 and MARSOC is better for it. He goes to Marine Forces Pacific, Camp Smith, Hawaii as their EHO. Lastly we say goodbye to my right arm, CDR Patrick Paul, MSC, USN, who was stellar as my MARSOC Force Planner/Deputy Surgeon since his arrival in September 2006. He leaves us in a few days to take command of 3rd Medical Battalion in Okinawa. He is replaced by LT Bill Getsy, MSC, USN who comes from Naval Hospital Camp Lejeune's Manpower Division as their Junior Officer of the Year. He will join Command Masterchief Bill Cherry, USN, as my chief protectors and advisors to get things right the first time. LT Getsy is a former Reconnaissance Marine (MOS:0321) for nine years and will be a great addition to our team. Welcome aboard.

Our Marine Special Operations Companies (MSOC) continue to provide the SOC component to our Marine Expeditionary Units and are fully engaged in GWOT/OEF. My recent deployment to CJSOTF-A/OEF was made even more rewarding by hearing the many compliments from the SOCCENT commanders who have seen the tremendous professionalism, aggressiveness, and tactical results achieved by MARSOC.



Our advisor group (MSOAG) continues to field teams to diverse locations in AFRICOM with LCDR Mike Shusko's innovative healthcare strategies making great strides in the non-kinetic fight in GWOT. One recent mission involving three MARSOC physicians ended with a premature retrograde due to serious civil unrest in that country's capitol.

MARSOC Medical currently has >90% of its 24 Navy officers (eight medical officers), while our enlisted manning just passed 80%. In 21 months we have grown from zero to 155. MARSOC Medical will have to remain adaptive and meet some very serious challenges in the fu-

ture as our organizational demand signal for USN Operators (SARC and SARC/IDC) is expected to increase dramatically. Our reliance on JSOMTC to assist us in "growing our own" will be even more critical. More to follow on this evolution as MARSOC continues to morph in our global mission requirement environment.

As I close this update, I would like to thank all of my Component Surgeons, their staffs, and COL Farr and crew for their much appreciated help during these two years.

As I say to almost all when I describe MARSOC's challenges, "Our best friends have all been within USSOCOM." God Bless America and the warriors-elite who protect her.



Admiral Eric Olson CDR, USSOCOM (front row, fourth from left) with MARSOC Medical

# TSOC SURGEON



Ricardo Ong, MD  
LTC USA  
SOCCENT Surgeon

I have resolved the problems with my TCS orders and I am now officially on-board and getting involved in the war effort. Following an 18-month stint with the conventional Army (which was very educational), I am happy to return to the Special Operations community. I am thrilled to be back among warriors who love Special Operations, are superbly motivated, would rather be nowhere else, and willingly live deep within enemy territory battling our enemy on every front.

As I integrate into the SOCCENT battle staff, I am grateful to COL Bob Noback for his efforts to establish permanent manning on the JTD for the SOCCENT Surgeon section, while, more importantly, addressing all the current issues concerning medical support capabilities for our Special Operations Forces engaged in the fight. I offer my sincere gratitude to COL Noback for his outstanding work over the past 18 months (and for dual-hatting the past six months awaiting my arrival). I also thank the SOCOM Surgeon, COL Rocky Farr, for providing a Deputy Surgeon (Lt Col Kevin Franke, COL Tracy Wyatt, and MAJ Kevin Cooper all occupied this position) to support the mission over the past six months, as I tried to close-up my business on the conventional side.

A number of issues require my attention. Foremost, I am re-engaging MNC-I on the issue of blood component therapy in our remote regions of the Iraqi theater. COL Noback was able to acquire packed red blood cells (PRBCs) in these locations, but met stiff resistance to the request for fresh frozen plasma (FFP) and the appropriate refrigeration equipment. Of course, the driving concern

# SOCCENT



is that without FFP the medical facilities in these outlying regions are unable to support a proper resuscitation, should it be required, given the extensive air evacuation times. I am optimistic that I will meet a favorable response from Multinational Corps (MNC) — in this go-around, as there are some new faces in key positions that are more likely to be SOF friendly.

As most are aware, there is a strong push within SOCOM for SOF-specific level II surgical support (resuscitative, damage control, and holding capability). Each Theatre Special Operations Command (TSOC) has provided SOCOM a request with its specific requirement. Hopefully these direct requests will provide additional justification to COL Farr's initiative to get AMEDD to modify its doctrine and equip/train/authorize modular, flexible, SOF-specific Level II surgical teams that could also be useful on the conventional side. Since I do not expect this process to provide appropriately funded, fielded, and trained Level II teams in the near future, I am actively pursuing other options, including use of AFSOC Special Operations Surgical Teams (SOST). This requirement will become more important over the next several years should conventional forces in Iraq continue to draw-down; at some point, health service support (HSS) assets would be expected to constrict as well.

Another project that I expect will occupy a fair part of my time is assisting COL Anders in the transition of the Africa AOR from SOCEUR and SOCCENT to SOCAF. I am certain this will be no small mission for COL Anders. The SOCCENT Surgeon cell stands by,

ready to assist as needed, even if it requires multiple planning and coordination conferences in Stuttgart in the October time-frame. COL Anders, we're here for you ... whatever it takes.

Finally, by the time I depart next year, I would like to definitively establish a permanent SOCCENT Surgeon position, into which my replacement can actually PCS (on jump, flight, and dive status) with a staff directly

under the control of the Surgeon. Although my tenure here is temporary, it represents a critical juncture to define the role and function of a permanent party SOCCENT Surgeon. Regardless of the prospects of a conventional force draw-down, I fully expect that SOF will remain in the current theaters of operations indefinitely, which will necessitate continued reliance on a functional, permanently established Surgeon and staff.



# TSOC SURGEON



Wm. John Gill, PA-C MPAS  
LTC USA  
SOCSouth Surgeon

This has been an exceptionally busy three months here at the TSOC. SOCSouth successfully completed an exercise with our Colombian partners. The exercise was to stand up a Combined Joint Special Operations Task Force (CJOSTF) and carry out joint special operations activities. The effort was full spectrum with assets from the entire SOF and conventional communities and our host nation.

The medical components supporting the effort were, for the first time, projected into theater to function at the level of care expected during combat operations. It was an amazing effort and validation of just how important the medical plans component is during the pre-execution phase. I must give kudos to LTC Rene Chadwell who did the heavy lifting on the medical operations.

This exercise also validated the need for dedicated level II care for this TSOC. The timeliness of positioning these assets in an immature theater is possibly the most critical part of our medical efforts. There was no lack of individual enthusiasm to participate in this exercise, but at times, the institutional bureaucracy was frustrating. However, when all the pieces were in place, it was one heck of a team.

Well, in spite of every effort to leave no issue unplanned and every contingency covered down to the third order, up popped Murphy's ugly head. It has been a learning experience on every level of medical operations. The need for a medical logistics package was apparent early on and the availability of a TSOC clinical support component, to address CJOSTF health issues,

# SOCSOUTH



also clarified the requirements for those medical assets to be resourced within the TSOC.

We are integrating these lessons into our future operational planning and looking forward to increased dialogue on the medical manning issues unique in this theater and TSOC. Improvements in medical operations, logistics, and planning developed from this exercise will benefit future operations at every level. This operation further validated the established tenet that our prime mission in the Command Surgeon's office is, and will continue to be, the complete support and well being of the SOF operators.

The SOCSouth family continues to grow and manning is expected to double in the near future. The requirements for medical assets will increase with this growth and subsequent increased operational tempo. The challenge to meet these requirements continues to be at the top of the agenda.

My role here will end in June as I return to my prior life in the civilian world. It has been incredibly rewarding to be part of this command. The people here at SOCSouth are the most competent, dedicated, tireless, quiet professionals I have had the honor of working with during my Army career. This command is truly a "Center of Excellence."

I will look forward to seeing all of you at the next SOMA conference.





## SOCAFRICA



Frank Anders, MD  
COL USA  
SOCAfrica Surgeon



### Special Operations Command Africa The Long Road Ahead

John A. Lane  
Capt, USAF  
Medical Planner

The formation of a Theater Special Operations Command (TSOC) is a long arduous process; but, I would argue the development of a validated TSOC Surgeon's Cell is much more challenging. Currently, with the exception of SOCEUR and Special Operations Command Africa, TSOC planners are faced with covering down on all their respective J functions associated with medical. For the past year prior to arriving here at SOCAfrica, I had the opportunity to work in the United States Special Operations Command (USSOCOM) Surgeon's Office. Everyone on staff there, as well as out in the TSOCs themselves, have done a superb job in conducting a paradigm shift away from a cobbled together medical force structure, to one validated on the manpower books.

From day one, the USSOCOM Surgeon's Office, in concert with the SOCEUR Surgeon's Office has bulldogged this effort. The pay off is that for the first time, we have a validated TSOC Surgeon's Office at the inception of a TSOC. Having this occur previously was unheard of, and by pushing this action, the SOCOM Surgeon's Office has

assisted in setting a precedent for identifying the need for a Surgeon's Cell within each and every TSOC. With every TSOC comes the specific challenges associated not only with their respective area of responsibility; but, also with ensuring the medical support of their force. The mantra of "slow is fast" bears relevance with the development of SOCAfrica and as many may have not even been aware that such an animal exists -- thus is truth.

With the gradual transition of mission sets between SOCEUR and SOCAfrica comes the opportunity to synergize our efforts producing a better overall product for both Commands.

**Command Surgeon's comment:** Captain Lane has done a superb job of laying the groundwork for the development of SOCAfrica's medical section. I look forward to continued cooperation with LTC "Rusty" Rowe, my SOCEUR counterpart, and beginning to work with LTC "Ric" Ong, of SOCCENT and Frank Newton of SOCPAC, as well as their staffs in order to eventually accept the medical responsibility of each of their African AORs.

MG Salvatore F. Cambria, commanding general of Special Operations Command-Pacific (SOCPAC), congratulates COL Frank J. Newton, SOCPAC Surgeon, following Newton's promotion to Colonel on April 22. Newton is the first surgeon ever assigned to SOCPAC in its 25 year. Bordelon Field, location of the ceremony, is named in honor of Marine Staff Sergeant William J. Bordelon who was posthumously awarded the Medal of Honor for combat actions in World War II. During his remarks, Newton said the location of his promotion ceremony was significant because Bordelon died while fighting for and providing aid to his men.

*Photo by Lucy Pemoni, Diamond Head Photography*



Official SOCPAC input from COL Newton to start in the Summer 08 edition.

COL Frank J. Newton, Special Operations Command-Pacific (SOCPAC) Surgeon, stands with his wife at Camp H.M. Smith, Hawaii following his promotion ceremony on April 22. *Photo by Chief Petty Officer Keith W. DeVinney*

## Special Forces Surgeon



Peter J. Benson, MD  
LTC, USA  
Command Surgeon



## USASFC



The Special Forces Command Surgeon's Office is continuing to define the scope and direction of its efforts. One upcoming task is to look into the development of Army Special Forces with regard to health service support (HSS) capabilities, staffing, and support. A working group sponsored by HQ, USASOC is currently underway which will examine the TO&E manning and equipment allocations of all USASOC units for necessary updates and changes. After almost seven years of combat in the Global War on Terror (GWOT), it is absolutely vital to look at our Group structure in depth. One of the goals of the USASFC Surgeon's Office is to ensure that the medical composition and capability of Special Forces meets our deployment requirements in support of the National Defense Strategy.

Development of the medical force means not only inculcating the lessons learned on the battlefield today, but looking toward the future medical requirements of Special Forces in the GWOT. Continued refinement of tactical clinical medicine is a necessary piece of sustaining the force. Evolving "best practice" guidelines, regularly updating protocols like TCCC, and fielding new equipment will keep our Special Forces Medical Sergeants and Special Operations Combat Medics the best in the world. One area that certainly needs wider discussion is the provision of higher level resuscitative

surgical and medical support to our units in the austere, far-forward environment. The unique ability of Special Forces to prosecute operations across the spectrum of unconventional warfare (UW) and irregular warfare (IW) makes the provision of HSS to the force in the austere environment a critical mission enabler. The focus of Special Forces' HSS has long been solely on SFMS tactical skills, to the exclusion of the wider aspects of HSS at the regional and theater level. As the scope of the GWOT evolves, the structure and requirements of HSS for Special Forces need to develop in order to support the Force within the National Defense strategy.

With a medical focus on the direction and development of Special Forces, I would like to emphasize again how important it is to capture lessons learned from operations. The use of the Joint Lessons Learned Information System (JLLIS) from USSOCOM needs to be emphasized at all levels of the Special Forces Group medical structure. I challenge all Special Forces providers to ensure that lessons are captured and relevant After Action Reports are forwarded to higher levels, including the USASFC Surgeon's Office. Feedback on the needs of the force and its development are vital to establishing the programs needed to ensure the correct HSS training, equipment, doctrine, and staffing for the future.



## **The Joint Staff and Combatant Command Internship Program: A Win-Win Situation**

Kevin Cooper, Medical Logistics Officer, USSOCOM Surgeon's Office

The Army Medical Department (AMEDD) publishes its Long Term Health Education and Training (LTHET) message each year which identifies degree-producing and non-degree programs that select AMEDD officers can apply for. One of the non-degree producing programs, the Joint Staff and Combatant Command (COCOM) Internship Program, is a one-year internship designed to train field grade officers for positions within the Surgeon's Office at the Joint Staff and COCOM level. Each year approximately three AMEDD officers are selected for this program. The LTHET message delineates the eligible AMEDD career fields for this training. Eligible career fields include: 70H (Operations), 70B (Medical Field Assistant) and 70K (Medical Logistics). Currently, the Office of the Command Surgeon, U.S. Special Operations Command, has both an Army 70H and 70K intern working within the Operations and Logistics sections, respectively, as well as an Air Force operations intern. This internship provides a structured forum for participants to learn the skills required to effectively work at a joint command. Interns are afforded the opportunity to attend structured educational opportunities, deploy in support of a Theater Special Operations Command (TSOC), and benefit from inclusion in "on-the-job" real-world learning opportunities within the US-SOCOM Surgeon's Office (SOCOM/SG).

As part of the SOCOM SG curriculum, interns must complete a multitude of courses that provide the necessary groundwork for working in a joint environment and at the COCOM level. Attendance at such courses as the Joint Medical Planners Course and the Joint Special Operations Medical Officers Orientation Course prepares interns to effectively function as medical planners serving on a COCOM staff, at a Component Headquarters of COCOMs, on Joint Task Forces, or at a Service Headquarters level. With the knowledge and skills gained by attending courses such as these, the SOCOM/SG interns are able to apply health support planning principles in joint and combined operations and hone their skills at planning for contingency and crisis action planning situations.

In addition to the training value of the classroom environment, recently, I, MAJ Kevin Cooper, the SOCOM SG medical logistics intern, was able to deploy in support of Special Operations Command Central (SOCCENT). It is the SOCOM Command Surgeon's intent to allow interns to deploy in support of real-world operations at least once during the internship year so that they can see firsthand how a TSOC operates and apply health support planning principles obtained from classroom instruction. My time spent at SOCCENT provided an excellent venue to not only work internal staffing actions within the Combined Forces Special Operations Component Command (CFSOCC) and SOCCENT, but also to directly support SOCCENT's deployed forces. Issues such as medical logistics support to forward operating bases, level II surgical requirements support planning, and customer support visits to combined joint Special Operations task forces reinforced the benefits obtained from the Joint Staff and COCOM internship program.

Probably the most beneficial learning opportunity derived from the internship program is the day-to-day staffing interaction within the SOCOM/SG office and with that of the various service components, centers within SOCOM, and external agencies that support SOCOM. Involvement in preparing and staffing various actions, attendance and participation in working groups, and daily contact with various service components and the SOCOM staff provides an "informal" education that no structured curriculum or program of instruction could provide. In most cases, officers selected for the Joint Staff and Combatant Command Internship Program do not have experience at the COCOM level and are unfamiliar with the staffing processes and nuances of working at that level. Spending a year fully integrated into the SOCOM/SG staff provides these officers with the "tool kit" necessary to succeed in future joint assignments.

The Joint Staff and Combatant Command Internship Program is a win-win situation for both the officers selected to participate and for SOCOM. It professionally develops interns for future assignments as Joint staff officers and provides them with exposure to the unique world



of the Special Operations community. The end product is a competent joint staff officer with institutional knowledge of SOCOM and its staffing processes. At the conclusion of the one-year internship, interns have

broadened career opportunities at the joint staff level. Both their service component and SOCOM receive a return on investment from participation in the Joint Staff and Combatant Command Internship program.

## RG-31 and RG-33 MRAP SOF Variant Vehicle CASEVAC Update

The SOCOM/SG recently sent a representative to Ft. Carson, CO, to an on-site test of the RG-31 and RG-33 Mine



Resistant Ambush Protected (MRAP) SOF Variant vehicles. The purpose of the visit was to receive familiarization with the RG-31 and RG-33 MRAP SOF Variant vehicles, identify CASEVAC processes when using the MRAP SOF Variant vehicles, and develop a mobile training team (MTT) training plan / outline for casualty evacuation (CASEVAC) operations with the RG-33 and RG-31 MRAP SOF Variant vehicles. The intent is to field a maximum of two CASEVAC kits as part of the basic issue items (BII) for the RG-33 MRAP SOF Variant vehicle and one each CASEVAC kit as part of the BII for the RG-31 MRAP SOF

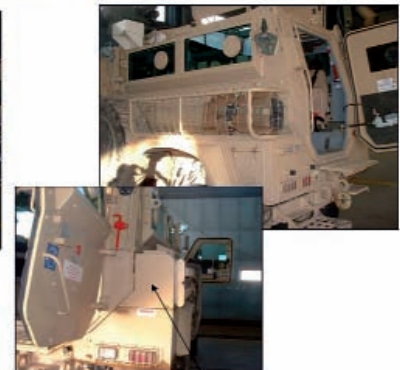
Variant vehicle as part of the SOCOM SG's Tactical Combat Casualty Care (TCCC) program.

For the RG-31 MRAP SOF Variant vehicle, the recommended stow points for the CASEVAC kit are identified below:

### RG-31 Recommended CASEVAC Kit Stow Points

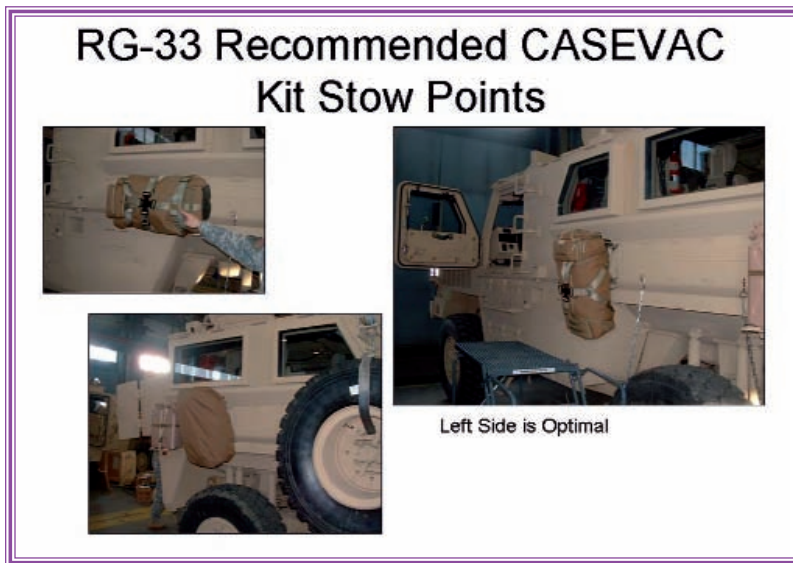


Left Rear Basket (Optimal)

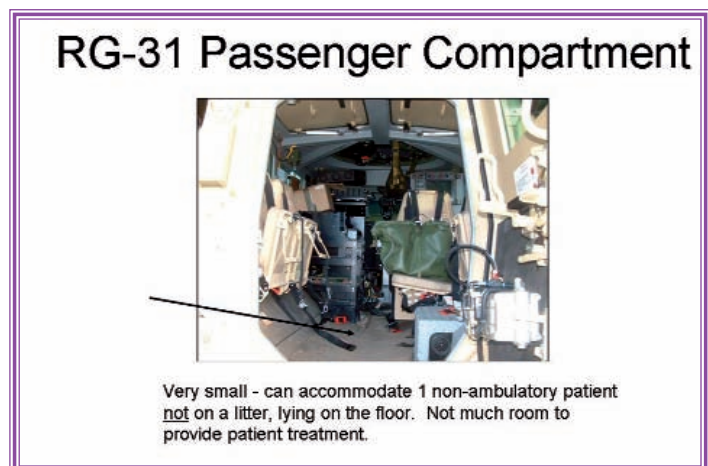


Need to add Mount points

For the RG-33 MRAP SOF Variant vehicle, the recommended stow points for the TCCC CASEVAC kit are identified below:

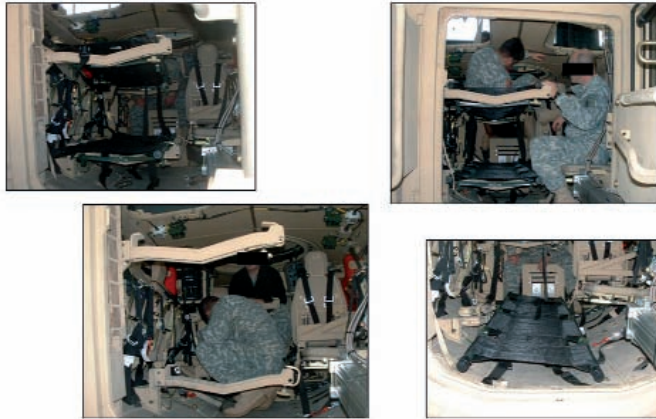


The design of the RG-31 MRAP SOF Variant vehicle accommodates one non-ambulatory patient not on a litter on the floor of the vehicle as identified in the below pictures.



The design of the RG-33 MRAP SOF Variant vehicle accommodates two patients on litters utilizing folding litter supports as identified in the below pictures. SOF Operators can also load a non-ambulatory patient on the floor of the RG-33 MRAP SOF Variant vehicles when the folding litter supports are not in use: Additional information will follow in AMHS format from the SOCOM/SG Office related to the proper use and placement of the CASEVAC kit provided as part of the TCCC program.

## RG-33 Passenger Compartment



### UNCLASSIFIED RG-33 / RG-31 MRAP Casualty Evacuation (CASEVAC) Training Guidelines

- **RG-33**
  - Load all patients feet first on 78 inch Talon-II quad folding litter (Vehicle BII)
  - Load bottom litters brackets first, followed by top brackets
  - Off-load top litter patient first followed by the bottom
  - Recommend most injured patient is loaded on bottom
  - Ensure patient is secured to litter with 2 attached litter straps
  - Prior to vehicle departure, ensure litter is secured to brackets
  - RG-33 is capable of carrying 2 litter patients with up to 2 ambulatory patients and a medic / attendant in rear passenger compartment
  - Confined space allows for only a small amount of extra medical treatment supplies
  - Vehicle has 2 organic CASEVAC kits as part of basic issue items (BII)
  - Use caution in closing rear hatch to prevent injury to areas of patient not on litter
- **RG-31**
  - Passenger compartment size allows for transport of one non-ambulatory patient, placed on the floor.
  - Confined space allows for only a small amount of extra medical treatment supplies
  - Vehicle has one organic CASEVAC kit as part of BII

UNCLASSIFIED

SOCS

1



### UNCLASSIFIED Equipment Use and Casualty Loading Procedures

- Inspect all CASEVAC equipment with daily PMCS and pre-mission
- Ensure entire crew is familiar with quad folding litter employment procedures
- Familiarize entire crew with contents and function of items in CASEVAC kit. Kits have instruction manuals provided.
- 3 dismounted personnel lift litter into vehicle for receipt by soldier in vehicle, who places litter in support brackets and ensures security
- Recommend stow of CASEVAC kit on front left side of vehicle on established anchor points vertically or horizontally (RG-33)
- Recommended stow of CASEVAC kit in rear left bustle rack (RG-31)
- Refer to operators manual for deployment and post operation stow of litter support brackets (RG-33)
- Consider planning contingency load plan for CASEVAC operations

UNCLASSIFIED

SOCS

2



## USSOCOM Education and Training Update

COL Robert Vogelsang

Deputy Surgeon for Clinical Operations



As you should be aware, USSOCOM personnel may only attend commercial combat trauma training (CTT) courses which contain LTT that have been approved by HQ, USSOCOM. Initial policy for this issue was put out in a 9 December 2005 memo from General Brown, then Commander, USSOCOM. Admiral Olson has not made any changes to this policy. Methodology for units to initiate the approval process on commercial vendors was put forth by the USSOCOM Command Surgeon in November 2006. There was initial discussion as to why commercial vendors required HQ, USSOCOM approval if units could simply “buy a seat” in a commercial civilian course as it was felt all animal care and use responsibilities were squarely on the vendor and not USSOCOM, component commands, or DoD. However, it was decided that, due to the sensitivity of animal use in medical training programs, commercial vendors should be evaluated to ensure compliance with federal law, federal and DoD regulations, and policy guidance.

This decision was made prior to a New York Times article published November 2, 2006 about a Corpsman with conventional Marines in which the following was printed,

*“In one course, an advanced trauma treatment program he had taken before deploying, he said, the instructors gave each Corpsman an anesthetized pig.*

*“The idea is to work with live tissue,” he said. “You get a pig and you keep it alive. Every time I did something to help him, they would wound him again. So you see what shock does and what happens when more wounds are received by a wounded creature.”*

*“My pig?” he said. “They shot him twice in the face with a 9-millimeter pistol, then six times with an AK-47, then twice with a 12-gauge shotgun, and then he was set on fire.”*

*“I kept him alive for 15 hours,” he said.*

*“That was my pig.”*

*“That was my pig,” he said.*

Needless to say, though the article was a positive one, BUMED had to answer some questions about this and subsequently created their own policy of use of commercial LTT vendors which is a lot like USSOCOM’s.

This methodology requires SOF units desiring the services of commercial vendors to request initiation of the approval process through their chain of command to the USSOCOM Surgeon office. The unit chain of command must be supportive of the request for commercial LTT and understand its responsibility for funding such training in a commercial setting. Currently, there are four commercial CTT vendors providing LTT which are approved by HQ, USSOCOM. Approval memoranda were sent to all component commands at the time approval was given. Additionally, approved vendors may be found under “Command Surgeon Documents” in the “Commercial CTT” folder at the USSOCOM Command Surgeon public portal page on SIPR at:

<https://sofnet.socom.smil.mil/sites/SOCS/Command%20Surgeon/Shared%20Documents/Forms/AllItems.aspx>

Contrary to what many people seem to believe, no HQ, USSOCOM regulations, directives, or policies exist requiring any SOF service member to participate in LTT. The only exceptions are medical personnel in the Special Operations Combat Medic (SOCM) course and the Special Operations Combat Medical Skills Sustainment course (SOCMSSC) conducted at the Joint Special Operations Medical Training Center (JSOMTC). The decision to utilize LTT for the training of non-medical personnel, and medical personnel outside SOCM and SOCMSSC, belongs to the commander and the commander alone.

This office has recently received inquiries directly from commercial vendors requesting approval. We explained to these vendors that this office does not accept solicitation directly from vendors and that USSOCOM subordinate units must initiate such a request. As a reminder, if your unit wishes to use a commercial vendor which is not currently approved by HQ, USSOCOM, you must send a request to initiate the evaluation process through, and obtain the approval of, your chain of command to the USSOCOM Command Surgeon. Once the

Command Surgeon receives the request, we will contact the vendor and supply a list of documents which must be provided to the Command Veterinarian. This list includes (not exhaustive):

- List of current Institutional Animal Care and Use Committee (IACUC) members including name, IACUC position they are filling, and if they do not work directly for the organization, their affiliation or position/employer.
- Copy of IACUC meeting minutes showing discussion and voting on the animal care and use protocol used for the training course(s). These minutes must include the date of the meeting and show the vote approved the protocol.\*
- Copy of the animal care and use protocol for any and all courses potentially offered to SOF personnel for attendance. The protocol should follow the format outlined in Appendix C of Army Regulation 40-33 (same as SECNAVINST 3900.38C and AFMAN 40-401(I)), The Care and Use of Laboratory Animals in DoD Programs, 16 February 2005. The copy must have signatures where required; electronic copies without actual signatures are not acceptable.\*
- Current APHIS (Animal and Plant Health Inspection Services) Form 7021, Research Facility Certificate.

\* Vendors may conduct different courses (e.g. one for medical personnel and another for non-medical personnel) and if so, each course may require separate protocols and IACUC meeting minutes. Do not assume that approval for one course conducted by a vendor allows attendance at all courses conducted by a vendor.

The Command Veterinarian will review material submitted by the vendor and if sufficient, will inform the vendor at which time coordination will proceed for an on-site assessment by a veterinarian to reconcile the protocol against actual conduct of training to ensure what is described in the protocol is performed during the training events. If the material is found to be insufficient, or requires changes, the vendor is provided feedback and is required to resubmit protocols and new IACUC meeting minutes approving the updated protocol. Once the documents are considered sufficient, coordination for on-site assessment can proceed. On-site assessments can sometimes be challenging since very few veterinarians within SOF are familiar with such training, and they generally have a high OPTEMPO with their units. Units requesting vendor ap-

proval may be required to fund the TDY required for the veterinary assessment. Veterinarians organic to requesting units will not be allowed to evaluate vendors due to conflict of interest.

Assessment of training by a veterinarian must occur while the vendor is conducting the same training for non-SOF members (e.g. other DoD, other federal/state/local agencies). A vendor is either approved by HQ, USSOCOM for attendance or it is not. There exists no provisional, temporary, or other interim status allowing attendance by USSOCOM personnel prior to the vendor receiving full approval. Once the veterinarian concludes the assessment and reports to the Command Surgeon, a recommendation is sent to the HQ, USSOCOM Chief of Staff who makes the final determination as to whether a vendor should receive approval or disapproval.

The timeline required for the entire process to occur is variable. If the vendor has all documents in proper order and immediately available to the Command Veterinarian, and the vendor has training courses that an available veterinarian can assess, the whole process can take as little as four to six weeks. However, if the vendor does not have required documentation available, submitted materials require changes, or courses are not being conducted and veterinary support is not immediately available, the process could take much longer.

Units are cautioned not to make contractual/payment agreements with vendors currently non-approved. Units should not expect to use a currently non-approved vendor for near-term training schedules simply because a request for approval has been sent and received by this office.

Note that CTT courses which do not contain LTT need not be approved by HQ, USSOCOM prior to attendance by SOF personnel. Of course, any servicemember may participate in any commercial course, whether approved by HQ, USSOCOM or not, if they attend as a private individual during non-duty hours or in a leave or permissive TDY status, and pay for the course with personal funds.

Units with organic Army Veterinary Corps officers (VCO) generally perform “in-house” LTT utilizing protocols approved through the JSOMTC IACUC. For many circumstances, in-house training is more desirable to the commander when he has the ability to conduct it. Unit VCOs can support training in locations other than home station (though only on other DoD / U.S. government installations) such as the Joint Readiness Training Center (JRTC) at Ft. Polk, LA and the National Training Center (NTC) at Ft. Irwin, CA, to name but two. Coordination and authorization; however, must first be made with the host installation.

OCONUS LTT requires all the same processes as that within CONUS. Do not think that just because you are in Iraq or Afghanistan that you can perform any LTT of any kind, regardless of whether any veterinary support is present and available. Forward stationed units and forward deployed units must coordinate with and gain the approval of their Theater Special Operations Command prior to the training event and as part of previously outlined approval processes.

Any questions about LTT should be addressed to your unit VCO if you are in a USASOC Special Forces Group (Airborne), 95th Civil Affairs Brigade and its battalions, Sustainment Brigade (Special Operations) (Airborne), or 75th Ranger Regiment. Other USASOC units without VCOs should contact the USASOC Command Veterinarian. NAVSPECWARCOM, AFSOC, and MARSOC units should contact the USSOCOM Command Veterinarian.



## Official Do Not Use List

All, please note the Official “Do Not Use” List below and incorporate these changes into your future JSOM sub-  
missions. These changes were retrieved from the Joint Commission’s website at:  
<http://www.jointcommission.org/PatientSafety/DoNotUseList/>.

<b>Official “Do Not Use” List<sup>1</sup></b>		
<b>Do Not Use</b>	<b>Potential Problem</b>	<b>Use Instead</b>
U (unit)	Mistaken for “0” (zero), the number “4” (four) or “cc”	Write “unit”
IU (International Unit)	Mistaken for IV (intravenous) or the number 10 (ten)	Write “International Unit”
Q.D., QD, q.d., qd (daily)	Mistaken for each other	Write “daily”
Q.O.D., QOD, q.o.d, qod (every other day)	Period after the Q mistaken for “I” and the “O” mistaken for “I”	Write “every other day”
Trailing zero (X.0 mg)* Lack of leading zero (.X mg)	Decimal point is missed	Write X mg Write 0.X mg
MS	Can mean morphine sulfate or magnesium sulfate	Write “morphine sulfate” Write “magnesium sulfate”
MSO <sub>4</sub> and MgSO <sub>4</sub>	Confused for one another	

<sup>1</sup> Applies to all orders and all medication-related documentation that is handwritten (including free-text computer entry) or on pre-printed forms.

**\*Exception:** A “trailing zero” may be used only where required to demonstrate the level of precision of the value being reported, such as for laboratory results, imaging studies that report size of lesions, or catheter/tube sizes. It may not be used in medication orders or other medication-related documentation.

<b>Additional Abbreviations, Acronyms and Symbols</b> (For <u>possible</u> future inclusion in the Official “Do Not Use” List)		
<b>Do Not Use</b>	<b>Potential Problem</b>	<b>Use Instead</b>
> (greater than) < (less than)	Misinterpreted as the number “7” (seven) or the letter “L” Confused for one another	Write “greater than” Write “less than”
Abbreviations for drug names	Misinterpreted due to similar abbreviations for multiple drugs	Write drug names in full
Apothecary units	Unfamiliar to many practitioners Confused with metric units	Use metric units
@	Mistaken for the number “2” (two)	Write “at”
cc	Mistaken for U (units) when poorly written	Write “ml” or “milliliters”
µg	Mistaken for mg (milligrams) resulting in one thousand-fold overdose	Write “mcg” or “micrograms”



## **Better Training Through Lessons Learned: Casualty Treatment and Evacuation Vignettes from Operation Iraqi Freedom (OIF) and Operation Enduring Freedom (OEF)**

CPT Scott M. Gilpatrick, APA-C, DMO, USSOCOM PA and ATP Coordinator  
LTC Shawn Kane, MD, MFS, DMO, USASOC

For this, the second installment of the Lessons Learned column, we changed the name! We want to focus on using the lessons learned in the vignettes to help units plan for and execute more realistic and relevant training. The new Critical Task List (CTL) for the ATP is almost ready for the street and implementation into the SOCM curriculum. The SOCOM RB (Requirements Board) worked hard extrapolating these CTLs from lessons learned and feedback from Medics out in the command. Take the lessons learned from these scenarios and implement them into your element's training plan. Review and test your standard operating procedures (SOPs) frequently, share and compare your SOPs with other SOF and conventional units. This will help keep SOF medicine relevant and up to date while keeping the best practices in the field.

The Joint Lesson Learned Information System - Special Operations Forces (JLLIS-SOF) is an excellent place to find lessons learned, after action reviews (AARs), and other publications to learn from. Register at the SIPR Site (<http://www.jllis.smil.mil/ussocom/>) and then you can do your own "Google type search" for whatever interests you.

The following after action reviews (AARs) are from SOF Medics and medical officers on today's battlefield. Within, and at the end of each, you will find their discussions and lessons learned, both good and bad. At the end, we have highlighted a few things of noted importance. No names, unit identities, or specific locations were used due to privacy and operational security concerns. Generally, these AARs are as they were submitted to us for publication and the JLLIS-SOF. We have made some minor editing changes to help with readability or to better highlight important facts and issues.

### **MEDICAL AFTER ACTION REVIEW, OCT 2007 SITUATION**

Task force assault on a location known to be used by enemy insurgent groups. Task organization consisted of a ground force with three embedded Medics and an air component with two xMH-60s with one Medic.

### **ACTIONS ON THE OBJECTIVE**

The Assault Force infiltrated and contained four buildings and then conducted a callout on the primary targets sequentially in a predetermined order. A small structure located next to one of the target buildings had not been cleared. After the callout was completed, a K9 was sent in to check the structure. Immediately upon entering the building, an enemy combatant shot the K9, was subsequently engaged by the ground force, and then proceeded to detonate his suicide vest. Inside the structure, the enemy had stacked hay bales to the ceiling to create a false wall near the entrance to try and conceal their position. After the suicide vest detonated, a second individual engaged the Assault Force and was killed.

### **ASSESSMENT AND TREATMENT**

Two Soldiers were within 10 feet of the suicide bomber at detonation, and they continued with the assault and were exfiltrated with the force. The wounded canine was treated on the scene by an ATP and due to his condition was CASEVAC'd for further care. Below is a description of the incident as described by **WIA #1**:

"I felt the blast against my face (felt like a boat paddle against my nose) and felt my



head snap back. I did not hear anything. I estimate that the vest was 10 to 15 pounds of explosives. The fact that the enemy was in the prone, and behind the small mud wall, the fragmentation was contained, but the overpressure still came forward.

The assaulter engaging the suicide belt enemy was put down by the blast and had more injuries than I did. I was able to continue the assault post blast and check on the dog handler to make sure he was not wounded.

As the adrenalin wore off, I was able to feel the blast effect more and I felt my neck and right leg start to stiffen considerably. I took my helmet off until exfiltration; it was too painful to wear on my neck and shoulders. The handler and I checked each other out for fragmentation wounds; no holes were detected. Once I returned to base, I went to the PA to report that I had sucked up a blast, and that I was feeling lots of pain all over. He examined me from head-to-toe, noticed I was in pain, and started an IV. He gave me Valium to reduce my immediate neck pain and over all muscle pain. Since I have had whiplash, concussions, and blast injuries before — I was able to recognize this injury as nearly identical to my previous ones. I also had a lot of nausea, and a hard time remembering things that I had just written down or said. The PA administered the MACE test and I scored an 18 out of 30. I felt the effects of this blast for at least a week before my pain level returned to normal.”

After assessment of WIA #1, it was determined that he had the following injuries: Closed-head injury, neck strain/sprain, and a left shoulder contusion. The patient was treated in accordance with the injuries and required activity modification. WIA #1 was treated with diazepam for muscle spasms, ondansetron for nausea, acetaminophen for headaches, activity modification with head injury precautions, and mental status re-evaluations. His symptoms lasted approximately one week and once they resolved he was returned to duty.

**WIA #2** was assessed by the PA and found to have the following injuries: Closed-head injury and a right ear hemotympanum with slight hearing loss and tinnitus. He was treated with Tylenol and oxymetolazone for headaches and ear injury respectively. His injuries re-

quired activity modification (no physical activity for seven days). He had residual symptoms, headache, tinnitus, and hearing loss, for four to five days which required activity modification.

The two patients were treated in accordance with the clinical practice guidelines (CPG) outlined in “Acute Management of Mild Traumatic Brain Injury in Military Setting” developed by the Defense and Veteran’s Brain Injury Working Group released on 22 December 06.

#### **PATIENT OUTCOME**

Both Soldiers remained on duty and their symptoms continued to improve. Upon return to home station a thorough symptom focused follow up will be obtained.

#### **LESSONS LEARNED**

**ISSUE:** Mild traumatic brain injury (mTBI) is difficult to diagnose and may be more difficult to treat effectively.

**RECOMMENDATION:** Medical providers must be versed on the acute evaluation and treatment of individuals who may have sustained a mTBI. Providers must ensure that initial Military Assessment Concussion Exam (MACE) and appropriate follow up screening is performed. In addition, patients with impaired cognition can become a risk to themselves and others while conducting combat operations. Personnel should be treated in accordance with the CPG guidelines and returned to fully mission capable only after confirmation of fitness by a medical professional.

**ISSUE:** Mild TBI can lead to long-term sequela to include impaired judgment, decreased concentration, impulsivity, and poor job performance.

**RECOMMENDATION:** Medical providers must document exposure and ensure follow-up via a specialist in the diagnosis and treatment of mTBI. The majority of early treatment will focus on symptom relief. Individuals with symptoms more severe, progressive, or unremitting must be evacuated to a higher echelon of care to receive further testing and evaluation. Some individuals with more severe TBIs may require long-term treatment to improve clinical outcomes.

**ISSUE:** Personnel exposed to repeated blast episodes are at increased risk of developing mTBI. In addition, the symptoms of post traumatic stress disorder (PTSD)

are very similar so include this condition in your differential diagnosis. It is possible to develop both conditions simultaneously.

**RECOMMENDATION:** Ensure all unit personnel are trained to identify the common findings of mTBI. Leaders must know their personnel and look for subtle changes to personality or duty performance, and must refer personnel for medical evaluation if there is any question of an injury. In addition, all personnel who are exposed to any blast injury must be evaluated by a medical professional, undergo initial cognitive testing, receive the appropriate treatment to include activity modification, be evacuated to a higher level of care if needed, and must receive further diagnostic testing upon return to home station. Utilize the various sources of information available regarding mTBI.

**ISSUE:** There are several sources that can be utilized to assist with the treatment of patients with mild traumatic brain injury to include “Guidelines for Field Management of Combat-Related Head Trauma,” Brain Trauma Foundation, and JTTS Clinical Practice Guidelines for In-Theatre Management of Mild Traumatic Brain Injury (Concussion) released in August 2006.

**RECOMMENDATION:** Pick one of the guidelines and know how to apply it to your patients.

**ISSUE:** Several guidelines recommend the use of the Glasgow Coma Scale for initial evaluation.

**RECOMMENDATION:** This test is not practical in the initial assessment of mTBI, most patients with a mTBI will have a score of 15. Avoid the GCS for initial treatment of mild traumatic brain injury but continue to utilize for more obtunded individuals.

**AUTHOR’S COMMENTS:** mTBI is “the signature” injury of the GWOT. There is still more we don’t know than we do know and this is especially true when it comes to blast or “overpressure” TBIs. The diagnosis of mTBI requires a very low index of suspicion on the part of the provider. Anytime you have a servicemember who sustains a mTBI from a blast or overpressure situation you should probably consider screening everyone involved. Don’t forget the ears; the tympanic membrane is an excellent way to assess for overpressure injuries. Ruptured tympanic membranes should warrant a TBI evaluation. The use of Peltor or sound attenuating headsets do offer significant protection and intact membranes do not exclude the diagnosis of TBI.

The MACE is an excellent point of injury screening tool and it is recommended that it be used for standardization purposes. Consider the fact that SOF personnel typically function at a slightly higher mental level. Give consideration to using a normal cutoff score of 26 and pay a lot of credence to the number order test (a very sensitive indicator in our population).

Successfully treating mTBI is pretty easy: Cognitive and physical rest until all the symptoms are resolved (to include while exerting oneself). The fact that this can take upwards of seven to ten days is what makes it difficult in this population and why they will hide symptoms from the medical staff.

Mild TBI usually does not require any neuropsychological (NP) testing beyond the MACE. NP testing becomes more important with more significant TBIs. The key to post-injury NP testing is pre-injury/baseline testing. Recommend all SOF personnel get baseline NP testing early on in their SOF career due to the risk of head injuries in everything we do.

**ATP Thoughts:** An addition to the August 2007 CTL is recognition of TBI. Early documentation of the MACE test given as soon as possible, and measured serially afterward is key to accurately tracking the physical and cognitive signs and symptoms of TBI. **Document anything and everything about TBI or the possibility of TBI!!** This will allow for good continuity of care all the way to retirement and subsequent VA care if necessary. Some other things to think about: Hearing loss, make sure you document it.

#### **CANINE TRAUMA**

Be prepared for it if you have working dogs as part of your Assault Force. If you are part of a unit that has its own dogs, you should have received appropriate veterinary training from your unit veterinary staff and should have “dog-specific” medical items. If you are not in a unit with dogs, but will support an operation you know will include dogs, just pack a few additional items you would use on a human patient and apply them similarly to a dog. HemCon® dressings would be used the same; however, the CAT tourniquet will not work on a dog’s limb. Use whatever expedient method is at hand, like a Penrose drain, cravat/windlass, etc. For pain relief, you can administer morphine to a dog at a dose of 0.25mg/lb IM (maybe 15mg for an averaged sized dog). This route may cause the dog to vomit, but is not concerning if the dog is otherwise alert with a patent airway. As with humans, be careful of opioid use if the dog has respiratory compromise. Suspected tension pneumothoraces can be decompressed as with hu-

mans, though thoracocentesis would be performed around the 7th and 9th intercostal space, a little toward the spine (about same level as xiphoid would be sufficient, you just want to release air). Also very important is having a dog evacuation plan and that means knowing where the nearest veterinary unit is located that can handle dog trauma cases (not all veterinary units have facilities/equipment for dog trauma). It is best to have contacted veterinary units in your area to determine their capability. Don't worry, they know you are out there and they don't ask questions about who owns the dog or what the unit was doing.

*COL Robert Vogelsang DVM, DACVS  
USSOCOM Deputy Surgeon for Clinical Operations*

### **MEDICAL AFTER ACTION REVIEW, DEC 2007**

#### **SITUATION**

Thirteen and fifteen year-old local national males wounded in vicinity of kinetic air strike. Strike Force mission was to collect SSE on target and surrounding structures following air strike in OEF, Forward Surgical Team (FST), ER doc, and a certified registered nurse anesthetist (CRNA) on objective.

**PT #1** 15 year-old male, multiple fragmentation wounds to extremities and torso.

**PT #2** 13 year-old male with 80% amputation of right foot/ankle.

#### **ACTIONS ON THE OBJECTIVE**

##### **ER**

Asked to accompany SOF Assault Force and recommended second FST member accompany for additional critical care support and help during extended ground action and transport time (CRNA accompanied). Pre-mission, discussed packing list with CRNA to compliment trauma aid bags of ground force Medics and myself.

Initially positioned at central blocking position in order to facilitate rapid movement from central location on objective. Casualty number #1 was found in first series of buildings cleared. Casualty #2 was found during fourth series of buildings on objective.

The CRNA and I moved toward the objective to help transport the patient up a significant terrain feature and to help facilitate consolidation of force to prepare for exfiltration. Due to the tactical situation (enemy contact), initial treatment rendered was done on

a SKEDCO litter under limited red lens. The patient appeared unstable, tachycardia in 130s, altered mental status, rigid abdomen, with multiple penetrating lower extremity and posterior thoracic wounds. No active external hemorrhage was noted. The right upper extremity (RUE) wound fracture was splinted and dressed while the CRNA established a left antecubital IV access. Decision was made to give Factor rVIIa and initiate a packed red blood cell (PRBC) transfusion through a warmer. The patient was then given judicious pain meds and placed in a Hyperthermia Prevention Management Kit (HPMK) for transport on the SKEDCO. Treatment took approximately 10 to 15 minutes. The Assault Force commander instructed need for movement.

The CRNA, an assault Medic, the battalion surgeon, and I acted as part of the litter team. During the 1 to 1.5 kilometer transport on foot, the situation reports and recommendations were sent up higher through the commander's communication. I plugged into his radio to transmit as opposed to relaying information due to the complexity of the report. I also relayed the report from the Assault Force Medic with PT#2. We were not in the vicinity of PT #2 and the force was in direct contact, so we did not evaluate the patient until at the primary HLZ. Coordination was made with the ISG to transfer the CRNA and I from chalk 3 to chalk 2 (Casevac Helo); he supported.

At PZ I assumed care of PT #2 from the Assault Force Medic. PT #2 had multiple fragment wounds to left extremity and an 85% amputation of the right foot at the talus. The wound was dressed in an Israeli dressing and a tourniquet was placed above knee. No active bleeding was noted at the foot; no pulses present. Attempted tourniquet below knee, but the child was too small for tourniquet, splinted with a SAM and redressed with an Israeli. PT #2 was extremely combative, striking transport team and biting repeatedly, forcing flex cuffs and restraint. Patient crawled off SKEDCO repeatedly; difficult transport to HELO for exfiltration; needed five additional assaulters to help and guide. Upon exfiltration, attempted to give a fentanyl lollipop for pain; PT #2 refused and spit it out. Re-started left AC IV, gave morphine sulfate 8mg IV before PT #2 was able to rip out second IV. Restarted and ripped out third IV during transport. PT #2 ripped out of HPMK and space blankets on multiple occasions. Vital signs remained stable. CRNA managed PT #1 during transport. Both patients were placed near troop heaters in the back of 47. The nearest surgical capability was bypassed due to overcrowding and the patients returned with the force and were offloaded at the CSH.

## CRNA

Tasked to support the objective as a member of ground force element. With knowledge that other medical providers (two assault Medics, battalion surgeon, and FST ER) were equipped with hemostatic dressings, tourniquets, and other “bleeding stoppers.” I chose to bring two units PRBC, IV start kit, ETT and laryngoscope, blood tubing, two bags of Hespán®, the Enflow Fluid Warmer with one battery, three 2.4mg vials of Factor VII, and an HPMK. I felt the outside temperature of less than 40 degrees would aid in keeping blood and Factor rVIIa cold.

ER and CRNA informed of PT #2, but decision was made by Medic to take the patient who was stable for move to exfiltration HLZ due to proximity to HLZ. The ER physician initially saw and assumed care for patient #2 at the exfiltration HLZ.

PT #1 was brought to ER and CRNA by the battalion surgeon and senior Medic for purpose of “blood and Factor VII.” Patient was responsive and alert, had a palpable radial pulse, demonstrated tolerable pain, and was wrapped in two blankets with patent IV. The patient was given oral fentanyl and IV Invanz by the Assault Medic. An initial head to toe assessment showed RUE and left lower extremity (LLE) wounds with clean dressings. The most significant injury was a penetrating wound to the right lower back. The abdomen was rigid and the HR was noted to be in the 130s. A decision was made to take the patient out of the blankets and into an HPMK. Also, due to the torso injury, the patient was given 4.8mg of Factor VII (approximate wt 50kg). One unit of PRBCs was started and administered through the Enflow fluid warmer. The tactical situation did not allow for further medical treatment.

PT #1 then carried over 1 kilometer to exfil HLZ. This took over an hour due to terrain and enemy contact. This patient was assessed frequently over this period, and remained alert with palpable radial pulse. At time of exfil, HR was in the 100s; there was no other change in status.

On CH-47, able to get oxygen saturation of 98 to 99, with HR in the 100s. Approximately 1½ hour after started, PRBC completed. Started Hespán® at 100ml/hr. Patient continued to verbalize tolerable pain; time of flight one hour; patient remained stable.

At arrival airfield the patient was escorted by the CRNA from the CH-47 to the ambulance to trauma bay. The patient was turned over to FST surgeon, physician assistant, and hospital staff. Patient remained responsive, vital signs were; temp - 36.1C, BP - 110/70, HR - 90s, SpO2 - 98, respirations - 20s. The HGB was

12; no other labs recalled. Patient was taken to OR for exploratory lap.

Keeping this patient warm after penetrating trauma in sub 40 degree temps was a definite factor in the status of patient upon arrival to CSH. The ground force medical team did this with use of an HPMK and giving fluids via Enflow warmer. The simplicity of the warmer allowed the CRNA to deliver an adequate amount of fluids (PRBC) to keep the patient from shock without worry of re-bleeding. The decision to use Factor VII was proven excellent as reported by the FST surgeon, who stated the patient had a liver laceration.

## LESSONS LEARNED

### KEY NOTES

1. PT#1 stabilized and improved with care given during care under fire phase; actually resuscitated adequately in field. Able to give warm blood and Factor VII due to its presence forward, especially given tenuous tactical situation. A CRNA should always be considered as a member of a resuscitation team on ground when FST not first surgical option.
2. HPMK proved extremely effective in patient warming in this case.
3. Do not hesitate to restrain violent patients during transport to protect force and facilitate care, even young ones.
4. Provide lots of pain medications after tourniquet application, if patient tolerates and is stable.
5. Do what you can, as fast as you can and allowed by ground situation, but be ready to move with patient and kit on moment's notice; not as easy as it sounds.
6. Practice with red or blue light.

**AUTHORS COMMENTS:** This AAR emphasizes the benefits of thorough mission analysis by the ground force medical element and the medical augmentees. The augmentees are being brought on target to do just that, “augment” the ground force. The personnel in this scenario did that! Had the ER physician and CRNA not brought the tools to allow them to utilize their skill set, they would have been no value added to this mission and quite possibly, a detriment. Hypothermia has been shown in recent literature to be a major independent variable in mortality, blood products required, etc. The forward use of blood and Recombinant Factor VIIa is a very sensitive topic with the conventional medical community. This AAR clearly demonstrates that there is a place for them on the battlefield. It appears as if the appropriate indications were met in this case and the products were successfully used. We don't have any issues with this, but I

am sure someone will read it and will! In this case, a physician used them but we all know that most of the time it will be an ATP. We have an obligation to train and educate our ATPs to be able to think and act like a physician when they are in this situation. More than likely, next time it will be an ATP who does this. Keep your patients warm and remember even if you think it is warm they are probably already cold or are getting cold. Blankets and helicopters don't mix; strap them down

**ATP Thoughts:** A few highlighted moments from the vignette: PEDIATRICS! The pain, fear, and terror of an event like this to a child is made worse by the big men with green glowing eyes taking you away in a helicopter. When taking care of a HN child consider these things:

- Medication doses for kids tend to go by amount/kg of body weight.
- Sometimes your splints and tourniquets do not fit.
- A small pediatric bag is not a bad idea.

**COLD:** The HPMK and other devices out there now are made for just these events. Hypovolemia/hypothermia/acidosis usually lead to significant coagulopathy. So, do all you can to stop bleeding and keep your patient warm. Be careful with blankets and helicopters. Do your best to make sure any casualty blankets are secured tight prior to walking under an aircraft's rotor disc. All too often that last blanket gets blown away because it's just placed on top of the patient.

**FACTOR VII and BLOOD:** If you are fortunate enough to have access to packed red cells and Factor VIIa close to a target, know when it's appropriate to use it or not to use it. In the role of a first responder we don't have tri-corders (yet) to automatically give us a person's HCT. We have to rely on other things like mental status, vital signs, and mechanism of injury. Do not forget about warming of the fluid or blood.

**COMMUNICATION WITHIN THE TEAM:** From this vignette we can see how from start to finish, when everyone from assaulters to surgeon talks and knows capabilities, good decisions are made. From packing your aid-bag to what chalk you exfill with is determined by how good your communication is. This story proved that people from different units can operate together successfully with good communication.

## **MEDICAL AFTER ACTION REVIEW for FEB 08 SITUATION**

SOF Assault Force, in conjunction with coalition forces, assaults OBJ to kill/capture AQ elements in order to disrupt and gain actionable intelligence on the AQIZ network. The Assault Force consisted of attached TF, a U.S. infantry platoon, and indigenous forces. After the targeting process, the target location was set. Due to the size of the TF element, an infantry platoon from a nearby patrol base was used to assault the target once a target building was pinpointed and isolated by our element. We were also informed that the target village had previously assaulted the Iraqi police checkpoint outside of it and overtaken it, flying an insurgent flag until coalition forces counterattacked. No coalition patrols had entered the village in two months.

### **PLANNING**

**CASEVAC** — The movement to the Forward Operating Base (FOB) was conducted by three conventional UH-60s, which were briefed as the primary CASEVAC platform and would ground laager at FOB (approx 10 minutes flight from OBJ). Although the helicopters were configured with seats in, I decided that their capability to receive one floor loaded patient and multiple walking wounded made them a better option than to spin up MEDEVAC from our alternate and contingency sites (30 minutes vs 12 minutes); the target was equidistant from Tikrit and Kirkuk. Tikrit was the location of the Forward Surgical Team and also had a more robust surgical capability than Kirkuk; therefore, the primary medical facility was Tikrit. I confirmed this plan enroute to the objective with the pilots over the ICS in the UH 60. There were three pre-planned HLZ's around the target area.

Upon arrival at the patrol base, we did a brief-back with the senior leaders of the platoon and loaded vehicles for the target. I was informed during planning that the walk in from the vehicle drop-off (VDO) would be approx 500m, and that the GAF package would remain at the VDO. There was no plan to move the vehicles to the target (with my back-up bag) which implied that litter to an HLZ would carry any casualties approximately 300 meters west. We had one litter with a hypothermia kit carried by our indigenous element and I assumed that the infantry platoon Medic had litters for his people.

## **INFIL**

Our element rode in the lead Mine Resistant Armored Protected vehicle (MRAP) which was driven by U.S. infantry at approximately 25mph by white light up to the VDO.

## **ACTIONS ON THE OBJECTIVE**

Once the target building was isolated, our coordination element took up security positions on the front side of the target and waited for the call-out to commence. During the call-out (conducted by the infantry platoon) gunfire erupted from the white side of the target which immediately caused all seven casualties. An eight-foot stonewall encircled the compound with an entrance that led directly to the front side breach of the building. After the initial burst of gunfire, I saw two men fall just outside the compound wall, both shouting for a Medic. I moved immediately to a covered position where I drug the platoon leader (WIA#1) behind a wall and began to examine him for wounds. The other man down (WIA #2) was located on the other side of the outermost fatal funnel of the compound wall. Due to the lack of any ambient light whatsoever, I decided to move WIA #1 inside an open garage/cow pen that provided cover from the objective. I convinced him to attempt to stand with my help and I assisted him to the garage where I was able to assess him with white light.

## **ASSESSMENT AND TREATMENT**

WIA #1's initial concern was that he was shot in the testicles and chest – which made him feel like he was coughing up blood and instilled a noticeable sense of panic. He had no bleeding coming from a large wound to the anterior thigh or his testicles, so I chose to first expose his thorax where I found a left posterior trapezius GSW and a left posterior CVA GSW. I covered both chest wounds with occlusive dressings, packed his leg injury with Kerlix®, wrapped the multiple fragment wounds on his testicles with gauze, and instructed him to apply pressure to his leg. At this point, WIA #1 began to have difficulty breathing (four minutes post injury). Due to the time since his injury, I felt a tension pneumothorax was unlikely and felt most of his difficult breathing was psychological. I instructed him to remain seated for ease of breathing, to calm down, take deep breaths, and that I would return to check on him. It was at this time that I unplugged my headset due to the high volume of traffic and I instructed another Soldier to relay communications for me. Our casualty collection point (CCP) element approached and asked if I wanted the CASEVAC called in and I responded that we had one litter Urgent. I heard a call

from another team leader asking me to meet him in the courtyard and I planned to move to him once I checked the next patient at my location, which was the other man down in the street that I was not able to reach initially. Another Soldier brought WIA #3 to my location and the Soldier complained of severe burning pain to his foot. I quickly examined his foot and did not see any signs of GSW or any trauma. I was going to cut his boot off when a team leader told me that I need to follow him to more wounded. Hostile fire was ongoing at this point, and I knew that there was no chance we could establish a CCP and that I would have to move to the other men instead of having them brought to me. I left the patients at the garage and followed the team leader around the outer perimeter wall where I ran into three more casualties leaning against the wall, which I assumed I was being led to. I examined each quickly and noticed that all had relatively minor extremity wounds, were conscious, bandaged, and being cared for by the platoon medic. My count at this point was four Priority and one Urgent. One of our team leaders immediately told me that the patient I needed to see was still in the courtyard at the main breach point being worked on by other TF personnel. I climbed the courtyard wall, saw WIA #2, and our EOD Tech gave me a quick rundown on his wounds. When I began my assessment I noticed the EOD Tech had completed the vast majority of WIA #2's life-saving treatments. His left arm had a tourniquet, his right lower leg had a tourniquet above a severely comminuted compound fracture to his tibia, and he was actively bleeding from a posterior flank GSW. As I turned him to examine the flank wound, I noticed that his perineum was severely distorted and actively hemorrhaging. I packed the cavity with two rolls of chitosan impregnated gauze (Chitoflex®), one roll of Kerlix®, and bandaged it in place in a figure of eight with ACE® wrap. The patient complained about the pain in his legs and the EOD Tech brought it to my attention that his opposite leg was also broken at the tibia. I saw no wounds at the site and assumed that it was a closed fracture. Due to his level of pain, I gave the patient an 800mcg fentanyl sucker and proceeded to buddy splint his legs together with the EOD Techs help. I was able to fill out a casualty card on him and record the time of drug administration and attempted to get some sort of vital signs on the patient, but I had no reading on my finger pulse ox and no radial pulse. Due to his alert mental status and the fact that I had no warm fluids, I opted to defer IV access and considered him normo-volemic despite his unpalpable radial pulse (possibly due to my cold hands). Before this, our troop commander (who dragged this patient out of hostile fire) categorized the patient

also litter Urgent based on the EOD Tech's assessment. Two TF Soldiers had already opened our litter kit, got the heating blanket working, unwrapped the space blanket, and packaged the patient as per troop SOP (he stayed normothermic due to the warming system we carry). I reassessed his wounds, and left to find my first patient with the penetrating chest trauma. At this time, my count was two litter Urgent and four Priority. When I arrived, WIA #1 was still in the position I left him in, and not on a litter contrary to what I expected. The Soldiers at the scene got him on the litter and prepped him to move with motivational assistance from our team leader there. WIA #1 then informed me that it was "getting really hard to breathe;" this was approx 25 minutes post-injury. I performed a needle decompression on him with a 10-gauge needle and patient claimed partial relief from his dyspnea. At this point the troop SGM informed me that the vehicles were in position on the road and that he was ready to move the patients. (during the brief-back the infantry platoon leader informed us that the roads were too narrow for vehicles; however, the presence of casualties seemed to have changed their minds). One litter patient was moved in the lead MRAP vehicle and the walking wounded were mistakenly loaded into the second MRAP which left only an up-armored HUMM WV for the other litters. I cut the lanyards on the doors with my shears, which allowed the doors to open completely, and we managed to move the patient inside the truck. One TF Soldier had to walk beside the vehicle supporting the litter handle to prevent the patient from tipping on his side. This caused great discomfort to the patient and underscores the value of a robust ground CASEVAC capability in this AOR. I moved to the lead MRAP and rode to the HLZ with WIA #1 to the HLZ and reapplied his Hyfin™ occlusive dressings, which had partially failed. I replaced them, reinforced them with tape, and reassessed his wounds. Once this was complete, our troop SGM told me the birds were inbound and that he wanted me to stay with the force on the ground. I concurred (this is our SOP) and moved to the CCP where we prepared to move the two Urgent patients on the first lift.

### CASEVAC

We had to motivate the soldiers on hand to act as litter bearers. As we moved the patients to the aircraft, our team leader approached and instructed me to accompany the two patients to the CSH. I told him that our troop SGM instructed me to stay; however, with the progressive difficulty breathing of my patient, I agreed with him and accompanied them to the CSH. I made a

face-to-face again with my troop SGM before liftoff. The aircraft ended up being MEDEVAC birds and not our aircraft that were waiting at the FOB as planned – much to my surprise. Our two Urgent patients occupied both carousels and we attempted to load walking wounded in the rear of the aircraft but the crew did not allow this (in hindsight, this was probably due to the MEDEVAC crew plan to split the patient load without informing the ground force). As we flew, I found a hypothermia kit and covered WIA #1 who was shivering at this point and the flight medic administered oxygen via a non-rebreather. He expressed that he needed to sit up to breathe, so I pulled him out of the bottom carousel position and sat him up where I decompressed his chest two more times in flight with minor relief. I was able to see that the other urgent patient with the abdominal trauma was still conscious and had adequate pain relief.

### CSH HANDOVER

The FST leader met me at the entrance to the ER. He led me into the ER where multiple trauma teams were poised to receive our patients. I presented my patients to the surgical teams who were receptive and worked quickly to stabilize the patients. The FST's CRNA was also there and evaluating WIA #2 and I was able to relay to him the time and dose of fentanyl administration. The FST ER Physician immediately gave the WIA #1 a chest tube while the FST surgeon also examined the wounds on the abdominal case. I also provided information that the Soldiers had been shot while on the ground which clued the staff in on the strange bullet tracks, which seemed to run up and down the bodies instead of through and through.

I stayed with the FST until the patients were out of the OR.

### OUTCOME

**WIA #1:** Gunshot wound to left chest without an exit wound, shrapnel to the genitalia, and multiple other injuries. Underwent a CT scan and then had initial surgery to repair his urethra and tubes inserted for chest injuries. WIA #1 was transferred from Tikrit to Balad;

**WIA #2:** Open fracture to right lower extremity, through and through gunshot wound to left upper extremity and an abdominal gunshot wound. Soldier underwent a laparotomy with colostomy and washout of his flank wounds. Lower extremity wounds were washed out. Patient's brachial artery and vein which were injured were repaired in the OR. WIA #2 was transferred from Tikrit to Balad;

**WIA #3:** Soft tissue injury to right foot; went to OR for wound washout and was admitted to the Intermediate Care Ward (ICW).

**WIA #4:** Superficial gunshot wound to left thigh and lacerations to the back of the right thigh. Admitted to the ICW.

**WIA #5:** Gunshot wound to right arm. Washed out in the OR and then admitted to the ICW.

**WIA #6:** (INTERPRETER): Gunshot to back hit his vest but still penetrated. Taken to OR for wound exploration and washout, transferred to the ICU.

**WIA #7:** Penetrating forearm and hand wounds, stable, admitted to ICW pending orthopedic evaluation.

## LESSONS LEARNED

ISSUE: Working with conventional units

RECOMMENDATION: There is obviously a wide range of capabilities and SOPs within units we work with, especially the regular infantry. I discovered we had different approaches to preparedness and planning. If I had made a face-to-face with their Medic prior to leaving the gate I could have at least found out that they had no contingency or kick-out bags, just slick litters (and that they weren't going to bring any up to the objective). We were under a time constraint, but I still should have made the effort to find out this info. Under the med planning brief we use, there is a line for location of medics, and this should have prompted me to find out more about their assets. I assumed kick-out bags on each vehicle and that the vehicles would pull up once the assault commenced but this ended up being false. I have also added some more specific details/checklists to aid in planning under time constraints.

ISSUE: CASVAC categories

RECOMMENDATION: When our troop SGM asked the company commander how many Urgents he had, the CPT told him "seven." There were actually only two and five Priorities. At some point in the mission there was even an Expectant call made by someone. We need to make it clear that you are Urgent, Priority, or Routine in combat trauma. You are either at risk for dying or not. I am not convinced that people understand this, so it is worth it to brief as part of the med plan what and when we classify patients as.

ISSUE: CASEVAC

RECOMMENDATION: I assumed that the UH-60s that flew us from Kirkuk to the patrol base would be TACON to us for CASEVAC, this was not the case. I had a med plan that made sense to us, but this was not synced with the infantry unit's plan. When we called for CASEVAC, our primary plan to spin-up the infil air just five minutes away was overridden by the infantry battle CPT who could not fathom using anything other than MEDEVAC for MEDEVAC. Although the MEDEVACs ended up arriving just as we needed them, this was not the plan. The infil pilots we called were evidently told to stand down by the infantry unit and then they called the MEDEVAC air from Kirkuk.

Carousels for MEDEVAC birds are not ideal. There is simply not enough room to effectively treat a patient with this system. I needed to give my patient a chest tube in flight, a doable task on a slick helo, but could not due to the confined space of the carousel apparatus. A slick helo, with room for two floor litters or three door-to-door litters is a much more reasonable option. There is room to work and room to take out walking wounded. This goes for transport aircraft also.

Reaction time on the MEDEVAC was excellent, and it is rumored that they shaved seven minutes off their flight time. I expected to have a flight Medic to work with me, but both of them jumped in the gunner seats and only handed me equipment when I needed it. I am assuming that they were in fact Medics and just got out of my way to let me work. I was however, able to relay through them, to the CSH that we had one penetrating chest patient and one penetrating abdominal patient coming in. The CSH said they got the word and the first trauma team called for the chest patient, and the FST called for the abdominal patient; so despite the mix up, the hand-off went as planned. If the MEDEVAC had taken us to Kirkuk, we would have overwhelmed EMEDS.

ISSUE: Actiq

RECOMMENDATION: The 800mcg fentanyl worked much more quickly than I expected on the WIA #2. He had 2 tourniquets, two compound tib-fib, his perineum was blown out, and we still had to manipulate his legs to splint them. I think he had so much painful stimulation that as soon as the fentanyl started to work he noticed — which seemed to be really fast — maybe it was a little bit psychological as I told him that this magic sucker would take away all his pain. All he talked about all the way into the CSH was how great the lollipop was.



ISSUE: MAST pants

RECOMMENDATION: I could have justified using them on my abdominal injury. He had lost a significant amount of blood from an arterial bleed, had an unknown abdominal wound, two fractured legs, and he needed pressure on his pelvic bleed. He also had no palpable radial pulse, but he was mentating very well, which drove me away from IV access and fluids. However, what if he went unconscious 10 minutes later from internal bleeding I could not see? I think MAST pants would have been the treatment of choice in this case. It would have taken care of many of his problems.

I spoke with the FST surgeon about this and he was initially against them, had never seen them used, and said that once they go on, they usually never come off without killing the patient. My opinion is that they will buy time and that the Medic should remind the physician to fully resuscitate prior to MAST removal.

ISSUE: Pulse ox

RECOMMENDATION: I am learning the limitations with this tool. I was not able to get any readings on target, and the trauma teams could not get a reading either in the ER. I also could not feel a radial pulse on a person who was mentating just fine. Maybe he was compensating and actually shocky, or maybe this sign is just difficult to appreciate under stress. I have a feeling that the combination of cold, dirt, and peripheral vasoconstriction make the finger a bad site for a reading. I am seriously thinking about putting my stethoscope back in my bag, just to hear heart sounds for counting a pulse manually. This may also aid in confirming death.

ISSUE: Hyfin™ chest seal

RECOMMENDATION: I am a big fan of the Hyfin™; however, this was my first operational use. They adhered, but the chest wounds bled considerably and peeled them from inside out. Then reapplied new Hyfins™ with good old three-inch tape, and these made it all the way to the CSH.

ISSUE: Needle decompression

RECOMMENDATION: The decompression site I used on WIA #1 was the anterior chest. It was the only choice, because the patient needed to stay in the seated position. The seated position made the decompression more difficult because as I applied painful pressure, he started to move back away from the needle. The flight

Medics handed me two more needles when I asked for them and they were 14 gauge shorts — and the patient was a thick guy. Our needles (14g, 3¼”) are definitely not too long. I had to put a lot of pressure on the short needles to compress his tissue and get the proper depth. I got a new Nonin fingertip pulse oximeter from the Medics in the bird, and his saturation read 80% and his HR read 285 – in addition to these being ridiculous numbers, his mental status was so good that I was not too concerned. We also put him on an NRB enroute and his saturation did not move.

If I had my back-up bag, I would have given WIA #1 a chest tube — which I have not done during training in a long time, so ensure you refresh on all your procedures. Giving him a tube and applying squid suction may have assisted his breathing temporarily and may have decreased any bleeding inside by expanding the lung. It also would have meant that I did everything in my power to help him. I think I put the chest tube on the back burner, because of the whole “short evac times” argument ... which, only applies in Baghdad. We are trained to put them in and have the drugs to do it, so it should probably go back in the bag. Coaching him to breathe and giving more decompressions got old quick. I had a 20-minute helo ride to get it done... more than enough time. Maybe the Uresil is another option to look at.

ISSUE: Antibiotics

RECOMMENDATION: I did not give any, and that was definitely a mistake on my part. I did not have any extra PO Avelox to give to the conventional guys, and it didn't even cross my mind to hit the abdominal guy with IM Ertapenem ... which is why we are carrying it in the first place. My cross-trained team Medic was constantly asking me what I wanted him to do, and I could easily have had him mix and administer it.

ISSUE: Equipment used

RECOMMENDATION: I used all the Hemcon® and Kerlix® in my belt kit. I still had four Z-Kerlix® packs left on my pants. I also used two Tac-wraps and most of the guys used their own individual med kits on the guys. If I had my back-up bag, I could have used my MAST pants, and my better Nonin; but other than that, I felt that I had all that I needed. In all I used four rolls of Kerlix®, four Chitoflex's™, four Hyfins®, two Tac-wraps, two SAM® splints, one ACE® wrap and three 800mcg fentanyl suckers.

We had no idea where the individual first-aid

kits (IFAKs) were located on our patient's kit and what they have in them. We really should try to always familiarize ourselves with them. Also removing their IBA was not easy, and this should be rehearsed as well.

**ISSUE:** Ground Assault Force

**RECOMMENDATION:** The unit we worked with on this OBJ briefed they could not move the vehicles forward to the target. If they had planned to do so initially, we would have had access to med kit, cover while working on wounded, litters, and ready transport to the HLZ. By the way, for those who have not seen the Mine Resistant Armored Protective (MRAP) vehicle, the back hatch is about 5 feet off the ground. We fit one litter in the back; however, it is supposed to accommodate two. We had two MRAPS, and two litter Urgent patients; however the walking wounded jumped on one of the MRAPs, which took away the ability to move a litter patient. They had obviously not rehearsed this. We had to use an up-armor HMMWV, and had to cut the cloth straps on the doors to get the litter inside.

**ISSUE:** Running a MASCAL

**RECOMMENDATION:** I think we should conduct more training to help identify jobs that need to be undertaken during a MASCAL. If the Medic is busy treating, he will not be able to direct the process like we would want. Someone needs to run the MASCAL which entails directing wounded or litter teams to the CCP, ensuring that they are placed in the right positions, getting accountability and classifications straight, directing movement to the transload site, ensuring all the patients get loaded and unloaded, and organizing the HLZ into lifts. I think this should be standard training, and would better enable the Medic to train his troop. I do not think having the Medic orchestrate is very feasible unless there are two Medics. The training should be focused on "running" the MASCAL, not so much on treating multiple patients.

**AUTHOR'S COMMENTS:** The ATP and the rest of his team performed superbly in this situation and as a direct result, numerous U.S. Soldiers survived to fight another day. There are numerous lessons learned from the vignette. The most striking and impressive lesson is that a non-ATP, in this case an EOD Tech, successfully treated numerous life-threatening injuries while under fire. How was he able to do this? Medical training! There was only one Medic on this team but it appears as if the team members were trained to an exceptionally

high level. The ATP needs to be commended for the cross training he did for his guys; as a result he and his team handled this situation exceptionally well. We are very comfortable working with other SOF units, the flexibility and adaptability make working together easy. Conventional forces have their own unique way of doing things, just as we do, and working with them brings a new set of challenges. Planning and rehearsing will be the key to success. MEDEVAC aircraft and carousels, if they do not need to dump the weight (i.e., Afghanistan) they will not. A lot of time and effort has been expended on trying to demonstrate the benefits of not having a carousel while doing point of injury/tactical evacuations. We will need to continue to push this issue as not only is it better for SOF but it is better for the military. When a SOF ATP is on scene, a conventional Medic might be hesitant to get involved or think you do not need any help. Again, prior coordination is vital and when treating patients encourage them to help. Consider equipment limitations – the pulse ox is a great device but when the patient is cold and dirty it will not work as well. While onboard aircraft, they can be influenced by the vibration in the aircraft and give you false readings intermittently with accurate readings. This event captures the essence, skill, training, and desire of the ATP and his fellow SOF Soldiers.

**ATP THOUGHTS:** The ATP in this instance was handed a bad scenario and certainly made the best happen with what he had. All his lessons learned were covered completely at the end. Working with other than SOF forces sometimes requires extreme diligence in follow up and diplomacy when trying to get stuff done.

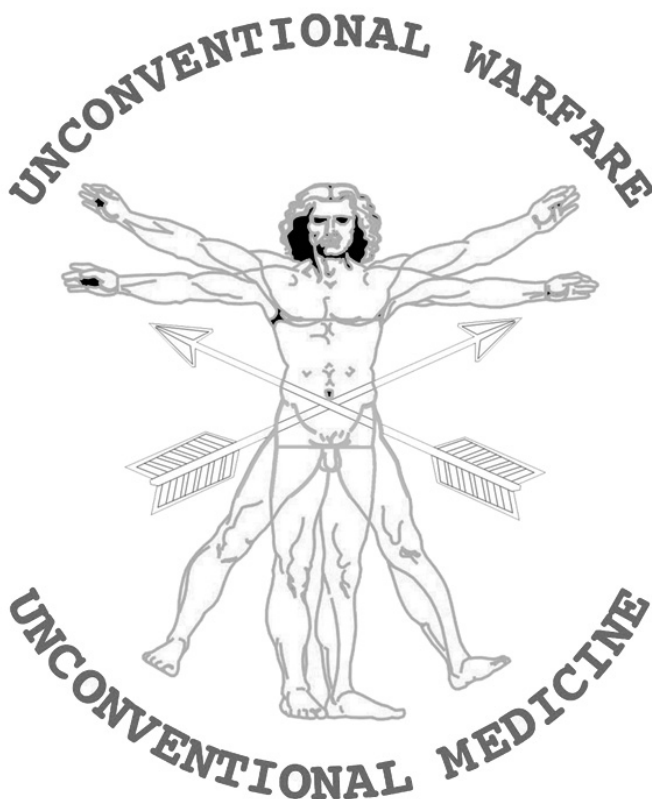
#### **SOF INTEROPERABLE MEDIC STANDARD**

Not just knowing how to use "Special Operations Medical Equipment and Techniques" makes you an ATP. All who complete training at the JSOMTC or PJ School and successfully pass the ATP examination are certified to our SOF Medic standard. When an ATP gets to his unit, he begins his unit-specific train-up. These unit SOPs / TTPs and lessons passed on from the senior Medics are what make a SOF Medic a great Medic. We are fortunate to have a military/combat Medic centered and tested standard of care. The regular Army certifies its Medic with the NREMT-B test, a civilian certification. The ATP curriculum includes the Department of Transportation (DoT) paramedic requirements as well as TCCC and the USSOCOM Requirement Board (RB) Critical Task List (CTL). The above vignette highlights the capabilities of a SOF Medic and the ATP standard. The lessons learned we read about like loading a MRAP,

use and amount of carried hemostatic dressings, providing care in a helicopter, using the Hyfin® dressing, and antibiotic war wound therapy are part of the ATP standard. Many wonder why this community went away from the National Registry of Emergency Medical Technicians Paramedic (NREMT-P) test as our interoperable standard. This scenario is a great example as to the gap in what an EMT-P is trained to do versus an ATP. The ATP needs to make big decisions autonomously — NO MEDICAL CONTROL. He might

be on a target for hours or days and then have an extended evacuation. The SOF Interoperable Medic standard covers this.

There were no special or secret super-high-speed pieces of equipment or techniques used in the scenario above. The procedures done were all base level tasks for the ATP. It was his superior SOF Medic training and decision making that got the job done, reduced morbidity and mortality, and saved lives during this action.





## PLEASE NOTE

SOMA members receive the JSOM as part of their membership. If you are a SOMA member and are not receiving the JSOM, please contact SOMA directly through <http://www.trueresearch.org/soma/> or contact Jean Bordas at [j.bordas@trueresearch.org](mailto:j.bordas@trueresearch.org). SOMA provides a very valuable means of obtaining SOF related CME, as well as an annual gathering of SOF medical folks to share current issues.

## CORRECTIONS

Correction to a typo in the Winter 08 edition of "Diagnosis This..." on page 127. It should read "Diagnose This..." Also the author title has the last name first, it should read Chetan Kharod, MD, MPH

### France, Britain honor U.S. woman who spied on Nazis (Spring Cover photo)

Wednesday, December 13 2006 11:29 (IST)

Article acquired 24 January 2008 from <http://news.oneindia.in/2006/12/13/france-britain-honor-us-woman-who-spied-on-nazis-1166004740.html>

David Alexander

WASHINGTON, Dec 13 (Reuters) Britain and France paid tribute to one of the greatest spies of the Second World War, a little-known Baltimore woman who organized resistance and sabotage behind Nazi lines despite a prewar hunting mishap that left her with only one leg.

The tribute organized yesterday, for Virginia Hall, who died in 1982 at age 76, was organized by the French and British ambassadors after officials discovered she had never received a royal warrant meant to accompany the medal King George VI gave her in 1943 when he made her a member of the Order of the British Empire.

“Virginia Hall is a true hero of the French Resistance,” French President Jacques Chirac said in a statement read at a ceremony at the French ambassador’s residence.

Lorna Catling, who received the royal certificate from British Ambassador David Manning on behalf of Hall’s family, said, “I am so glad that my aunt has finally ... become public.

She did so many wonderful things that she deserves to be known. And I am glad it has happened.” Hall was fluent in French, Italian, and German and as a young woman wanted a career in the U.S. Foreign Service. While working as a clerk at the American Embassy in Warsaw, she lost her left leg in a hunting accident.

The Foreign Service would not take her because of her disability. Undeterred and with the Second World War looming, she joined the French army and worked as an ambulance driver.

After the defeat of the French forces, she went to Britain, where she joined the British Special Operations Executive, which taught her spycraft and sent her to Vichy France to establish a network to support the French Underground, Manning said.

Posing as an American newspaper reporter named Brigitte Le Contre, Hall worked for 15 months in Vichy, helping to coordinate the activities of the underground and aiding escaped prisoners of war.

“From my point of view and that of many of my colleagues, Virginia Hall can be considered the greatest wartime agent,” Chirac’s statement quoted one of her fellow agents as saying.

Sought by the Gestapo, she escaped through Spain and returned to Britain, where she joined the U.S. Office of Strategic Services, the predecessor to the Central Intelligence Agency, Manning said.

Hall returned to occupied France in 1944 and began to organize sabotage and guerrilla missions in support of the Allied invasion of Normandy. She pretended to be a milkmaid during the day, mapped drop zones, located safe houses, and trained resistance fighters in sabotage and guerrilla warfare.

Hall, who later worked for the CIA, received the U.S. Distinguished Service Cross in 1945 for her wartime service, the only female civilian to receive the honor.

The discovery that Hall had never received the royal warrant to accompany her MBE came during background research for an oil painting of Hall. The painting is ultimately meant to hang in the CIA’s museum, artist Jeff Bass said.

## Downloadable AFMIC Medic CD Now Available on the AFMIC Website

As many of you might already know from the beta testing process (Thank you!) and as advertised at the recent Navy and Marine Corps Public Health Center Conference, the Armed Forces Medical Intelligence Center (AFMIC) Medical Environmental Disease Intelligence and Countermeasures (MEDIC) CD will no longer be mass produced and distributed by AFMIC.

Instead, we have shifted to a much improved, downloadable version of the MEDIC CD which is currently available on our unclassified website at:

<https://afmicuweb.afmic.detrick.army.mil/index.php> <<https://afmicuweb.afmic.detrick.army.mil/index.php>> .

The intent of this new downloadable product is to allow our customers to be able to download a more up-to-date and tailorable product to fit their particular needs. It will also allow you to download new intelligence product updates to your MEDIC CD on a monthly basis, thus giving you access to much more current information than did the original annual MEDIC CD.

We also realize that there will be isolated cases whereby units may be unable to download this information, mainly due to connectivity limitations. In this case, we would request that units first check with their next echelon of command and request that this product be downloaded/distributed from there. If not, AFMIC can assist in providing a small number of CDs via regular mail.

We at AFMIC appreciate the opportunity to provide this world class product in support of our most valued customer the operational forces. Please contact our AFMIC Operations department if you ascertain that you will be in need of hard copy CDs by email at [afmicops@afmic.detrick.army.mil](mailto:afmicops@afmic.detrick.army.mil) or by phone at commercial (301) 619-7574, DSN 343-7574.

CDR Todd L. Wagner, MC, USN  
Armed Forces Medical Intelligence Center  
Phone (301) 619-8876 DSN 343-8876 Secure 981-4438  
[diwagtl@dia.ic.gov](mailto:diwagtl@dia.ic.gov) (JWICS)  
[diwagtl@afmic.dia.smil.mil](mailto:diwagtl@afmic.dia.smil.mil) (SIPR)  
[twagner@afmic.detrick.army.mil](mailto:twagner@afmic.detrick.army.mil) (NIPR)

## Degree plan for 18D Soldiers announced

*Previously Published in Special Warfare July – August 2007; Vol 20, Issue 4*

A new distance-learning program that will allow Special Forces medical sergeants to earn a college degree has been added to the Army Career Degree Program, or ACDP.

The degree, a bachelor of science in emergency medical care, is offered by North Carolina's Western Carolina University. The new program is accredited by the Committee on Accreditation of Education Programs for the EMS Professions and, like all Western Carolina's programs, by the Commission on Colleges of the Southern Association of Colleges and Schools.

The new degree program is designed to allow students to work as paramedics and enhance their leadership skills while employed in the healthcare field. Students must complete one of two concentrations: science or health-services management. The science concentration is for students seeking to complete medical or graduate school. The health-services management concentration is

designed for those seeking careers in health-care administration. The amount of credit Western Carolina University will award Soldiers toward degree requirements varies, depending on their training and experience.

The ACDP, a specialized Army education initiative in the Servicemembers Opportunity Colleges Army Degree program, or SOCAD, provides options for Soldiers to obtain college degrees that are directly related to their military occupational specialties. Reviewing the degree plan — along with a visit to the local Army Education Center — should be a Soldier's first step in deciding whether ACDP is the right program. Interested Soldiers can review the MOS 18D ACDP plan online at: <http://www.soc.aascu.org/socad/18D.html>. The site also provides information about other MOS-related ACDP plans, as well as tuition information.

For more information about the SOCAD ACDP, send an e-mail to: [socad@aascu.org](mailto:socad@aascu.org), or call 1-800-368-5622.

## E-mail Connects Doctors in Iraq with Experts in U.S.

Jerry Harben, Editor, The Mercury

*Previously published in the January 2008 Mercury, an Army Medical Department publication.*

*Republished with permission.*

Space-age technology makes it possible for Army healthcare providers deployed overseas to have access to the technical knowledge of medical specialists within a few hours. E-mail teleconsultations make the best treatment available while avoiding unnecessary evacuations of patients for specialty care.

"The program gives deployed physicians a user-friendly reachback capability when communications systems are not robust and/or bandwidth is limited," said COL Ronald Poropatich, deputy director of the Telemedicine and Advanced Technology Research Center and medical informatics consultant to The Surgeon General. "An e-mail with JPEG image attachments works well for teleconsultations. Digital cameras are common in theater."

"The simplicity of use and minimal training needs has resulted in a self-sustaining program. Deployed physicians are able to make informed decisions to either care for the patients at their facilities or evacuate for more definitive care," he added.

### SAFER THAN TRAVEL

"It provides a rapid response when it will be safe for the patient. To transport a patient when there might be an (improvised explosive device) by the road could be dan-

gerous," said Chuck Lappan, project manager for the OTSG Teleconsultation Program. Lappan also manages the teledermatology program for the Great Plains Regional Medical Command.

Providers needing a consultation can submit the e-mail to an AKO address for the specialty group, or to [chuck.lappan@us.army.mil](mailto:chuck.lappan@us.army.mil) for a specialty with no organized group.

Contact groups are organized for burn trauma, cardiology, dermatology, ophthalmology, infectious diseases, internal medicine, nephrology, neurology, orthopedics and podiatry, pediatrics intensive care, preventive medicine, rheumatology, toxicology, and urology. Specialty medical consultants supervise their respective teleconsultation service and ensure scheduling and availability of medical staff.

Consultations are available at any hour and any day. Lappan said he received an e-mail from a consultant on call on Thanksgiving Day, concerned the system might not be working because he had not received any consult requests over the holiday.

Most consult requests are answered within five hours. Lappan advises providers to be sure to notify their information management support to disable their home-

base Outlook e-mail account (amedd.army.mil) when they deploy, and to turn off the AKO automatic forwarding of e-mail. Otherwise, the consult may be routed unseen to the provider's home account at a MEDDAC or MEDCEN.

"I am usually able to get through, but it takes a lot more work to ensure we support the provider in the way they deserve. I really can't fault the deployed provider. When you receive a deployment order the last thing on your mind is adjusting your e-mail account," he said.

Another problem Lappan sees is too-large e-mail files. He said three to five photos are sufficient with patient history and exam information, and high-resolution images are not necessary.

Messages must not contain any patient identifying information to maintain privacy.

#### **PROVIDING INFORMATION**

Lappan briefs classes at the AMEDD Center and School about the program. He also has available pocket-sized cards explaining the procedures.

AMEDD telemedicine began in 1992 with deployed reachback teleconsultation from Somalia. The AKO teleconsultation program was established in 2004. Since then the system has received more than 3,000 consult requests from more than 900 health-care professionals.

More than 100 patients were evacuated on advice of the consultants, while more than 50 evacuations have been avoided.

Besides Iraq and Afghanistan, consult requests have been received from Belize, Bosnia, Chad, Diego Garcia, Djibouti, Ecuador, Egypt, Honduras, Kenya, Kuwait, Kyrgyzstan, Nepal, Okinawa, Pakistan, the Philippines, Qatar, Turkey, the United Arab Emirates, and Navy ships at sea.

The service is available to deployed providers of all military services for any patients they treat. It can be used for humanitarian or civil-affairs missions as well as combat support.

"Even though it is an Army system, only about 55 percent of the patients are Army," said Poropatich.

The program is not open to hospitals in the U.S. or fixed facilities in Europe. However, regional medical commands operate teleconsultation programs in dermatology and cardiac echocardiography (Brooke Army Medical Center), radiology (Landstuhl RMC), pediatrics and intensive care (Tripler AMC), and psychiatry and neurosurgery (Walter Reed AMC).

"I must commend the selfless service of the consultants who support this effort. They are doing this on love time - literally answering the mail on off-duty time. They have made this program self-sustaining with nearly zero funding. This kind of selfless service is what makes this a special program," said Poropatich.

## **Summary for the teleconsultation program for January 2008**

Chuck Lappan, Project Manager, OTSG Telemedicine Teleconsultation Programs Project Manager

Three specialties had record months: Neurology, Orthopedics, and Urology. The consults to dermatology are slowly decreasing. I am wondering if that is due to the number of deployed dermatologists as general medical officers? OB-GYN and Gastroenterology continue to lead as the most requested "other specialties."

My problem in making the summary was selecting the Case Studies for this file. We had a number of good candidates. The ones I chose had the most interesting eye-candy appeal.

I keep a lot more data than is highlighted in this summary. I can make this information available to you on short demand or do some data mining if you have a project and want to use this information.

The Mercury published an excellent article on our program in the January issue on Page 7. If you have

not seen it at your facility, you can read it following the presentation slides, or look at it online at this address: <http://www.armymedicine.army.mil/news/mercury/08-01/e-mail.cfm>.

The "Wall Hanging" slides on this page are a short presentation that was designed to hang on a clinic wall as a quick reference. Following the slides are a separate briefing that was prepared for a groups deploying.

Chuck Lappan  
Project Manager, OTSG Telemedicine Teleconsultation Programs Project Manager, Telehealth Great Plains Regional Medical Command Fort Sam Houston, TX  
(210) 295-2512  
chuck.lappan@us.army.mil



## Teleconsultation Program

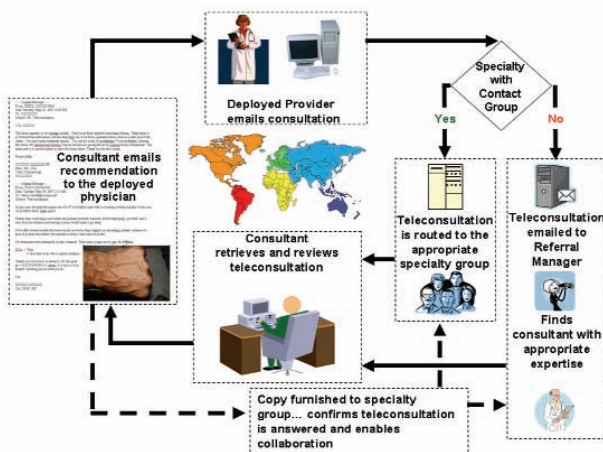
- Available to all deployed providers and to Independent Duty Medical Technicians working under the authority of a provider
- Consultations are answered 7 days a week
- Recommendations submitted within 24 hours
- Uses Army portal with participation by all branches of the military
- Consultants are from all branches of the military (Army, Navy, Air Force)
- POC is LTC (Retired) Chuck Lappan  
[chuck.lappan@us.army.mil](mailto:chuck.lappan@us.army.mil) (210) 295-2512 (San Antonio, Texas)  
 (Monitors email every day of the week)

## Teleconsultation Groups

Specialties organized into email groups – send teleconsult to appropriate email

- [burntrauma.consult@us.army.mil](mailto:burntrauma.consult@us.army.mil) (Burn-trauma)
  - [cards.consult@us.army.mil](mailto:cards.consult@us.army.mil) (Cardiology)
  - [derm.consult@us.army.mil](mailto:derm.consult@us.army.mil) (Dermatology)
  - [eye.consult@us.army.mil](mailto:eye.consult@us.army.mil) (Ophthalmology)
  - [id.consult@us.army.mil](mailto:id.consult@us.army.mil) (Infectious Diseases)
  - [im.consult@us.army.mil](mailto:im.consult@us.army.mil) (Internal Medicine)
  - [nephrology.consult@us.army.mil](mailto:nephrology.consult@us.army.mil) (Nephrology)
  - [neuron.consult@us.army.mil](mailto:neuron.consult@us.army.mil) (Neurology)
  - [ortho.consult@us.army.mil](mailto:ortho.consult@us.army.mil) (Orthopedics and Podiatry)
  - [tbi.consult@us.army.mil](mailto:tbi.consult@us.army.mil) (Traumatic Brain Injury) (under development)
  - [picu.consult@us.army.mil](mailto:picu.consult@us.army.mil) (Pediatrics Intensive Care)
  - [pmom.consult@us.army.mil](mailto:pmom.consult@us.army.mil) (Preventive Medicine)
  - [rheum.consult@us.army.mil](mailto:rheum.consult@us.army.mil) (Rheumatology)
  - [toxicology.consult@us.army.mil](mailto:toxicology.consult@us.army.mil) (Toxicology)
  - [urology.consult@us.army.mil](mailto:urology.consult@us.army.mil) (Urology)
- > Other specialties “as requested” – send teleconsultation to [chuck.lappan@us.army.mil](mailto:chuck.lappan@us.army.mil)
- Allergy
  - Endocrinology
  - EENT
  - Flight Medicine
  - Gastroenterology
  - General Surgery
  - Hematology
  - Legal
  - Neurosurgery
  - Nutrition
  - OB-GYN
  - Oncology
  - Oral Pathology
  - Pharmacy
  - Plastic Surgery
  - Pulmonary Diseases
  - Psychiatry
  - Radiology
  - Speech Pathology
  - Vascular Surgery

## Business Practice



## How To Send A Consult

- Patient History
  - > When did it start? Days? Weeks? Months? Years?
  - > Patient symptoms now?
  - > Chronicity: Getting better? Worse? Staying the same? Spreading?
  - > What was used to previously treat the patient?
  - > Effectiveness of previous treatments?
  - > Laboratory and Test results if any?
  - > Your Diagnosis and/or Differential Diagnosis
  - > Limitations you have in treating the patient such as medications, procedures, lab tests?
- Include Patient Demographics: branch of service, age, and gender. If not U.S. military state their nationality. Identify if contractor, detainee, foreign military, etc
- Include digital images if appropriate
  - > Use the jpeg format for images
  - > Check images before transmitting to ensure they are in focus and accurately portray the problem as you see it
  - > Usually 3 to 5 images is all we need
  - > When in doubt, overload us with images
- Other attachments:
  - > PDFs of EKGs
  - > JPEGs of radiographs
  - > Copies of laboratory and pathology reports
- Do not include any patient identifying information
  - > Do not include the patient's name or SSN
- Try to limit one patient per teleconsultation

## How To Send A Consult

- If you send a consult and later need additional assistance send the teleconsultation to the generic email address of the specialty and not to the consultant who answered your consult
  - > Most consultants are on a call-roster and look for consults during the period they are on-call
  - > Most delete the consult after they have answered it
  - > Project Manager makes an MSWord file for each consult
  - > When a reconsult is sent, the Project Manager transmits the file to the on-call consultant

- Do not include "archive" attachments
  - > Certain file types such files are automatically blocked

"The sender of the message sent the following files that are not allowed by NETCOM guidance 2004-11A:

OnyxLite.exe

In accordance with NETCOM guidance 2004-11A, AKO has begun stripping files with the following extensions:

.ace, .ad, .ade, .adp, .asp, .b64, .bas, .bat, .bhx, .ceo, .ce0, .chm, .cpt, .crt, .dbx, .dll, .dot, .eml, .exe, .flp, .hpx, .hta, .inf, .ins, .js, .jse, .lnk, .mdb, .mde, .mim, .msi, .msp, .nch, .ocx, .pi, .plf, .rar, .scr, .sct, .shb, .shs, .upx, .uue, .uu, .vbe, .vbs, .vss, .vst, .vsw, .wml, .ws, .wsc, .wst, .wsh, .xxe, and .zip.

Since this is an Army policy, AKO will not be able to grant exceptions.

You may view the NETCOM guidance at <https://www.us.army.mil/suite/doc/190255>

The guidance includes instructions on how the sender should send the files that are restricted."

# OTSG Telemedicine

## ".consult" Teleconsultation Program

January 2008

### Summary

#### Program Summary

- > 15 specialties with contact groups: [xxx.consult@us.army.mil](mailto:xxx.consult@us.army.mil)
- > 3,388 teleconsultations (Apr 04 to Jan 08 – 46 months)
- > 61 known evacuations prevented
- > 116 known evacuations facilitated following consultant's recommendation
- > 1,016 different referring health care professionals
- > 469 teleconsultations on non-US patients
- > Average Reply Time 5 hr 11 min

Country	Count	Country	Count
Alghanitan Army	1	Iraqi Civilian	1/2
Alghanitan Detainee	1	Iraqi Air Force	1
Alghanitan Non-Combatant	30	Iraqi Army	26
Australian Army	1	Iraqi Detainee	43
Austrian Navy	2	Iraqi Navy	1
Bosnian Child	1	Jordanian Soldier	1
Bosnian Officer	1	Kenya Child	1
Bosnian Contractor	1	Korean Army	3
British Contractor	1	Kyrgyzstan Contractor	1
British Soldier	1	Malaysian Contractor	1
British Air Force	1	New Zealand Contractor	1
Bulgarian Army	2	Pakistan	30
Canadian Soldier	1	Philippine Contractor	1
Columbian Army	2	Poland Army	1
Congo Child	1	Romanian Contractor	1
Djibouti Child	1	Russian AFES Contractor	1
Dutch Army	2	Saudi Detainee	1
Egypt Contractor	1	Scottish Civilian	1
German Child (in Turkey)	1	US Asian (not specified)	1
Hungarian Contractor	1	South Africa Contractor	2
Hungarian Army Police	13	Sri Lanka Contractor	2
India Army Police	1	Turkey Contractor	2
Indo Contractor	10	Urduan Army	40
Italy			

Year	Reply Time
2004	5 hr 9 min
2005	5 hr 16 min
2006	5 hr 12 min
2007	5 hr 56 min
2008	4 hr 45 min
<b>Program</b>	<b>5 hr 11 min</b>

### Program Summary By Specialty (organized into formal teleconsultation groups)

Specialty	2004					2005					2006					2007					2008					Program Totals	Consults Program	%
	Totals	Totals	Totals	Totals	Totals	Oct	Nov	Dec	Jan	YTD	Oct	Nov	Dec	Jan	YTD	Oct	Nov	Dec	Jan	YTD	Oct	Nov	Dec	Jan	YTD			
Burn-Trauma		23	24	19		2	6		2	10	76					2	6		2	10	76					76	2%	
Cardiology		2	67	41		2	5	1	3	11	121					2	5	1	3	11	121					121	4%	
Dermatology	321	543	528	487		29	42	41	40	151	2,010					29	42	41	40	151	2,010					2,010	59%	
Infectious Diseases		82	110	106		7	6	8	2	23	319					7	6	8	2	23	319					319	9%	
Internal Medicine				34		4	2	1	4	11	45					4	2	1	4	11	45					45	1%	
Nephrology		13	18	33		1	1	4		6	70					1	1	4		6	70					70	2%	
Neurology				79		4	8	12	13	37	115					4	8	12	13	37	115					115	3.4%	
Ophthalmology	10	51	38	54		2	4	4	5	15	168					2	4	4	5	15	168					168	5%	
Orthopedics				11		3	8	5	11	27	38					3	8	5	11	27	38					38	1.1%	
Pediatrics		8	21	27		1	3	2	1	7	63					1	3	2	1	7	63					63	2%	
Privt Med			3	13		1	1	2		4	20					1	1	2		4	20					20	0.6%	
Rehabilitation				1						1	0.0%									1	0.0%					1	0.0%	
Rheumatology			13	25				1		2	42							1		2	42					42	1.2%	
Toxicology		2	19	15		2		1		3	39					2		1		3	39					39	1.2%	
Urology				6		4	2	5	7	18	24					4	2	5	7	18	24					24	0.7%	
Other Specialties		7	61	123		8	9	16	13	46	237					8	9	16	13	46	237					237	7%	
<b>Totals</b>	<b>331</b>	<b>731</b>	<b>903</b>	<b>1,053</b>		<b>69</b>	<b>98</b>	<b>100</b>	<b>103</b>	<b>370</b>	<b>3,388</b>									<b>3,388</b>								

59% Dermatology  
9% Infectious Diseases  
7% Other Specialties

### Program Summary By Specialty (not organized into formal groups)

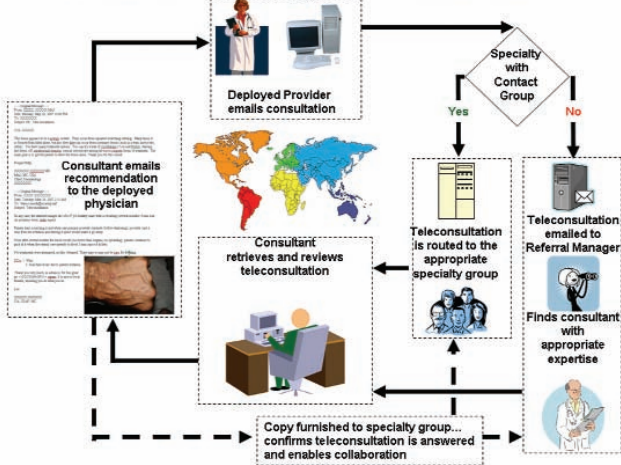
Specialty	2005					2006					2007					2008					Program Totals	Consults Program	%				
	Totals	Totals	Totals	Totals	Totals	Oct	Nov	Dec	Jan	YTD	Oct	Nov	Dec	Jan	YTD	Oct	Nov	Dec	Jan	YTD							
Allergy						1	1	2													4					4	2%
Endocrinology						1	4	12	1	1	2	1	5			1	4	12	1	1	2	1	5			22	9%
Flight Medicine											1										1					1	0.4%
Gastroenterology											2	13	2	4	3	9					2	13	2	4	3	24	10%
General Surgery											2					2					2					2	1%
Hematology											4					4					4					4	2%
Judge Advocate General											2					2					2					2	1%
Line of Duty																1					1					1	0.4%
Neurology						1	10	1								1	10	1			12					12	5%
Neurosurgery						4	5									1	1				5					5	4%
Nutrition											1					1					1					1	0.4%
OB-GYN											2	14	2	1	4	4	11				2	14	2	1	4	27	11%
Oncology											3					3					3					3	1%
Oral Pathology						1	2	4	1	1	1	3				1	2	4	1	1	3					10	4%
Orthopedics											15	12				15	12				27					27	11%
Otolaryngology						2	16	2	2	2	2	8				2	16	2	2	2	26					26	11%
Pharmacy											2					2					2					2	1%
Plastic Surgery						1	1									1	1				2					2	1%
Pulmonary Diseases						1	1	4		1	1	2				1	1	4		1	2					8	3%
Preventive Medicine						1	1									1	1				2					2	1%
Psychiatry											1					1					1					1	2%
Radiology						2	3	1	2	1	4	9				2	3	1	2	1	4					9	4%
Traumatic Brain Injury											2					2					2					2	1%
Speech Pathology											1					1					1					1	0.4%
Urology											10	17				10	17				27					27	11%
Vascular Surgery						1	3									1	3				4					4	2%
15-6 Investigation											1					1					1					1	0.4%
<b>Total</b>	<b>6</b>	<b>59</b>	<b>126</b>	<b>8</b>	<b>9</b>	<b>16</b>	<b>13</b>	<b>46</b>	<b>237</b>											<b>237</b>							

Includes consultations before a formal teleconsultation group was established  
Most commonly requested specialties not organized into a formal call team

### Program Summary by Location

Location	2004					2005					2006					2007					2008					Program Totals	Consults Program	%
	Totals	Totals	Totals	Totals	Totals	Oct	Nov	Dec	Jan	YTD	Oct	Nov	Dec	Jan	YTD	Oct	Nov	Dec	Jan	YTD	Oct	Nov	Dec	Jan	YTD			
<b>Major Facilities &gt;50 Consults</b>	<b>111</b>	<b>306</b>	<b>427</b>	<b>531</b>	<b>13</b>	<b>18</b>	<b>171</b>	<b>86</b>	<b>462</b>	<b>174</b>										<b>1,199</b>								
Alghanistan	35	29	31	2					64	2%																		
Bosnia	0	20	17	19	5	3	7	12	66	2%																		
Colombia	1	29	16	11					60	1%																		
France (MFO)	197	477	670	764	49	71	63	66	248	86%																		
Germany	54	50	33	20	2	1	2	4	114	3%																		
Italy	2	27	37	32	1	1	9	8	117	3%																		
Kenya	10	4	28	22	2	1		3	73	2%																		
<b>Minor Facilities &lt;50 Consults</b>	<b>30</b>	<b>27</b>	<b>71</b>	<b>50</b>	<b>2</b>	<b>5</b>	<b>3</b>	<b>34</b>	<b>304</b>	<b>9.0%</b>																		
Bahia	0	0	0	2					2	0.1%																		
Chad	0	1	0	1					2	0.1%																		
Congo	0	0	0	0					4	0.1%																		
Cuba (PMAO)	0	0	1	0					1	0.0%																		

## Teleconsultation Program Business Practice



## Locations Submitting Teleconsultations



http://www.cia.gov/cia/publications/factbook/reference\_maps/pdf/time\_zones.pdf Map as of 1 February 2008

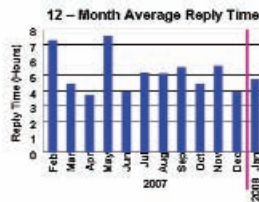
Supported Facility	Supported Facility	Supported Facility	Supported Facility	Supported Facility
Afghanistan	Djibouti	Iraq	Nepal	United Arab Emirates
Belize	Ecuador	Italy - Sicily	Okinawa	US & Australian Navy afloat
Bosnia	Egypt - MFO Sinai	Kenya	Pakistan	
Congo	Honduras	Kuwait	Philippines	
Chad	Germany	Kyrgyzstan	Qatar	
Continental US	Hurricane Katrina	Morocco	Turkey	

## January Summary

### Summary

- > 103 teleconsultations
- > 1 evacuation prevented
- > 6 evacuations following consultants recommendation
- > 15 non-US patient teleconsultations
- > 13 consults "Other Specialties"
- > Neurology, Orthopedics, and Urology had their best month since entering the program
- > Average Reply Time: 4 hr 45 min

Specialty	Nationality	# of Consults
Burn-Trauma	Iraqi Child	1
Dermatology	Afghanistan Army	1
Dermatology	Afghanistan Child	2
Dermatology	Iraqi Child	2
Dermatology	Iraqi National	2
Dermatology	Turkey National	1
Gastroenterology	Afghanistan National	1
Infectious Diseases	Afghanistan Child	1
Neurology	Afghanistan National	1
Ophthalmology	Iraqi National	1
Orthopedics	Iraqi Child	1
Pediatrics	Iraqi Child	1
<b>Total</b>		<b>10</b>



## January Summary

### 90 consultations for on-going programs

- > Burn-Trauma: 2
- > Cardiology: 3
- > Dermatology: 40
- > Infectious Diseases: 2
- > Internal Medicine: 4
- > Nephrology: 0
- > Neurology: 13
- > Ophthalmology: 5
- > Orthopedics: 11
- > Pediatrics: 1
- > Preventive Med: 0
- > Rheumatology: 2
- > Toxicology: 0
- > Urology: 7

### 13 consultations answered by Other Specialties:

- > Endocrinology: 1
- > Gastroenterology: 3
- > OB-GYN: 4
- > Oral Pathology: 1
- > Otolaryngology: 2
- > Pharmacy: 1
- > Radiology: 1

## January Summary Evacuations

### Evacuations facilitated

Specialty	Location	Patient Branch	Providers Diagnosis	Consultants Diagnosis	Outcome
Endocrinology	Iraq	Marine Corps	Diabetes onset	Diabetes onset	Can remain in theater but Cdt decided to evacuate based on comments of consultant
Gastroenterology	Iraq	Army	Bloody diarrhea	Ulcerative colitis	Evacuate to Germany for treatment
Neurology	Afghanistan	Army	TBI	TBI	Evacuate for treatment
Orthopedics	Iraq	Army	Muscle Tear while lifting weights	Muscle Tear	Evacuate to CORUS for treatment
Orthopedics	United Arab Emirates	Air Force	Ankle fracture after motor vehicle accident	Medial malleolus fracture	Evacuate for tx
Rheumatology	Iraq	Army	Polyarticular hand pain	Arthritis	Evacuate to Germany for Tx

### Evacuation Prevented

Specialty	Location	Patient Branch	Providers Diagnosis	Consultants Diagnosis	Outcome
Gastroenterology	Iraq	Army	Early Diabetes	Early Diabetes	Manage in country. Evacuation not required.

## January Summary Collaborations

Primary Specialty	Collaborating Specialty	Location	Patient Branch	Providers Diagnosis
Dermatology	Orthopedics	Iraq	Iraqi Child	Maffucci's Syndrome
Neurology	Ophthalmology	Qatar	Air Force	Transient monocular vision loss

## Other Specialties

Specialty	Location	Patient Branch	Diagnosis
Endocrinology	Iraq	Marine Corps	Early Diabetes ... Pt evacuated
Gastroenterology	Iraq	Army	Chronic pancreatic Ulcerative colitis ... Evacuated in Germany
OB-GYN	Afghanistan	Afghanistan National	Intermittent colitis
	Iraq	Army	Methylenetetrahydrofolate reductase gene disorder
OB-GYN	Iraq	Marine Corps	Intrauterine bleeding Cervical dysplasia
	Iraq	Marine Corps	Very heavy menstrual bleeding
Oral Pathology	Iraq	Marine Corps	Oral Lesions
Otolaryngology	Iraq	Army	Severe Allergy Problems
Pharmacy	Iraq	Marine Corps	Ear Pain
	Iraq	Army	Out-dated medications
Radiology	Iraq	Air Force	Gynecomastia

## January Case Studies Burn – Trauma



### Referring Physician's Narration

Can anyone provide some information on the best way to practice nerve sheath block medicine on this 8 yo girl with a 3rd degree burn to her leg. She was on a radiant heater (pillow) when someone threw kerosene on her and it ignited. I don't know much more than that. She was seen injured by California Fire, and the family is afraid to take anything. Assuming that we have fairly good vitals suggests for treatment...any recommendations on treatment in the field that we would then discuss and conclusions in this young patient. Any help on how to debride, prevent contractures, etc.

### 1<sup>st</sup> Burn-Trauma Consultant's Recommendation

I would recommend you contact your nearest surgical facility and ask them to accept her for surgical debridement. That is a fairly good idea and can be achieved beyond the level of resources in the area.

### 2<sup>nd</sup> Burn-Trauma Consultant's Recommendation

The degree of burn is difficult to determine from the photos. I would recommend you contact your nearest surgical facility and ask them to accept her for surgical debridement. That is a fairly good idea and can be achieved beyond the level of resources in the area.

### 3<sup>rd</sup> Burn-Trauma Consultant's Recommendation

The child is in need of surgical debridement and grafting. I would recommend you contact your nearest surgical facility and ask them to accept her for surgical debridement. That is a fairly good idea and can be achieved beyond the level of resources in the area.

### Referring Physician Follow Up

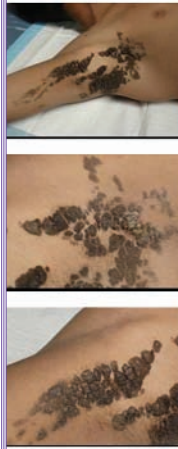
Revisits that the patient would be back at all these facilities and not provide the knowledge of the amount necessary. I suggest you call the nearest surgical facility and ask them to accept her for surgical debridement. That is a fairly good idea and can be achieved beyond the level of resources in the area.

### Referring Physician Outcome

I would like to thank you for your interest and advice regarding my young patient burn victim. The patient was taken to the hospital and the surgery was performed on the leg through the process the night before the surgery. I am deeply indebted to you for your help. I have not heard from you since the surgery. I would like to thank you for your interest and advice regarding my young patient burn victim.

## January Case Studies Dermatology

### Images



### Referring Physician Narration

10 year old local national boy with extensive scaling lesion to right axilla. Parents reports that affected area was initially erythemic at birth, then progressed to current appearance by age 7 months. Patient reports that this raised lesion causes constant irritation to his axilla.

### Dermatologist's Recommendation / Dx

This looks like a linear verrucous epidermal nevus. It is a benign lesion, although rare cases of malignancies developing within it have been reported. 5-FU (Efudex) cream has been reported to help to flatten it, although personally I've been underwhelmed by its efficacy. Other options would include cryosurgery and CO2 laser. I would be hesitant to recommend surgical excision due to the anatomic location. Since it is benign, how aggressively you treat it would depend on how severe the symptoms are.

## January Case Studies Ophthalmology

No Images Initial Consult

### Referring Physician's Narration

The pt is a 24 yo african american male who presented about a week ago with complaints of redness of the eye and redness and general discomfort but no photophobia. He had reported that in the past he had had similar problems and was told it was from the start of the workweek he worked in. An exam showed some redness of the conjunctiva and sclera inferior and later on to the pupil but did not extend past the midline, nor onto the iris, nor were any lesions present. Fluorescein stain did not show any corneal defects. He was started on Cipro eye drops for conjunctivitis. A recheck 2 days later showed decreased redness and irritation. He was released to his work or sooner. He came in 3 days later with increased redness, irritation, and now some photophobia. He was switched to Tobradex drops and will be following up in 24 hours. Do you have any other words of counsel on this case?

### 1<sup>st</sup> Ophthalmologist's Recommendation / Dx

Could be conjunctivitis... The pt noticed a vision change as the affected eye and when he got the visual acuity in each eye? They contact lens wear or trauma? His glasses? When the pt returned with increased redness and photophobia did the fluorescein stain show any corneal defects? Any clues to epithelium and/or sclera?

If the cornea had any defects on staining, I'd avoid Tobradex due to the steroids. The cipro would be the best (Vigamox or Zymar if available) even better. Augmenting with an antiviral (Acyclovir or Zovirax) will provide additional protection. If the cornea is clear and the concern is for an infectious etiology due to the photophobia, that will be difficult to determine without a slit lamp. However I would be difficult to tie the history together with results on the etiology.

### 2<sup>nd</sup> Ophthalmologist's Recommendation / Dx

I would be most concerned for keratitis in this gentleman, hard to do the corneal condition without a slitlamp exam. We started in the fluorescein stain would certainly make him better.

Continued on Next Page  
Page 1 of 2 Pages

### Image – 2 Days Later



### Referring Physicians FU

There's the update on this case. He is improving on the Tobradex. One of the other providers saw him at his follow up on Sunday (I didn't come in on my shift as instructed). These informed all my providers here and they will be looking for him when he comes in. We do have a slit lamp (although not a nice one, kind of an older one, but we'll still look). He did not have any visual changes and is not a contact lens wearer. He had no trauma and no dryness. We're limited on the eye but we have (only) Cipro, Gelo, and (regular) eye. Is there anything on the slitlamp that would suggest a diagnosis for keratitis? I've included the only photo I was able to get. He would blink so much from the flash, I wasn't able to get anything better. If I can, will certainly send it in on my next. Again, we appreciate you help on this matter. Will keep in touch on this matter. Thank!

### 2<sup>nd</sup> Ophthalmologist's FU

doesn't look classic for the peritibial flash that you get a keratitis, as opposed possibly to a vesicular keratitis. back in my day we used to get that but we don't think that's what the realer really was. But even did they get better, so doesn't surprise me that it's a bit better on the side. Still, I wouldn't put the steroids on a keratitis.

For contact lens, you'd be looking for white blood cells floating in the anterior chamber, you've gotta know what you're looking for, as they can be hard to see unless it's 4+. no offense meant, but notice it users tend to focus on the iris. Good advice to put into focus, but that's not where the action is. It's a thin area anterior to that, between the back of the cornea and the iris. you need relatively good optics (they can be old, but they're in focus) and good illumination - and a good idea of how to focus in the middle of the eye. (hint: that the beam should be a thin slit focus on the cornea, the slit beam should be in focus as it "cuts" through the cornea, then focus on the iris detail - then pull back but stay back to the cornea - both the cornea and iris should be slightly out of focus, then slide the light vertically to a relatively small spot. light on on high, what you're looking for is the equivalent of dust specks floating in a shaft of light, they will have motion and coherency. it's sometimes easier to see if you cut the slit beam from the side, into the pupil and look for the cell against the darkness of the pupil.)

## January Case Studies Ophthalmology

### Referring Physician's 2<sup>nd</sup> Images



### Referring Physician's 2<sup>nd</sup> FU

Saw my patient today. His eye is doing much better on the Tobradex. I performed a slit lamp exam (see photo of the painful thing I had to use) and the cornea looked great. No discharge. The fix was interesting in that it had the appearance of having little globes of gelatin on it. I didn't see any fluorescein in the anterior chamber. I've included all of the photos I took, some of them are washed out as well as you have, not in pieces the thing together (I always have to think back on it).

### 2<sup>nd</sup> Ophthalmologist 2<sup>nd</sup> FU

your eye is probably handled (like in telling you something you don't already know, and it's hard at best with that model, still, it's a zee, with zee optics, so once you get the hang of it, it works pretty well in a pinch, and is infinitely better than nothing. I've never used any of the photos I took, some of them are washed out as well as you have, not in pieces the thing together (I always have to think back on it).

an alternative is to just use your clearest optics if you got a well paired battery, a bright light, and clean lenses - you can crank in the high (x) lenses as a cheap magnifying glass, the 20 will give you a pretty high mag, about at a very short focal distance, try it on your own hand...crank up the light and dial in sequentially higher plus lenses, and look at something like your skin sweat glands (finger etc).

you'll see the mag get higher and the focal length get shorter, on the eye, start from far away and sequentially crank in higher plus, but rather than looking for the reflex, you're going to focus on looking at the reflex, you can get pretty close and pretty high mag, not as good as a slit, but it might give you better clarity on the iris detail.

the history of gelatin-like clumps is bothersome, as it would speak to potentially accumulations of inflammatory cells. if the accumulations are on the posterior cornea, we call them keratic precipitates (kps) and it goes along with a granulomatous uveitis (eg, sarcoid). if they are truly on the iris, they could also be granulomas and the nodules, also potentially keratic clumps. given your age, it might be hard to tell exactly where the nodules are. to complicate matters, nodules can occur anteriorly, but you'd expect them bilaterally...so question is what the other eye is looking.

### 1<sup>st</sup> Ophthalmologist' FU

I agree. Nice job on the photos. Had I known I was a handheld I wouldn't have troubled you. That thing is hard enough to use...at most have the four hands. I see that area on the eye are decreasing. On the most recent external photo it looks to be at 5 to 7 o'clock. On the first photo you sent it is present, but I think that to be a reflection artifact. There is another area extending from 3-6 in that original pic. Is that a reflection or is that real?

Continued from previous page  
Page 2 of 2 Pages

## January Case Studies Orthopedics

### Image



### Referring Provider's Narration

I have a 23 yo M who fell down some stairs and fractured his R clavicle. He had difficulty moving it secondary to pain, but had good grip strength. He had 2+ radial pulse but had some decreased sensation to light touch on the medial and lateral aspect of forearm and hand. I have enclosed the shoulder XR for your evaluation. My question is how long should the paralytics last before we become concerned?

### 1<sup>st</sup> Orthopedic Consultant's Recommendation

Initial Response Time: 23 minutes

Neurologic complications after an acute clavicle fractures are rare - especially in one as minimally displaced as this soldier's. but it can happen - I guess I would want a better picture of his neurologic exam - of what peripheral nerve distribution is it? and is it numbness, or paresthesias?

all of these are academic points if he has to come home anyway. from what you sent me - that should not require surgery - but will require a 3 month (approx) period of protection from use of that arm, that usually is not possible in a deployed environment. therefore, you may want to medicate him for convalescence for his fracture healing.

### 2<sup>nd</sup> Orthopedic Consultant's Recommendation

Agree with XXX. Usually you're going to get a vascular injury with a major nerve injury. This is likely due to swelling and hematoma irritating the nerves more than anything. This looks very minimally displaced and should do well without surgery, but depending upon his environment and mission requirements you may want to send the guy out to heal. Tell his unit he'll be out 9-12 weeks.

### Referring Provider's Follow On

Thank you for the quick response. As of right now, we are not going to send him back to the rear. He is a commo guy that works on computers. We have a combined TMC, so we don't always see someone that is in our unit. If the patient does not leave the wire too often and has a MOS in which they aren't usually a trigger puller, we usually don't send them back. I wrote a profile for no OTM/DA for 12 weeks, but if at any time I feel that is going to give the soldier problems, I will have his provider get a release from theater for 12 weeks and send him back. Thanks again for the quick response.

## January Case Studies Rheumatology

### Rheumatologist's Recommendation

Thanks for the pictures and also the radiographs. There are certainly forms of arthritis associated with psoriasis and your patient may be manifesting one of these.

As with rheumatoid arthritis and other forms of inflammatory arthritis, we tend to be more pharmacologically aggressive in management now. The Rheumatoid Factor is probably not helpful, but the acute phase reactants (ESR and CRP) are helpful. Probably an agent that may be effective and still allow for deployment would be methotrexate. Thus I think you should probably send him to Landstuhl for evaluation.

### Referring Providers Follow On

I'll contact the patient and arrange for his travel to Germany for additional evaluation and treatment. I'll keep you posted of my progress in the evacuation process.

### Images



### Referring Providers Narration

This consult is for a patient with chronic hand swelling and pain a six months. 30 y/o white male with non-traumatic swelling and pain to MCP and PIP right middle and ring fingers since Aug 2007. I saw him this week with (new) acute swelling to MCP and PIP left index finger. Pt has a history for psoriasis that is well controlled. Pt is currently taking Naprosyn with some improvement in symptoms. Please find attached bilateral hand x-rays and digital photos. PE shows edematous MCP and PIP with pitting in the adjacent nail. Do you recommend any diagnostic tests? ESR, C-reactive protein, rheumatoid factor? Do you recommend any additional treatment to the NSAIDs?

# Necessity of Medical Personnel on the Advance Party

George Horsley, NREMT-P, APA-C, MPAS; Keith Wilson, RN, MPH

## ABSTRACT

Often when a unit sends an advanced echelon party forward, medical and preventive medicine personnel are not included. Medical planners make plans based upon their best estimates. Any opportunity for the medical personnel to gain ground truth prior to the deployment of the main body is an opportunity that should be taken. This article tries to reinforce this by providing a personal example. It also provides examples of effective preventive measures taken to decrease exposure to the filth fly.

It can't be overstated that whenever possible, site survey teams or advanced echelon (ADVON) parties should include a medical person capable of accessing the environment of quartering areas for potential disease and non-battle injury (DNBI) threats prior to arrival of the main body. This concept is so important that FORSCOM Regulation 700-2 states "All commanders will ensure all field sanitation teams (FST) ... will be actively engaged in all phases of operations." Review of Army Regulation 40-5 Preventive Medicine, and FM 21-10 FIELD HYGIENE AND SANITATION further emphasize this point.

There are many concerns that may not be readily apparent to untrained individuals until there is evidence of disease in a force that is quartering in a medically inhospitable environment. If the mission dictates a less than optimal area be utilized for quartering, then the medical preventive medicine pre-assessment becomes even more critical. This pre-assessment allows medical personnel on the ADVON to collect data and complete the medical and preventive medicine (prevmed) situation report (sitrep), which is sent to the main body. This information allows medical providers and prevmed technicians to be proactive rather than reactive.

In a recent deployment to a friendly Middle Eastern country many DNBI cases were avoided by having the Command physician assistant (PA) on the ADVON. The decision to send the PA was made because of his previous experience as a Special Forces Medic (18D) and without authorized prevmed personnel assigned to the command. The initial site survey by the PA found the intended site was a fixed facility with running water and plumbing in good repair with reasonable cleanliness.

There were no open drainage issues readily noticeable and there was no evidence of large collections of standing water, refuse, or waste products in the surrounding area. However, there was an unnaturally high amount of filth flies in the area where the main body was to be quartered. Although there was no initial evidence to explain the fly situation, it was later surmised that the fixed facility used for quartering was built upon the base's existing leach fields. The time between the deployment of the ADVON and the main body was 24 hours which allowed for the procurement of three commercial fly traps (figure 1).



Figure 1

Within a week of the arrival of the main body it became evident the commercial fly traps were being overwhelmed. Field expedient fly traps were then constructed similar to those presented in Armed Forces Pest Manage-

ment Board Technical Guide Number 30 (figure 2). Of the many types of bait attempted, the milk and sugar combination caught the most flies of the field expedient traps (figure 3). Link up with other Special Operations Forces operating in the area allowed for the procurement of several more commercial fly traps. As demonstrated in the pictures, many flies were trapped by the improvised traps, but their results paled in comparison to the commercial traps.

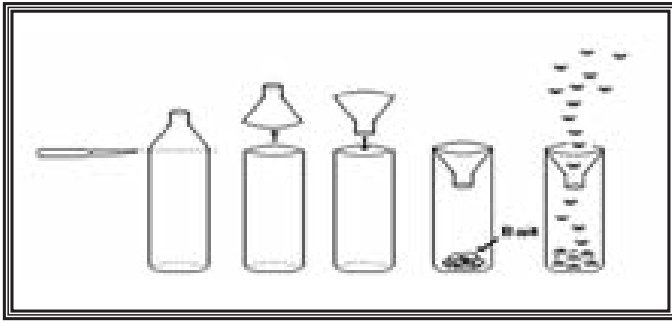


Figure 2 Plastic water bottle fly trap (inverted cone model)



Figure 3

In addition to the employment of fly traps many locally procured rolls of fly paper were employed (figure 4). The fly tapes in the common areas and in areas with openings to the outside were the areas where the greatest concentration of fly papers were employed. The tapes were placed approximately 1 meter apart, over the entire common areas. While this at first may sound excessive, it proved to be appropriate. The papers from these areas would become completely full necessitating removal and replacement every 48 hrs.



Figure 4

In association with the use of fly traps other methods employed to combat the filth fly infestation and diseases carried by the fly included instituting the following protocols:

- Closed door policy reinforced with written reminders placed on each door with an opening to the outside or to a hallway or common area, for the person using the door to ensure that the door was closed.
- Hanging drapes made of canvas in doorways where doors were not available.
- No food to be brought into or opened in the facility.
- Trash dumpsters moved further from entrance to billeting.
- Trash to be removed daily or sooner if necessary.
- Hand washing stations placed in common area and dining facility.
- Dining facility entrance screen repaired.
- Manhole cover to remain over septic tank opening. (It had come off when a truck ran over it.)
- Initial education and daily dissemination of the dangers posed by the filth fly.
- A self help station stocked with alcohol hand cleaners, foot powder, insect repellent, and sun screen was established. This allowed service members to get needed supplies without waiting for medical personnel to draw the items from inventory.
- NCO supervised cleaning of common areas including latrines.

Aside from the nuisance that flies present, it has been demonstrated that many diseases can be transmitted by filth flies. The below table was taken from the Armed Forces Pest Management Board Technical Guide Number 30 and details some of the most significant pathogens known to contaminate filth flies (table 1).

<b>Table 1. Significant Pathogens of Human Diseases Known to Contaminate Filth Flies</b>		
amoebic dysentery	hepatitis	<i>Shigella</i>
anthrax	intestinal worms	<i>Streptococcus</i>
cholera	leprosy	trachoma
diphtheria	polio	tuberculosis
<i>Escherichia coli</i>	rotavirus	typhoid fever
Eyeworms	<i>Salmonella</i>	yaws

The above chart has caused me to review what I think I know about the filth fly. This review of the literature has added to my understanding of the filth fly and its importance in military medicine. I will publish this review in this publication in the near future.

Medical or preventive medicine personnel should be on the ADVON whenever possible. Having the Command PA on the ADVON for this deployment allowed for a proper assessment of the environmental situation.

**REFERENCES**

Army Regulation 40-5 Preventive Medicine  
 FM 21-10 FIELD HYGIENE AND SANITATION  
 FORSCOM Regulation 700-2  
 Armed Forces Pest Management Board Technical Guide NO. 30



CPT George W. Horsley joined the Army in April 1987. He was first assigned to 2nd Ranger Battalion as an infantryman. After his first enlistment he attended the 18D SFQC and was assigned to 10th SFG at Ft Devens, Massachusetts. In 1995 he left the regular Army for A Co, 2nd Battalion, 19th SFG, RI ARNG. For the next two years he worked as a Paramedic until he was accepted into the Inter-service Physician Assistant Program. Upon graduation in 1999 he returned to the RI ARNG until late 2001, whereupon he was assigned to HHC 2/19 SFG, WV ARNG. He stayed assigned there until early 2006 when he was assigned to the Special Operations Detachment-Global, RI ARNG where he is assigned today. He was mobilized in late 2006 for OEF supporting SOCCENT for one year. In late 2007 he was continued on mobilization for support to the USSO-COM Surgeon's office.



Maj Keith A. Wilson, NC, USAF, is currently the Chief of Medical Plans at SOCCENT. Prior to this assignment he was a student at USUHS where he obtained a MPH. His prior assignments include duty as a flight nurse with the 43rd Aeromedical Evacuation Squadron (AES) and, prior to nursing school he was a Medic with the 1st Ranger Battalion.

# Tympanic Membrane Perforation in IED Blasts

Patrick Depenbrock, MD, FS

## ABSTRACT

Traumatic tympanic membrane (TM) perforation is a common finding in victims of IED blasts. Frequently it goes undiagnosed by medical providers on initial evaluation. Hearing loss, tinnitus, and vertigo are common complaints from Soldiers who have experienced acoustic trauma. Although symptoms are usually transient, their persistence is a cause for concern. Treatment of a ruptured TM is usually expectant. In certain instances specialty consultation is required. Since primary blast and neurologic injuries can accompany traumatic TM perforation, physicians should maintain a high index of suspicion for their presence. This article aims to address the pathophysiology, diagnosis, treatment, and associated complications of blast-induced tympanic membrane perforation.

## Objectives

1. Understand the biophysics of primary blast injury and how to prevent blast-induced acoustic trauma.
2. Understand the common presenting signs and symptoms of tympanic membrane rupture.
3. Understand the treatment of tympanic membrane rupture and the indications for specialty referral.
4. Understand the long-term complications associated with traumatic tympanic membrane rupture.

Improvised explosive devices (IEDs) are responsible for most of the 3,200 American combat deaths and 29,000 wounded in action (WIA) that have occurred since the advent of Operation Iraqi Freedom (OIF).<sup>1</sup> IEDs, which were used sparsely at the outset of OIF in March 2003, now account for nearly 70% of all hostile U.S. casualties in Iraq. Since IED casualties reached a peak in May 2007, Coalition medical providers have been under mounting pressure to familiarize themselves with the immediate and long-term sequelae of blast injuries.<sup>2</sup> While victims of IED blasts often suffer an array of injuries, rupture of the tympanic membrane (TM) is the most common, yet frequently most overlooked, blast injury. This article aims to address the pathophysiology, diagnosis, treatment, and associated complications of blast-induced tympanic membrane perforation.

IED blasts create dynamic pressure changes at tissue-density interfaces, such as that found at the junction of the auditory canal and the tympanic membrane. When an explosion occurs, high frequency stress waves interact with low frequency shear waves at the eardrum, creating barotrauma that results in perforation of the tympanic membrane.<sup>3</sup> This is an example of primary blast injury. Any organ damage occurring as a result of the direct effect of pressure from an explosion is termed primary blast injury. Tympanic membrane rupture, pulmonary tissue damage, and abdominal viscera perfora-

tion are the three most common examples of primary blast injury.<sup>3</sup> While much has been made of the ability of body armor to protect military personnel from ballistic projectiles like bullets and blast fragmentation (i.e., secondary blast injury), it does not protect Soldiers from the barotrauma of primary blast injury. Only hearing protection has been shown to significantly reduce the incidence of blast-induced TM perforation, and thus should be stressed as the primary form of prevention.<sup>4</sup>

Following initial stabilization of blast injury victims, a portable otoscope is used to identify the presence of TM rupture. Any debris from the external auditory meatus, which is common in IED blasts, should be removed in order to visualize the TM. The external auditory canal (EAC); however, should not be irrigated, as this may provoke pain and vertigo in the patient. In the acute setting, providers should be aware of the association between traumatic TM rupture and more severe primary blast injuries (e.g., blast lung). Blast-induced TM ruptures have been reported to possess a 50% predictive finding of concomitant lung injury, although this finding has been debated.<sup>5,6</sup> Due to the concern for concomitant lung injury, Soldiers with ruptured TMs should undergo screening chest radiography and observation for at least eight hours as clinically indicated to monitor for the development of pulmonary complications.<sup>3</sup> **(Editor's Note:** This is one approach, but the Israeli data presented as a corre-



spondence in *NEJM* 352:2651-2653 June 2005 based on 30 mass casualty incidents shows that all those who developed pulmonary complications had initial hemoptysis and or tachypnea, there was no “silent pulmonary injury” and thus a chest film is not required if no pulmonary symptoms exist and these patients may be discharged after four to six hours if vital signs remain stable. This is in fact the approach being used at many locations in OIF now. This should be presented as an alternative clinical pathway that can be followed in place of the mandatory chest x-ray and eight hours observation. Perforation of the tympanic membrane is considered a sentinel finding of exposure to blast overpressure. Due to the anatomy of the intervening external auditory canal, the only way to damage the TM is from the blast component of the explosion.) If TMs are found to be intact, serious primary blast injury can be conditionally excluded in the absence of other symptoms such as dyspnea, respiratory distress, and acute abdominal pain.<sup>3</sup> This is attributable to the fact that TM rupture occurs at significantly lower blast pressures (as low as five pounds per square inch above atmospheric pressure) compared with the pressure gradient required to induce pulmonary and hollow viscera barotrauma. The estimated threshold for lung injury in man exposed to a single short-duration airblast is 14.9 to 20 psi over ambient pressure. As a result, severe primary blast injury to internal organs rarely occurs in the absence of TM rupture.

Treatment of a ruptured TM is usually expectant.<sup>3</sup> Ninety percent of perforated TMs resolve spontaneously. Most small perforations will heal within a few weeks. (**Editor’s Note:** There is an inverse relationship between the extent of initial perforation and the probability of its spontaneous closure. Perforations larger than 30% of the total tympanic membrane surface area have a significantly lower rate of spontaneous healing.) While the perforation is still patent, Soldiers should avoid probing or introducing water into the auditory canal, as this can provoke pain and precipitate vertigo. For similar reasons, swimming or immersing the head underwater is strictly prohibited until the TM is fully healed. If contaminated debris is spotted in the auditory canal or behind the TM, antibiotic eardrops should be started as soon as possible to facilitate clearance of the ear canal and prevent infection.<sup>3</sup> A seven-day regimen of a topical fluoroquinolone antibiotic is a reasonable choice. Blast survivors with ruptured TMs often go undiagnosed upon initial evaluation. These Soldiers frequently return to duty complaining of hearing loss and tinnitus, which are manifestations of temporary neuropraxia in the receptor organs of the ear.<sup>3</sup> Vertigo, the sensation of spinning, should be differentiated from dizziness. Hearing loss due to acoustic trauma is usually transient and is termed temporary threshold shift (TTS). TTS is often accompanied by tinnitus, aural fullness, recruitment (ear pain with loud noises), diffi-

culty localizing sounds, and difficulty hearing in a noisy background. Hearing loss that does not resolve is termed permanent threshold shift (PTS). Hearing loss that persists 72 hours after acoustic trauma warrants audiometric testing, which can be accomplished in theater. Unit surgeons should consider evacuation from theater for Soldiers with a hearing threshold greater than 60 decibels (dB) at three consecutive frequencies. Until hearing loss resolves, Soldiers should be restricted from noise hazardous environments such as firing ranges, airfields, etc.

Sometimes blast-induced tympanic membrane perforation requires specialty evaluation. Absolute indications for referral to an ENT surgeon include vertigo lasting more than three days, presence of clear otorrhea, and presence of discolored otorrhea that persists despite seven days topical antibiotic therapy. Eardrum perforations greater than 50% of the eardrum, debris in the EAC that does not resolve with topical antibiotics, and inability to visualize the TM despite removal of debris from the EAC are relative indications for ENT referral.<sup>7</sup> An average hearing threshold of greater than 30 dB at frequencies 500, 1000, and 2000 Hertz (Hz) is an absolute indication for audiology referral. Hearing thresholds greater than 35 dB at any of the aforementioned frequencies, hearing thresholds greater than 55 dB at 3000 or 4000 Hz, or new onset asymmetrical hearing loss are also absolute indications for audiology referral. Significant communication problems (regardless of audiometric testing results) and tinnitus significantly affecting quality of life are relative indications for audiology referral.<sup>7</sup>

Concussion is often found to occur in Soldiers with acoustic trauma. While traumatic TM perforation has been found to be a marker of more serious primary blast injury, it may also be a marker for mild traumatic brain injury (mTBI). A study of 541 blast-injury victims at Balad Air Base in Iraq discovered a significant association between TM perforation and loss of consciousness.<sup>4</sup> In a separate study, researchers found that Soldiers experiencing combat-related loss of consciousness were more likely to suffer from depression and post-traumatic stress disorder (PTSD) on redeployment.<sup>8</sup> As a result, physicians should maintain a high index of suspicion for concomitant neurologic injury in blast survivors with ruptured eardrums. This can be accomplished with the aid of mTBI and PTSD screening tools such as the Military Acute Concussion Evaluation (MACE) card and the four-question Primary Care PTSD (PC-PTSD) screening instrument, both of which are largely incorporated into the Army’s Post Deployment Health Assessment.<sup>9,10</sup>

Tympanic membrane perforation is a frequent finding in victims of IED blasts. As enemy forces continue to utilize IEDs as the weapon of choice against

coalition forces in Iraq, medical providers will continue to treat Soldiers with tympanic membrane perforations. While up-armored HMMWVs, body armor, ballistic helmets, and ballistic eyewear offer limited protection against ballistic projectiles, they do not confer protection against the barotrauma of primary blast injury. Hearing protection has been shown to significantly reduce the incidence of traumatic eardrum rupture and should be stressed by unit surgeons and commanders alike. Treatment of traumatic tympanic membrane rupture itself is generally expectant, but providers should be alert to the short-term and long-term complications of acoustic trauma and its associated injuries.

#### REFERENCES

1. DOD Personnel and Military Casualty Statistics, Defense Manpower Data Center, Casualty Summary By Reason, October 7, 2001 through February 2, Retrieved February 12, 2008 from: <http://siadapp.dmdc.osd.mil/personnel/CASUALTY/castop.htm>.
2. Iraq Coalition Casualty IED Fatalities by Month, July 2003 through January 2008. Retrieved January 25, 2008 from <http://icasualties.org/oif/IED>.
3. DePalma R et al. (2005). Blast Injuries. *New England Journal of Medicine*, 352:1335-41.
4. Xydakis M, et al. (2007). Tympanic-Membrane Perforation as a Marker of Concussive Brain Injury in Iraq. *New England Journal of Medicine*, 357:830-31.
5. Ciraulo D, et al. (2006). The Surgeon and Acts of Civilian Terrorism: Blast Injuries *American College of Surgeons*, 203:5.
6. Almongy G, et al. (2005). Can External Signs of Trauma Guide Management? *Archives of Surgery*, 140:390-93.
7. Barton, C. (2007). Acoustic Trauma and Hearing Loss Information Paper. Air Force Theater Hospital, July 01; Balad Air Base, Iraq.
8. Hodge CW, et al. (2008). Mild Traumatic Brain Injury in U.S. Soldiers Returning from Iraq. *New England Journal of Medicine*, 358:453-463.
9. Helmick K, et al. (2006). Defense and Veterans Brain Injury Center (DVBIC) Working Group on the Acute Management of Mild Traumatic Brain Injury in Military Operational Settings Clinical Practice Guideline and Recommendations. Retrieved January 8, 2008 from Deployment Health Clinical Center Web site: [http://www.pdhealth.mil/downloads/clinical\\_practice\\_guideline\\_recommendations](http://www.pdhealth.mil/downloads/clinical_practice_guideline_recommendations).
10. Ebell M. (2007). Point-of-Care Guides: Screening Instruments for Post-Traumatic Stress Disorder. *American Family Physician*, 76:1848.



CPT Patrick Depenbrock received his undergraduate degree and medical degree from Wake Forest University in Winston-Salem, NC. He completed his family medicine residency at Womack Army Medical Center (Ft. Bragg, NC) in June 2005 before becoming Battalion Surgeon for 3rd Battalion, 5th Special Forces Group (Airborne).

# ***Editorials***

## **Tympanic Membrane Perforation in IED Blasts**

Michael S. Xydakis MD, MSc, FS, Lt Col, USAF MC

I congratulate Dr. Depenbrock on his manuscript entitled, “Tympanic Membrane Perforation in IED Blasts” and would offer the following observations.

Exposure to powerful blast waves from the explosion of ordinance is a common and unique feature of combat operations and is characteristic of military casualties. The incidence of blast loading trauma to the body in significant numbers is relatively rare in the civilian trauma world and is primarily associated with industrial accidents and isolated terrorist bombings. The resultant blast front produces a pressure load distribution on the surface of the body in marked excess of normal ambient atmospheric pressure. Barotraumatic (i.e., blast) pathophysiology differs significantly from other forms of trauma and typically results in distinctly patterned injuries.

Direct blast injuries are characterized as a form of mechanical damage to biological targets. Each biological target and organ system has its own threshold of injury. Because of the effects of compressibility, of particular susceptibility to the effects of blast overpressures are air-containing organs (e.g., ear, lung) and organs surrounded by fluid-filled cavities, such as the central nervous system (CNS).

The most common symptoms following direct blast exposure are audio-vestibular in nature. As the level of overpressure increases, pulmonary injury becomes the dominant effect. The lungs are the most critical major biologic target in terms of immediate pathophysiological effects. The levels at which direct

blast overpressure become a hazard to the human central nervous system are still unknown.

The vulnerability to personnel to direct blast overpressure is highly dependent on proximity to the blast. Blast waves lose overpressure extremely rapidly with increased distance. The severity of these injuries grows with the intensity of the blast. However, range-yield-effects data for detonations contain considerable variability.

In conclusion, my experience as a surgeon at Landstuhl, Germany and at Balad, Iraq has revealed that these injuries may be easily overlooked in a combat environment as more dramatic and life-threatening traumatic impairments are treated. Moreover, few guidelines (e.g., “return-to-battlefield” recommendations) are available to assess levels of functional incapacitation in Soldiers after blast exposure and individual disposition is usually performed. A better predictive scheme is urgently required.

Michael S. Xydakis MD, MSc, FS, Lt Col, USAF MC  
Assistant Professor of Surgery  
Director - ENT/ Head & Neck Surgery  
Department of Surgery - A3017  
Uniformed Services University of the Health Sciences  
Tel: (301) 295-3155

# Casualty Wounding Patterns in Special Operations Forces in Operation Iraqi Freedom

Joseph Royal, DVM

The opinions expressed in this article represent the views of the author and do not represent any official view, statement, or policy of the Department of Defense. The author does not have any affiliation or monetary relationships with any organization which should be additionally detailed or described.

## ABSTRACT

This report describes compiled data on wound patterns for casualties sustained by Special Operations Forces (SOF) of the Combined Joint Special Operations Task Force-Arabian Peninsula during Operation Iraqi Freedom. The intent of this report is to provide information to the SOF Medic on the types of combat-related wounds that are most common in the ongoing Iraq war. During the period evaluated, the extremities and the head were the most common wound sites. Extremity wounds were commonly associated with fractures. Most of the fatally-injured had head and/or neck wounds. The information in this report may be used by SOF Medics to focus training to better address the types of injuries that are commonly seen on the current battlefield and to plan operational and logistical aspects of combat trauma medicine.

## OBJECTIVES:

1. Describe common combat wound sites in SOF patients wounded in OIF.
2. Use wound pattern data to train and prepare for and execute emergency medical aspects of combat missions.
3. Provide guidelines for the compilation and analysis of SOF casualty data in future conflicts.

## INTRODUCTION

Many studies have addressed combat casualty statistics for conventional U.S. military forces. Comparatively few published reports have described casualty data specifically for Special Operations Forces (SOF), and these have looked at data collected at higher level medical treatment facilities. The SOF Medic is unique among military Medics in that he must be capable of being the sole medical provider for a unit conducting unconventional warfare often in austere, isolated conditions for extended periods of time and with limited resources. Because of their advanced skills and isolated working conditions, SOF Medics often treat patients that would have been evacuated to a higher-level treatment facility for treatment in a conventional unit. Prolonged evacuation times for SOF wounded may also necessitate longer stabilization treatment by SOF Medics.<sup>1</sup> This report attempts to better characterize wound patterns typical of SOF operations by providing a snapshot of the array of wounds a SOF Medic is likely to encounter on the Iraq

battlefield. It describes types of wounds, mechanisms of injury, and patient outcomes. It also addresses how to focus medical training and operational and logistical planning to best address these types of wounds.

## MATERIAL AND METHODS

We collected data for the period from March 2003 to October 2007 for the Combined Joint Special Operations Task Force-Arabian Peninsula (CJSOTF-AP) and subordinate SOF elements throughout Iraq. We searched archived casualty reports, operational reports, and the casualty database maintained by CJSOTF-AP medical staff for information on SOF casualties from Operation Iraqi Freedom (OIF). The latter consisted of a compilation of descriptions of injuries reported during the course of OIF to CJSOTF-AP by SOF operators and further data collected by CJSOTF-AP medical staff from patient medical records. Morbidity and mortality data for battle wounds were compiled and analyzed to provide an

overall picture of wounds received, causes of wounds, and short-term patient outcomes.

#### INCLUSION CRITERIA

The data set included all casualties wounded in action (WIA), killed in action (KIA), or died of wounds (DOW) due to combat operations.

#### Definitions:

**Casualty:** For the purposes of this study, any wounded personnel requiring treatment by medical providers, which includes SOF Medics (note: the term “casualty” generally denotes a servicemember (SM) that is removed from combat by illness, death, or injury that requires movement to a hospital for treatment. Because the purpose of this study is to collect data on battle wounds that SOF Medics will be treating in the field, we used an alternative definition). **WIA:** Any Soldier wounded as a direct result of engaging in combat missions. **KIA:** Any Soldier killed as a result of hostile action who died before arriving at a medical treatment facility. **DOW:** Any Soldier wounded as a result of hostile action who died after evacuation to a medical facility. **Fatalities:** The sum of the KIA and DOW. **Fatality rate:** Percentage of fatalities among a group of wounded. **IED:** Improvised explosive device (includes roadside IED, suicide IED, and vehicle-borne IED). **Head wound:** Any wound to the head or face (not including neck), to include penetrating wounds, superficial wounds, eardrum injuries, and concussions or traumatic brain injury where clinical signs of brain injury were recorded by medical personnel. **Neck wound:** Any injury to the neck or throat. **UE (upper extremity) wound:** Any injury to the hands, arms, or shoulders. **LE (lower extremity) wound:** Any injury to feet, legs, buttocks, or pelvic areas inferior to the abdominal cavity. **Thoracic wound:** Any injury, penetrating or superficial, to the thoracic area. **Abdominal wound:** Any injury, penetrating or superficial, to the abdominal area. **Spinal wound:** Any injury with clinical or radiological documentation of vertebral or spinal cord injury or where neurologic symptoms attributable to spinal injury were reported. **Multiple site:** Any individual injured in more than one of the above regions.

#### RESULTS

Our search found records for 225 wounded service members from CJSOTF-AP and subordinate units from March 2003 to October 2007. Of these, 21 were classified as KIA and four as DOW, for a total fatality rate of 11.1%.

#### SITES OF WOUNDS

The following categories were used to classify wound sites: head, neck, UE, LE, thorax, abdomen, and spine. The most common wounds were as follows: 91 (40% of the wounded) had head wounds, followed by 76 (34%) with UE wounds and 71 (32%) with LE wounds. There were 37 casualties with wounds to the torso (7 abdominal, 18 thoracic, and 14 spinal). Table 1 gives a breakdown of the number of casualties with wounds in given locations and percent of total wounded. It also shows numbers wounded and killed as well as fatality rates for patients with each wound type and the percentage of fatalities that had wounds in given locations.

Approximately one third of the wounded had wounds in multiple sites (see Table 2). Of note, extremity wounds as a group (i.e., patients with upper and/or lower extremity wounds) were the most common injuries. There were 129 individuals with extremity wounds, 18 of which had wounds both to UE and LE.

As noted above, a large proportion of the casualties had injuries to the head. In fact, almost one fourth of the wounded presented with only a head wound. The reader should keep in mind that head injuries in this study include everything superior to the neck (soft tissue, bony, cerebral, facial, and ocular wounds). While available clinical descriptions did not always provide sufficient detail for exact wound site on the head, the following breakdown of numbers provides some detail on the nature of head wounds in this study: Of the 91 head injuries that were documented, approximately 39 cases (17% of all casualties) reported symptomatic post-concussive or tympanic membrane injuries, 18 of which had no visible soft tissue injuries to the head. It is unknown how many cases of traumatic brain injury went undiagnosed. Six cases of injuries to one or both eyes were reported, including destruction of the globe, foreign bodies, and unspecified eye injuries.

**Table 1. Casualty wound patterns**

	Head	Neck	UE	LE	Abdomen	Thorax	Spinal
Total casualties	91	19	76	71	7	18	14
% of total casualties with a given wound	40%	8%	34%	32%	3%	8%	6%
Number WIA	82	13	74	68	7	14	13
Number total fatalities	9	6	2	3	0	4	1
Fatality rate	10%	32%	3%	4%	0%	22%	7%
% of fatalities with a given wound	36%	24%	8%	12%	0%	16%	4%

**Note:** Because many casualties received wounds in multiple sites, the total numbers in this table are greater than the overall numbers of casualties, WIA, and total fatalities.

## FATALITIES BY WOUND SITE

Neck wounds had the highest fatality rate, with 6 of 19 (32%) neck wounds associated with fatality, followed by 4 of 18 (22%) thoracic wounds, and 9 of 91 (10%) head wounds.

Head wounds were associated with the greatest overall number of fatalities. Of the 25 fatalities, 9 had head wounds (36%). Additionally, 24% of fatalities had neck wounds, 16% had thoracic wounds, and 20% had extremity wounds (UE and/or LE). If we consider head and neck injuries as a group, 12 (48%) of the fatalities had a wound to the head and/or neck, 3 (12%) of which had both head and neck wounds.

Many casualties presented with solitary wounds. Table 2 gives a breakdown of data for casualties with wounds in only one anatomical location. As previously indicated, 50 (23%) casualties presented with head wounds only, of which 5 (10%) were fatal. Three presented with neck wounds only, of which two (67%) were fatal. While many casualties presented with solitary wounds of the UE (36) or LE (37), only one such case was fatal (traumatic amputation of LE). Fewer casualties had wounds only to truncal regions (thorax, abdomen, or spinal), with only one fatality in this group (penetrating thoracic wound). Of the 74 casualties presenting with wounds in multiple sites, 16 (22%) were fatal. Thus multiply wounded individuals accounted for 64% of the fatalities, followed by solitary head injuries (20%), and solitary neck injuries (8%). (See Figure 1)

## MECHANISM OF INJURY (MOI) BY WOUND SITE

Not surprisingly, 5 of 13 (38%) explosively-formed penetrator (EFP) casualties and 32 of 84 (38%) IED casualties were multiply wounded. However, it should be noted that it was not always possible to determine if a blast was due to an EFP or an IED. This report simply relied on the reports given by Medics or other personnel and in some cases on operational reports for iden-

Table 2. Casualty wound patterns for casualties with solitary wounds and multiple wound sites

	Head only	Neck only	UE only	LE only	Abdomen only	Thorax only	Spinal only	Multiple sites	total
Total casualties	50	3	36	37	1	8	6	74	215*
% of total casualties with given wound	23%	1%	17%	17%	0%	4%	3%	34%	100%
Number of WIA with given wound	45	1	36	36	1	7	6	58	190
Number KIA/DOW with given wound	5	2	0	1	0	1	0	16	25
CFR for given wound	10%	67%	0%	3%	0%	13%	0%	22%	
% of fatalities with the given wound	20%	8%	0%	4%	0%	4%	0%	64%	100%

\*Wound site data were not available in 10 cases, resulting in total of 215 of the total 225 casualties

**Note:** Because many casualties received wounds in multiple sites, the total numbers in this table are greater than the overall numbers of casualties, WIA, and total fatalities.

tification of the mechanism of injury. It is possible that in some cases EFPs were reported as IEDs and vice versa. Notably, 18 of 68 (26%) small-arms fire (SAF) casualties were multiply wounded. This generally resulted from either multiple bullets, fragmentation of bullets on or before impact, and tracking of bullets through different parts of the body.

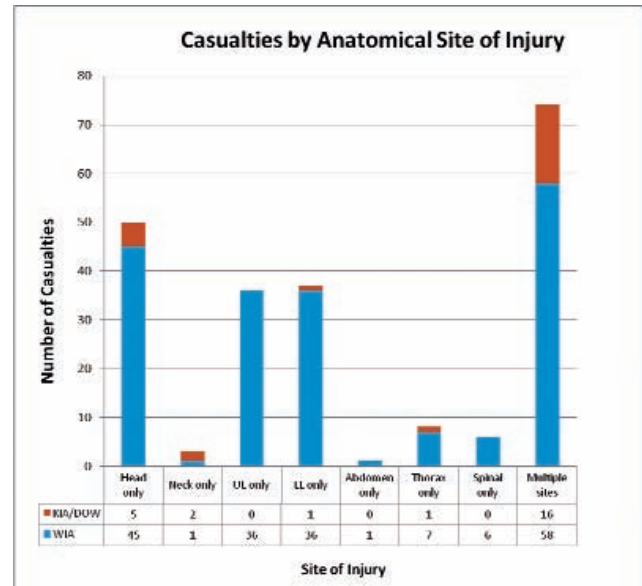


Figure 1 Number of casualties with solitary wounds and multiple wounds, with breakdown of number WIA and total fatalities (KIA/DOW)

A comparison of wound sites for SAF and IEDs may shed light on the nature of aimed enemy fire and effectiveness of current body armor systems. Sixteen of 90 SAF wounds were to the head (18%). By comparison, 36 of 93 (39%) IED wounds affected the head (counting only visible external head wounds). (See Table 3) This proportion is more than double that of SAF ( $p=0.002$ ). On the other hand, 10 of 90 (11%) SAF wounds were to the thorax compared to 1 of 93 (1.1%) IED wounds ( $p=.005$ ). This data set takes into account all casualties, wounded or killed, for whom applicable MOI and wound site data were available. All  $p$  values were calculated using a two-tailed Fisher's exact test

## DISCUSSION

### Mechanism of injury

The data in Table 3 may provide insight into the effectiveness of protective equipment against different types of weapons. Shrapnel from IEDs caused higher rates of head wounds compared to SAF, while SAF caused thoracic injuries much more commonly

than did IEDs. We may conclude that SAF was more effective than IEDs at causing chest wounds. On the other hand, IEDs were more effective than SAF at causing head wounds. This specific analysis does not evaluate fatality rates of these particular types of wounds, a valuable piece of information that could be elucidated with a larger data set. Nonetheless, in this instance, it appears that currently used body armor provided effective protection of the thorax from IED type explosions. This may also reflect a tendency of the enemy to concentrate aimed fire more at the chest than at the head. In practical terms, these data imply the need to emphasize better protection of the head from explosive type injuries and protection of the chest from SAF. However, further investigation into these trends is warranted.

### WOUND SITES

Several studies have looked at similar data patterns. While we must be cautious in comparing data from different types of studies, general trends in numbers may provide useful information. Montgomery et al. compiled data from OIF in 2003 on casualties who were evacuated to Walter Reed Army Medical Center and triaged to inpatient status.<sup>2</sup> Of 119 casualties,

**Table 3: Number and % of total wounded with SAF wounds vs IED wounds in various locations of the body**

	Head	Neck	UE	LE	Abdomen	Thorax	Spinal	Total
# casualties due to SAF with wounds at a given site	16	5	25	29	2	10	3	90
% of total SAF wounds	18%	6%	28%	32%	2%	11%	3%	
# casualties due to IEDs with wounds at a given site	36*	4	22	21	3	1	6	93
% of total IED wounds	39%	4%	24%	23%	3%	1%	6%	

\*IED head wound figure does not include the 13 cases of concussion or TM injury due to IEDs with no mention of external wounds to head

wound locations were as follows: 29 head and neck, 25 chest, 20 abdomen, 74 LE, and 36 UE. Our figures reveal higher rates of head and neck injury and lower rates of truncal and extremity injuries. This may be due to skewing of the results towards head injuries due to the inclusion of mild traumatic brain injuries (TBIs) in our data. In a 2006 Congressional Research Service report on Soldiers injured primarily in OIF and OEF, 229 (20%) out of the 1,124 injured had sustained multiple injuries.<sup>3</sup> While this rate is somewhat lower than the 74 (33%) of 225 casualties in our study, it shows a consistent trend of multiply injured patients. The difference may be attributed to higher rates of IED and EFP injuries in OIF compared to OEF, which may produce more multiply wounded patients.

### EXTREMITY INJURIES

The high rate of extremity injuries in this study is not surprising, since arms and legs present a relatively large profile and are usually not protected by body armor. Other studies have reported similar findings. Owens et al. reported that in previous conflicts extremities have accounted for 54 to 71% of combat wounds (WWII 58%, Korea 65%, Vietnam 61%, Desert Storm 71%, OIF/OEF 54%).<sup>4</sup> Another study on casualties evacuated to a level IV medical treatment facility early in OIF reported 68% with extremity wounds.<sup>5</sup> Zouris et al. reported that in one group of battle wounded in OIF, approximately 70% had extremity injuries.<sup>6</sup> Peoples et al. reported an extremity wound rate of 58% among 224 patients presented to a Forward Surgical Team in Afghanistan in 2001 and 2002.<sup>7</sup> Our study found 57% of casualties had extremity wounds. Thus there is some consistency in extremity wounding rates. In general terms, Medics should expect that a majority of their patients in combat will have extremity wounds, many severe enough to warrant evacuation from theater.

Owens et al. described 3,575 extremity wounds (to 1281 individuals) from OIF and OEF [not including those returned to duty (RTD) within 72 hours].<sup>4</sup> Of all extremity wounds, over half (53%) were penetrating soft tissue wounds and over one fourth (26%) had fractures. Half of the fractures were in the UE and half in the LE. Of all fractures, 82% were open. The article further reported that in previous conflicts, 23 to 39% of extremity wounds have involved fractures. By comparison, our data set included 129 casualties with extremity wounds, of which 76 had UE wounds and 71 LE wounds. Of all casualties with extremity wounds, 81 (63%) had soft tissue wounds only, and 25 (19%) had fractures. In 23 (18%) cases, our records did not specify if a fracture was present.

This data shows that extremity wounds are a consistent finding, and that fractures, most of which are open, generally occur in at about a fourth of extremity battle wounds, with a similar incidence in UE and LE. This suggests to Medics the importance of training on and preparing for initial management and stabilization of open UE and LE fractures. Such planning should include splinting, tourniquets, antimicrobial therapy, analgesia, wound management, etc. It is encouraging to note that there was only one death among those wounded only in the extremities. This may reflect effectiveness of current first aid techniques for extremity wounds.

## **SURVIVABILITY**

While our study did not evaluate survivability of fatal wounds, other studies have addressed this extremely important issue. A recent study by Holcomb et al. reported on 82 combat-related deaths in SOF from October 2001 to November 2004.<sup>8</sup> A panel of evaluating physicians classified 12 of the 82 (15%) as potentially survivable. These cases included truncal hemorrhage (8), compressible hemorrhage (2), hemorrhage amenable to tourniquet (1), tension pneumothorax (1), airway obstruction (1), and sepsis (1). Kelly et al. analyzed 982 autopsy reports from combat deaths in Iraq and Afghanistan from 2003 to 2006.<sup>9</sup> In this study, they found that noncompressible truncal hemorrhage was the leading cause of potentially survivable (PS) death, accounting for approximately half of all PS deaths. Hemorrhage amenable to a tourniquet and compressible hemorrhage not amenable to a tourniquet were the next leading causes, and these three categories accounted for approximately 85% of PS deaths. Such information should also be used by SOF medical personnel to focus their training and mission preparation. In our study, detailed descriptions of fatal wounds and causes of death were generally not available, though in most cases, the available descriptions suggest that the most common direct causes of death were head trauma or exsanguination. Future studies and data collection should address this important topic.

## **LIMITATIONS**

This data set is bound by several limitations. The small sample size limits the reliability of comparisons between data sets. Our study used different inclusion criteria (e.g., including patients treated on site by SOF Medics) than many other studies have used, making comparisons of data difficult. Minor wounds were often not reported or were reported with little clinical information. There were some time gaps in the data, especially early in OIF, where records were either not kept or could not be located. It is unknown how many injuries were undiagnosed or unreported, but prior experience shows that traditionally about 50% of battlefield wounds are minor with RTD within 72 hours.<sup>10</sup> Such covert injuries can be especially difficult to document in the SOF community, where Operators are often reticent with injuries and illness, especially the less obvious injuries like TBI. This phenomenon could skew the results somewhat in favor of more serious injuries. In many cases, medical records from a medical treatment facility were not available for review. In these cases, the only available information was the description in the casualty database as recorded by previous CJSTOF-AP medical staff. As a

result, some of these descriptions were vague or incomplete, and did not provide the level of detailed information that can be obtained from a review of medical records. Furthermore, autopsy reports and definitive causes of death were not available in most cases. Therefore, for purposes of this study, we did not attempt to analyze the factors that affected survivability of wounds or a KIA versus DOW outcome. Finally, while this information provides applicable information to the current conflict, it may be less applicable in future conflicts in other scenarios. In spite of these limitations, we still believe these data proffer valuable and applicable information that can be used to develop tactics, techniques, procedures, training programs, and technology that can save lives.

## **CONCLUSIONS**

Head and extremity wounds were very prevalent. Neck wounds, while present in lower numbers, were associated with high fatality rates. In spite of modern body armor, some thoracic wounds still occurred, most of which were SAF related. Medics should therefore be prepared to treat ballistic wounds to the torso. A large number of patients were wounded in multiple regions. Such patients present treatment and triage challenges for the first responder. Also of note was the significant number of SMs with concussive-type TBIs. This highlights the importance of recognition of these kinds of battle injuries. The prevalence of open fractures to upper and lower limbs suggests an obvious need to focus training and logistics to address such wounds. Treatment of such wounds is especially important because body armor modifications are unlikely to provide significant protection to the limbs.

High fatality rates of head, neck, thoracic, and multiply wounded casualties point to the importance of determining ways to prevent and treat such wounds. For example, future research may address alterations in helmet design to protect the head, and body armor modifications to protect the neck and axillary regions. Ideally, body armor should protect these vulnerable areas without becoming overly cumbersome and a hindrance to maneuverability.

Using this information, Medics may better prepare for upcoming conflicts by focusing training on certain types of injuries and adjusting their medical supply and operational planning for anticipated needs. For example, in a conflict like OIF, with an abundance of IED injuries, the Medic should be vigilant for blast wounds to the head, which may require airway management and rapid evacuation to a facility with computed tomography (CT) capabilities. A high probability of extremity fractures may guide medical logistics planning for anal-



gesic medications, tourniquets, splints, and bandaging material. Furthermore, this information may be used to guide development of future products and technologies, such as body armor extensions, hemostasis products (tourniquets, hemostatic dressings, etc.), and treatments for hemorrhage (field transfusion, hemoglobin-based oxygen carriers, etc.).

A salient conclusion of this study is the need for SOF medical units to compile and maintain thorough, reliable data on all wounded. The following parameters should be tracked for all casualties: Patient ID; demographic information; date of injury; tactical situation; unit; MOI (specific); evacuated or RTD; when RTD; evacuation locations; types and locations of injuries (very specific and detailed); immediate outcome (WIA, KIA, DOW, RTD, etc.); long-term outcomes (disability, RTD, etc.); severity of wounds; and autopsy information for KIA/DOWs (direct cause of death, detailed wound descriptions, etc.) Other information that could be tracked includes effect on mission, protective equipment used, initial treatments received before evacuation, surgeries and other treatments required after evacuation, evacuation times, etc. Also for all fatalities, a medical evaluation should be performed to determine if the death was potentially preventable.

Thorough, accurate, reliable records of combat casualties provide extremely valuable information to SOF Medics and medical planners. This information will allow us to retrospectively evaluate the effects of changes in equipment, tactics, techniques, and procedures. By compiling and analyzing these data, we can monitor wounding trends and evaluate combat risks in order to determine how to best prevent, prepare for, and treat casualties in future combat operations.

#### REFERENCES

1. Place RJ, Rush RM Jr, Arrington ED. (2003). Forward surgical team (FST) workload in a Special Operations environment: The 250th FST in Operation ENDURING FREEDOM. *Current Surgery*, 60(4), 418-22.
2. Montgomery SP, Swiecki CW, Shriver CD. (2005). The evaluation of casualties from Operation Iraqi Freedom on return to the continental United States from March to June 2003. *Journal of the American College of Surgeons*, 201(1), 7-12.

3. Fischer, Hannah. (2006). United States Military Casualty Statistics: Operation Iraqi Freedom and Operation Enduring Freedom. *CRS Report for Congress*. Accessed on 4 December 2007 at <http://handle.dtic.mil/100.2/ADA458285>.
4. Owens BD, Kragh JF Jr, Macaitis J, Svoboda SJ, Wenke JC. (2007). Characterization of extremity wounds in Operation Iraqi Freedom and Operation Enduring Freedom. *Journal of Orthopedic Trauma*, 21(4), 254-7.
5. Johnson BA, Carmack D, Neary M, Tenuta J, Chen J. (2005). Operation Iraqi Freedom: the Landstuhl Regional Medical Center Experience. *Journal of Foot and Ankle Surgery*, 44(3), 177-83.
6. Zouris JM, Walker GJ, Dye J, Galarneau M. (2006). Wounding patterns for U.S. Marines and sailors during Operation Iraqi Freedom, major combat phase. *Military Medicine*, 171(3), 246-52.
7. Peoples GE, Gerlinger T, Craig R, Burlingame B. (2005). Combat casualties in Afghanistan cared for by a single forward surgical team during the initial phases of Operation Enduring Freedom. *Military Medicine*, 170(6), 462-468.
8. Holcomb JB, McMullin NR, Pearse L, Caruso J, Wade CE, Oetjen-Gerdes L, Champion HR, Lawnick M, Farr W, Rodriguez S, Butler FK. (2007). Causes of death in U.S. Special Operations Forces in the global war on terrorism: 2001-2004. *Annals of Surgery*, 245(6), 986-91.
9. Kelly JF, Ritenour AE, McLaughlin DF, Bagg KA, Apodaca AN, Mallak CT, Pearse L, Lawnick MM, Champion HR, Wade CE, Holcomb JB. (2008) Injury severity and causes of death from Operation Iraqi Freedom and Operation Enduring Freedom: 2003-2004 versus 2006. *The Journal of Trauma, Injury, Infection, and Critical Care*, 64(2), S21-S27.
10. Holcomb JB, Stansbury LG, Champion HR, Wade C, Bellamy RF. (2006) Understanding Combat Casualty Care statistics. *The Journal of Trauma, Injury, Infection, and Critical Care*, 60(2), 397-401.



CPT Joe Royal graduated from Brigham Young University in 2001. He graduated from Washington State University a Doctor of Veterinary Medicine and entered active duty service in 2005. He is currently assigned to the 10th Special Forces Group (Airborne).

# Veterinary Care System for Military Working Dogs – A Case Study

Robert Vogelsang, DVM; Cheryl Sofaly, DVM; Mark Richey, DVM

## ABSTRACT

A previous JSOM article (Spring 2007) discussed military working dogs (MWD) in SOF and their care by SOF medical personnel. MWDs are becoming more commonly utilized within SOF in current theaters and are subject to similar injuries and illnesses experienced by their human counterparts. SOF personnel can only provide basic care, as described in the earlier article, requiring more severely injured/ill dogs be evacuated to a conventional veterinary treatment facility. This article discusses current conventional veterinary capability and utilizes a case study to help demonstrate the spectrum of veterinary care for MWDs, from point of injury, to CONUS rehabilitation and eventual return to duty. It is important that SOF medical and planning personnel understand what veterinary support exists, its capabilities and locations to ensure the best care possible can be provided to their dogs.

## OBJECTIVES

- 1) Understand conventional military veterinary support doctrine for working dog care.
- 2) Recognize potential problems/shortfalls within the veterinary care system.
- 3) Understand capabilities of conventional military veterinary care for the military working dog.

## DOCTRINAL CARE OF THE WORKING DOG USING A CASE STUDY – “MR. D”\*

\*Identities of Special Operations members must be protected due to the sensitive nature of their work and as such, only the dog’s initial has been used.

This article will use a case study that follows a wounded dog from point of injury to return to duty to demonstrate the care a MWD receives throughout the entire veterinary health care spectrum.

**Signalment:** Mr. D is a 5 1/2 year-old, male, Belgian Malinois working dog.

**Injury:** Mr. D received a single 7.62mm gunshot wound entering the right-dorsal aspect of neck, exiting distal and lateral to the scapulohumeral joint creating a wound approximately 12x8cm in size (Figs. 1 and 2).

**Immediate first aid:** Mr. D was first treated on the objective by his handler who described brisk and significant bleeding from the wound (spurting/pulsing stream of blood arcing up out of the wound). The handler packed the wound with non-elastic gauze and applied a pressure dressing using an elastic bandage. The

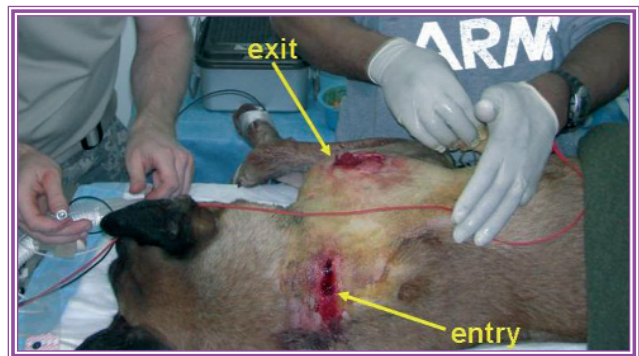


Figure 1



Figure 2

dog was included in the unit CASEVAC plan and Mr. D was subsequently evacuated to the nearest veterinary unit with surgical capability. Flight time was approximately 10 minutes. The unit Medic attempted to initiate an intravenous (IV) catheter, but was unsuccessful due to darkness, vibration, and that the limb was not clipped, so he began administering lactated Ringer's solution (LRS) subcutaneously (SQ) in an attempt to get some fluids into the patient. The dog had received approximately half a liter upon arrival at the medical treatment facility (MTF). The unit's CASEVAC plan for a critically ill dog states to evacuate the dog to the MTF landing zone, where the veterinary team will receive the dog in the Level III human facility and move to the veterinary treatment facility (VTF) when stabilized.

**Level II-III care:** Upon arrival, Mr. D was laterally recumbent and conscious, but shocky and painful. Mr. D was taken to the Air Force Theater Hospital emergency room (ER) where, initially, ER providers attended to him with guidance from an Army Veterinary Corps Officer (VCO). In the ER, an IV catheter was placed in a dorsal (anterior) metatarsal vein which is not a location generally used for catheters in veterinary medicine; more often the IV is placed into cephalic veins in fore limbs and lateral saphenous veins in hind limbs. In this case; however, it was found by veterinary personnel to be a good place for catheterization as the dog appeared to tolerate it well after surgery and it was away from the area requiring surgical intervention. He received approximately 1.5 liters of LRS IV plus the subcutaneous half liter prior to the veterinary team taking him to their facility. The dog was given 0.05mg of fentanyl IV for pain. Biplanar radiographic views of the chest taken to assess for air or fluid in the thorax, with none found. By the time Mr. D was transported approximately 100 to 150 meters to the veterinary clinic, four VCOs and one 68T had gathered, so one team worked on preparing the wounds for surgery while the second team prepared the surgery room and managed fluids, records, drugs, etc.

The hair around the wounds was shaved and cleaned of gross debris prior to anesthetic induction while he was receiving fluids and the surgery room prepared. He received butorphanol and glycopyrrolate as premedications which facilitated this process. Induction was made with ketamine plus diazepam IV; isoflurane was used for maintenance anesthesia via endotracheal tube.

In surgery, the non-elastic gauze packing was removed, the wounds cleaned and debrided, and the

wound tract copiously lavaged. Damage was generally confined to the subcutaneous tissues surrounding the tract, plus disruption to the muscles around the shoulder joint (Fig. 3). No nerve damage was sustained. The acromion process of the scapula was found to be fractured, but there was no apparent damage to the scapulohumeral joint itself. No attempt was made to repair the acromion fracture as it appeared too splintered to be reattached. Penrose drains were placed and the transected muscle bellies reapposed as well as possible. Dead space under the skin along the wound tract



Figure 3

was obliterated with subcutaneous sutures and the skin then closed with the drain exiting ventral to the ventral extent of the wound tract.

For the first three days following surgery, a full limb bandage was applied to the right front leg to minimize swelling. The limb was also put in a modified sling to prevent weight-bearing (Fig. 4). Wound dressings were placed over drain exits and laced in place using umbilical tape through loops of suture placed in the surrounding skin. These wound dressings were



Figure 4

used to absorb exudate and prevent skin irritation. They were changed as often as needed until drains were removed. Two days post-op, passive range-of-motion exercises were conducted daily and leash walking commenced on day four. Drains were removed by day six when they were no longer productive. Skin sutures were removed prior to departure from theater on day 10 when Mr. D redeployed with his unit. Note that in a case like this where the dog is friendly and easy to handle by veterinary staff, the handler can return to the unit and participate in missions while the dog is convalescing. At departure, he was walking/trotting well, but with a noticeable limp. He did develop a small seroma at the distal aspect of the dead space after the drain incision closed which resolved without further treatment.

Antibiotics used were IV cefazolin plus metronidazole, switching to oral enrofloxacin plus metronidazole once he was back on food. Pain management post-op included oral carprofen plus intermittent butorphanol for three days, then oral carprofen only through departure from theater.

**Level V Care:** After arrival at home station, arrangements for referral and transport to Lackland AFB were made between the unit and the DOD Military Working Dog Veterinary Service (DODMWDVS). The dog was flown by commercial carrier to Houston and then driven onward to Lackland. The dog could not be flown into San Antonio as the commercial airport there would not accept an extra-large shipping kennel. The dog and escort were met by DODMWDVS personnel and Mr. D admitted as a patient.

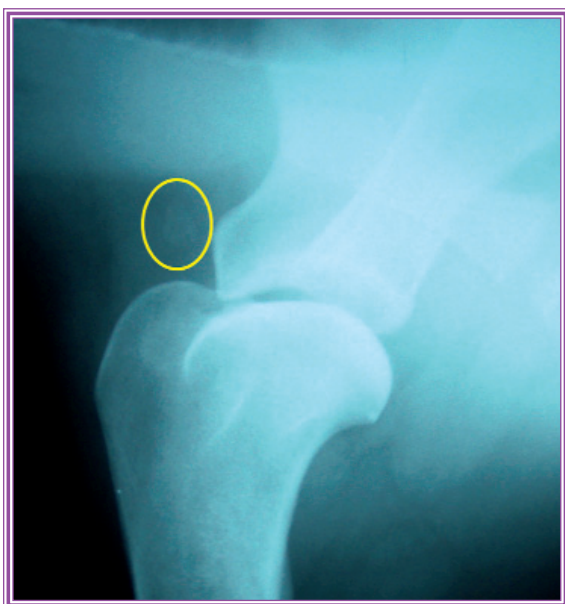


Figure 5

The assessment by DODMWDVS staff was that Mr. D had obvious right forelimb lameness. It did not appear to be painful and the lameness diagnosed to be functional in its etiology. This was attributable to significant loss of range of motion (ROM) in his right shoulder, specifically loss of extension. Mr. D's ROM was measured to be 75 degrees (130 degrees at maximum extension to 55 degrees at maximum flexion). In a dog of his breed and size, normal ROM is expected to approximate 110 degrees (165 at maximum extension to 55 at maximum flexion).<sup>1</sup> The evaluation found gross muscular atrophy around the shoulder joint including the supraspinatus, infraspinatus, and acromial deltoid muscles; additionally, extensive fibrosis within this area was suspected. Lateral (Fig. 5) and craniocaudal (Fig. 6) view radiographs of the shoulder were taken which showed the fractured acromion (yellow markers). Repair of the fractured acromion was not considered as it was suspected that the fragment was firmly encased in fibrous tissue, it was not significantly contributing to the lameness, and the anesthesia and surgical trauma to at-

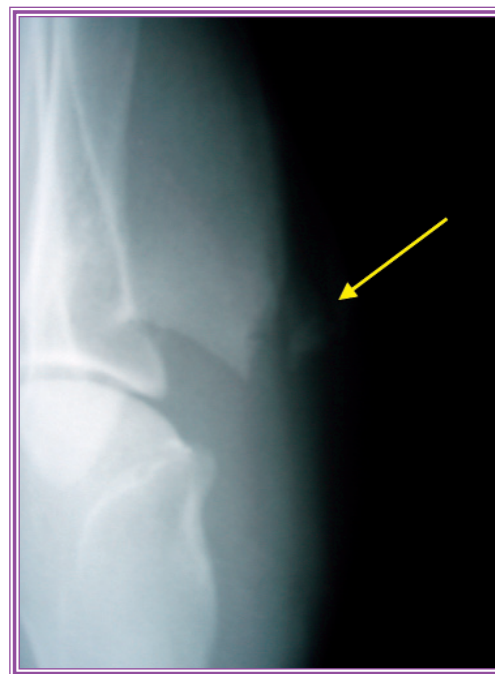


Figure 6

tempt such a repair would be more detrimental to the dog than leaving the acromion in place as it was.

Mr. D was placed into a physical therapy/rehabilitation program overseen by a Certified Canine Rehabilitation Practitioner (CCRP) with the goals of: 1) Gaining ROM (extension) in the right shoulder; 2) Gaining muscular mass in the musculature of the lateral shoulder; 3) Minimizing further fibrous contraction at the surgical site and release of fascial planes. He aver-

aged four therapy sessions per week for the six weeks he was at the DODMWDVS. His regimen consisted of:

- Underwater treadmill (UWTM) therapy three times weekly for 15 minutes at gradually increasing speed (Fig. 7)
- Passive range of motion and stretching, 30 repetitions each session, three times weekly following each UWTM session (Fig. 8).
- Therapeutic ultrasound therapy at the scar/surgical site twice weekly for eight minutes at 1MHz/1.2W/cm<sup>2</sup>.
- Electrical stimulation for the supporting musculature surrounding the shoulder twice weekly (sedated).
- Stretching (focus on extension) under sedation twice weekly following the electrical stimulation therapy.
- Two treatments of local aquapressure/scar injection with Vitamin B complex for stimulation of local acupuncture sites and release of intramuscular trigger points.

After treatment at Lackland, Mr. D was released to his unit with a ROM in his right shoulder of 100 degrees, or about 91% of expected normal ROM, an excellent progression from the initial presentation of only 68%. The muscle mass around the shoulder was considered near normal as was his gait (Fig. 9). The unit was advised not to deploy the dog for two months and instructed to continue stretching and passive range of motion exercises and allow the dog to play and exercise without limitations. If Mr. D continued to remain improved at the end of the two-month period, the veterinary staff believed he could return to unlimited duty and deployment.



Figure 9

#### MILITARY VETERINARY ORGANIZATION

The Army is the DOD Executive Agent for Veterinary Services and, as such, is the only Service which provides animal care to all of the other Services. While the Air Force has some veterinarians, these personnel

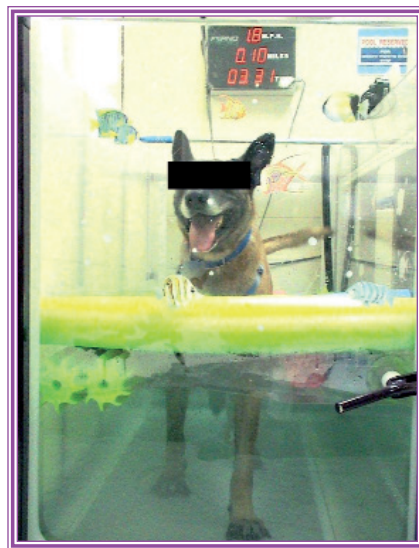


Figure 7

Figure 8  
Kelley Meyer, RVT, CCRP, performs passive range of motion exercises on Mr. D at the MWDVS.



function as Public Health Officers who apply preventive and public health techniques to reduce and control the incidence of communicable diseases and occupational illnesses and do not have a role in the care of animals.

There are currently seventeen documented and authorized veterinary positions that exist in SOF, all are within USASOC. These positions are filled with VCOs and/or Army Military Occupational Specialty (MOS) 68T, Animal Care Specialist/NCO.

- \*VCO in each Special Forces Group (Abn) x 7
- VCO at 95th Civil Affairs Bde
- VCO in each Civil Affairs Bn
- VCO and 68T (2) at the Joint Special Operations Medical Training Center
- \*VCO in the USASOC Sustainment Brigade (SO) (Abn)
- VCO on the USASOC Surgeon's staff

Future FY veterinary positions approved to be filled include:

- \*VCO and 68T at HHC, 75th Ranger Regt (VCO is currently assigned)

\*VCO and 68T at Support Company, MAR-SOC Special Operations Support Group VCO on the USSOCOM Surgeon's staff (VCO currently assigned)

\*Denotes veterinary staff which do/will have working dog care responsibilities; remaining positions are staff or perform functions generally distinct and apart from working dog care.

Within the conventional Army, there are two TO&E (Table of Organization and Equipment) veterinary unit types; the Medical Detachment, Veterinary Service (MDVS) and the Medical Detachment, Veterinary Medicine (MDVM). The MDVS requires 57 personnel, is authorized 55 (with two Professional Filler System positions), and organized with a HQ section and six subordinate teams of seven personnel each. Of the six subordinate teams, only five (Veterinary Service Support Team or VSST) have working dog care responsibility and capability; the other team is dedicated to food inspection and laboratory analysis. These teams are generally dispersed throughout an area of operation, sometimes at great distances from their headquarters. Each VSST has one VCO and one 68T; however, only one team has a gas anesthesia machine, while the other VSSTs have intravenous anesthesia capability, operating table, surgical light set, and scrub sink. None of the VSSTs has a holding capability. The team with surgical equipment can provide Level II care though this can be debated since all VSSTs have an operating room (OR) table, surgical light, point of care chemistry (iSTAT), ultrasound, and total intravenous anesthesia capability. At best, VSSTs provide Level II since they do not have radiology, chemistry analyzer, clinical specialists, or holding capability. The term "level" in this description is in reference to capability of care generally associated with medical treatment facilities for human patients. It should be noted that, as defined in Army Field Manual 4-02.18, *Veterinary Service Tactics, Techniques, and Procedures*,<sup>2</sup> there are some differences in the doctrinal description of "level" capability between medical and veterinary care. Chapter 3, Section III, Part 3 to 11 of FM 4-02.18 states, "Level I (unit level) veterinary care for MWDs includes medical triage, EMT, stabilization, and evacuation. Level II veterinary care is the same as Level I except it has additional capabilities that include having anesthesia and being able to perform some limited surgical procedures." Though each team has a 68T, many times the MDVS will reorganize to create an "animal support team" and combine many 68Ts within

the detachment into this squad whose main responsibility is animal care. When such reorganization occurs, the other teams generally have only a VCO which can provide working dog care.

The mission of the MDVM unit is specifically to provide animal care, especially to military working dogs. It includes three VCOs and nine 68Ts. This unit has surgical, x-ray, ultrasound, and some laboratory capability. The MDVM has some holding capacity; but, since it cannot provide definitive care for more complicated cases, dogs which cannot be returned to duty within an established evacuation policy generally would be evacuated to fixed facilities in Vogelweh (Kaiserlautern), Germany, or Okinawa, Japan (analogous to Level IV); or the DOD Military Working Dog Veterinary Service at Lackland AFB, TX (analogous to Level V, the Walter Reed/Bethesda of the Veterinary Corps).

#### **VETERINARY SUPPORT TO OEF/OIF**

At present, one complete MDVS detachment supports Operation Iraqi Freedom (OIF) in Iraq. A portion of another MDVS (U.S. Army Reserve) supports OIF in Kuwait, Qatar, and the Horn of Africa. A portion of another MDVS (U.S. Army Reserve) supports Operation Enduring Freedom (OEF) in Afghanistan. Currently, none of the three existing MDVM detachments is deployed. One VCO is deployed in support of OEF-P, but he has no facilities or equipment or animal technicians; unlike Iraq and Afghanistan, this area of operations has few MWDs.

The VSSTs are dispersed across a total of nearly 20 locations throughout their respective AOs; some 68Ts are further forward at certain Forward Operating Bases (FOBs) or other areas that may have high MWD populations. For example, one detachment is spread out over nine locations that are able to provide some veterinary care to dogs (some sites may only have one technician). However, there are reported to be over 700 military and contract working dogs, spread over at least 50 locations, in Iraq alone. Due to the great dispersion of the dog population and relatively non-permissive environment, it is sometimes challenging to get dogs to veterinary units and vice versa. The MEDEVAC system can be used to transport dogs; however, most of these transports are routine and the dog and handler may be kept away from their duty site for up to a week awaiting transportation back to their FOB after pursuing a simple treatment for minor illnesses or injuries.

#### **DOD MILITARY WORKING DOG VETERINARY SERVICE**

The DOD Military Working Dog Veterinary Service is the largest military veterinary hospital in

DOD. There are approximately 30 personnel on staff include VCOs who are board-certified in surgery, internal and/or emergency medicine, and radiology. The DODMWDVS has two operatories equipped with full instrumentation for orthopedic, general/soft tissue, laparoscopic, and neurological surgery. A full laboratory provides complete blood count and most chemistry panels. Imaging capabilities include digital radiography, fluoroscopy, and ultrasound. The DODMWDVS has a canine physical therapy/rehabilitation section with an underwater treadmill and is staffed by a board-certified physical therapist/rehabilitator. A brand new facility will open in late spring or early summer of 2008 which will include a CT machine in addition to all current capabilities.

The DODMWDVS serves as the referral center for all MWDs and provides professional and technical assistance to VCOs and 68Ts throughout DOD.

#### OVERVIEW OF VETERINARY CARE

Few units will have veterinary personnel deployed with them to support their dogs and those that do will not likely have those assets with them at point of injury. As such, the handler will be the first responder, unless the handler has been incapacitated. In that situation, the Medic would likely perform initial first aid. Though basic Tactical Combat Casualty Care phases of care can be directly applied to the injured canine, by both handler and Medic must plan for and address a few differences for canine treatment. First, the Combat Application Tourniquet will not work on a canine limb due to the limb's due to the relatively small diameter of the canine limb.. Tourniquets for the canine patient will need to be improvised using a cravat/windlass, Penrose drain, or similar expedient method. Hemostatic dressings; however, should be used on the dog as they would on a human. Obviously, the nasopharyngeal airway will not be useful in the canine casualty and the combat pill pack contents are not appropriate for the dog. Moxifloxacin is not yet commonly used in the dog, but what evidence that does exist implies a dose of 2 to 5mg/kg as appropriate (personal communication). As such an average working dog would receive 150 to 200mg orally. Maximum therapeutic meloxicam dose (per package insert) for a dog is only 0.2mg/kg which would be approximately 6mg for an average SOF dog. The combat pill pack dose of meloxicam is more than twice the dog dose (15mg). High doses of non-steroidal anti-inflammatory drugs (NSAID) in the dog can cause significant to deadly sequelae. Acetaminophen is not frequently used in dogs as it can cause methemoglobinemia and

hepatic necrosis.<sup>3</sup> With the current combat pill pack for humans, a working dog could receive half a tablet of the moxifloxacin and half a tablet of the meloxicam; that is if you could get the dog to swallow the medications. If the dog is distressed, it may not allow hands in its mouth or may not swallow the tablets if they could be placed in the mouth. In the author's opinion, no acetaminophen should be administered. As the use of dogs in combat becomes more frequent, development of a Tactical Canine Combat Casualty Care (TCCCC or TC4) program should be entertained.

One of the most important things that will help ensure the best outcome for MWDs is prior veterinary support planning. CASEVAC/MEDEVAC for dogs must be incorporated into the medical support plan. Units should know where the closest veterinary units are located, what their capabilities are, and how to contact veterinary personnel. Units wishing to get deployed veterinary unit locations and contact information may contact the USASOC or USSOCOM Command Veterinarians.

Once the dog is received by the deployed veterinary team/detachment, the dog's unit must maintain contact with the veterinary unit. In some cases, a dog may not allow veterinary care to be given without being with its handler and the handler may be required to remain with the dog at the veterinary unit's location.

Should a dog need further treatment at a Level IV or V veterinary facility, it is the responsibility of the supporting veterinary detachment to coordinate evacuation with their supporting medical regulating office for movement and referral arrangements with the receiving veterinary facility. Note that the USSOCOM liaison officer (LNO) at the Landstuhl Regional Medical Center is responsible for assisting with human casualties and will also assist with canine casualties going through Germany. The LNO has previously arranged lodging and transportation for evacuated dogs and their handlers/escorts, which has proven to be very helpful. The Landstuhl USSOCOM LNO office phone is DSN (314) 486-7776; cell phone is 0162-273-0111.

Veterinary units and dog-owning units must maintain communication as there is no real in-transit visibility on canine patients. Once the dog has been treated/rehabilitated, the veterinary facility will make arrangements with the owning unit for release and travel to home station or other location as required.

Dogs are being used with increasing frequency by SOF units, as they are with conventional units. With larger numbers of dogs performing more at-risk missions, it is imperative that these valuable and difficult-to-replace assets are cared for in a manner and to

a standard similar to that for our human service members. All SOF medical personnel are encouraged to stay engaged with their unit veterinary personnel where such exist. It is important for all providers to understand and be familiar with canine trauma/emergency management principles and planning considerations. For other SOF units with dogs, but no organic veterinary support, work with your local installation veterinary treatment facility personnel for canine first aid and emergency treatment. Questions regarding canine care and planning can be addressed to the USASOC Command Veterinarian at (910) 396-1589 or the USSOCOM Command Veterinarian at (813) 826-6031.

#### REFERENCES

1. Jaegger G, Marcellin-Little DJ, Levine D. (2002). Reliability of goniometry in Labrador Retrievers. *Am J Vet Res.* Jul;63(7):979-86.
2. Army Field Manual 4-02.18, Veterinary Service Tactics, Techniques and Procedures, Ch 3, Sec III, Part 3-11 of FM 4-02.18
3. Villar D, Buck WB, Gonzalez JM. (1998). Ibuprofen, aspirin and acetaminophen toxicosis and treatment in dogs and cats. *Vet Hum Toxicol.* Jun;40(3):156-62.



COL Vogelsang is currently the USSOCOM Deputy Surgeon for Clinical Operations as well as Command Veterinarian. He graduated from Michigan State University with a DVM in 1988. He completed a residency in small animal surgery at the University of California, Davis in 1995 and is a Diplomate of the American College of Veterinary Surgeons. He has twenty years' experience directly caring for or planning/coordinating care for Military Working Dogs. COL Vogelsang has previously served as Chief of Surgery and Dentistry, DOD Military Working Dog Veterinary Service (DODMWDVS) and as Group Veterinarian, 3rd Special Forces Group (Airborne); deploying to Kuwait/Saudi Arabia during Desert Shield/Storm. He will be moving to Lackland AFB, TX this summer to become the Director, DODMWDVS.



LTC Sofaly is currently serving as Chief of Veterinary Medicine, 43rd Medical Detachment (VS) (FWD). She obtained her DVM degree from Colorado State University in 1995 and entered the Army Veterinary Corps that same year. She received a Masters in Veterinary Preventive Medicine from Ohio State University in 2003. LTC Sofaly attained board certification from the American College of Veterinary Internal Medicine in 2003. Previous to deployment, LTC Sofaly commanded the 28th Medical Detachment (VM); she is currently projected to assume command of the 43rd Medical Detachment (VS), Ft. Hood, TX upon return from Iraq.



MAJ Mark Richey is currently serving with the Department of Defense Military Working Dog Veterinary Service at Lackland AFB, Texas. He earned his Doctorate of Veterinary Medicine from Colorado State University in 1995. He accepted a direct commission to the Veterinary Corps in 1998. MAJ Richey received a Master's degree in Specialized Veterinary Medicine (Surgery) from North Carolina State University in 2005, and obtained board certification from the American College of Veterinary Surgeons in 2007. He served as the Commander, 129th MED DET (Veterinary Medicine) in Yongsan, South Korea from 2005 to 2007.



# Air Force Special Operations Command Special Operations Surgical Team (SOST) CONOPS

Mark D. Ervin, MD, FS

## ABSTRACT

The call for small surgical teams to provide direct support to SOF units has gained intensity over the last seven years. In July of 2003, the need for SOF specific Level II (including forward surgical support) was one of the top SOCOM medical lessons learned from OEF. In October of the same year, SOCOM put forth a tasking to develop organic resuscitative surgical capability within SOF.

To respond to this tasking, the components looked to the existing smallest surgical units present in the services' inventories such as the FST, FRSS, and MFST. Army Forward Surgical Teams (FST) and Navy Forward Resuscitative Surgical Squadrons (FRSS) are designed to provide trauma care during maneuver warfare to battalion-sized forces and have delivered exceptional results in OIF. But even though these units are small compared to traditional Level III surgical hospitals, their size is too large to support emerging and short duration SOF missions.

While other components were hindered by the lack of very small surgical units within their services' conventional inventories, AFSOC was able to rapidly acquire a few Air Force Mobile Field Surgical Teams (MFST) and begin developing the training, tactics, techniques, and procedures to meet the SOF community's needs. In doing so, it became clear that "SOF specific" surgical units serve a unique customer, must work within unique constraints, and must be agile enough to provide unique solutions. This paper presents the experiences and lessons learned in the ongoing development of the AFSOC Special Operations Surgical Team (SOST).

## AFSOC SOST HISTORY

In 1995, the AFMS began developing the Mobile Field Surgical Team (MFST). The goal was to provide the absolute smallest personnel and equipment package that could provide trauma surgical care in the austere environment of a newly established air base. The resulting five person team with man portable equipment became one of the core building blocks of what would later become the Air Force EMEDS system.

Throughout its early development, the designers recognized its potential as a stand alone resuscitative surgical package that, because of its size, could uniquely support SOF forces. The pilot unit for the MFST, Wilford Hall Medical Center, developed a rotational coverage between their ten teams to ensure one team was always on standby status for AFSOC taskings. One of these teams was responsible for the first life saved by surgeons during Operation Enduring Freedom. Although the effectiveness of the MFST was recognized by AFSOC early in OEF, the sourcing of these teams out of conventional medical treatment facilities (MTF) posed significant logistical problems in promptly re-

sponding to emerging mission. Critical issues involved difficulties extracting teams out of the MTF for training and missions, monthly changes in personnel on alert status (preventing adequate reading in to classified programs), lack of SOF hardening, and geographic separation from the SOF units with which they were tasked to deploy.

As it became clear that these issues posed insurmountable hurdles to maximizing the effectiveness that these teams could provide to AFSOC, in 2002, the AF SG directed the creation of two MFSTs that would be stationed at Hurlburt Field and be operationally tasked to support AFSOC. The teams were rapidly built and deployed in support of SOF forces engaged in the invasion of Iraq four months later. Although by all reports they performed well during the invasion, the teams returned to home station committed to revising the CONOPS and equipment packages of the conventional MFST to better address the unique mission requirements that SOF forces demanded. With over 9000 deployed man days, 14 deployments and greater than 100 resuscitative surgical

procedures performed, the culmination of lessons learned concerning the delivery of austere surgical care is reflected in this AFSOC Special Operations Surgical Team (SOST) article.

### **AFSOC SOST DOCTRINE**

Traditional joint level II provides patient holding and elevation of care from the CCP. Radiology, lab, and dental care are usually also available at this level. Resuscitative surgical care has traditionally not been codified into level II but rather exists as an independent augmentation with or without co-located level II units. In general, when size and numbers are not an issue, a robust level II and attached resuscitative surgical unit provide an ideal platform to deliver forward surgical care to military deployments. However, due to the very nature of SOF missions, size and personnel numbers have to be kept exceedingly small if there is any hope to be able to include advance trauma care on the mission.

Resuscitative surgical care is based on the principles of damage control surgery practiced in U.S. trauma center operating rooms. For trauma patients that are in severe or prolonged hemorrhagic shock, protracted surgical procedures to definitively address all injuries have a higher than acceptable mortality and morbidity rate. During the lengthy surgical procedures, the death spiral of acidosis, hypothermia, and coagulopathy results in excessive cell injury and eventual death. Abbreviated surgical procedures with the focused goal of hemorrhage control and limiting continued contamination are rapidly performed before returning the patient to an ICU. In the ICU the patient is warmed and resuscitated while coagulation issues are addressed. Once stabilized, the patient is returned to the operating room for more definitive surgical procedures that will restore normal anatomy and anatomic function.

Although forward surgical teams are often required to treat more severely injured patients, they lack the larger amount of Class VIII resources available to modern U.S. trauma centers. Military resuscitative surgery incorporates the principles of civilian damage control surgery into surgical procedures at forward locations to, quickly and economically, convert unstable patients to stabilized patients capable of withstanding evacuation to higher echelons of care. The vast majority of procedures performed by AFSOC surgical teams are not considered definitive and will require evacuation for additional surgical care within the next 48 hours. But by utilizing resuscitative surgical principles, Class VIII usage is minimized and more patients can receive initial surgical care within a brief period of time.

There is a dictum in SOF medical planning that “a bad day in SOF is one casualty.” Although there are instances of multiple severe casualties occurring in SOF operations, this is thankfully a rare occurrence. Due to the skills of the Operators, effective use of body armor, and precision in mission planning, it is rare that direct action operations produce more than one or two casualties that require prompt life saving surgical intervention. Conventional medical planning focuses on “worst case scenarios” and attempts to provide adequately sized surgical teams capable of effectively managing the patient load that these events could produce. Because of the less than overt nature of SOF mission and the usual requirement to minimize the footprint of SOF operations, the weight and cube of these larger medical units excludes their inclusion on the deployment package for most SOF missions.

AFSOC surgical teams are designed with one purpose – to be small enough to fit into the load plan for almost any mission, fast enough to be able to provide care within ten minutes of arriving at a location, and versatile enough to manage the vast majority of potentially life threatening injuries seen in a SOF environment. In the most typical of SOF casualty producing events, this “Silver Bullet” capability to save one or two lives is the AFSOC surgical team’s primary contribution to the mission. The impact of the AFSOC surgical teams is not only measured by the number of surgical cases performed. Perhaps more importantly, it is reflected in the willingness of SOF commanders and combatants to undertake higher gain / higher risk missions knowing that a capable surgical team is available if casualties are taken.

### **AFSOC SOST MISSION CAPABILITY**

#### ***SOST (FFQE3) Mission Capability Statement***

PROVIDES PERSONNEL TO PERFORM ADVANCE TRAUMA LIFE SUPPORT, SURGICAL STABILIZATION AND LIMITED POST-OP CRITICAL CARE IN SUPPORT OF SPECIAL OPERATIONS FORCES IN LOCATIONS FORWARD OF ESTABLISHED HEALTH CARE SUPPORT SYSTEMS. DEPLOYS WITH FFQES, FFQEE, AND FFQEF SPECIAL OPERATIONS SURGICAL EQUIPMENT. ONLY SUBSTITUTION AUTHORIZED IS ANESTHESIOLOGIST (45A3) FOR CRNA (46M3). GRADE/ SKILL LEVEL SUBSTITUTIONS ARE RESTRICTED IAW AFI 10-403, CH 5. BOS REQUIRED.

Assuming a standard mix of traumatic injuries, AFSOC surgical teams are able to provide resuscitative

surgical care for up to ten surgical procedures and ten trauma resuscitations. As each type of traumatic injury will have different Class VIII material requirements, the degree of severity of injured patients will determine the exact number of surgical patients that can be treated. As the teams have very limited holding capability and the Class VIII supplies for post operative care will have to be drawn against supplies allocated to surgical care, rapid post-operative evacuation is essential to maintain maximal surgical capability.

As the team's staffing usually only allows the performance of surgical operations in a serial manner, it is expected to take two to four hours for the team to address the third surgical case. As the injury pattern for most SOF mission sets provides only one to two severely injured combatants, this is rarely a problem but medical planners should research the availability of alternate surgical facilities. Regardless of the number of patients, medical planners will need to plan for aeromedical evacuation of post operative patients to the nearest approved surgical facility for continued care of post operative patients. Mission sets expected to produce much higher levels of U.S. casualties should be supported with a larger conventional surgical unit.

#### **SECONDARY MISSION CAPABILITIES:**

Most conventional surgical units consider themselves tasked with the "consequence management" of the expected outcome of military conflict. They are equipped and tasked to provide care to traumatized combatants that are brought to them. As a SOF unit, AFSOC surgical teams are expected to be prepared to engage effectively in a variety of roles throughout the planning and execution process to best support the JSOTF commander's attainment of mission goals. Although the primary avenue of this support is in the provision of "silver bullet" surgical care for U.S. forces, there are additional capabilities the teams bring to the fight. These include, but are not limited to:

- Rapid movement forward to respond to emerging need
- Modular employment to meet space limitations within theater
- Limited CASEVAC capability
- Limited trauma response capability
- Limited VIP medical escort capability
- MASCAL plan development
- TCCC training / refresher instructors
- Augment of independent duty medical corpsman clinics
- Site assessment of local medical facilities

- MEDCAP support
- Host nation medical outreach
- Host / Allied forces medical training
- Medical / surgical consulting services
- Civil Affairs / NGO liaison

#### **AFSOC SOST MANNING REQUIREMENTS**

AFSOC surgical team's specialty composition is similar to the AF MFSTs that have been employed for over 10 years. Each team consists of a general surgeon, orthopedic surgeon, emergency medicine physician, CRNA, and an OR technician. This composition has proven to be effective in a wide range of mission profiles and provides a great deal of flexibility. AFSOC primary alterations to the MFST standard manning has been the replacement of an OR circulating nurse with an OR technician and the use of CRNAs instead of anesthesiologists. In the following paragraphs, the roles, responsibilities, and justification for each of these positions will be discussed.

In designing the makeup of these small surgical teams, maximal effort was placed in providing the most versatile skill sets into the smallest possible package that could provide competent resuscitative surgical care. While the AFSOC solution may not provide the "best" trauma surgical team composition for certain injuries, the discussion below should demonstrate how the teams are well suited to provide the best possible solution for a wide variety of possible medical scenarios.

In addition, the discussion will report on the non-medical tasking we expect (and train) the team members to perform. It became clear early in the team's development that functioning in the austere SOF environment required the unit to be able to provide greater self reliance than would be required for a similar unit at a more developed conventional forward airbase. The location of these teams in close proximity to SOF units and under the command and control of line units has been critical in meeting these training requirements. Conflicts over competing priorities have proven to be a hindrance to mission readiness and availability in units under the command of brick and mortar medical treatment facilities. Discussion of these additional duties is pertinent as it addresses the mechanism the AFSOC teams have undertaken to reduce the support small SOF units must provide and, therefore, decrease the medical "drag" on tactical SOF operations.

#### **ROLE: GENERAL SURGEON (TRAUMA TEAM LEADER)**

**Rationale:** The general surgeon is the medical director for all trauma care and is an essential component to the surgical team. Subspecialists who have maintained a

portion of their practice seeing general surgery patients can be legitimate substitutions as they all have completed full general surgery residency programs. General surgeons are experienced not only with the operative management of trauma but also trauma resuscitations, ICU medicine, non-trauma surgical disorders, and have limited experience with OB/GYN, orthopedic trauma and chronic medical conditions.

**Additional duties:** Back up to EM physician for team medical care, triage officer

**Non-medical duties:** Weapons

**ROLE: CRNA (ANESTHESIA PROVIDER)**

**Rationale:** The safe and effective delivery of anesthesia to patients undergoing resuscitative surgical procedures requires experienced providers in this specialty. Although anesthesiologists would be clearly able to perform this task, for a variety of reasons, seasoned CRNAs have proven to be the best fit for these surgical teams. Their experience as prior critical care and emergency room nurses provides a resource for crucial nursing skills in managing patients in the pre- and post-operative setting. Their relative abundance compared to physician anesthesia providers in the AFMS allows for a larger pool of candidates to choose from, ensuring the greatest chance to acquire superior personnel. This has been demonstrated by AFSOC CRNAs having been awarded the AF CRNA of the year award in three of the last four years.

**Additional duties:** Nursing duties, trauma airway management, post op recovery, narcotics manager

**Non-medical duties:** Communications

**ROLE: SURGICAL SCRUB TECHNICIAN**

**Rationale:** Having a capable surgical technician who is able to manage the surgical instruments and provide them promptly during a resuscitative surgical procedure is critical to the effective functioning of these small teams. The lack of “scrub” experience for circulating nurses dramatically decreases their effectiveness in this role which is why AFSOC only employs surgical technicians. Their experiences in central sterile supply and logistics have also been of great benefit. AFSOC also trains these individuals to EMT-B levels aiding in their ability to assist during MASCAL and trauma resuscitations.

**Additional duties:** Alternate first assistant, medical logistics, limited bio-medical maintainer, EMT-B

**Non-medical duties:** Non-medical logistics, mechanics, military vehicle drivers

**ROLE: ORTHOPEDIC SURGEON (SURGICAL FIRST ASSISTANT)**

**Rationale:** For non-urgent surgical cases, the prior three discussed positions are the minimum sized team that could reasonably and effectively provide adequate surgical care. For larger trauma cases, the presence of a second set of skilled surgeon’s hands are critical to providing rapid access to actively bleeding sites, to perform the surgery in the least amount of time, and to ensure the best possible surgical outcomes. AFSOC has successfully utilized orthopedists in this role as they have been exposed to trauma surgery within their residency, operate with team general surgeons at home station, and are practicing independent surgeons in their own specialty. Their effectiveness in this role has been not only proven on the AFSOC teams but also in the much greater number of MFSTs within the AFMS inventory.

With the advancement of body armor technology, the relative frequency of severe extremity trauma has markedly increased. Although general surgeons are capable of addressing the majority of life threatening extremity injuries, the orthopedist generally provides these patients with higher quality surgical results due to their expertise in orthopedic trauma. This results in decreased morbidity, faster recovery, and better long-term results for the patient. When deployed, the orthopedist is routinely the most active member of the team addressing muscular-skeletal injuries. The presence of a forward orthopedist frequently acts as a force multiplier by decreasing the number of individuals medically evacuated for conservatively treatable orthopedic issues. Often, these patients can be treated locally and the combatant reinserted into the fight. AFSOC has found that the versatility the orthopedic surgeon provides the team to greatly outweigh the benefit of filling this billet with a second general surgeon.

**Additional duties:** Physical therapy, sports medicine

**Non-medical duties:** Communications, comptroller

**ROLE: EMERGENCY MEDICINE PHYSICIAN (PRE/POST OPERATIVE PROVIDER)**

**Rationale:** With the above mentioned individuals fully engaged in the care of the patient on the operating room table, it is critical to have an individual available to manage the care of patients awaiting surgical care or immediately post operative. AFSOC has used ER physicians to great advantage in this role. The emergency medicine physician is trained in the acute management of trauma, evolving critical illnesses, acute airway management, and has ICU medicine experience. They also

function as the OR circulator during surgical cases, run the ER portion of trauma code, and manage post operative patients when the surgeons are engaged in the OR. They are equipped with a small trauma bag that allows them to respond to patients outside the treatment facility.

They are the primary physician to transport patients to the next echelon of care.

**Additional duties:** Team physician, trauma response, CASEVAC/MEDEVAC provider

**Non-medical duties:** Training officer, Intel, SERE

### AFSOC SOST EQUIPMENT PACKAGES (UTCs)

The SOST allowance standard is designed to be light, modular, and focused on supporting the unit's trauma-focused mission requirements. All items on the allowance standards are intended for resuscitative surgery and associated tasks. As these teams are not intended to provide sick call care, the allowance standard does not include any items solely for use in field primary care. In fact, there is not a single pill on the allowance standard. The allowance standard consists of three separate equipment UTCs – Quick Response, Electronics, and Sustainment.

#### QUICK RESPONSE PACKAGE (FFQEF)

##### MISSION CAPABILITY STATEMENT

**Provides resuscitative surgery and advanced trauma support equipment for up to 10 surgeries. Contained in man-portable field packs capable of being transported as checked baggage. Requires shelter of opportunity for operations. augmented by FFQEE and FFQES as required by mission.**

The first UTC is the unit's core equipment package which provides the most primitive package that meets the unit's mission capability statement. It consists of four bags each weighing less than 100lbs, contains very limited amounts of electronic equipment, and contains no hazardous materials. This allows airline transportation as excess baggage to expedite movement when MILAIR is not available or convenient.

The bags are organized as:

**OR bag:** This bag contains all the instruments and supplies required to perform up to 10 surgical procedures. When opened, this bag lies flat and consists of three separate modular panels that can be quickly separated to be

hung from a wall or laid out on a floor. Each compartment is made of see-through material so needed items can be pointed out to a non-team member to retrieve during surgical procedures when the OR tech is scrubbed. Standard items common to all procedures are packaged in individual quick start packs contained on the outside of the bag to allow the surgical tech to begin preparing the surgical field immediately upon arriving at the operating location. Within the bag, items are organized by category allowing "assistants of opportunity" to be quickly briefed on where to locate common items.

**Litter bag:** This bag contains two collapsible litters and four stanchions to be used as the OR table and back instrument table. When the structure of opportunity contains a suitable surface for the back table, the second stretcher will either not be set up (to save time) or be made available for a second casualty. Also included in this bag are fluids to be used for irrigation and/or resuscitation.

**ER bag:** The ER bag contains a smaller trauma ruck that allows the ER physician to provide initial trauma resuscitation evaluations and treatment either immediately upon arriving at the site or at a forward location. The remainder of the bag contains the additional supplies needed for multiple trauma resuscitations as per the unit's MISCAP.

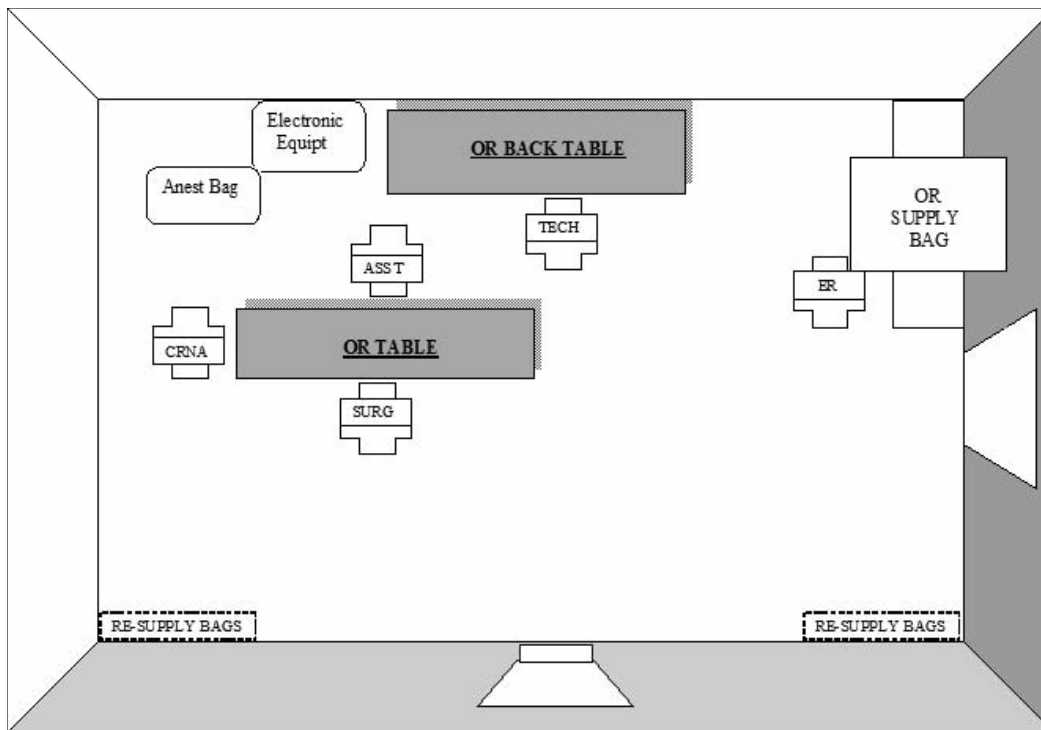
**Anesthesia bag:** This bag supplies all the equipment needed for the delivery of anesthesia and airway management.

All items needed to do an emergency anesthetic in an austere environment are readily accessible in a single compartment for quick access. Contained within the bag is a small ruck that allows the CRNA to initiate a surgical anesthetic. The remainder of the bag contains the additional

supplies needed for multiple surgical cases as per the unit's MISCAP.

By structuring the contents of the bags to the team members using them, the bags can be positioned separately to allow maximum accessibility to the individuals utilizing the contents but keeping them out of the way of efficient flow through the operating room. The diagram of the usual tactical layout of the SOST operating room demonstrates this.





**ELECTRONIC PACKAGE (FFQEE)**  
**MISSION CAPABILITY STATEMENT**

**Provides equipment for surgical and monitoring capabilities when added to FFQES and FFQEF. Can be tailored to meet specific mission requirements. Capable of being transported as checked baggage.**

The second UTC primarily consists of the four hardened containers containing communication and electronic patient care devices (portable ventilator, defibrillator, suction, etc). These can be taken as a package or as individual items in order to best meet mission objectives. All together these items weigh less than 400 lbs and fit with ample room left over in a single tri-wall container. This package is not necessary for providing the surgical care in the austere environment, but does increase the efficiency with which patients can be monitored and treated.

**SUSTAINMENT PACKAGE (FFQES)**  
**MISSION CAPABILITY STATEMENT**

**Equipment sustainment package for FFQEF and FFQEE including critical resupply. Increases surgical capacity to an additional 10 surgeries. Contained in man-portable field packs.**

The third UTC provides additional supplies for the surgical team including a duplicate OR bag and a more robust operating table. This UTC is designed for those missions where the team will provide hub and spoke surgical support. It allows the team to maintain

a complete OR set up at a central site while deploying to a more austere surgical package forward repeatedly. This package is roughly the size of a tri-wall container also.

Including the personal baggage for the five personnel, a surgical team can deploy with all three UTCs and still fit into the space of four tri-wall containers (one half a pallet position). In minimum size configuration, personnel equip-

ment and the first equipment UTC should require about one tri-wall container of space (one eighth of a pallet position).

**AFOSC SOST EMPLOYMENT CRITERIA**

The AFSOC surgical teams are a low density, high demand resource that must be carefully managed if the capability is to be appropriately utilized. With this in mind, the teams have been designed to be able to be rapidly inserted and redeployed with minimal logistical requirements. As only a handful of these teams exist, it is incumbent on medical planners and line commanders to ensure that the teams are accessed only when operational risk is significantly increased and to promptly redeploy the teams when threat levels have declined. Failure to do so prevents other SOF asset access to these teams and negatively impacts the providers' clinical currency. Guidelines for the appropriate utilization of the AFSOC surgical teams are as follows:

**Limited duration SOF mission** Long term requirements for static surgical facilities should be tasked to conventional units. These missions do not utilize the unique capabilities of the AFSOC surgical teams and effectively prevent their use by any other unit. In general, most deployments should be under 30 days with a maximum appropriate deployment being 90 days. Lengths longer than this significantly impact the currency of the providers and limit their surgical effectiveness. With appropriate length taskings, multiple teams can be en-

gaged at one time. With long term static taskings, multiple teams are required to man a single mission.

**Significant risk of trauma casualties** The scarcity of these teams does not allow them to be kept on hand for long periods when the mission is unlikely to produce casualties. An emerging mission may start with limited planning, difficult to ascertain risks and significant concerns for casualties. Once it has become clear that the risk no longer supports the employment of these teams, they must be redeployed so they can be available for other missions

**Absence of more robust DOD surgical facilities nearby** In most cases, there is no indication to employ these teams if adequate DOD or U.S. standard surgical care is available in the immediate area. There are rare cases where OPSEC or other operational needs require the unique skills sets the AFSOC surgical team brings despite ready access to adequate conventional surgical care.

**Limited available space** If load plans will support the employment of more robust surgical units (Army FST, Air Force EMEDS, or Navy FRSS), strong consideration should be given to using these teams. As these teams often require two or more pallet positions to provide surgical care, situations where they can be fit into the airlift load plan tend to be larger SOF operations with far greater numbers of persons at risk. These conventional teams are better equipped to address the larger and more static surgical missions.

**Rapid and frequent movements** The AFSOC teams are designed to rapidly set up and tear down their surgical capability. Missions requiring temporary forward positioning of surgical capability for brief interval are ideally suited to the AFSOC surgical teams design. This ability to forward position surgical capability for periods as short as a couple hours in support of far forward direct action missions is a core competency of these teams. Utilizing a hub and spoke concept, these teams can provide surgical coverage over a wide geographic area to multiple fielded units, shifting locations to support units during periods of increased risk. The requirement for advanced field and survival training provided to the AFSOC surgical teams' members is closely tied to this mission set.

**Rapidly emerging missions** The AFSOC teams' small equipment size allows for movement by commercial air as well as military air. In addition, as they are assigned to line units, they can be rapidly extracted from hospital duties in order to meet emerging mission requirements.

**"Outside the wire" missions** The AFSOC teams training in convoy operations, defensive tactical shoot-

ing, survival, and field skills provides the mission commander with a surgical unit that is comfortable in ground movement through less than permissive areas. Although clearly not combatants, team members are more comfortable than most conventional medics in participating in operations requiring movement outside of the main base of operations.

**OPSEC** All members of the AFSOC surgical teams possess at least a Secret level security clearance, are read on to SOF contingency programs, and are well versed in the OPSEC requirements of less than overt SOF missions. These teams are well suited for mission sets where OPSEC is critical and where it may be desired to avoid individuals receiving treatment being seen by conventional medical providers.

#### **AFOSC SOST TRAINING**

The goal of the SOST training program is to take a group of hospital based providers and transition them into a field proficient SOF surgical team. Great strides have been made recently by the SOSTs parent unit to codify and refine the training program for the surgical teams. During their training, teams learn the concepts and practice of military damage control surgery, the tactical employment of surgical assets, and how to function within the SOF environment. Core to this process is the indoctrination into the philosophy that the role of the SOST is not only to provide surgical care but to also fully engage with the SOF units they are supporting to maximize the team's participation in all aspects of the mission.

It should be stated at the outset that the most critical training for team members is the hands-on delivery of medical care. It is the core task they are expected to perform in the deployed environment. Team members are assigned to a line unit which removes them from the "business plan" in the MTF. Their time in the MTF is for training in critical skills, but they are not encumbered with many of the administrative duties common to hospital based providers.

Trauma care experience is augmented by working at the Air Force C-STARS program at Baltimore Shock Trauma. Team based training on the field use of the equipment package occurs at the unit with both field based animate labs and human patient simulators in the Tactical Operational Medical Skills Center at Hurlburt Field. Both internal and external sources are used to train team members on the techniques and philosophy of military damage control surgery. Additional trauma based training occurs at career field specific training courses such as Operational Emergency Medical Skills, War Surgery, and Ad-

vanced Trauma Care for Nurses courses. In addition, all team members take the TCCC course and are expected to become instructors.

SOST members' field based training is not intended to turn them into "Operators". They remain at all times Geneva Convention medical providers. But their taskings will often require them to travel "outside the wire" in tactical convoys and they are therefore trained to a higher standard. All team members receive field based instruction on survival skills including ground navigation, communication, search and recovery, signaling, and evasion. Convoy training includes driving military vehicles, immediate action drills, MASCAL management, convoy procedures, and defensive maneuvers. Individual team members are individually trained to higher levels on weapons, communications, logistics, SERE, and other tasks based upon their position as listed above. Field training also includes a series of exercises that challenge all of these skills along with delivery of surgical care in the austere environment.

## **AFSOC SOST "TRUTHS"**

### **1) Humans are more important than Hardware**

Our SOF Operators are the most important weapon system in SOCOM's inventory. Surgical teams must be small and agile enough to be where they are most needed in order to provide live-saving surgical care to our combatants. They need to integrate themselves into the planning process so that they can provide leadership the best possible support for the mission at hand.

### **2) Quality is more important than Quantity**

Most often it is the experienced clinician and the skill of the surgical team that saves lives, not the large supply stockroom back in the hospital operating room. The equipment taken to the field should be carefully chosen for its versatility, durability, and simplicity. There is no substitute for a trained, motivated, and somewhat stressed medical provider if one wishes to find a unique way to provide quality surgical care with whatever he has available on hand.

### **3) Competent SOF surgical teams can not be created after the emergency**

SOF surgical teams must work well outside the "comfort zone" of most providers. The tactics and doctrine required to meet the mission must be taught, trained, and exercised aggressively for these teams to work effectively in the SOF environment. Habitual re-

lationships need to be developed within the team and with the units they will support if they are to effectively integrate into the mission.

### **4) SOF surgical teams cannot be mass produced**

It takes especially motivated providers to repeatedly leave the comfortable confines of the hospital to train with these teams and to practice their trade in the most unforgiving of surgical environments. Selection of non-volunteers or billeting teams in an environment that does not foster team building will not provide for surgical teams that meet the mission requirement for high speed, low drag SOF surgical units.

## **SOCOM SURGICAL CARE: THE WAY FORWARD**

The AFSOC SOST has demonstrated that small surgical teams can be effective in providing "silver bullet" trauma care in austere SOF environments. Their successes have quickly raised awareness of their existence and unique capabilities, and increased the demand for these teams. Currently, AFSOC alone cannot meet the SOCOM wide demand to provide this capability across the SOF community, and the demand will certainly continue to increase in the future. It is desired that AFSOC's lessons learned and SOST doctrine discussed in this article will assist other components as they develop teams with similar capability.



Lt Col Mark Ervin graduated from Duke University with a BA in History in 1988 and graduated medical school at Emory University School of Medicine in 1992. He completed a residency in General Surgery at USAF Wilford Hall Medical Center in 1997. He is trained in Aerospace Medicine, Critical Care Aeromedical Transport, and has been involved with development / deployment of small surgical teams since 1996. Lt Col Ervin has flown CCATT missions in Europe, Africa, and the Middle East and was a founding member of the original AFSOC surgical teams. He currently is the Chief of Operational Medicine for Air Force Special Operations Command at Hurlburt Field, FL.



# Clinical Diagnoses in a Special Forces Group: The Musculoskeletal Burden

James H. Lynch, MD, MS and Mark P. Pallis, DO, FAAOS

## ABSTRACT

The published literature contains little epidemiologic information concerning the spectrum of morbidity in Special Operations units. This study defines the burden of illness and injury seen in a Special Forces Group by quantifying the distribution of diagnoses. Excluding administrative categories, musculoskeletal conditions comprised 40% of all clinical diagnoses, raising the question of what more can be done to address the preventable causes of lost time due to injuries. We conclude there is need for increased training in the diagnosis and treatment of musculoskeletal injuries among all healthcare professionals assigned to Special Forces Groups as well as a need for increased education and resources to achieve better strength, conditioning, rehabilitation, and injury prevention for our units.

## INTRODUCTION

From the collective anecdotal experience of 5th Special Forces Group providers who treated numerous middle-aged team sergeants with shoulder, back, and knee overuse injuries, the authors believed some leverage point existed address this issue systemically. First; however, we needed objective data to quantify the extent of this perceived problem.

Our study's aim was to define the spectrum of illness as well as injury seen in a Special Forces Group. This select group consisted primarily of healthy, very fit Soldiers. However, the study found a preponderance of overuse injuries in these patients. This manuscript quantifies the distribution of diagnoses and examines the question of what more can be done to address the preventable causes of lost time due to injuries and illnesses. Very little epidemiologic information is published in the literature concerning the spectrum of morbidity in Special Operations units. Certainly a wealth of information exists concerning *injuries* in diverse populations within the military — only a small fraction of which include Special Operations units. The following highlights some of the background evidence most applicable to our study.

In 1996, the Armed Forces Epidemiological Board (AFEB) Injury Prevention and Control Work Group coined the term “Hidden Epidemic” to refer to injuries as the leading cause of morbidity and mortality in the military.<sup>1</sup> Since then, the U.S. Army Center for Health Promotion and Preventive Medicine (CHPPM), among others, conducted considerable

work to identify, measure, and improve injury outcomes in the military. We know from these studies that the most important causes of morbidity are: training-related injuries, sports, falls, and motor vehicle accidents. Studies from 1994 revealed that accidents during *sports* are the second leading cause of injuries in the Army and Air Force and are the number one cause of hospitalizations.<sup>2</sup> Similar findings were revealed in a study of 10,000 Navy Physical Evaluation Board (PEB) cases from 1998 to 2000. Musculoskeletal conditions were the number one cause and accounted for 41.6% of all PEBs. For perspective, the second leading cause was mental disorders, which accounted for only 12% of Navy PEBs.<sup>3</sup>

Jones and Knapik have extensively studied the impact of physical training on injuries in the military.<sup>4</sup> Their study of exercise-related injuries in 1999 showed that unintentional injuries cause half of all disabilities and account for about half of all outpatient visits. Musculoskeletal conditions and injuries accounted for 28% of hospitalizations in U.S. Army personnel, with the next most common category being digestive diseases at 12%. These authors identified potentially modifiable risk factors which included high volumes of running, low levels of fitness, high and low flexibility, sedentary lifestyle, and tobacco use. Low cardiorespiratory endurance is the most consistently documented risk factor for injuries in the U.S. Army. From other studies we know the rate of injury for different subsets of the military. Incidence rates for operational infantry,

Special Forces, and Ranger units are about 10 to 12 injuries per 100 Soldier-months, which is comparable to collegiate endurance athletes. Of all the types of units studied, Special Forces has the highest incidence of injury rate at 12.1 per 100 Soldier-months.<sup>4</sup>

This pattern is consistent across jobs and branches of the Service. In a one-year injury study of Army mechanics at Fort Bragg, Knapik and colleagues showed 61% of injuries involved the lower back, knee, ankle, foot, and shoulder.<sup>5</sup> While occupation was hypothesized to contribute to injury patterns, injuries in mechanics were most likely the result of physical training, mechanical work, and sports. Notably, airborne operations only caused 9% of injuries. Based on a study of all active duty enlisted Marines in 1997 and 1998, Huang and associates determined that back and upper extremity disorders were among the top four sources of outpatient visits and duty limitations among enlisted Marines.<sup>6</sup> Of interest for military providers with relatively older patients, the study found that injury rates increased with age for 11 of the 15 diagnoses for the back and upper extremity. This is not surprising but has been overlooked in the literature since most military injury data has been obtained from studies on young, healthy basic trainees. In an effort to study seasoned, operational Soldiers versus new recruits, Smith and Cashman evaluated 3,000 active duty light infantry Soldiers, all males between 17 and 48 years old.<sup>7</sup> While not the exact same demographics, this population more closely resembles a Special Forces Group than the numerous new recruit studies. This study revealed that physical training caused 50% of all injuries, and 30% were linked to running. Injuries resulted in 10-times the number of profile days (lost work days) as illnesses. In an attempt to quantify this loss, the investigators determined the average loss of duty time per injured Soldier from physical profiles (light duty). For shoulder injuries, this was 30 days, and for ankle and knee injuries the average profile was about 20 days.

For years others have examined this “hidden epidemic” across the military. We believed that Special Operations Forces ought to be evaluated for similar patterns in the context of all diagnoses to obtain a true picture of the burden of musculoskeletal injuries.<sup>8</sup> This was the aim of our study. We hypothesized that the leading reason for outpatient visits in our Group was for musculoskeletal disorders.

## METHODS

We gathered data using the Composite Health Care System (CHCS) electronic medical record by mining the records for all Soldiers assigned to 5th Special Forces Group (Airborne) at Fort Campbell, Kentucky

who sought care during fiscal year 2007 (FY07). To do this we identified every encounter for all 5th Group primary care physicians and physician assistants during FY07. We included in the study every clinic encounter during this time that was documented in the Armed Forces Health Longitudinal Technology Application (AHLTA) database. Since some encounters had more than one diagnosis, we included in the data the top three diagnoses for each encounter. This totaled 3,180 diagnoses. Each diagnosis was categorized using the International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM). We did not use any form of unique patient identifiers to preserve protected health information. This study was given institutional review board approval by Southeast Regional Medical Command (SERMC).

## RESULTS

Total diagnoses categorized by system are portrayed in Figure 1. The majority of patients seen were for musculoskeletal conditions and education/exams. This second category consists mostly of physical exams and also a small number of other visits for counseling and patient education. If we excluded this “administrative” category from our total clinical diagnoses, then musculoskeletal conditions would make up 1005/2511 or 40% of all clinical diagnoses.

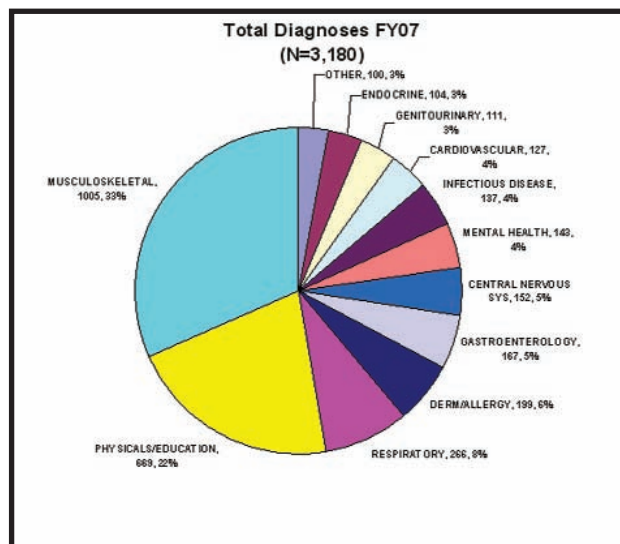


Figure 1. Total Diagnoses by System

From the 1,005 musculoskeletal diagnoses, we then evaluated anatomic location. The locations of affected musculoskeletal conditions in descending order include: back/neck (31%), ankle (10%), shoulder (10%), and knee (10%). Due to the imprecision of some diag-

noses assigned, some conditions existed for which a location was not available (unspecified 14%). Also, the categories of *upper extremity* and *lower extremity* include diagnoses for a limb without a more precise location. These two categories probably resulted in underestimates of shoulder, knee, and ankle conditions.

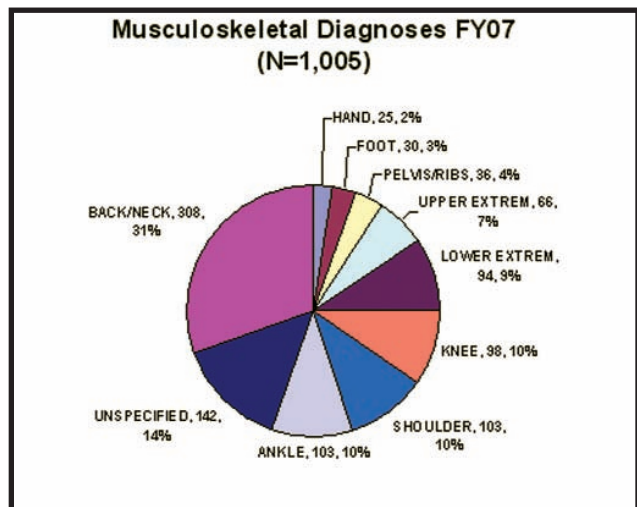


Figure 2. Musculoskeletal Diagnoses by Location

## DISCUSSION

This study helps to quantify the burden of musculoskeletal injuries in an Army Special Forces Group. We found that over 40% of all clinical diagnoses in the 5<sup>th</sup> Group Clinic were for musculoskeletal problems. This finding is comparable to previously published studies of Army populations.<sup>4,7</sup> With the average time spent on profile (light duty) of 20 to 30 days<sup>7</sup> and over one thousand clinic visits for musculoskeletal conditions, the operational impact on the unit is significant.

Spine and upper extremity-related diagnoses accounted for 50% of the musculoskeletal diagnoses. This differs from other studies of Army populations, where lower extremity diagnoses predominate.<sup>4,5,7</sup> This may be due to the slightly older average age of our Soldiers versus conventional units, in addition to the cumulative effect of repetitive micro trauma from airborne operations, combatives training, wearing heavy body armor, and carrying heavy loads.

This study has certain limitations. First, the total number of patients seen in the Troop Medical Clinic may not accurately reflect the true number of Soldiers who sustained a musculoskeletal injury. Many Special Forces Soldiers seek treatment from their Special Forces Medical Sergeants (18Ds) and never report to the clinic. In fact, it is only after several weeks of treatment by the medic that many Soldiers even report

to the physicians or therapist. Additionally, the encounter data used in this study does not include the Soldiers that the Group Surgeon evaluated and treated in the Orthopaedic Surgery Clinic, nor does it include Soldiers initially evaluated and treated by the Group Physical Therapist. The actual number of musculoskeletal injuries would certainly be much higher had we included this data.

Second, this study relied on the ICD-9 diagnostic code entered by the treatment provider. There is considerable variability among providers as to the diagnostic codes used for certain injuries. Further, it is not known whether the recorded diagnoses reflected the actual conditions that were treated. Greater consistency among diagnoses would have allowed for more precise interpretation.

Despite these limitations, this study highlights the need for increased training in the diagnosis and treatment of musculoskeletal injuries among primary care physicians and physician assistants assigned to Special Forces Groups. The typical family medicine resident, for example, spends one to three months out of three years of training in orthopaedics while other specialties spend considerably less. Physicians and PAs assigned to Special Forces Groups should undergo refresher training prior to or immediately upon assignment to Special Forces. This could easily be done by spending several weeks in an orthopaedic clinic, or through a specific program of instruction given by the Group Physical Therapist. Our population is decidedly different from what is typically seen in adult medicine clinics both in and outside of the military system, therefore our training should be modified to match.<sup>9</sup>

Military medical providers including those in SOF units should receive additional training in coding properly. The importance of accurately coding for a diagnosis is often minimized in the rush to get through a busy clinic. Other times, uncertainty of the exact diagnosis results in a vague ICD-9 code. This is a disservice to both the patient and the unit. Accurate diagnostic codes with appropriate E codes (cause/place of injury) allow unit surgeons to collect better epidemiologic data on non-battle injuries and to provide commanders with objective data with which to make sound decisions. Accurate coding enables a more complete assessment of the potential threats to unit readiness and the development of more effective measures to combat these threats.

The Special Forces Medical Sergeants should also receive more training in the diagnosis, treatment, and prevention of musculoskeletal injuries, both in their initial training and subsequent centralized sustainment

training. The 18D training is mainly focused on trauma management (with good reason), yet they serve as the primary caregiver for the members of their Operational Detachments both in garrison and while deployed. Currently, musculoskeletal training in the 46-week Special Forces Medical Sergeant Course consists of 50 hours of didactics and a 1-week orthopaedic clinical rotation. In an effort to improve their musculoskeletal diagnostic and treatment skills, the 5th Special Forces Group has incorporated orthopaedic clinic rotations in all medical proficiency training and has added orthopaedic/physical therapy lectures and hands-on training to all non-trauma module training.

Finally to focus more on prevention, Special Forces Groups should modify unit physical training programs to incorporate the fitness and performance fundamentals used in today's top athletic programs. Military researchers have shown that modified physical training programs can result in lower injury rates with improvements in physical fitness.<sup>10,11</sup> Training regimens that emphasize core strength and cross-training would likely increase physical readiness while decreasing the incidence of spine and lower extremity injuries. Other SOF units have demonstrated the value of additional expertise and resources dedicated to functional fitness principles. Specifically, Special Forces Groups should hire Certified Strength and Conditioning Specialists (CSCS) as coaches to oversee physical training and to consult with the Group Physical Therapist. An invaluable asset, the Group Physical Therapist must have a Physical Therapy Technician to assist with clinical duties, which have to this point precluded him from focusing on Group physical training and injury prevention. By making these changes to training and resourcing, Special Forces Groups will be investing in our most lethal weapon—the individual Special Forces Soldier.

## CONCLUSION

This study quantifies the extent of the musculoskeletal burden of illness in a Special Forces Group. The data defines a somewhat different injury pattern than has been previously published in other military injury studies. These results underscore the need for increased training in the diagnosis and treatment of musculoskeletal injuries among all healthcare professionals assigned to Special Forces Groups as well as

the need for increased education and resources to achieve better strength, conditioning, rehabilitation, and injury prevention for our units. Future studies should be aimed at further evaluating the extent of musculoskeletal injuries across Special Operations Forces and should address the effectiveness of available interventions.

## ACKNOWLEDGMENT

We would like to thank LTC Mark Trawinski, LTC Kao Bin Chou, and MAJ David Haight for their critical review of this article. We give very special thanks to Mrs. Mary Arrington of Blanchfield Army Community Hospital Outcomes Management without whom this study would have been impossible.

## REFERENCES

1. Jones BH, Hansen BC, eds. (1996). *Injuries in the military: A hidden epidemic*. Aberdeen Proving Ground, MD: U.S. Army Center for Health Promotion and Preventive Medicine, November 1996 (Tech. Rep. 29HA 4844 978).
2. Jones BH, Perrotta DM, Canham-Chervak ML, Nee MA, Brundage JF. (2000). Injuries in the military: A review and commentary focused on prevention. *Am J Prev Med*, 18(3S):71-84.
3. Bohnker BK, Telfair T, McGinnis JA, Malakooti MA, Sack DM. (2003). Analysis of Navy physical evaluation board diagnoses (1998-2000). *Milit Med*, 168(6):482-485.
4. Jones BH, Knapik JJ. (1999). Physical training and exercise-related injuries. *Sports Med*, 27(2):111-125.
5. Knapik JJ, Jones SB, Darakjy S, Haurer KG, Bullock SH, Sharp MA, Jones BH. (2007). Injury rates and injury risk factors among U.S. Army wheel vehicle mechanics. *Milit Med*, 172(9):988-996.
6. Huang GD, Feuerstein M, Arroyo F. (2001). Back and upper extremity disorder among enlisted U.S. Marines: Burden and individual risk factors. *Milit Med*, 166(11):1007-1017.
7. Smith TA, Cashman TM. (2002). The incidence of injury in light infantry Soldiers. *Milit Med*, 167(2):104-108.
8. Mercer G, Strock M. (2005). Introduction of functional physical training into Special Operations units. *J Spec Opns Med*, (5)1:54-59.
9. Jackson JL, Strong J, Cheng EY, Meyer G. (1999). Patients, diagnoses, and procedures in a military internal medicine clinic: Comparison with civilian practices. *Milit Med*, 164(3):194-7.
10. Knapik JJ, Darakjy S, Scott SJ, et al. (2005). Evaluation of a standardized physical training program for basic combat training. *J Str and Condit Research*, 19(2):246-253.
11. Knapik JJ, Bullock SH, Canada S, Toney E, Wells JD, Hoedebecke, Jones BH. (2004). Influence of an injury reduction program on injury and fitness outcomes among Soldiers. *Injury Prevention*, 10:37-42.



MAJ Jim Lynch, MD, MS, is a 1989 graduate of the U.S. Military Academy. He obtained his Master of Science in Healthcare Improvement from Dartmouth College in 2001 and graduated from Brown Medical School in 2003. He completed his residency training in Family Medicine at Tripler Army Medical Center in 2006. He is currently serving as Battalion Surgeon, 2nd Battalion, 5th Special Forces Group (Airborne) at Fort Campbell, Kentucky.



LTC Mark Pallis, DO, FAAOS, is a 1996 graduate of the University of Medicine and Dentistry of NJ, School of Osteopathic Medicine. He completed a Transitional Internship at Walter Reed in 1997 with follow-on assignment as Battalion Surgeon, 2/3rd Special Forces Group (Airborne). He completed his residency training in Orthopaedic Surgery at Tripler in 2003. Following residency, he was assigned to Blanchfield Army Community Hospital at Fort Campbell and served as a medical augmentee to USSOCOM. He is currently serving as Group Surgeon, 5th Special Forces Group (Airborne). He has multiple deployments to Iraq and Afghanistan in support of the Global War on Terrorism.

# ABSTRACTS FROM CURRENT LITERATURE

## **Can Urine Dipstick be Used as a Surrogate for Serum Creatinine in Emergency Department Patients Who Undergo Contrast Studies?**

Daniel Firestone MD; Adam Wos MD; James P. Killeen MD; Theodore C. Chan MD; Kama Guluma MD; Daniel P. Davis MD; and Gary M. Vilke MD

*Journal of Emergency Medicine* Volume 33, Issue 2, August 2007, Pages 119-122

### **ABSTRACT**

Contrast-induced nephropathy (CIN) is a complication associated with contrasted computed tomography (CT). Elevated creatinine (Cr) is often used to screen for CIN. This study evaluates dipstick urinalysis (Udip) detection of Cr > 1.5 mg/dL. If sufficiently sensitive, Udip results could then be incorporated into future rapid screening protocols for patients undergoing contrast studies. This retrospective record review evaluated all Emergency Department patients over 2 years with documented Udip and serum creatinine results. Patient demographics and pertinent past medical history were also collected. Data were collected on 2421 patient visits, with 241 having Cr > 1.5 mg/dL (9.9%). There were 923 patient visits with a negative Udip (38.1%). Sensitivity and negative predictive value for abnormal Udip in detecting elevated creatinine were 85.5% and 96.2% ( $p < 0.01$ ), respectively. Thirty-five patient visits (among 26 patients) had negative urine dip and Cr > 1.5 mg/dL, but each reported at least one of the following at triage: prior renal disease, hypertension, diabetes, congestive heart failure, or age > 60 years. Udip is a sensitive screening test, but alone is not accurate enough to predict patients at potential risk for CIN (Cr > 1.5 mg/dL). However, combining Udip results with risk factor screening may allow a rapid method for predicting which patients may safely undergo contrast CT scanning in the ED, but this needs prospective evaluation.

## **Impact of Activated Charcoal After Acute Acetaminophen Overdoses Treated with N-Acetylcysteine**

Henry A. Spiller MS, DABAT; Tama S. Sawyer PHARMD, CSPI

*Journal of Emergency Medicine* Volume 33, Issue 2, August 2007, Pages 141-144

### **ABSTRACT**

Previous studies have suggested that patients receiving both activated charcoal (AC) and N-acetylcysteine (NAC) after acute acetaminophen (APAP) overdoses may have improved outcomes. We evaluated all acute acetaminophen overdoses that received NAC therapy reported to U.S. poison centers for the years 1993 through 2004. Groups were separated based on therapy received: 1) both AC and NAC and 2) NAC alone. There were 97,960 acetaminophen overdoses reported, with 49,427 patients (50%) receiving NAC and AC. Reports of AST/ALT > 1000, a major effect, and death were 1301 (2.9%), 2957 (6.6%), and 232 (0.5%), respectively, for patients receiving NAC plus AC, vs. 5273 (12%), 4534 (10.3%), and 369 (0.8%), respectively, for patients receiving NAC alone ( $p < 0.01$ ). Use of Toxic Exposure Surveillance System data in the present study has a number of limitations, including its retrospective nature and no documentation of when NAC therapy was initiated. It is possible that those patients who did not receive AC presented to the Emergency Department later in their overdose and had NAC therapy initiated later, and therefore they were predisposed to a greater risk of hepatic injury. Evaluation of 12 years of acute APAP overdoses suggests that the use of AC, in addition to NAC therapy, may provide improved patient outcomes.

## Recombinant Activated Factor VII Increases Survival Time in a Model of Incompressible Arterial Hemorrhage in the Anesthetized Pig

Sapsford, Wayne FRCS; Watts, Sarah PhD, MRCVS; Cooper, Graham PhD; Kirkman, Emrys PhD  
*Journal of Trauma-Injury Infection & Critical Care*. 62(4):868-879, April 2007.

### ABSTRACT

**Background:** Hemorrhage is the leading cause of death in battlefield casualties and the second leading cause of death after civilian trauma. Evacuation time for military casualties to surgical care can be prolonged and improved hemostasis could greatly reduce mortality. There are several anecdotal reports that recombinant activated factor VII (rFVIIa) may arrest uncontrolled bleeding after trauma. However, the majority of prospective randomized controlled trials show little benefit in survival. The aim of this study was to determine whether rFVIIa could increase survival time within a clinically relevant time scale for military practice and reduce the volume of blood loss in a model of incompressible arterial hemorrhage. A secondary aim was to determine the effects of hypotensive versus normotensive resuscitation on the effectiveness of rFVIIa. **Methods:** Terminally anaesthetized Large White pigs were randomly allocated to one of four treatment groups. All animals received a controlled hemorrhage of 40% of the total estimated blood volume. They were given either rFVIIa (180 [ $\mu$ g/kg) or placebo (saline 0.3 mL/kg) intravenously and a 4 to 5 mm longitudinal aortotomy created in the infra renal aorta before resuscitation commenced with 0.9% saline to one of two target systolic arterial blood pressures (SBPs): 110 mm Hg (normotensive) or 80 mm Hg (hypotensive). Group sizes were as follows: placebo/normotensive (6), placebo/hypotensive (7), rFVIIa/normotensive (7), and rFVIIa/hypotensive (7). Survival was monitored for a maximum of 6 hours after the onset of resuscitation. **Results:** rFVIIa was associated with a significantly prolonged survival time in animals managed hypotensively (214 [79-349] vs. 35 [19-52] minutes mean [95% confidence interval] rFVIIa vs. placebo,  $p = 0.03$  Peto log rank test). There was no significant difference in survival time between those given rFVIIa and placebo in groups managed normotensively (128 [6-249] vs. 40 [15-66] minutes respectively,  $p = 0.27$ ). Both rFVIIa and hypotensive management were associated with reduced uncontrolled hemorrhage volumes. There was no evidence of inappropriate intravascular thrombi or microthrombi associated with the use of rFVIIa. **Conclusions:** rFVIIa, combined with hypotensive resuscitation, can increase survival time and reduce hemorrhage in a model of arterial hemorrhage. The increase in survival time is clinically relevant for military evacuation of battlefield casualties to surgical care.

## Household Firearm Ownership and Rates of Suicide Across the 50 United States

Miller, Matthew MD, ScD; Lippmann, Steven J. BS; Azrael, Deborah PhD; Hemenway, David PhD  
*Journal of Trauma-Injury Infection & Critical Care*. 62(4):1029-1035, April 2007.

### ABSTRACT

**Background:** The current investigation explores the association between rates of household firearm ownership and suicide across the 50 states. Prior ecologic research on the relationship between firearm prevalence and suicide has been criticized for using problematic proxy-based, rather than survey-based, estimates of firearm prevalence and for failing to control for potential psychological risk factors for suicide. We address these two criticisms by using recently available state-level survey-based estimates of household firearm ownership, serious mental illness, and alcohol/illicit substance use and dependence. **Methods:** Negative binomial regression was used to assess the relationship between household firearm ownership rates and rates of firearm, nonfirearm, and overall suicide for both sexes and for four age groups. Analyses controlled for rates of poverty, urbanization, unemployment, mental illness, and drug and alcohol dependence and abuse. **Results:** U.S. residents of all ages and both sexes are more likely to die from suicide when they live in areas where more households contain firearms. A positive and significant association exists between levels of household firearm ownership and rates of firearm and overall suicide; rates of nonfirearm suicide were not associated with levels of household firearm ownership. **Conclusion:** Household firearm ownership levels are strongly associated with higher rates of suicide, consistent with the hypothesis that the availability of lethal means increases the rate of completed suicide.

## Early Versus Late Recombinant Factor VIIa in Combat Trauma Patients Requiring Massive Transfusion

Perkins, Jeremy G. MD; Schreiber, Martin A. MD; Wade, Charles E. PhD; Holcomb, John B. MD  
*Journal of Trauma-Injury Infection & Critical Care.* 62(5):1095-1101, May 2007.

### ABSTRACT

**Background:** Coagulopathy is a consequence of severe trauma, especially in massively transfused patients ( $\geq 10$  units of red blood cells in 24 hours), and is associated with increased mortality. We hypothesized that recombinant factor VIIa (rFVIIa) administered to massive transfusion patients before transfusion of 8 units of blood (early) would reduce transfusion requirements compared with rFVIIa after 8 units (late). **Methods:** We retrospectively reviewed records for trauma admissions to combat support hospitals in Iraq between January 2004 and October 2005. Patients requiring a massive transfusion and receiving rFVIIa were identified. Groups were divided into those who received rFVIIa early or late. **Results:** Of 5,334 trauma patients (civilian and military), 365 (6.8%) required massive transfusion. Of these, 117 (32%) received rFVIIa. Complete records for blood transfusions were available for 61 patients: 90% had penetrating trauma, 17 received rFVIIa early, and 44 received it late. At admission, temperature, heart rate, blood pressure, Glasgow Coma Scale score, base deficit, hemoglobin, platelets, prothrombin time/International Normalized Ratio, and Injury Severity Score were similar in both groups as were administered units of fresh frozen plasma, fresh whole blood, cryoprecipitate (cryo), and crystalloid. The early rFVIIa group required fewer units of blood during the first 24-hour period (mean 20.6 vs. 25.7,  $p = 0.048$ ) and fewer units of stored red blood cells (mean 16.7 vs. 21.7,  $p = 0.049$ ). Early and late mortality (33.3% vs. 34.2%,  $p = \text{NS}$ ), acute respiratory distress syndrome (5.9 vs. 6.8%,  $p = \text{NS}$ ), infection (5.9% vs. 9.1%,  $p = \text{NS}$ ), and thrombotic events (0% vs. 2.3%,  $p = \text{NS}$ ) were similar. **Conclusions:** Early administration of rFVIIa decreased red blood cell use by 20% in trauma patients requiring massive transfusion.

## How Dangerous is BASE Jumping? An Analysis of Adverse Events in 20,850 Jumps From the Kjerag Massif, Norway

Soreide, Kjetil MD; Ellingsen, Christian Lycke MD; Knutson, Vibeke MSc  
*Journal of Trauma-Injury Infection & Critical Care.* 62(5):1113-1117, May 2007.

### ABSTRACT

**Background:** Extreme sports, including BASE (building, antenna, span, earth) jumping, are rapidly increasing in popularity. Associated with risk for injuries and deaths, this activity may pose a burden on the emergency system. Hitherto, no reports exist on accidents and deaths associated with BASE jumping. **Methods:** We reviewed records of 20,850 BASE jumps from 1995 to 2005 at the Kjerag massif in Norway. Frequency of deaths, accidents, and involvement of helicopter and climbers in rescue are analyzed. Fatalities were scored for injury severity scores (Abbreviated Injury Scale score, Injury Severity Score, New Injury Severity Score) on autopsy. **Results:** During an 11-year period, a total of 20,850 jumps (median, 1,959; range, 400-3,000) resulted in 9 fatal (0.04% of all jumps; 1 in every 2,317 jumps) and 82 nonfatal accidents (0.4% of all jumps; 1 in every 254 jumps). Accidents increased with the number of jumps ( $r = 0.66$ ;  $p = 0.007$ ), but fatalities did not increase, nor did activation of helicopter or climbers in rescue ( $p > 0.05$ ). Helicopter activation (in one-third of accidents) in rescue correlated with number of accidents ( $r = 0.76$ ,  $p = 0.007$ ), but not climbers. Postmortem examination ( $n = 7$ ) of fatalities revealed multiple, severe injuries (Abbreviated Injury Scale score  $\geq 3$ ) sustained in several body regions (median, Injury Severity Score 75; range, 23-75). Most nonfatal accidents were related to ankle sprains/fracture, minor head concussion, or a bruised knee. **Conclusion:** BASE jumping appears to hold a five- to eightfold increased risk of injury or death compared with that of skydiving. The number of accidents and helicopter activation increases with the annual number of jumps. Further analysis into the injury severity spectrum and associated hospital burden is required.



## The Value of Conservative Treatment in Ruptures of the Anterior Cruciate Ligament (ACL)

Strehl, Alexander MD; Egli, Stefan MD

*Journal of Trauma-Injury Infection & Critical Care.* 62(5):1159-1162, May 2007.

### ABSTRACT

**Background:** Thirty-eight of the 73 consecutive acute ruptures of the anterior cruciate ligament (ACL) proven by a magnetic resonance imaging scan (MRI) in skeletally mature patients (16-55 years old) were classified as suitable for primarily conservative treatment. Patient selection was performed using a preoperative screening protocol based on the structural damage, clinical symptoms, compliance, sportive activity, and the consent of a well-informed patient. **Methods:** In 12 of the 38 treated patients, the conservative protocol showed a good to very good outcome, 2 patients had persistent giving-way and were considering ACL reconstruction, 14 patients had a secondary ACL reconstruction in our clinic (average 5.3 months after injury), 9 patients were operated on in other hospitals (average 13.3 months after injury), and 1 patient was lost to follow-up. **Results:** All patients with successful conservative treatment were able to perform low-risk pivoting sports and two patients are practicing high-risk pivoting sports. The average International Knee Documentation Committee (IKDC) score was 92.5 (82.8-98.9); the subjective overall knee function was 93% (60% to 100%). Of the 12 patients with good and very good results, 6 continued playing the same sports at an unreduced intensity, 4 patients reduced their activities slightly, and 1 patient played more sports than before. **Conclusions:** Although the authors performed a preoperative screening to select patients suitable for conservative treatment, almost two-thirds of the primarily conservatively treated ACL ruptures needed an operative reconstruction in the long term. In one-third of the patients, conservative treatment led to a good or very good result. At the endpoint of the study only 12 (16%) of a total of 73 patients with acute injuries of the ACL had successful conservative treatment. Therefore, patients must be comprehensively instructed about the treatment program and the chances of success of conservative ACL treatment.

## Penetrating Gunshot Injuries to the Brain

*Journal of Trauma-Injury Infection & Critical Care.* 62(6):1446-1451, June 2007.

Kim, Tae-Won MD; Lee, Jung-Kil MD; Moon, Kyung-Sub MD; Kwak, Hyoung-Jun MD; Joo, Sung-Pil MD; Kim, Jae-Hyoo MD; Kim, Soo-Han MD

### ABSTRACT

**Background:** Civilian gunshot injuries to the brain are relatively rare and study of these injuries has been neglected in South Korea. **Methods:** Thirteen patients with civilian craniocerebral gunshot injuries were admitted to the Chonnam National University Hospital during a period of 22 years. A retrospective analysis of these patients with regard to outcome and prognostic factors was performed. **Results:** The Glasgow Coma Scale (GCS) score at admission was recorded to be 3 to 5 in one patient, 6 to 8 in three patients, 9 to 12 in two patients, and 13 to 15 in seven patients. The admission GCS score was the most valuable prognostic factor. Of the nine patients with a GCS score of more than 8, eight patients survived with favorable outcomes; of the four patients with a GCS score of less than 8, all had unfavorable outcomes (1 died, and 3 had severe disability). There was a correlation between the presence of a transventricular or bihemispheric trajectory and poor outcome. **Conclusions:** Patients with GCS scores of more than 8 or brain lesions limited to a single lobe of the brain can benefit from early aggressive management. Our results suggest that retained fragments after first debridement did not increase the risk of infection or seizure.

## Motor Vehicle-Related Cardiac and Aortic Injuries Differ From Other Thoracic Injuries.

Conroy, Carol MPH, PhD; Hoyt, David B MD, FACS; Eastman, A Brent MD, FACS; Holbrook, Troy Lisa MS, PhD; Pacyna, Sharon RN, BSN, MPH; Erwin, Steve; Vaughan, Teresa RN, MFS; Sise, Michael MD, FACS; Kennedy, Frank MD, FACS; Velky, Tom MD, FACS

*Journal of Trauma-Injury Infection & Critical Care.* 62(6):1462-1467, June 2007.

### ABSTRACT:

**Background:** Traumatic cardiac and thoracic aortic injuries are hypothesized to result from rapid deceleration of occupants during a motor vehicle crash. The purpose of this study was to identify potential risk factors for motor vehicle-related cardiac and thoracic aortic (HTA) injury using the Crash Injury Research Engineering Network (CIREN) database. **Methods:** CIREN data were used to test the hypothesis that there is no difference between occupants with HTA injury and occupants with thoracic injury other than the heart or aorta (non-HTA). Occupant variables (restraint use, airbag deployment, Glasgow Coma Scale score, Injury Severity Score, concomitant injuries, driver versus passenger status, height, and comorbidity) and crash variables (principal direction of force, change in velocity, vehicle crush, intrusion, and vehicle type) were compared for these two groups. Odds ratios were used to quantify the potential risk factors for HTA injury compared with non-HTA injury. **Results:** There were 168 occupants with an HTA injury and 731 with a non-HTA injury. Greater crash severity (based on vehicle crush and change in velocity), improper safety belt use, and lack of safety belt use were significantly associated with HTA injury. Unrestrained occupants had almost three times the chance of having an HTA injury (odds ratio = 2.86;  $p < 0.05$ ). For restrained drivers, 41.4% of HTA injuries were caused by vehicle interior components. When not protected by both safety belts and air bags, 45.7% of driver HTA injuries were caused by the steering wheel. For passengers, the vehicle interior (arm-rests, side interior, and B-pillars) accounted for most HTA injuries regardless of safety system status. More than half of all occupants wearing safety belts who sustained an HTA injury were improperly wearing their safety belts. **Conclusion:** The high mortality associated with cardiac and aortic injuries supports the need to prevent these injuries from occurring during motor vehicle crashes. These results suggest proper use of safety belts is necessary to prevent cardiac and thoracic aortic injuries. However, other important potential risk factors, such as motor vehicle size and crash severity, might continue to present a challenge to motor vehicle safety professionals.

## Are Patients With Self-Inflicted Injuries More Likely to Die?

David, Jean-Stephane MD, PhD; Gelas-Dore, Benedicte MSc; Inaba, Kenji MD, MSc; Levrat, Albrice MD; Riou, Bruno MD, PhD; Gueugniaud, Pierre-Yves MD, PhD; Schott, Anne-Marie MD, PhD

*Journal of Trauma-Injury Infection & Critical Care.* 62(6):1495-1500, June 2007.

### ABSTRACT

**Background:** Suicide represents one of the leading causes of trauma in industrialized countries. However, when compared with unintentional injury and assault, the outcome of self-inflicted injury has not been well described. **Methods:** All patients admitted to a French academic trauma center from January 2002 to December 2004 and listed in a trauma data bank were included in a prospective analysis. Variables including mortality, circumstances (unintentional vs. assault vs. self-inflicted), and mechanism of injury were recorded. **Results:** About 1,004 continuous trauma patients were analyzed: 151 (15%) with self-inflicted injuries, 761 (76%) with unintentional injuries, and 91 (9%) with injuries from assault. When compared with patients suffering from unintentional injuries and assault, self-inflicted injury patients presented more frequently after a fall from height (94 of 151 vs. 133 of 759 and 0 of 91,  $p < 0.05$ ) and with a severe head injury (47 of 151 vs. 172 of 752 and 10 of 91,  $p < 0.05$ ). They also had a more severe injury (Injury Severity Score, 28 +/- 21 vs. 22 +/- 16 and 12 +/- 10;  $p < 0.05$ ), a lower probability of survival (Trauma Related Injury Severity Score, 0.71 +/- 0.37 vs. 0.83 +/- 0.28 and 0.92 +/- 0.19;  $p < 0.05$ ), and survival rate (70% vs. 85% and 93%,  $p < 0.05$ ). In multivariate analysis, Trauma Related Injury Severity Score (odds ratio, 0.54; 95% confidence interval, 0.45-0.59;  $p < 0.001$ ), age (odds ratio, 1.17; confidence interval, 1.02-1.34;  $p < 0.05$ ), and mechanism of trauma ( $p = 0.01$ ) were independently correlated with the final mortality rate. **Conclusions:** Self-inflicted injury patients presented with a higher mortality rate that was related to increased injury severity. The circumstances surrounding the trauma were not independently associated with an increased odds ratio of death after major trauma.

## Acute Mountain Sickness: Influence of Fluid Intake

Maria Antonia Nerín, MD; Jorge Palop, MD; Juan Antonio Montaña, MD; José Ramón Morandeira, MD; Manuel Vázquez, RN

*Wilderness and Environmental Medicine: Vol. 17, No. 4, pp. 215–220.*

**Objective:** High altitude and exposure to cold are associated with significant levels of dehydration because of cold-altitude urine output, high energy expenditures, and poor access to water. The aims of the present study were to measure the fluid intake and urine output among military mountaineers during their stay at high altitude and to study the level of fluid intake and decrease in urine output in relation with acute mountain sickness (AMS). **Methods:** This study used an analytic prospective follow-up design of hydration-dehydration conditions of a group of mountaineers with similar characteristics (military group). Data collected each day included quantity and type of fluid intake, urine output in 24 hours, other fluid output (as diarrhea or vomiting), and symptoms or signs of AMS according to the Lake Louise consensus score. Values are given as mean  $\pm$  SE. A 1-factor analysis of variance procedure and *t* test were used to compare variables. **Results:** The mountaineers consumed a variety of fluids, including water, tea, coffee, soup, Isostar, and milk. Daily fluid intake was  $2800 \pm 979$  mL, with a maximum intake of 4700 mL. Daily urine output was  $1557 \pm 758$  mL. When we stratify our sample at the median by fluid intake, a significant correlation is detected with mean balance and mean urine output. Mountaineers developing AMS demonstrated reduced urine output (mean 1336 mL) when compared with those without AMS (mean 1655 mL). **Conclusions:** We found that fluid intake was associated but insignificantly correlated with incidence and degree of AMS. Past research suggests that vigorous hydration decreases incidence and severity of AMS and other altitude illnesses. Our results also imply that aggressive fluid intake is protective, but our limited sample size yielded insufficient power to demonstrate a statistically significant difference.

*Key Words:* altitude sickness, dehydration, prevention

## Venomous Adversaries: A Reference to Snake Identification, Field Safety, and Bite-Victim First Aid for Disaster-Response Personnel Deploying Into the Hurricane-Prone Regions of North America

Edward J. Wozniak, DVM, PhD; John Wisser, MS; Michael Schwartz, MD

*Wilderness and Environmental Medicine: Vol. 17, No. 4, pp. 246–266.*

Each hurricane season, emergency-preparedness deployment teams including but not limited to the Office of Force Readiness and Deployment of the U.S. Public Health Service, Federal Emergency Management Agency, Deployment Medical Assistance Teams, Veterinary Medical Assistance Teams, and the U.S. Army and Air Force National Guard are at risk for deploying into hurricane-stricken areas that harbor indigenous hazards, including those posed by venomous snakes. North America is home to 2 distinct families of venomous snakes: 1) Viperidae, which includes the rattlesnakes, copperheads, and cottonmouths; and 2) Elapidae, in which the only native species are the coral snakes. Although some of these snakes are easily identified, some are not, and many rank among the most feared and misunderstood animals. This article specifically addresses all the native species of venomous snakes that inhabit the hurricane-prone regions of North America and is intended to serve as a reference to snake identification, basic field safety procedures, and the currently recommended first-aid measures for snakebite casualties.

*Key Words:* snakes, snakebite, envenomation, hurricanes, snake identification

## Chitosan Dressing Provides Hemostasis in Swine Femoral Arterial Injury Model

Scott B. Gustafson, DVM, MS; Pam Fulkerson, DVM; Robert Bildfell, DVM, MSc;  
Lisa Aguilera, MS, AHT; Timothy M. Hazzard, PhD, DVM  
*Prehospital Emergency Care* 2007;11:172-178

### ABSTRACT

**Objective:** Chitosan dressings have been shown to be effective in improving survival of severe parenchymal injuries in an animal model and in treating prehospital combat casualties. Our goal was to test the efficacy of chitosan acetate dressings in providing durable hemostasis in a high-flow arterial wound model. **Methods:** A proximal arterial injury was created with 2.7mm vascular punches in both femoral arteries of fourteen anesthetized swine. By using a crossover design, 48-ply gauze (48PG) or a chitosan dressing (HC) was applied with pressure to the injury for 3 minutes and then released. If hemostasis was not maintained for 30 minutes, a second identical attempt was made by using the same dressing type. If hemostasis was still not achieved, the dressing was considered an acute failure and the alternate dressing type was applied. If failure of hemostasis occurred between 30 and 240 minutes after application, the dressing was considered a chronic failure and the artery was ligated. **Results:** All 25/25 (100%) of the HC tests and 3/14 (21%) of the 48PG maintained hemostasis for 30 minutes. At 240 minutes, 21/25 (84%) of the HC tests and 1/14 (7%) of the 48PG maintained hemostasis. Statistical analysis by Fischer's exact test shows a significant ( $p < 0.001$ ) difference in hemostatic efficacy between the 48PG and HC groups in this model, both at 30 minutes and at 240 minutes. **Conclusion:** Chitosan acetate hemorrhage control dressings provided superior hemostasis to 48 ply gauze in high inguinal femoral arterial injuries. Chitosan-based dressings may provide prehospital treatment options for hemostasis in patients with severe hemorrhagic arterial injuries.

## Unrecognized Misplacement of Endotracheal Tubes by Ground Prehospital Providers

David D. Wirtz, MD, MPH; Christine Ortiz, MD; David H. Newman, MD; Inna Zhitomirsky  
*Prehospital Emergency Care* 2007;11 :213-218

### ABSTRACT

**Objective:** Endotracheal intubation by emergency medical services (EMS) is well established. Esophageal misplacement is a catastrophic complication that has until recently been studied by using methods that have called into question the accuracy of the reported data. The purpose of our study was to determine the incidence of unrecognized endotracheal tube misplacement, reasons for deferred intubations in the field, and to report outcomes in those patients with unrecognized misplacement. **Methods:** This was a prospective observational study with a consecutive sample. All arriving with an endotracheal tube or in whom endotracheal intubation was performed within 10 minutes of arrival were included, and a physician immediately determined placement. Hospital records were reviewed to determine outcome of those patients in whom the tube was misplaced. Unrecognized esophageal misplacement triggered communication to the medical director of the transporting agency. **Results:** During the enrollment period, 192 patients were evaluated. Overall, 132 of 192 (69%) were intubated in the prehospital environment, and 60 were intubated within 10 minutes of arrival in the emergency department. Among prehospital intubation attempts, 12 of 132 (9%; 95 CI 5.3-15.2), 11 esophageal, and 1 hypopharyngeal were misplaced. Right mainstem intubation occurred in an additional 20 of 132 (15%; 95 CI 10.0-22.3). Among patients arriving with unrecognized esophageal misplacement of the endotracheal tube, one patient survived to hospital discharge. **Conclusion:** The rate of esophageal misplacement of endotracheal tubes in the prehospital environment in our urban setting and the poor clinical course of patients with unrecognized misplacement is consistent with previous reports, suggesting that the benefit of prehospital airway management does not clearly supercede the potential risks.

## Paramedic Perceptions of Challenges in Out-Of-Hospital Endotracheal intubation

Jane Boyce Thomas, BA, BS; Benjamin N. Abo, BS, NREMT-P; Henry E. Wang, MD, MS  
*Prehospital Emergency Care* 2007;11:219-223

### ABSTRACT

**Objective:** Paramedics often perform endotracheal intubation (ETI), insertion of a breathing tube, on critically ill out-of-hospital patients. Recent studies highlight important paramedic ETI shortcomings including adverse events, errors, and poor outcomes resulting from this procedure. Little is known about workforce perceptions of these events. We sought to identify paramedic and physician perceptions regarding the challenges and pitfalls of out-of-hospital ETI. **Methods:** We conducted a qualitative study involving paramedic focus groups sessions and individual interviews with Emergency Medical Services (EMS) physician medical directors. We recorded and transcribed all sessions. We used inductive theory construction to examine, organize, and classify thematic patterns. **Results:** Fourteen paramedics and 6 physicians participated. Although paramedics and physicians recognized problems with paramedic ETI, all participants strongly felt that paramedics should continue to perform the procedure. Physicians and paramedics disagreed about the ability of paramedics to perform neuromuscular blockade-assisted intubation. Both groups identified aspects of paramedic education, skills acquisition, and maintenance as core issues. Participants also identified broader factors about the structure of emergency services, the role of the medical director, and workforce culture and professionalism. **Conclusion:** Paramedics and EMS physicians attribute paramedic ETI performance to a myriad of factors involving EMS education, organization, oversight, retention, and professionalism. Efforts to improve ETI must include strategies to address multiple aspects of EMS operations and culture.

## Endotracheal Intubation Increases Out-of-Hospital Time in Trauma Patients

Michael T. Cudnik, MD; Craig D. Newgard, MD, MPH; Henry Wang, MD, MPH; Christopher Bangs, MS;  
Robert Herrington IV, MD  
*Prehospital Emergency Care* 2007;11:224-229

### ABSTRACT

**Objectives:** Prior efforts have linked field endotracheal intubation (ETI) with increased out of hospital (OOH) time, but it is not clear if the additional time delay is due to the procedure, patient acuity, or transport distance. We sought to assess the difference in OOH time among trauma patients with and without OOH-ETI after accounting for distance and other clinical variables. **Methods:** Retrospective cohort analysis of trauma patients 14 years or older transported by ground or air to one of two Level 1 trauma centers from January 2000 to December 2003. Geographical data were probabilistically linked to trauma registry records for transport distance. Trauma registry OOH time (interval from 9-1-1 call to hospital arrival) was validated against a subset of linked ambulance records using a land-Altman plots and tested by using the Spearman rank correlation coefficient. Based on the validation, the sample was restricted to patients with OOH time 100 minutes or less. The propensity for OOH-ETI was calculated by using field vital signs, demographics, mechanism, transport mode, comorbidities, Abbreviated Injury Scale head injury 3 or greater, injury severity score, blood transfusion, and major surgery. Multivariable linear regression (outcome = total OOH time) was used to assess the time increase (minutes) associated with OOH-ETI after adjusting for distance, propensity for OOH-ETI, and mode of transport. **Results:** A total of 8,707 patients were included in the analysis, of which 570 (6.5%) were intubated in the field. Adjusted only for distance, OOH times averaged 6.1 minutes longer (95% CI 4.2-7.9) among patients intubated with RSI. After including other covariates, OOH time was 10.7 minutes (95% CI 7.7-13.8) longer among patients with RSI and 5.2 minutes (95% CI 2.2-8.1) longer among patients with conventional ETI. The time difference was greatest farther from the hospital. **Conclusions:** Patients with OOH-ETI have increased total OOH time, especially among those using RSI, even after accounting for distance and other clinical factors. Injured patients may benefit from airway management techniques that require less time for execution.

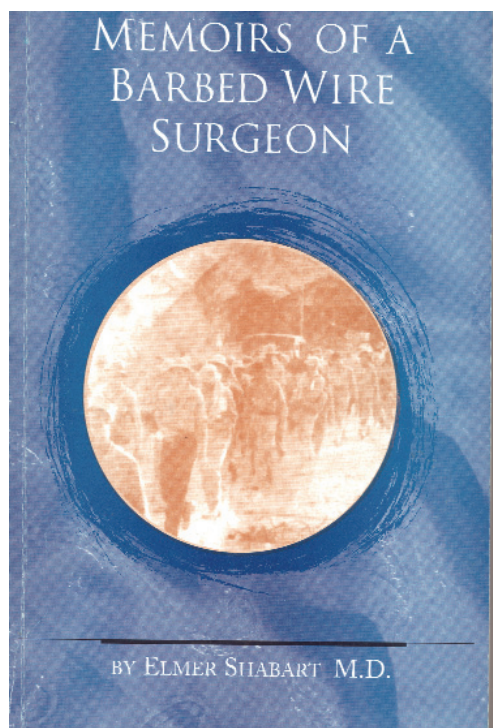
# Book Reviews

## Memoirs of a Barbed Wire Surgeon

Elmer Shabart

Regent Press: Oakland, CA, 1997. ISBN 1-88905-02-1, paperback, 180 pages.

Review by COL Warner Farr, MD



The author relates the story of his time as a military surgeon in the Philippine Islands during World War II as part of the American forces on the Bataan Death March, and then during further captivity on the Asian mainland. Dr. Elmer Shabart joined the United States Army in 1940 on a voluntary basis, ostensibly to take care of new recruits in the dramatically increasing pre-war force for one year. After joining, the Army informed him that it was not just for one year and that he could volunteer for either the Philippine Islands or Iceland. By his own admission, he took the Philippines as it was further from the saber rattling Germans. He was assigned to Company A, 12th Medical Regiment, The Philippine Scouts, where he served until the war broke out in December 1941.

After the retreat to Bataan, he encouraged his native troops, Philippine Scouts, to flee into the civilian surroundings while advancing Japanese forces captured him and several other medical officers. After capture, he re-

lates both his story of the Bataan Death March with numerous Japanese atrocities and the story of performing an appendectomy with only what was available in the Japanese prisoner of war camp: sharp glass and common needle and thread. In 1942, his Japanese Army captors transferred him to a camp in Manchuria. He was transported from the Philippines to China through Korea on a Japanese merchant ship without any identifying markings as a "prisoner of war" carrying ship.

Conditions in the Manchurian camp were more conducive to practicing medicine thanks to a camp hospital and contact with a Japanese Army physician who had to approve all medications and always cut the dose prescribed by the Americans in half. Dr. Shabart managed to obtain permission to take selected patients to a local Japanese Military Hospital for treatment, usually surgical cases, and established significant rapport with both the hospital surgeons and a Japanese Army dentist who had been American trained. Prior to that Dr. Shabart had also been doing significant dentistry. He relates several surgical cases, in particular an abdominal obstruction that turned out to be an Ascaris worm bolus and a difficult throat case. He describes in detail the camp hospital at the second Manchurian camp that he was at, Mukden, and relates the havoc and injury from a stray American bomb that hit the camp, causing many casualties. The camp received some American general officers, along with British and Dutch officers, as the war progressed.

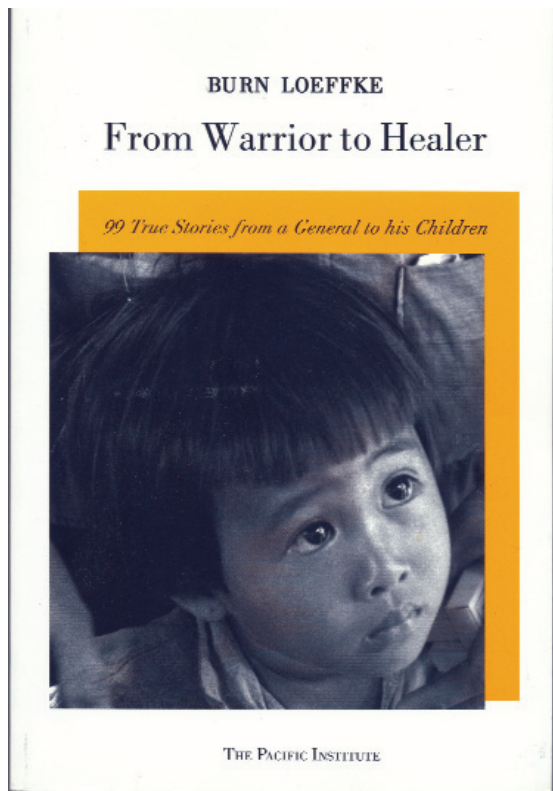
In 1945 the camp was liberated by Soviet troops and in an interesting turn of events the Japanese military hospital officer personnel requested to be allowed to surrender their swords to him instead of to the Russians and presented the author with a full set of unused Japanese Army Field Hospital Surgical Instruments which now resides in the U.S. Army Medical Department Museum at Fort Sam Houston. This autobiography of First Lieutenant Shabart, yes he was lieutenant the entire war, is different from the average war story primarily by the amount of surgical cases that the author managed to accomplish in the difficult circumstances of a prisoner camp.

## From Warrior to Healer: 99 True Stories from a General to his Children

Burn Loeffke

The Pacific Institute: Seattle, WA, 1998. 203 pages. ISBN 1-930622-00-7

Review by William J. Gephart



Why I have never heard of BG Burn Loeffke (Ret) before, I'm not sure. He seems to embody the best that America and its Special Operations Forces (SOF) have to offer. This Soldier not only received a B.S. in Engineering from West Point, and an M.S. in Russian Literature, but also a PhD in Political Science. His military experiences ran the gamut from his three combat tours in Vietnam; the first as an SF advisor to the French, the 2nd as an advisor to a Vietnamese parachute unit, and

the third as a battalion commander in the 82nd Airborne. He was also the Commanding General in Panama, of what was then called, "Army South," before and during Operation Just Cause.

His military accomplishments are nearly too long to list (*e.g.*, Airborne and Ranger School, the "Q" course, Army Attaché in Moscow (USSR days), and Defense Attaché in Beijing, and the first Westerner known to jump with the Army of the Peoples' Republic of China). He was also a staff officer at the White House, and the Director of the Commission of White House Fellows. There's plenty more too (*e.g.*, fixed-wing pilot, decathlon athlete, and marathoner, *etc.*), but these are relayed more as asides to his stories. Thankfully, this information is conveyed in such a way that makes the author seem confident, yet not arrogant.

The book contains not only many lessons for Loeffke's own children, but I believe they are particularly poignant for SOF today. While his occasional Christian sermonizing may put off some SOF readers, he does exhort his own children to learn both foreign languages, and medicine, as the best ways to truly influence foreigners. In fact, this impressive man not only gained fluency and a working knowledge of several foreign languages, but he also graduated from PA school in 1997, and has done several medical/missionary tours in the Sudan.

I believe any reader interested in SOF medicine, counter-insurgency, or self-improvement would benefit from reading this short paperback book. In fact, I would like to see the author invited to speak at the 2008 SOMA Conference, on a topic of his choice. You will feel the same after reading this book!

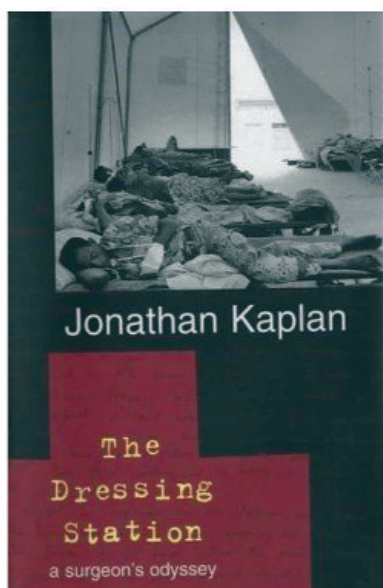
## The Dressing Station: A Surgeon's Odyssey and Contact Wounds: A War Surgeon's Education

Jonathan Kaplan

The Dressing Station: A Surgeon's Odyssey. New York: Picador Press, 2001. ISBN 0330480804. 256 pages.

Contact Wounds: A War Surgeon's Education. New York: Grove Press, 2005. ISBN 0802118003. 278 pages

Review by Frank Anders, MD

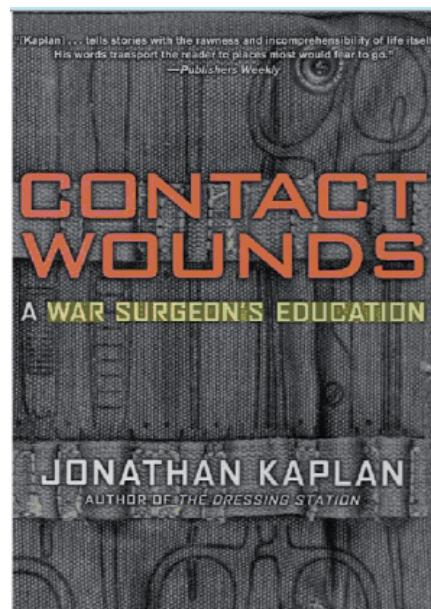


Kaplan's first book was "The Dressing Station," a book about his medical efforts in and his view of the atrocities in the ongoing Turkish-Iraqi Kurdish conflict. Trained as a physician in apartheid-torn South Africa and London, Kaplan has had an extraordinary professional life as an emergency field surgeon on the front lines of apartheid in Namibia and Zululand, as well as in other conflicts, declared and undeclared, like Kurdistan, Angola, Mozambique, Burma, and Eritrea. He went on to be a cruise ship doctor in the South China Sea and a "flying doctor," traveling wherever his surgical expertise was needed. He occasionally tried his hand as a journalist and documentary filmmaker. I had read his first book several years ago and enjoyed it so when his second book, "Contact Wounds," came out I jumped at it.

"Contact Wounds" fills out his story of growing up in South Africa, going to medical school in Cape Town, abandoning segregated South Africa, and then traveling as a surgeon to war-torn areas, the latest being Baghdad. He again has his narrative style, not analyzing the disturbing events he relates, just telling the stories of being in the middle of conflicts he cannot understand. Kaplan first lands in Angola, taking charge of a combat-zone hospital, the only surgeon for 160,000 civilians; the guerrilla war exposed him daily to the horrors of war.

Of particular interest to us is his section on the American war in Iraq, where he went during the U.S. invasion to be a humanitarian aid worker. He treated civilian casualties amid gunfights for control of hospitals and dealt with gangs of AK-47 armed looters as they stripping pharmacies as well as militant Shi'a groups harassing doctors out of operating rooms. He believes that this war forever changed the style of aid efforts in wartime. Nevertheless, despite the increased danger, he says he will continue to battle the true enemy in every war—death. His view of his interactions with the American military, from privates on patrol to senior officers, and embassy personnel, is enlightening. His dealings with American military physicians is an interesting outsider's view of us, and not complimentary.

The book also takes us through Kaplan's journey as a teenager to an Israel wracked by the 1967 war, his first experience of trying to live sanely among chaos. Exploring the underground bunkers in the kibbutz on the Golan Heights, the young Kaplan saw medical supplies laid out and understood "the truth at the heart of the practice of medicine: that there was no mystery, that learning and skill turned these ordered bits of equipment into the means of stopping bleeding and bringing together shattered tissue to make a greater order, to save a life."







## Needle Thoracostomy in the Treatment of a Tension Pneumothorax in Trauma Patients: What Size Needle?

Imme Zengerink, MD; Peter R. Brink, MD, PhD; Kevin B. Laupland, MD, MSc, FRCPC; Earl L. Raber, MD, FRCPC; Dave Zygun, MD, MSc, FRCPC; and John B. Kortbeek, MD, FRCSC, FACS

Previously published in *The Journal of Trauma Injury, Infection, and Critical Care*. 2008;64:111–114. Permission granted by Lippincott Williams & Wilkins to republish in JSOM.

### ABSTRACT

**Background:** A tension pneumothorax requires immediate decompression using a needle thoracostomy. According to advanced trauma life support guidelines this procedure is performed in the second intercostal space (ICS) in the midclavicular line (MCL), using a 4.5cm (2-inch) catheter (5cm needle). Previous studies have shown a failure rate of up to 40% using this technique. Case reports have suggested that this high failure rate could be because of insufficient length of the needle. **Objectives:** To analyze the average chest wall thickness (CWT) at the second ICS in the MCL in a trauma population and to evaluate the length of the needle used in needle thoracostomy for emergency decompression of tension pneumothoraces. **Methods:** Retrospective review of major trauma admissions (Injury Severity Score >12) at the Foothills Medical Centre in Calgary, Canada, who underwent a computed tomography chest scan admitted in the period from October 2001 until March 2004. Subgroup analysis on men and women, <40 years of age and >40 years of age was defined a priori. CWT was measured to the nearest 0.01cm at the second ICS in the MCL. **Results:** The mean CWT in the 604 male patients and 170 female patients studied averaged 3.50cm at the left second ICS MCL and 3.51cm on the right. The mean CWT was significantly higher for women than men ( $p < 0.0001$ ). About 9.9% to 19.3% of the men had a CWT >4.5 cm and 24.1% to 35.4% of the women studied. **Conclusions:** A catheter length of 4.5cm may not penetrate the chest wall of a substantial amount (9.9% – 35.4%) of the population, depending on age and gender. This study demonstrates the need for a variable needle length for relief of a tension pneumothorax in certain population groups to improve effectiveness of needle thoracostomy.

A tension pneumothorax (TPT) is a life-threatening condition that is caused by a laceration of the lung. A flap valve effect may develop that allows air to enter the pleural cavity during inspiration but does not permit it to escape during expiration.<sup>1,2</sup> A technique for emergent chest decompression is needle thoracostomy (NT). NT can be a life-saving technique that releases the pressure inside the thoracic space allowing time to properly insert a thoracostomy tube. NT is frequently used to diagnose a TPT by the rush of air after insertion and converts the existing TPT to a normal pneumothorax.<sup>3</sup> In this procedure, a large caliber needle is inserted in the second intercostal space (ICS) in the midclavicular line (MCL) of the affected hemithorax, as recommended by the advanced trauma life support guidelines.<sup>4</sup> The needle portion is removed, and the plastic sheath is left in place.<sup>5</sup> The largest caliber needle typically used for this purpose is the 14-gauge 5cm needle with a sheath length of 4.5cm (2 inch).

Previous studies show a failure rate in the pre-hospital environment of as high as 40%.<sup>6,7</sup> Numerous case reports have been published during the last years, suggesting that the failure rate might be caused by an insufficient length of the cannula used in NT.<sup>3,8–12</sup>

In a study by Britten et al.,<sup>13</sup> the chest wall thickness (CWT) was measured by ultrasound on patients scheduled for abdominal ultrasound. Only 4% were found to have a CWT >4.5 cm. Other studies have measured the CWT on computed tomography (CT) scans in small convenience samples of trauma patients and found that 25% to 33% of all patients have a CWT of  $\geq 5$  cm.<sup>14,15</sup>

The true CWT at the second ICS MCL is poorly defined and may have important therapeutic implications.

### OBJECTIVE

The primary objective is to analyze the average CWT at the second ICS in the MCL in a trauma population. The second is to evaluate the length of the needle

used in NT for emergency decompression of tension pneumothoraces.

## METHODS

This study is a retrospective review of chest CT scans performed on trauma patients at the Foothills Medical Centre in Calgary, Canada. For this study, approval from the Conjoint Health Research Ethics Board was granted. The Foothills Medical Centre is the sole tertiary trauma center serving Southern Alberta with a referral population of approximately 1.75 million.

Radiographic records of all major trauma patients (Injury Severity Score [ISS] >12) and age  $\geq 18$  who were admitted in the period from October 24, 2001 until March 31, 2004 were reviewed to identify those who underwent a CT scan of the chest. All of these CT scans were retrieved and reviewed by the principal author. CT scans that did not meet quality criteria of visualization and reproduction or did not image more than half of the clavicles were excluded. The variables measured were age, gender, CWT, and whether the patient was scanned with arms up (routine) or down during the examination.

All of the data were collected by review of the CT scans on the Foothills Medical Centre PACS (Picture Archive and Communication System) on dedicated diagnostic workstations (AGFA, Holland, IMPAX platform V 4.5). Information was collected on a standard data collection Excel-sheet. Demographic information was obtained from the Alberta Trauma Registry.

As per the standard of practice for NT treatment of a TPT, the CWT was measured in the MCL in the second ICS. Accurate measurement of each patient's right and left CWT was calculated by the following method. Review of the coronal scout image (an initial low dose radiograph-like image from which the subsequent CT scan's field of view is planned), allowed for identification of the middle of the clavicle. From this point on the coronal scout image an accurate 3D cross-reference was made to the axial images to subsequently identify the second and third ribs and thus the second ICS. A precise measurement of the CWT was performed using the workstation's caliper measurement tool.

Data were analyzed by using Stata 8.0 (Stata Corp, College Station, TX). Means, standard deviations, and median with interquartile range (IQR) were used to describe normally or skewed variables, respectively. Group means were compared using the Student's *t* test and medians using the Mann-Whitney *U* test. Fisher's exact test was used for comparison of categorical data. A power analysis was performed a priori based on the outcome of the study of Givens et al.,<sup>14</sup> with the result of  $n$

$\geq 288$ . Subgroup analysis on men and women, <40 years of age and  $\geq 40$  years of age were defined a priori.

## RESULTS

A total of 774 patients, of whom at least one side of their chest wall was measured, were studied; 604 (78%) were men and 170 (22%) were women. The median age was 40 (IQR, 25 – 53) years. The mean ISS was 23, the median was 20.

The mean CWT of female patients was significantly higher than that of the men as shown in Table 1.

**Table 1 Mean Chest Wall Thickness (cm) in the Second Intercostal Space Midclavicular Line**

	Right	Left
Female	3.84 ± 1.17	3.92 ± 1.42
Male	3.41 ± 1.04	3.37 ± 0.99
<i>p</i> value	<0.0001	<0.0001

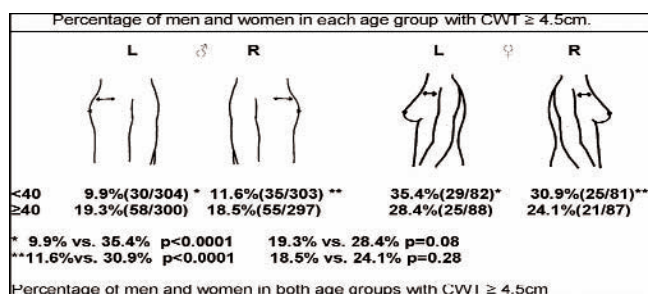


Figure 1. CWT 4.5cm

For male patients, the CWT increased with age (left side, 3.15 – 3.60cm and right side, 3.22 – 3.62cm, *p* <0.0001). For female patients, the chest wall became thinner with age but the difference was not significant.

In men <40 years, approximately 10% exceeded a CWT of 4.5cm, jumping to 19% for men  $\geq 40$  years. For women <40 years, the number with a CWT greater than 4.5cm was a third, falling to a fourth for those  $\geq 40$  years. Figure 1 illustrates the significant difference between the percentages of each gender in the age group under 40, but not in the age group of  $\geq 40$  years.

The effect of the position of the arms during scanning was particularly noticeable in women. Of the female patients with their arms down 72.2% (left) and 57.1% (right) had a CWT  $\geq 4.5$ cm versus 28.9% (left) and 23.1% (right) with their arms up (both *p* <0.01). For male patients with their arms down, these results were 18.9% (left) and 33.3% (right) versus 14.2% (left) and 13.2% (right) when they had their arms up in the scanner (*p* <0.01 right, *p* =0.41 left).

Finally, the distance from the anterior wall to the pericardium was measured in each patient. In 19 of 774

patients (2.45%) a 4.5cm needle could potentially penetrate the pericardium when passed through the second ICS MCL. There was no significant difference for age and gender but there was a non-significant tendency toward younger women.

## DISCUSSION

An NT is a potentially life-saving emergency procedure in patients with a TPT. It is a simple procedure that allows time for a thoracostomy tube to be inserted using a sterile technique in an adequate setting. If a TPT is not confirmed by a rush of air upon needle placement possible explanations are that a TPT was not present or that the needle did not reach the pleural space.<sup>16</sup> CT images were reviewed to define anatomic depth at the site of NT.

To eliminate beam hardening artifact from degrading the images of the chest on CT, standard protocol is to position patients in the CT scanner with their arms elevated (up) whenever possible. However, in certain circumstances, such as trauma, this is not always possible. We note in this study that the CWT increased for men and women when their arms were left down. For female patients in the supine position with their arms positioned up, breast tissue tends to fall outwards and to the side, resulting in a thinner CWT. In female patients whose arms are left down during the CT scan, breast tissue may not be as spread out and this may result in a significantly higher number of female patients with a CWT >4.5cm. This is a very important practical consideration because while most female patients are scanned in the arms up position, most emergent NTs are performed with the patient's arms in what would be the arms down position.

This study suggests that a 5cm needle with a 4.5cm sheath may fail to decompress a pneumothorax in around 10% of the male patients under 40 years of age and around 19% of the male patients over 40 years of age. For female patients, this risk is even higher with approximately one-third of the women under 40 and one-fourth of the women over 40 years of age having a CWT exceeding 4.5cm. It also shows that men increase their CWT over the years; for women, the effects of age on body habitus may actually reduce CWT at the second ICS. The number of patients whose pneumothoraces might not be decompressed by a 4.5cm needle is potentially even higher given the effect of arm elevation on decreasing CWT during imaging.

Givens et al.,<sup>14</sup> in a similar study in 2004 in Texas, reported a convenience sample of 111 patients. Twenty-two percent of all patients had a CWT over 5cm. The authors did not differentiate in this percentage between male patients and female patients. We found in this considerably larger study, a lower percentage of male patients having a CWT over 4.5cm and a higher percentage of female

patients having a CWT over 4.5cm, even with this lower cut-off point. The IV catheter from BD Insite was used as a reference. The sheath of the needle measures 2.1 X 45mm, the needle itself 50mm. An assumption was made that a CWT of exactly 4.50cm would not be decompressed by a 4.5cm catheter in case of a TPT.

The CWT has been measured in a trauma population to resemble the population in which a TPT is most likely to occur. Givens et al.<sup>14</sup> excluded a woman with a CWT over 10cm because of subcutaneous air; in this study all people with subcutaneous emphysema, anterior hematomas, or other chest wall abnormalities are included.

The patients requiring an NT are more likely to be found in this group.

This study demonstrated that in 2.5% of all trauma patients, a 4.5cm needle used for NT could puncture the heart at the second ICS MCL. This is a potential concern on the left side; interestingly, in one patient it was the case on the right side because of a mediastinal shift.

## LIMITATIONS

Although CT may be the most suitable, accurate, and reproducible tool to measure the CWT, there are some limitations with this method, especially in a retrospective review.

The accuracy of where to take the measurement of CWT is critical, as a small error 1cm to either side of the MCL could make a significant difference in the measured CWT because of the acute degree of slope high in the chest cavity at the second ICS in some patients. In addition, when patients in a cervical spine collar are positioned in the CT scanner with their arms up, their subcutaneous soft tissues can be distorted and compressed against the collar. This creates abnormal skin folds that can spuriously increase the measured CWT.

These anatomic and practical limitations could challenge the reproducibility of this studies findings. However, we think that the large sample size makes up for these limitations. Since only one investigator measured all the CT scans with the cut-off point in mind, this could have lead to a bias. Practical application of NT would undoubtedly encompass some variability in site of decompression.

The lack of cadaver verification is a limitation of this study. CT correlation with cadavers has been limited by freezing and preservation that changes soft tissue dimensions.<sup>17</sup> Use of recent CT technology and comparison to fresh cadaver studies demonstrates very high correlation.<sup>18</sup> CT imaging is currently being used for preoperative sizing of implantable medical devices with very good fit at time of surgery or implantation.<sup>19</sup>

The study has been performed retrospectively in

only one health center in Canada. This population may not be anatomically representative of other trauma systems with variation in height, build, and body mass index.

## CONCLUSIONS

The catheter used in needle decompression of a TPT may not reach the pleural space in 10% to 19% of men and a fourth to a third of women, depending on age. However, several authors,<sup>3,12,20</sup> do not advise a longer catheter because of the possibility of subclavian or pulmonary artery injury and cardiac tamponade. One author actually did recommend a longer needle if the 14-gauge needle fails.<sup>15</sup>

In cases of subcutaneous air or chest wall hematoma, pressure on the catheter may collapse the lumen. To prevent this, the needle can be left in place<sup>3,10</sup> with use of a stabilization device,<sup>21</sup> which also creates more length and prevents kinking. But leaving the needle in place can be a danger,<sup>11</sup> potentially leading to damage to lung tissue or vital structures. Another suggestion is to use the lateral mid-anterior axillary line (used for chest tubes) for needle decompression,<sup>2,12,22,23</sup> since there is less fat and muscle tissue and less chance of damage to vessels and heart. However, pleural adhesions are more likely to be encountered and may increase the risk of lung injury when a large pneumothorax is not present.<sup>24</sup> Considering the tools available now and their advantages and disadvantages, the 4.5cm needle remains the best choice, but one should be aware of its potential shortcomings.

This study suggests that 4.5cm needles for decompression may be inadequate. Interestingly, no device for needle catheter decompression of TPT has yet been developed to overcome the conflicting challenges posed by variable chest thickness versus the potential risk of damage to lung, heart, and great vessels. These results support performance of a clinical trial to evaluate effectiveness and risk of a longer catheter. Development of a longer introducer needle with a blunt retracting tip may be useful in the clinical setting of suspected TPT.

## REFERENCES

1. Dudley H. *Hamilton Bailey's Emergency Surgery*. Bristol: Wright; 1986:231.
2. Leigh-Smith S, Harris T. Tension pneumothorax-time for a re-think? *Emerg Med J*. 2005;22:8–16.
3. Cullinane DC, Morris JA Jr, Bass JG, Rutherford EJ. Needle thoracostomy may not be indicated in the trauma patient. *Injury*. 2001;32:749–752.
4. American College of Surgeons, Committee on Trauma. *Advanced Trauma Life Support Course Manual*. Chicago, IL: ACSCOT; 2004;105:127.
5. Friend KD. Prehospital recognition of tension pneumothorax. *Prehosp Emerg Care*. 2000;4:75–77.
6. Barton ED, Epperson M, Hoyt DB, Fortlage D, Rosen P. Prehospital needle aspiration and tube thoracostomy in trauma victims: A six year experience with aeromedical crews. *J Emerg Med*. 1995;13:155–163.
7. Davis DP, Pettit K, Rom CD, et al. The safety and efficacy of prehospital needle and tube thoracostomy by aeromedical personnel. *Prehosp Emerg Care*. 2005;9:191–197.
8. Heng K, Bystrzycki A, Fitzgerald M, et al. Complications of intercostal catheter insertion using EMST techniques for chest trauma. *ANZ J Surg*. 2004;74:420–423.
9. Britten S, Palmer SH. Chest wall thickness may limit adequate drainage of tension pneumothorax by needle thoracocentesis. *J Accid Emerg Med*. 1996;13:426–427.
10. Pattison GT. Needle thoracocentesis in tension pneumothorax: In sufficient cannula length and potential failure. *Injury*. 1996;27:758.
11. Jones R, Hollingsworth J. Tension pneumothoraces not responding to needle thoracocentesis. *Emerg Med J*. 2002;19:176–177.
12. Jenkins C, Sudheer PS. Needle thoracocentesis fails to diagnose a large pneumothorax. *Anaesthesia*. 2000;55:925–926.
13. Britten S, Palmer SH, Snow TM. Needle thoracocentesis in tension pneumothorax: Insufficient cannula length and potential failure. *Injury*. 1996;27:321–322.
14. Givens ML, Ayotte K, Manifold C. Needle thoracostomy: Implications of computed tomography chest wall thickness [see comment]. *Acad Emerg Med*. 2004;11:211–213.
15. Marinaro J, Kenny CV, Smith SR, et al. Needle thoracostomy in trauma patients: What catheter length is adequate? *Acad Emerg Med*. 2003;10:495.
16. Mines D, Abbuhl S. Needle thoracostomy fails to detect a fatal tension pneumothorax. *Ann Emerg Med*. 1993;22:863–866.
17. Janssens V, Thys P, Clarys JP, et al. Post-mortem limitations of body composition analysis by computed tomography. *Ergonomics*. 1994;37:207–216.
18. Mitsiopoulos N, Baumgartner RN, Heymsfield SB, et al. Cadaver validation of skeletal muscle measurement by magnetic resonance imaging and computerized tomography. *J Appl Physiol*. 1998;85:115–122.
19. Warriner RK, Haddad M, Hendry PJ, Mussivand T. Virtual anatomical three-dimensional fit trial for intra-thoracically implanted medical devices. *ASAIO J*. 2004;50:354–359.
20. Butler KL, Best IM, Weaver WL, Bumpers HL. Pulmonary artery injury and cardiac tamponade after needle decompression of a suspected tension pneumothorax. *J Trauma*. 2003;54:610–611.
21. Allison K, Porter KM, Mason AM. Use of the Asherman chest seal as a stabilization device for needle thoracostomy. *Emerg Med J*. 2002;19:590–591.
22. Biffi WL. Needle thoracostomy: A cautionary note [comment]. *Acad Emerg Med*. 2004;11:795–796.
23. Rawlins R, Brown KM, Carr CS, Cameron CR. Life threatening hemorrhage after anterior needle aspiration of pneumothoraces. A role for lateral needle aspiration in emergency decompression of spontaneous pneumothorax. [comment]. *Emerg Med J*. 2003;20:383–384.
24. Goodman LR, Putman CE, eds. *Intensive Care Radiology, Imaging of the Critically Ill*. Philadelphia: W.B. Saunders; 1982:99–100.

# Chest Wall Thickness in Military Personnel: Implications for Needle Thoracentesis in Tension Pneumothorax

COL H. Theodore Harcke, MC USA; LCDR Lisa A. Pearse, MC USN; COL Angela D. Levy, MC USA; John M. Getz, BS; CAPT Stephen R. Robinson, MC USN|

Previously Published in *MILITARY MEDICINE*. 172. 12:000.2007. Republished in JSOM with permission.

## ABSTRACT

Needle thoracentesis is an emergency procedure to relieve tension pneumothorax. Published recommendations suggest use of angiocatheters or needles in the 5cm range for emergency treatment. Multidetector computed tomography scans from 100 virtual autopsy cases were used to determine chest wall thickness in deployed male military personnel. Measurement was made in the second right intercostal space at the midclavicular line. The mean horizontal thickness was 5.36cm (SD = 1.19 cm) with angled (perpendicular) thickness slightly less with a mean of 4.86cm [SD 1.10cm). Thickness was generally greater than previously reported. An 8cm angiocatheter would have reached the pleural space in 99% of subjects in this series. Recommended procedures for needle thoracentesis to relieve tension pneumothorax should be adapted to reflect use of an angiocatheter or needle of sufficient length.

## INTRODUCTION

Advanced Trauma Life Support guidelines and combat casualty care doctrine recommend the use of needle thoracentesis (needle thoracostomy) for the emergency treatment of tension pneumothorax. The second intercostal space in the midclavicular line is the preferred location.<sup>1</sup> For successful placement, the angiocatheter (or needle) must be of sufficient length to pass through the chest wall and enter the pleural space. However, if the angiocatheter is too long, it may puncture the lung.

McPherson et al.<sup>2</sup> estimate that tension pneumothorax was the cause of death in 3% to 4% of fatally wounded combat casualties in the Vietnam War. In the study of a continental U.S. military trauma center population, Givens et al.<sup>3</sup> reported computed tomography (CT) measurements of chest wall thickness and concluded that a 5cm catheter would reliably penetrate the pleural space in only 75% of patients. Since these data may not be valid in combat zone casualties, a study of chest wall thickness in a forward-deployed tri-service population was undertaken through the retrospective analysis of multidetector CT (MDCT)-assisted autopsies performed on combat casualties at the Armed Forces Institute of Pathology.

## METHODS AND MATERIALS

The study was performed with the approval of the institutional review board of the Armed Forces Institute of Pathology and was compliant with the Health Insurance Portability and Accountability Act. The Armed Forces Medical Examiner Tracking System was used to identify a series of 124 consecutive military male trauma

deaths that underwent total body MDCT scanning before complete autopsy at the Dover mortuary from January 2006 through March 2006. Twenty-one subjects were excluded from the study because the wounds sustained resulted in thoracic deformity that would alter measurement of the chest wall. In two cases, the images could not be retrieved. The final study population consisted of 101 male subjects (19 - 48 years of age: mean = 25.7 years). The subjects were servicemembers from the Army ( $n = 56$ ), Marine Corps ( $n = 41$ ), Air Force ( $n = 2$ ), and Navy ( $n = 1$ ).

Total body MDCT scans were obtained on a GE Lightspeed 16 (General Electric Medical Systems, Milwaukee, Wisconsin) within 2 to 4 days after death. Subjects were scanned with 16 x 5mm collimation, pitch 1.375:1, rotation speed of 0.6 seconds, and table speed of 27.5 mm/rotation, or with 16 x 5mm collimation, pitch 0.562:1, rotation speed of 0.6 seconds, and table speed of 11.2mm/rotation. No contrast material was administered. Images were retrospectively reconstructed at the CT console to a slice thickness of 1.25mm before being sent to a GE Advantage Workstation (software version 4.2: General Electric Medical Systems), images were viewed and measured on the workstation using two-dimensional axial, coronal, oblique, and sagittal data sets.

Chest wall thickness was measured in the right second intercostal space, midclavicular line, using a two-step process. Step 1 determined the clavicular and interspace location from a coronal multiple intensity projection (MIP) image reconstructed on the GE Advantage Workstation (Fig. 1A). This point provided the location for measurement on a sagittal image linked to the

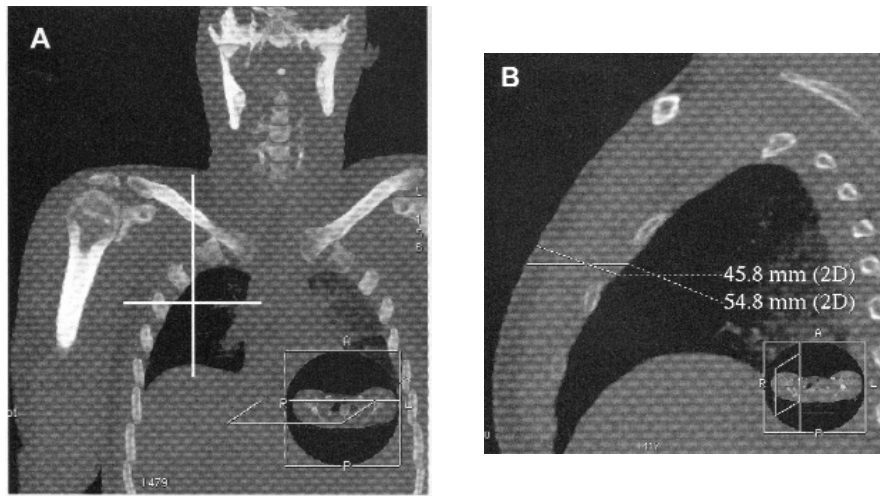


Figure 1. (A) Coronal MIP image of the upper thorax showing the right clavicular and anterior ribs. The intersecting lines show the location of the second intercostal space in the midclavicular line. (B) Linked sagittal image of the thorax at the point determined in (A). The horizontal measurement is indicated by a solid line: the angled (perpendicular) measurement is indicated by the dotted line.

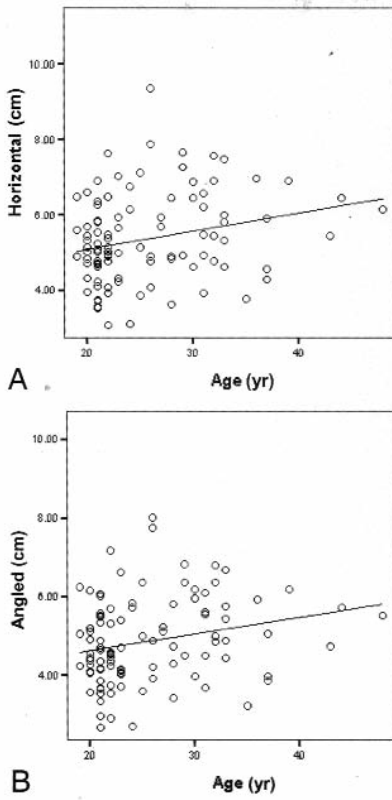


Figure 2. Chest wall thickness by age. (A) Horizontal, (B) Angled. Linear regression lines show the trend for each measurement to increase with age.

exact location on the coronal image. In step 2, linear distance software (two-dimensional) was used to make two measurements of chest wall thickness. A horizontal measurement was made in the mid-second interspace. The second measurement was done perpendicular to the chest wall and angled to pass above the third rib (Fig. 1B). Measurements are reported in millimeters to the nearest 0.1.

Statistical analysis was performed using SPSS for Windows (version 14,0: Chicago, Illinois). A scatterplot of horizontal versus angular measurement in the initial 101 cases revealed one outlier, which turned out to be an obese Navy sailor. All subsequent analysis was done excluding this individual: therefore, 100 cases are the basis for this report.

## RESULTS

Mean horizontal chest wall thickness was 5.36cm (SD = 1.19cm), with a range of 3.07cm to 9.35cm. The mean angled (perpendicular) thickness was 4.86cm (SD = 1.10cm), with a range of 2.66cm to 8.02cm. There was a statistically significant correlation of increasing chest wall thickness with age for both horizontal and angled measurements (Fig. 2). We were able to compare chest wall thickness between Army and Marine Corps subjects but had insufficient numbers for sailors and airmen. The mean horizontal thickness for Army subjects of 5.51cm was statistically different from the 5.1cm mean observed in Marine Corps subjects. The calculated confidence interval (0.72 - 0.89) was obtained using a (test for equality of means.

TABLE I  
COMPARISON OF ANGLED AND HORIZONTAL MEASUREMENTS  
BY PERCENTILE

Percentile	Angled		Horizontal	
	Centimeters	Inches	Centimeters	Inches
2.5th	2.80	1.1	3.32	1.31
25th	4.08	1.6	4.62	1.82
50th	4.71	1.85	5.13	2.02
75th	5.67	2.23	6.19	2.44
97.5th	7.46	2.94	7.77	3.06

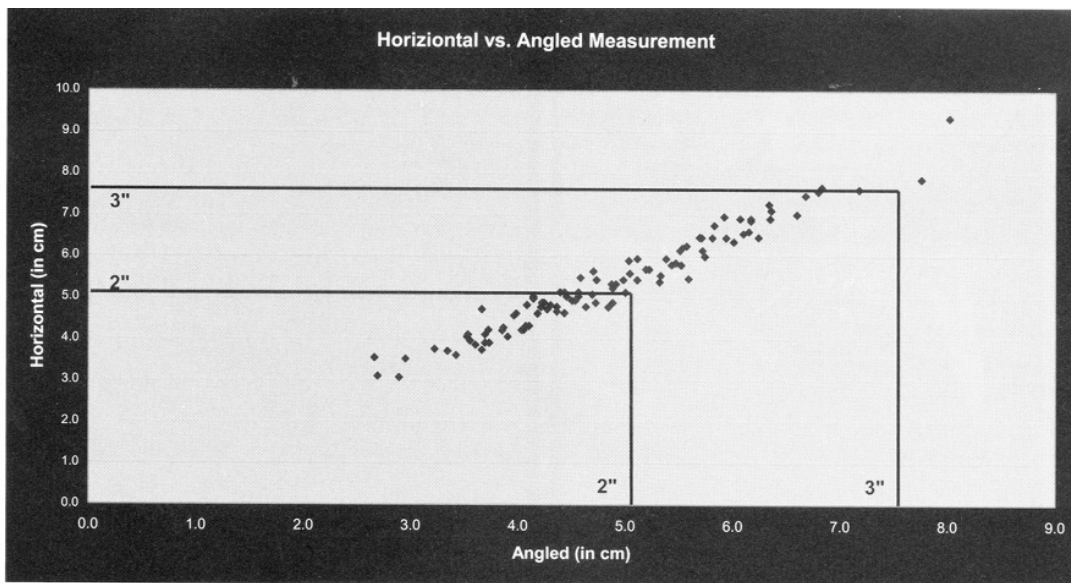


Figure 3. Plot of horizontal versus angled measurement in centimeters for the 100 subjects. Note that only 1 subject measurement exceeds 8.0cm. Note also that this presentation reflects the full range of lengths which would be encountered regardless of the angle of entry for needle decompression. It also indicates the consistent trend for both measures.

When horizontal and angled measurements by percentile were compared, the horizontal measurement was always slightly greater than the angled measurement (Table 1). The angled measurement was <8.0cm in all 100 cases, and the horizontal measurement was <8.0cm in all but 1 case (Fig. 3).

#### DISCUSSION

Emergency situations require a reproducible, simple, and effective response for treatment of life threatening pneumothorax. If needle thoracentesis is attempted with an angiocatheter or needle of insufficient length, the procedure will fail. Knowledge of chest wall thickness in the population being supported will enable addition and designation of appropriate cannulas to emergency bags for the procedure. Treatment sets routinely contain angiocatheters for vascular access, and these are usually 5cm (2in) in length. This is in keeping with the Advanced Trauma Life Support recommendations.<sup>1</sup> We have observed several cases where thoracentesis has been performed with these angiocatheters and the tips did not reach the pleural space (Fig. 4).

The medical literature contains several reports of chest wall thickness as the basis for angiocatheter selection. Britten et al,<sup>4</sup> used ultrasound to determine the chest wall thickness at the second intercostal space in 54 patients, ages 18 to 55 years. The thickness exceeded 4.5cm in only two patients (4%). In our military population, the mean chest wall thickness in two planes exceeded this

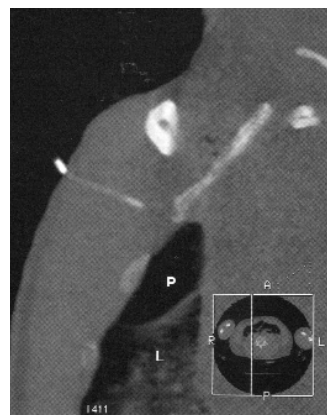


Figure 4. Sagittal MIP HDCT image of the right hemithorax obtained post-mortem shows a needle thoracentesis catheter (arrow) that does not reach the pleural space. The needle thoracentesis was performed with a 5cm angiocatheter. Note that the catheter tip does not reach the anterior pneumothorax (P). Free air is anterior to the right lung (L).

value. This confirmed our expectation that males serving in a combat zone require a different standard. We suspected that military-age males in the Army and Marine Corps would exhibit greater-than-average chest wall thicknesses because they are a selected segment of the population in a field emphasizing strength and fitness.

The study by Givens et al.<sup>3</sup> used CT to determine thickness in 111 patients. Although the results were obtained in a military hospital, they reflect a mixed population of both men and women. Their mean chest wall thickness of 4.2cm is less than the mean chest wall thickness in our study. We know that the axial measurement technique used in their study does not differ from the sagittal technique we used because we validated our sagittal data by measuring the same point on a corresponding axial slice and found no difference. It is of note

that women in their report had a mean chest wall thickness greater than men. This may reflect more subcutaneous fat in their female population. We also feel that increased subcutaneous fat explains the increase in chest wall thickness with increasing age that we observed in our series. In our study, the mean age for Marines was less than that for Army personnel. It is our opinion that these age differences in Army and Marines accounted for the thicker Army measurements and that the thickness was related to increased subcutaneous fat.

The recommended anatomic location to insert a needle thoracentesis catheter for emergency treatment of a pneumothorax is the second intercostal space at the midclavicular line.<sup>1</sup> When access to the second intercostal space midclavicular line is prevented by field conditions such as wound location, equipment, or position of the casualty, needle thoracentesis may need to be done at an adjacent location. The chest wall thickness may vary, but we have not observed appreciable increases at adjacent interspaces. Variation in catheter placement within an interspace may occur. Placing the needle closer to the superior margin of the third rib is optimal because the intercostal vessels run in a groove along the inferior aspect of each rib. Consequently, needle placement adjacent to the superior margin of the third rib minimizes the potential of vascular injury. We selected horizontal and angled measurements to determine if there was variability in needle distance based upon angulation. Inserting the needle perpendicular to the chest wall results in a slight inferior angulation and a shorter chest wall thickness. For emergency response in a combat zone, it is preferable to have a single angiocatheter available that will be effective in the majority of situations. This avoids

the need to find and try multiple catheters or to apply a “rule-of-thumb” based upon parameters such as size and age. Britten et al.<sup>4</sup> recommend a 4.5cm length and Givens et al.<sup>3</sup> recommend a catheter longer than 5cm. Our results show that in a deployed military population, a 5cm angiocatheter under optimal conditions would have reached the pleural space in >50% of our subjects, and an 8cm angiocatheter would have reached the pleural space in 99% of our subjects. It is hoped that these data will assist military trauma surgeons in making an updated recommendation for the performance of needle thoracentesis.

## CONCLUSIONS

Our study shows that chest wall thickness in deployed military personnel is generally greater than previously reported. Recommended procedures for needle thoracentesis to relieve tension pneumothorax should be adapted to reflect use of an angiocatheter or needle of sufficient length. An 8cm angiocatheter would have reached the pleural space in 99% of the cases in this series.

## REFERENCES

1. Advanced Trauma life Support Program for Doctors. Ed 6, Chicago. IL American College of Surgeons, 1997.
2. Mr. Pherson JJ, Feigin DS, Bellamy RF. (2006). Prevalence of tension pneumothorax in fatally wounded combat casualties, *J Trauma*. 60;573-8,
3. Givens ML, Ayotte K, Manifold C. (2004). Needle thoracostomy: Implications of computed tomography chest wall thickness, *Acad Emerg Med*. 11;211-3.
4. Britten S, Palmer SH, Snow TM. (1996). Needle thoracentesis in tension pneumothorax: Insufficient cannula length and potential failure. *Injury*. 27;321-2.



# Educational Resources

**The following is a list of information resources for education and training opportunities.**

*This list is not endorsed by DOD or USSOCOM, nor can we vouch for the quality of their training.*

Casualty Care Research Center  
Department of Military and Emergency Medicine  
Uniformed Services University  
4301 Jones Bridge Road  
Bethesda, Maryland, United States 20814-4799  
Office: (301) 295-6263  
Fax: (301) 295-6718  
Web Site: [www.casualtycareresearchcenter.org](http://www.casualtycareresearchcenter.org)

Cypress Creek Advanced Tactical Team  
c/o Cypress Creek EMS  
16650 Sugar Pine Lane  
Houston, Texas, United States 77090  
Office: (281) 440-9650 Extension 156  
Fax: (281) 440-7677  
Web Site: [http://www.ccems.com/catt\\_team/](http://www.ccems.com/catt_team/)

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

Heckler & Koch, Inc.  
International Training Division  
21480 Pacific Boulevard  
Sterling, Virginia, United States 20166-8903  
Office: (703) 450-1900 Extension 293  
Fax: (703) 406-2361  
Web Site: <http://www.tacticalmedicine.com/>

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

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

JTM Training Group, LLC  
5546 Camino Al Norte, Suite 253  
North Las Vegas, NV 89031  
Office: (702) 759-5075  
Web Site: <http://www.jtmlasvegas.com>

Lion Claw Tactical  
5900 East Virginia Beach Boulevard  
Suite 408  
Norfolk, Virginia, United States 23502  
Office: (757) 321-2059  
Fax: (757) 498-0059  
Web Site: [www.lionclawtactical.com](http://www.lionclawtactical.com)

“Medic Up” Tactical Medic Training Course  
3300 Via Giovanni  
Corona, California, United States 92881  
Office: (909) 340-9201  
Fax: (909) 340-9201  
Web Site: <http://www.medicup.netfirms.com/>

National Academy of Tactical Medical Response  
3075 Shattuck Road  
Suite 813  
Saginaw, Michigan, United States 48603-3258  
Office: (989) 585-4001  
Fax: (989) 585-4001  
Web Site: [www.tacticalmedical.com](http://www.tacticalmedical.com)

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

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

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

SERT Group International  
P.O. Box 371231  
Reseda, California, United States, 91337-1231  
Office: (866) 500-5465  
Fax: (818) 344-8099  
Web Site: <http://thesertgroup.homestead.com>

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

STS Consulting  
PMB Box 176  
1981 Memorial Drive  
Chicopee, Massachusetts, United States 01020  
Office: (413) 531-8699  
Fax: (413) 532-1697  
Web Site: [www.tactical-ems.com](http://www.tactical-ems.com)

Tac1Aid  
157 Middle Road  
Newbury, Massachusetts, United States 01922  
Office: (978) 499-0492  
Fax: None  
E-mail: [Tac1Aid@hotmail.com](mailto:Tac1Aid@hotmail.com)

Tactical Element, Inc.  
380-H Knollwood Street  
Suite 140  
Winston Salem, North Carolina, United States 27103  
Office: (336) 945-2289  
Fax: (336) 945-2289  
Web Site: [www.tacticalement.cc](http://www.tacticalement.cc)

Team One Network  
620 Richards Ferry Road  
Fredericksburg, Virginia, United States 22406  
Office: (540) 752-8190  
Fax: (540) 752-8192  
Web Site: [www.teamonenetwork.com](http://www.teamonenetwork.com)

The Tactical EMS School  
1309 Dawn Ridge Road  
Columbia, Missouri, United States 65202  
Office: (573) 474-2436  
Fax: (573) 474-2436  
Web Site: [www.tactical-specialties.com](http://www.tactical-specialties.com)

## **VETERINARY MEDICINE**

K-911 Emergencies, Inc.  
P.O. Box 8652  
Jupiter, Florida, United States 33468-8652  
Office: (561) 575-2514  
Fax: None  
Web Site: [www.k911emergencies.com](http://www.k911emergencies.com)

The ResQ Shop  
1051 Meadow West Drive  
El Paso, Texas, United States 79932  
Office: (915) 877-4312  
Fax: (915) 877-4242  
Web Site: [www.theresqshop.com](http://www.theresqshop.com)

# SPECIAL OPERATIONS MEDICAL REFERENCE GUIDE

## ADMINISTRATION

Hospital Emergency Preparedness and Response. Joseph A. Barbera. Jane's Information Group. 2003.  
Contingency Planning Links & Resources: <http://www.businesscontingency.com/links.php>  
Continuity, Contingency and Disaster Planning: <http://www.business-continuity-world.com/>  
Disaster Planning Resources: <http://www.disaster-resource.com/>  
Vulnerability Assessment: <http://www.ojp.usdoj.gov/odp/docs/vamreport.pdf>  
Health and Disaster Preparedness Tools: <http://www.ahrq.gov/prep/>  
Emergency Preparedness Planning: <http://www.bt.cdc.gov/planning/>  
Hospital Readiness Planning: <http://www.aha.org/aha/issues/Emergency-Readiness/resources.html>  
Positioning America's Healthcare System for Terrorism: <http://www.acep.org/NR/rdonlyres/0E7F8FEF-3104-4FB5-BFC3-91453EF55ADD/0/terrorismResponse.pdf>  
Health Actions in Crisis: <http://www.who.int/hac/en/>  
Analyzing Disrupted Health Services: [http://www.who.int/hac/techguidance/tools/\\_disrupted\\_sectors/\\_en/\\_index.html](http://www.who.int/hac/techguidance/tools/_disrupted_sectors/_en/_index.html)  
Bioterrorism Pre-Planning and Response: <http://www.interpol.int/Public/BioTerrorism/BioterrorismGuide.pdf>  
Bioterrorism and Mass Casualty Preparedness in Hospitals:  
<http://www.fas.org/biosecurity/resource/documents/ad364.pdf>  
Health Care Management Tools: <http://erc.msh.org/toolkit/>  
Health Information Management Tools: <http://www.humanitarianinfo.org/IMToolbox/>  
Improving Decision Making for Health: <http://www.phrplus.org/Pubs/eop5.pdf>  
Health Systems Assessment: <http://healthsystems2020.org/manual.html>  
Health Program Evaluation Tools: <http://evalweb.usaid.gov/resources/sources.cfm>  
Management of Health Care Delivery: <http://www.who.int/management/en/>  
Health Services Technology Assessment: <http://www.ncbi.nlm.nih.gov/books/bv.fcgi?rid=hstat>  
Health Facilities Management Magazine: [http://www.hfmmagazine.com/hfmmagazine\\_app/index.jsp](http://www.hfmmagazine.com/hfmmagazine_app/index.jsp)

## ALTERNATIVE MEDICINE

U.S. Center for Complementary and Alternative Medicine: <http://nccam.nih.gov/>  
WHO Collaborating Centers for Traditional Medicine:  
<http://www.who.int/medicines/areas/traditional/collabcentres/en/>  
Ethnobotany Resource Directory: <http://www.cieer.org/directory.html>  
International Society of Ethnopharmacology: <http://www.ethnopharmacology.org/>  
Society for Medical Plants Research: [http://www.ga-online.org/links\\_en.html](http://www.ga-online.org/links_en.html)  
Ethnopharmacology Journal: <http://www.sciencedirect.com/science/journal/03788741>  
Ethnopharmacology Resources: <http://medicinus.info/research/areas/ethnopharmacology/>  
Cornell's Poisonous Plants Database: <http://www.ansci.cornell.edu/plants/>  
Traditional Healing Resources: <http://www.arctichealth.org/tm.php>

## ANESTHESIOLOGY

American Society of Anesthesiologists: <http://www.asahq.org/>  
Anesthesiology References: <http://www.asahq.org/Links/refsdb.htm>  
Anesthesiology Links: <http://www.asahq.org/Links/linksOfInterest.htm>  
American Society of Regional Anesthesia and Pain Medicine: <http://www.asra.com/>  
ASRAPM Links: <http://www.asra.com/links/index.html#indexes>

## **AVIATION MEDICINE AND PATIENT TRANSPORT**

Certified Flight Paramedic Exam Study Guide. Lauri Montanez (Editor). National Flight Paramedics Association. 2002.

Critical Care Transport Field Guide. UMBC. Jones and Bartlett Publishers. 2001.

Air & Surface Patient Transport: Principles & Practice. Renee S. Holleran. Mosby. 3rd Edition. 2002.

Aerospace Medical Association: <http://www.asma.org/>

Association of Air Medical Services: <http://www.aams.org/>

Association of Flight Paramedics: <http://www.flightparamedic.org/>

School of Aviation Medicine: <http://usasam.amedd.army.mil/>

Clinical Considerations in Aeromedical Transport: <http://www.ccat-training.org.uk/ccat3.htm>

Medical Evacuation Links: <http://usasam.amedd.army.mil/medevac/interest.htm>

Medical Evacuation in Hostile Environments:

[http://www.brooksidepress.org/Products/OperationalMedicine/DATA/operationalmed/Manuals/fm8\\_10\\_6/toc.pdf](http://www.brooksidepress.org/Products/OperationalMedicine/DATA/operationalmed/Manuals/fm8_10_6/toc.pdf)

Aviation Medicine Resources: [http://www.nh-tems.com/Aviation\\_medicine.html](http://www.nh-tems.com/Aviation_medicine.html)

Flight Medic Resources: <http://www.flightweb.com>

Journal of Aviation, Space and Environmental Medicine: <http://www.asma.org/journal/index.php>

### **e-BOOKS:**

Military Medicine: <http://www.brooksidepress.org/Military.htm>

Military Biodefense Manuals: <http://usamriid.detrick.army.mil>

NCBI Online Medical Bookshelf: <http://www.ncbi.nlm.nih.gov/sites/entrez?db=books>

National Library of Medicine: <http://www.nlm.nih.gov/>

National Academies Press – Books: <http://www.nap.edu/catalog/11063.html>

Merck/Medicus Online Portal: [http://www.merckmedicus.com/pp/us/hcp/hcp\\_home.jsp](http://www.merckmedicus.com/pp/us/hcp/hcp_home.jsp)

Free Books for Doctors: <http://www.freebooks4doctors.com/index.htm>

## **CHEMICAL BIOLOGICAL, NUCLEAR AND HAZARDOUS MATERIALS**

Bioterrorism: A Guide for First Responders. Imaginatics Publishing. 2nd Edition. 2004.

Chemical and Biological Terrorism: Research and Development to Improve Civilian Medical Response. Institute of Medicine. Washington, DC. 1999.

Chemical/Nuclear Terrorism: Guide For First Responders. Imaginatics Publishing. 2003.

First Responders Guide to Weapons of Mass Destruction. Jeffrey A. Adams. American Society for Industrial Security. 2001.

HazMat Emergency Response Manual. Alan, B Jones. One-Off Books. 2006.

Hitting America's Soft Underbelly: The Potential Threat of Deliberate Biological Attacks Against the U.S. Agricultural and Food Industry. Peter Chalk.

Rapid Guide to Hazardous Chemicals in the Environment. Richard P. Pohanish. Wiley. 2nd Edition. 1997.

Special Operations for Terrorism and Hazmat Crimes. Chris Hawley. Red Hat Publishing. 2001.

Weapons of Mass Destruction and Terrorism Field Response Guide. Joseph A. Cocciardi. Jones and Bartlett. 2004.

Bioterrorism Emergencies Preparedness and Response: <http://www.bt.cdc.gov/bioterrorism/>

Chemical Emergencies Emergency Preparedness and Response: <http://www.bt.cdc.gov/chemical/>

Radiation Emergencies Emergency Preparedness and Response: <http://www.bt.cdc.gov/radiation/>

Clinician's Biosecurity Center, University of Pittsburgh: <http://www.upmc-cbn.org/>

Chemical and Biological Defense Information Analysis Center: <http://www.cbiac.apgea.army.mil/>

Poison Control Centers: <http://www.ipl.org/div/kidspace/poisonsafe/pcenters.html>

Poisonous Plants Database: [http://www.cbif.gc.ca/pls/pp/poison?p\\_x=px](http://www.cbif.gc.ca/pls/pp/poison?p_x=px)

Materials Safety Data Sheets (MSDS): <http://www.msdssearch.com/Default.htm>

Toxicology Databases and Profiles: <http://www.atsdr.cdc.gov/toxpro2.html>

Hazardous Materials Database: <http://www.cameochemicals.noaa.gov/>

Center for Food Security and Public Health: (Agroterrorism, Foreign Animal Diseases, Zoonotic diseases)

<http://www.cfsph.iastate.edu/About/purpose.htm>

Food Safety, Animal and Plant Health: <http://www.ipfsaph.org/En/default.jsp>

## **DENTISTRY**

Assisting Dental Education and Dental Public Health in Developing Countries: A Symposium. Appropriate Health Resources and Technologies Action Group. 1981.

Emergency Dental Care: Diagnosis and Management of Urgent Dental Problems. Donald A. Falace Williams & Wilkins. 1994.

Maxillofacial and Dental Emergencies (Oxford Handbooks in Emergency Medicine. John E. Hawkesford. Oxford University Press, USA. 1994.

Traumatic Dental Injuries: A Manual. Jens O. Andreasen. Blackwell Publishing. 2nd Edition. 2003.

## **DERMATOLOGY**

Atlas of Cancer of the Skin. Gunter Burg. Churchill Livingstone. New York. 2000.

Andrew's Diseases of the Skin: Clinical Dermatology. Richard B. Odom. Editor. Harcourt Health Sciences. Philadelphia. 2000.

Emergency Dermatology: A Rapid Treatment Guide. Alan B. Fleischer. Wiley. 2nd Revised Edition. 1997.

Global Dermatology: Diagnosis and Management; According to Geography, Climate, and Culture. Springer. 1994.

Skin Disease: Diagnosis and Treatment. Thomas P. Habif. Editor. Harcourt Health Sciences. Philadelphia. 2001.

Dermatology Atlas: <http://www.brooksidepress.org/Products/OperationalMedicine/DATA/operationalmed/Manuals/GMOManual/clinical/Dermatology/AtlasofDermatology.htm>

## **e- DIAGNOSIS**

Merck Manuals Online: <http://www.merck.com/>

Psychological Guide <http://www.guidetopsychology.com/testing.htm>

Psych Tests and Assessments: <http://www.psywww.com/resource/bytopic/testing.html>

## **DISASTER MANAGEMENT**

Community Leadership Tool for Disasters:

[http://www.upmc-biosecurity.org/website/focus/community\\_engage/index.html](http://www.upmc-biosecurity.org/website/focus/community_engage/index.html)

Disaster Central: <http://www.disaster-central.com/index.html>

Disaster Roundtable: <http://dels.nas.edu/dr/index.shtml>

Guidelines for Disasters [http://www.paho.org/english/PED/tguidelines\\_menu.htm](http://www.paho.org/english/PED/tguidelines_menu.htm)

Disaster Management Tools Online: [http://www.hsc.usf.edu/nocms/publichealth/cdmha/toolkit\\_dm/Index\\_English.pdf](http://www.hsc.usf.edu/nocms/publichealth/cdmha/toolkit_dm/Index_English.pdf)

Emergency Management and Command Forms: [http://www.emacintl.com/download\\_center/](http://www.emacintl.com/download_center/)

Emergency & Disaster Management Links: [http://ccs.tamu.edu/homeland\\_security/comprehensive.asp](http://ccs.tamu.edu/homeland_security/comprehensive.asp)

Mass Prophylaxis Planning Guide: [http://www.emsa.ca.gov/dms2/draft\\_mass\\_prophy\\_final.pdf](http://www.emsa.ca.gov/dms2/draft_mass_prophy_final.pdf)

Mass Care and Shelter Guide: <http://www.cdsscounties.ca.gov/coplanners/>

Post-Disaster Research: <http://www.colorado.edu/hazards/publications/sp/sp39/>

## **DISASTER MEDICINE**

Advanced Disaster Medical Response Manual for Providers. Susan M. Briggs. Editor. Harvard Medical International Trauma & Disaster. 2003.

Disaster Medicine, Gregory Ciottone. Editor. Mosby. 2006.

Disaster Medicine. David E. Hogan. Lippincott Williams and Wilkins. 2002.

Handbook of Disaster Medicine. J. De Boer. Brill Academic Publishers. 2000.

Medical Response to Terrorism: Preparedness and Clinical Practice. Daniel C. Keyes. Lippincott Williams and Wilkins. 2004.

Center for Disaster Medicine: <http://hsc.unm.edu/som/cdm/index.shtml>

Pre-Hospital and Disaster Medicine: <http://pdm.medicine.wisc.edu/home.html>

Center for Disaster and Humanitarian Assistance: <http://www.cdham.org/>  
Disaster Management and Humanitarian Assistance: <http://coe-dmha.org/>  
Journal of Disaster Medicine: <http://www.dmph.org/>  
Disaster Medicine Links: <http://pdm.medicine.wisc.edu/links.html>

## **DIVING MEDICINE**

Adjunctive Therapy for Decompression Illness Without a Chamber. Report of the UHMS Adjunctive Therapy Committee. Richard E. Moon, M.D. USSOCOM  
Arctic Underwater Operations. Louis Rey Editor. Springer. 1985.  
Assessment of Diving Medical Fitness for Scuba Divers and Instructors. Ernest S. Campbell. 2006.  
Diving Medicine by Alfred A. Bove and Jefferson Davis  
NOAA Diving Manual, James T. Joiner. Editor. 4th Edition, National Technical Information Service. 2001.  
Undersea and Hyperbaric Medical Society: <http://www.uhms.org/>  
Diving Medicine Links: <http://scuba-doc.com/lnks.html>  
Diving Diseases Research Center: <http://www.ddrc.org/>  
Diving Medicine Symptoms and Treatment: <http://scuba-doc.com/sitemap.html>  
Navy Diving Manual <http://www.supsalv.org/manuals/diveman5/divManual5.htm>

## **EMERGENCY MEDICINE**

Emergency Medicine Reference: <http://www.aha.org/aha/issues/Emergency-Resources>  
Resources for Emergency Department Operations Management:  
[http://www.acep.org/webportal/PracticeResources/issues/crowd/InformationPaperEmergencyDepartmentOperationsManagement.htm?wbc\\_purpose=Basic&WBCMODE=PresentationUnpublished%2cPresentationUnpublis](http://www.acep.org/webportal/PracticeResources/issues/crowd/InformationPaperEmergencyDepartmentOperationsManagement.htm?wbc_purpose=Basic&WBCMODE=PresentationUnpublished%2cPresentationUnpublis)  
National Center for Emergency Medicine Informatics: <http://www.ncemi.org/>  
Crowding and Surge Capacity References for the ED: [http://www.acep.org/NR/rdonlyres/D9697FC7-2F71-4B92-A696-3E369A560023/0/Crowd\\_Surg\\_Cap\\_4\\_07.pdf](http://www.acep.org/NR/rdonlyres/D9697FC7-2F71-4B92-A696-3E369A560023/0/Crowd_Surg_Cap_4_07.pdf)  
Pediatric Emergency Skills Retention (guide): <http://www.acep.org/NR/rdonlyres/1ED1E300-8D37-4A57-B65C-6E3FAF303CD8/0/PediatricCompendium.pdf>  
Primary Trauma Care Foundation: <http://www.primarytraumacare.org/>  
The Primary Trauma Care Manual: <http://www.steinergraphics.com/surgical/manual.html>

## **ENVIRONMENTS AND ENVIRONMENTAL MEDICINE**

The Desert Doc. Tom Myers, MD. (Due in 2007).  
Expeditions: The Expert's Way. John Blashford-Snell. Faber. 1977.  
Expedition Medicine. Royal Geographical Society Staff. Profile Books Limited. 7th Edition. 2004.  
High Altitude Medicine Handbook. Andrew J. Pollard. Radcliffe Medical Press. 2003.  
Jungle Travel & Survival. John Walden. The Lyons Press. 2001.  
Medicine for Mountaineering and Other Wilderness Activities. James A. Wilkerson. Mountaineers Books. 5th Edition. 2001.  
Wilderness Medicine: Management of Wilderness and Environmental Emergencies. Paul Auerbach. Mosby. 4th Edition. 2001.  
American Academy of Environmental Medicine: <http://www.aaem.com/>  
Environmental Medicine Links: <http://www.uib.no/isf/guide/occu.htm>  
International Society for Travel Medicine: <http://www.istm.org/>  
Resources in Travel Medicine: <http://gorgas.dom.uab.edu/geomed/links2.html>  
International Union for Circumpolar Health: <http://www.iuch.org/>  
Desert Operations Guides: [http://www.armystudyguide.com/content/army\\_board\\_study\\_guide\\_topics/desert\\_operations/index.shtml](http://www.armystudyguide.com/content/army_board_study_guide_topics/desert_operations/index.shtml)  
Riverine Operations: <http://www.globalsecurity.org/military/library/policy/army/fm/55-50/Ch7.htm>  
Royal Geographic Society Expedition Guides: <http://www.rgs.org/OurWork/Publications/Publications.htm>  
Tropical Medicine Links: <http://hml.org/WWW/tropical.html>  
Wilderness Medicine Links: <http://wms.org/links/interest.asp>  
Journal of Wilderness and Environmental Medicine: <http://www.wemjournal.org/wmsonline/?request=index.html>

## **ENVIRONMENTAL HEALTH AND SANITATION**

- Basic Environmental Health. Annalee Yassi. Oxford University Press, USA. 2001.
- Environmental Health: From Global to Local. Howard Frumkin, MD. Jossey-Bass 2005.
- Low Cost Urban Sanitation. Duncan Mara. John Wiley. 1996.
- Food-Borne Disease: A Focus for Health Education. World Health Organization. Geneva. 2000.
- Guidelines for Drinking Water Quality. World Health Organization Geneva. 2nd Edition. 1998.
- Water Resources: Health, Environment and Development. Brian H. Kay. Editor. E. & F.N. Spon. London. 1999.
- Center for Health Promotion and Disease Prevention: <http://chppm-www.apgea.army.mil/>
- Center for Health and the Global Environment: <http://chge.med.harvard.edu/>
- National Institute of Environmental Health Science: <http://www.niehs.nih.gov/>
- Environmental Health Topics: <http://www.niehs.nih.gov/health/topics/index.cfm>
- Environmental Health in Emergencies: [http://www.who.int/water\\_sanitation\\_health/hygiene/emergencies/en/](http://www.who.int/water_sanitation_health/hygiene/emergencies/en/)
- Environmental Health and Sanitation in Disasters: Field Sanitation Guide:  
[http://www.armystudyguide.com/content/army\\_board\\_study\\_guide\\_topics/field\\_sanitation/field-sanitation-study-gu.shtml](http://www.armystudyguide.com/content/army_board_study_guide_topics/field_sanitation/field-sanitation-study-gu.shtml)
- Water Sanitation and Health Resources: [http://www.who.int/water\\_sanitation\\_health/resources/en/index.html](http://www.who.int/water_sanitation_health/resources/en/index.html)

## **GERIATRICS**

- Essentials of Clinical Geriatrics. Robert L. Kane. McGraw-Hill. 5th Edition 2003.
- Geriatrics At Your Fingertips. David B. Reuben. The American Geriatrics Society. 8th Edition. 2006.
- Merck Manual of Geriatrics. Mark H. M.D. Beers (Editor). John Wiley. 3rd Edition. 2000.
- American Geriatrics Association Links: <http://www.americangeriatrics.org/links/>
- Geriatrics Practice: <http://www.fpnotebook.com/GER.htm>
- Merck Manual of Geriatrics Online: <http://www.merck.com/mrkshared/mmg/contents.jsp>

## **IMPROVISED MEDICINE**

- Ditch Medicine: Advanced Field Procedures for Emergencies. Hugh L. Coffee. Paladin Press. 1993.
- Do-It-Yourself Medicine. Ragnar Benson.. Paladin Press. 1997.
- Medical Tests You Can Do Yourself. Herbert Haessler. Contemporary Books. 1997.
- Survivalist Medicine Chest. Ragnar Benson. Paladin Press. 1982.
- The Survival Nurse: Running an Emergency Nursing Station Under Adverse Conditions. Ragnar Benson. 2000.
- Where There Is No Psychiatrist. Vikram Patel. Gaskell, Royal College of Psychiatrists. 2003.
- Where Women Have No Doctor: A Health Guide for Women. Ronnie Lovich. Hesperian Foundation. 1997.
- Where There is no Doctor: <http://www.healthwrights.org/books/WTINDonline.htm>
- Where There is no Dentist: <http://www.healthwrights.org/books/WTINDentistonline.htm>
- Where Women Have No Doctor: [http://www.hesperian.org/publications\\_download.php#wwhnd](http://www.hesperian.org/publications_download.php#wwhnd)
- Midwives Handbook: [http://www.hesperian.org/publications\\_download.php#midwives](http://www.hesperian.org/publications_download.php#midwives)

## **INFECTIOUS DISEASES**

- Control of Communicable Diseases Manual. Heymann D. L. American Public Health Association, 18th Edition. 2004.
- Emerging Infections. W. Michael Scheld. (Editor). ASM Press. 2006.
- Infections and Inequalities: The Modern Plagues. Paul Farmer. University of California Press. 2001.
- Infectious Disease Epidemiology. Kenrad E. Nelson, M.D. Aspen Publishers. 2006.
- Principles and Practice of Infectious Diseases. Mandell. 6th Edition. Churchill Livingstone, 2004.
- National Center for the Control of Infectious Diseases: <http://www.cdc.gov/ncpcid/>
- Center for Infectious Diseases Research: <http://www.cidrap.umn.edu>
- Emerging Infectious Diseases Journal: <http://www.cdc.gov/ncidod/eid/index.htm>
- Disease Surveillance: <http://www.bt.cdc.gov/episurv/>
- Outbreaks and Surveillance: <http://www.who.int/csr/don/en>
- Epidemic and Pandemic Alert: <http://www.who.int/csr/en/>
- Epidemiology Online: <http://www.epibiostat.ucsf.edu/epidem/epidem.html>
- Communicable Disease Control in Emergencies: [http://whqlibdoc.who.int/publications/2005/9241546166\\_eng.pdf](http://whqlibdoc.who.int/publications/2005/9241546166_eng.pdf)

Rare Diseases: <http://www.rarediseases.org>

Virology Online: <http://www.virology.net/garryfavwebindex.html>

## **INTERNATIONAL HEALTH**

Critical Issues in Global Health. C. Everett Koop, MD (Editor). Jossey - Bass, 2002.

Cross Cultural Medicine. Judy Ann Bigby. (Editor). American College of Physicians. 2001.

Indigenous Customs in Childbirth and Child Care. Yvonne Lefebvre. Netherlands. 1998,

International Public Health: Diseases, Programs, Systems, and Policies. Michael H. Merson. Aspen Publishers. 2001.

Multicultural Medicine and Health Disparities. David Satcher. McGraw-Hill. 2005.

Textbook of International Health. Paul F. Basch. Oxford University Press, USA. 2nd Edition. 1999.

Cross Cultural Medicine Resources: <http://medicine.ucsf.edu/resources/guidelines/culture.html>

Ethnomedicine Resources: <http://www.ethnomed.org/>

Cross Cultural Medical Links: [http://www.ethnomed.org/ethnomed/clin\\_topics/related.html](http://www.ethnomed.org/ethnomed/clin_topics/related.html)

US Global Health Site: <http://www.globalhealth.gov>

Global Health Topics: <http://www.globalhealth.gov/topics/index.html>

Global Health Council Online Publications: <http://www.globalhealth.org/publications/>

Global Public Health References: <http://www.pbs.org/wgbh/rxforsurvival/resources.html>

## **e-JOURNALS:**

Medical Journals Online: <http://www.biomedcentral.com/>

Medical and Science Journals for the Developing World: <http://www.biomedcentral.com/developingcountries>

Science and Medical Journals: <http://www.ispub.com/ostia/index.php?xmlFilePath=journals.xml>

Military Medical Technology: <http://www.military-medical-technology.com/>

## **KNOWLEDGE MANAGEMENT IN MEDICINE:**

Knowledge Management Library (U.K.): <http://www.library.nhs.uk/knowledgemanagement/>

National Knowledge Service (U.K.) <http://www.nks.nhs.uk/default.asp>

KM and Health: A WHO Project: <http://www.who.int/kms/about/strategy/en/index4.html>

<http://www.who.int/km4ph/en/> (KM & Public Health Forum)

<http://www.who.int/kms/resources/en/> (resources)

[http://www.who.int/kms/WHO\\_EIP\\_KMS\\_2006\\_2.pdf](http://www.who.int/kms/WHO_EIP_KMS_2006_2.pdf) (KM & KT)

A KM Platform for Translational Medicine: <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1560731>

KM in Medicine Workshop Abstracts: <http://ftp.informatik.rwth-aachen.de/Publications/CEUR-WS/Vol-131/>

Map of Medicine: KM and Evidence Based Medicine: <http://www.mapofmedicine.com/home.php>

Center for Knowledge Management: <http://ckm.osu.edu/index.cfm>

KM in Medicine: In Search of Lost Data: <http://www.cfnavarra.es/salud/anales/textos/vol25/n3/colai.html>

Knowledge & Process Management in Health Care:

<http://www.ncbi.nlm.nih.gov/sites/entrez?db=pubmed&uid=11933761&cmd=showdetailview&indexed=google>

KM Supporting Performance Based e-Medicine:

<http://www.ncbi.nlm.nih.gov/sites/entrez?db=pubmed&uid=11933761&cmd=showdetailview&indexed=google>

## **LABORATORY AND PATHOLOGY**

The Right Test: A Physician's Guide to Laboratory Medicine. Carl E. Speicher. Saunders. 3rd Edition. 1998.

Differential Diagnosis by Laboratory Medicine. Susan Mesko. (Editor). Springer. 2003.

Mosby's Manual of Diagnostic and Laboratory Tests. Kathleen Deska Pagana. Mosby. 2nd Edition. 2002.

Laboratory Links: <http://wwwn.cdc.gov/nltn/mltl.aspx>

Clinical Lab Science Resources: <http://members.tripod.com/~LouCaru/index-5.html>

Armed Forces Institute of Pathology: <http://www.afip.org/>

Pathology Links: <http://members.tripod.com/Pathnet/links.htm>

## **MASS CASUALTIES**

Mass Fatality and Casualty Incidents: A Field Guide. by Robert A. Jensen. CRC. 1999.



Mass Casualties and Events Response: <http://www.bt.cdc.gov/masscasualties/>  
Weapons of Mass Casualties. (AAOS Monograph) Charles Stewart. Jones and Bartlett. 2005.  
Hospitals for War Wounded: A Guide for Set-Up: <http://www.icrc.org/web/eng/siteeng0.nsf/html/p0714>  
Interagency Emergency Health Kit Guidelines: <http://www.who.int/medicines/publications/en/>  
Shelter Medical Services Primer: [http://www.acep.org/webportal/PracticeResources/issues/disasters/shelterprimer.htm?wbc\\_purpose=B](http://www.acep.org/webportal/PracticeResources/issues/disasters/shelterprimer.htm?wbc_purpose=B)  
Surge Capacity in Bombings: <http://www.bt.cdc.gov/masscasualties/surgecapacity.asp>  
Mass Casualty Resources: <http://www.bt.cdc.gov/masscasualties/>  
Predicting Causality Severity and Hospital Capacity: <http://www.bt.cdc.gov/masscasualties/capacity.asp>

## **MEDIC RESOURCES**

Critical Care Paramedic. Bryan E. Bledsoe. Prentice Hall. 2005.  
EMS Field Guide: ALS Version. Paul Lesage. Informed Publishing. 15th Edition. 2005.  
Emergency Care and Transportation of the Sick and Injured. Bruce D. Browner. 8th Edition. 2001.  
Essentials of Paramedic Care. Bryan E. Bledsoe. Prentice Hall. 2nd Edition. 2006.  
Hazardous Materials Injuries: A Handbook for Pre-Hospital Care. Douglas R. Stutz, Ph.D. 3rd Edition. 1992.  
Pre-Hospital Care of the Elder Patient. Bruce M. Becker. Prentice Hall. 2003.  
Pediatric Education for Prehospital Professionals. American Academy of Pediatrics. Jones and Bartlett. 2nd Edition. 2005.  
The Streetmedic's Handbook. Owen T. Traynor. Thomson Delmar Learning. 2nd Edition. 2004.  
International Committee for Military Medicine: <http://www.cimm-icmm.org/index.html>  
NAEMT Special Operations Division: <http://www.naemt.org/divisionsAndCommittees/specialOperationsDivision/>  
NAEMT Training: <http://www.naemt.org/educationalPrograms/>  
JEMS Training Links: [http://www.jems.com/education\\_and\\_training/index.html](http://www.jems.com/education_and_training/index.html)  
National Paramedic Institute: <http://www1.emsjane.com/>  
EMS Role in Disasters: <http://www.emsa.ca.gov/dms2/transformation.pdf>  
First Aid in Armed Conflicts: <http://www.icrc.org/web/eng/siteeng0.nsf/html/p0870>  
Journal of EMS: <http://www.jems.com/index.html>  
SWATMEDIC Links: <http://www.swatmedic.org>  
Diploma in Remote and Offshore Medicine (UK): [http://www.health-informatics.info/diprom\\_modules.asp](http://www.health-informatics.info/diprom_modules.asp)  
Diver Medical Technician Training: <http://www.nbdhmt.com/dmt.html>  
Pre Hospital Trauma Life Support: <http://www.naemt.org/PHTLS/>  
International Trauma Life Support Course: <http://www.itrauma.org/>  
Advanced Burn Life Support: <http://www.ameriburn.org/ablscoursedescriptions.php>  
Advanced Hazmat Life Support: [http://www.ahls.org/ahls/ecs/main/ahls\\_home.html](http://www.ahls.org/ahls/ecs/main/ahls_home.html)  
Advanced Medical Life Support: <http://www.naemt.org/AMLS/default.htm>  
Advanced Wilderness Life Support: <http://awls.org/index.htm>  
BiodefenseEd.org: <http://www.biodefenseeducation.org/>  
Medicine in Challenging Environments: <http://www.trueresearch.org/mice2006/>  
Biochemical Organic Radiological Disaster Educational Response System: <http://www.bordersalertandready.com/>  
Bio-Terrorism and Emerging Infections: <http://www.bioterrorism.uab.edu>  
Emergency Management Institute: <http://www.training.fema.gov/EMIWEB/>  
Blast Injury Training: <http://www.bt.cdc.gov/masscasualties/tiidefacts.asp>  
Center for Domestic Preparedness Courses: <http://cdp.dhs.gov/index.html>  
Humanitarian University Consortium <http://www.humanitarian.net/university>  
USMA Terrorism Training: <http://www.teachingterror.com/>  
WMD Online Preparedness Education Program: <http://oep.usuhs.edu/>

## **MEDICAL ANTHROPOLOGY**

Society for Medical Anthropology <http://www.medanthro.net>  
SAM Quarterly Journal Online <http://www.medanthro.net/maq/index.html>  
SAM' Global Directory of Medical Anthropology <http://www.medanthro.net/directory/submit.asp> JOIN!!  
MedAnthro @ Palomar <http://anthro.palomar.edu/medical/default.htm>

Med Anthro Tutorial <http://anthro.palomar.edu/medical/default.htm>  
Anthropology of Religion Links <http://www.aaanet.org/sar/LINKS.html>  
Anthropology Gateway <http://www.anthropologie.net/>  
Anthropology Journals Online <http://www.artsci.wustl.edu/~anthro/journals.html>  
Anthropology E-Journals <http://ejw.i8.com/anthroe-j.htm>  
Social Science E-Journals and Sites <http://ejw.i8.com/>  
Internet Anthropologist (online courses) <http://www.vts.intute.ac.uk/he/tutorial/anthropologist>  
Medical Anthropology Web <http://www.medanth.org/>  
WWW Virtual Library: Med Anthro: [http://vlib.anthrotech.com/Specialized\\_Fields/Medical\\_Anthropology/](http://vlib.anthrotech.com/Specialized_Fields/Medical_Anthropology/)

## **MEDICAL ECOLOGY, GEOGRAPHY, AND GEOLOGY**

Ecology:

<http://www.medicalecology.org/>  
<http://www.medicalecology.org/syllabus.htm> (e-course)  
[http://ci.columbia.edu/ci/eseminars/1112\\_detail.html](http://ci.columbia.edu/ci/eseminars/1112_detail.html) (e-course)

Geography:

International Journal of Health Geographics <http://www.ij-healthgeographics.com/home/>  
International Health Geographics Journal Online: <http://www.ij-healthgeographics.com/>

Geology:

International Medical Geology Association (IMGA): <http://www.medicalgeology.org/>  
IMGA Links: [http://www.medicalgeology.org/this\\_page\\_contains\\_links\\_to\\_memb.htm](http://www.medicalgeology.org/this_page_contains_links_to_memb.htm)  
Military: <http://www.military-medical-technology.com/article.cfm?DocID=1057>  
Online Text <http://www.knovel.com/knovel2/Toc.jsp?BookID=1663>  
Online Course: <http://www.pitt.edu/~super1/lecture/lec16081/index.htm>  
Articles <http://www.envimed.com/emb10.shtml> and [http://www.agiweb.org/geotimes/nov01/feature\\_medgeo.html](http://www.agiweb.org/geotimes/nov01/feature_medgeo.html)

## **MEDICAL IMAGING**

Radiology Links & Resources: <http://www.radiologyeducation.com/>  
MED PIX Medical Image Database: <http://rad.usuhs.edu/medpix/index.html>

## **MEDICAL INTELLIGENCE**

Armed Forces Medical Intelligence Center: <http://www.afmic.detrick.army.mil/>  
NATO MEDINT Course: [http://www.ciomr.net/en/NATO\\_And\\_Related\\_Organizations](http://www.ciomr.net/en/NATO_And_Related_Organizations)

## **MENTAL HEALTH**

Mental Health Resources: <http://www.bt.cdc.gov/mentalhealth/> and <http://www.mentalhealth.com/>  
Disaster Mental Health Institute: <http://www.usd.edu/dmhi/>  
National Mental Health Information Center: <http://mentalhealth.samhsa.gov/>  
Emergency Mental Health: <http://mentalhealth.samhsa.gov/cmhs/EmergencyServices/>  
Emotional Trauma Pages: <http://www.trauma-pages.com/>  
Critical Incident Strees Managemnt(CISM): <http://www.icisf.org/>  
CISM Articles and Resources: <http://www.icisf.org/articles/>  
American Academy of Stress Managemntt: <http://www.aaets.org/>

## **MORTUARY AND FORENSIC SCIENCES**

Identification of Pathological Conditions in Human Skeletal Remains. Donald J. Ortner. 2nd Edition. 2002.  
Techniques of Crime Scene Investigation. 7th Edition. Barry A. J. Fisher. CRC. 7th Edition. 2003.  
CDC Guidelines for Workers Who Handle Human Remains: <http://www.bt.cdc.gov/disasters/tsunamis/handleremains.asp>  
Management of Human Remains: <http://www.icrc.org/web/eng/siteeng0.nsf/html/p0858>  
Disaster Victim Identification Guide: <http://www.interpol.int/Public/DisasterVictim/guide/default.asp>

Mortuary Science: <http://healthweb.org/browse.cfm?subjectid=55>  
National Association of Medical Examiners (Issues): <http://www.thename.org/>  
Forensic Science: <http://www.ncjrs.gov/spotlight/forensic/Summary.html>  
Forensic Investigation Links: <http://www.nlectc.org/links/forlinks.html>

## **OBSTETRICS AND GYNECOLOGY**

Comprehensive Gynecology. (IV Edition). Morton A. Stenchever. Editor. Harcourt Health Sciences. 2001.  
Current Obstetric and Gynecologic Diagnosis and Treatment. Alan H. DeCherney. McGraw-Hill. 9th Edition. 2002.  
Obstetric and Gynecologic Emergencies: Diagnosis and Management. Mark D. Pearlman. McGraw-Hill. 2003.  
Antenatal Guidelines or Crisis Conditions: <http://www.icrc.org/web/eng/siteeng0.nsf/html/p0875>  
Reproductive Health Care in Emergencies: [http://www.who.int/reproductive-health/pages\\_resources/listing\\_emergency.en.html](http://www.who.int/reproductive-health/pages_resources/listing_emergency.en.html)

## **OPHTHALMOLOGY**

Emergency Ophthalmology: A Rapid Treatment Guide. Kenneth C Chern. McGraw-Hill Professional. 2002.  
American Academy of Ophthalmology: <http://www.aao.org/>  
ACO Resources: <http://www.aao.org/international/index.cfm>  
Eye Disorders Online: <http://www.merck.com/mmpe/sec09.html>  
Ophthalmology Journal: <http://www.ophsource.org/periodicals/ophtha>

## **PALLIATIVE CARE**

Hospice Guidelines and Toolkit: <http://www.mywhatever.com/cifwriter/content/22/files/sorostoolkitfinal120902.doc>  
American Academy of Hospice and Palliative Medicine: <http://www.aahpm.org/>  
Resource Guide: <http://www.aahpm.org/physresources/index.html>  
Journal of Palliative Medicine: [http://www.liebertpub.com/publication.aspx?pub\\_id=41](http://www.liebertpub.com/publication.aspx?pub_id=41)

## **PEDIATRICS**

Current Pediatric Diagnosis and Treatment. William W. Hay. McGraw-Hill. 17th Edition 2004  
Handbook of Paediatrics in Developing Countries. Vincent C. Harrison. Editor. 6th Edition. 2004.  
Merck Manual of Pediatric Therapeutics. John W Grae. Lippincott Williams. 6th Edition. 1997.  
Paediatrics and Child Health: A Manual for Health Professionals in the Third World. H.M. Coovadia, 5th Edition. 2003. Organization, Geneva. 2005.  
American Academy of Pediatrics: <http://www.aap.org/>  
ACP Resources: <http://www.aap.org/profed.html>  
Pediatric Immunization Guide: <http://aapredbook.aappublications.org/current.shtml>  
Pediatric Patient Management: <http://practice.aap.org/topicBrowse.aspx?nodeID=4000>  
Child Health and Development: <http://www.who.int/child-adolescent-health/publications/pubCNH.htm>  
Child Health in Emergencies: <http://www.who.int/child-adolescent-health/publications/pubemergencies.htm>  
Maternal/Child Health Resources: [http://www.who.int/making\\_pregnancy\\_safer/publications/en/](http://www.who.int/making_pregnancy_safer/publications/en/)  
Virtual Pediatric Hospital: <http://www.virtualpediatrichospital.org/>  
Pediatrics Journal: <http://pediatrics.aappublications.org/>

## **PHARMACOLOGY**

Basic and Clinical Pharmacology. Bertram G. Katzung. McGraw-Hill. 10th Edition. 2006.  
Essential Psychopharmacology: Practical Applications. Stephen M. Stahl. Cambridge University Press. 2nd Edition. 2000.  
Pre Hospital Emergency Pharmacology. Bryan E. Bledsoe. Prentice Hal. 6th Edition. 2004.  
PDR Pocket Guide to Prescription Drugs. Thompson PDR. Thomas PDR Publishers. 7th Edition. 2005.  
PDR for Nonprescription Drugs, Dietary Supplements and Herbs: The Definitive Guide to OTC Medications. Thomson PDR. Thomson PDR Publishers. 28th Edition. 2006.  
American College of Clinical Pharmacology: <http://www.accp1.org/>  
American Society of Psychopharmacology: <http://www.ascpp.org/>  
International Society of Ethnopharmacology: <http://www.ethnopharmacology.org/>

Drug Information Online: <http://www.drugs.com/>  
Orphan Drug Program: <http://www.orpha.net>  
PDRs Online: <http://www.pdr.net/>  
The Sanford Guide to Antimicrobial Therapy. David N. Gilbert. 34th Edition. 2004.  
Tarascon Pocket Pharmacopoeia, 2006. Steven M. Green. Tarascon Publishers. 20th Edition. 2005.  
Herbals: <http://www.botanical.com/botanical/mgmh/comindx.html>  
Merck Clinical Pharmacology: <http://www.merck.com/mmpe/sec20.html>  
WHO Essential Medicines, Medication and Formularies: <http://www.who.int/medicines/publications/en/>  
Journal of Clinical Pharmacology: <http://jcp.sagepub.com/>

## **PRIMARY CARE**

Current Practice Guidelines in Primary Care: 2006. Ralph Gonzales. McGraw-Hill. 6th Edition. 2005.  
Current Medical Diagnosis and Treatment: 2007. Stephen J. McPhee. McGraw-Hill. 46th Edition. 2006.  
The Merck Manual of Diagnosis and Therapy. Mark H. Beers. (Editor). Wiley. 2006.  
American Academy of Family Physicians: <http://www.aafp.org/online/en/home.html>  
AAFP Center for Health Information Technology: <http://www.centerforhit.org/>  
AAFP Resources: <http://www.aafp.org/online/en/home/aboutus/relatedsites.html>  
Policy Studies in Family and Primary Care Medicine: <http://www.graham-center.org/>  
Medicine for People in Need: <http://www.medpin.org/>  
Office of Rural Health Policy: <http://www.ruralhealth.hrsa.gov/>  
Basic Medical Exam: <http://www.brooksidepress.org/Products/OperationalMedicine/DATA/operationalmed/Exams/BasicExams.htm>  
Annals of Family Medicine: <http://www.annfammed.org/>  
Journal of Emergency Primary Health Care: [http://www.jephc.com/issue\\_contents.cfm?issue\\_id=30](http://www.jephc.com/issue_contents.cfm?issue_id=30)

## **e-PRACTICE AND PROTOCOL GUIDES (By Specialty)**

<http://www.fpnotebook.com/> <http://www.emedicine.com/> <http://healthweb.org/>  
<http://www.lib.uiowa.edu/hardin/md/> <http://www.medweb.emory.edu/MedWeb>  
Medical Index Sites <http://www.lib.uiowa.edu/hardin/md/idx.html>  
Medical and Health Sciences Libraries Online: <http://www.lib.uiowa.edu/hardin/hslibs.html>

## **PSYCHIATRY**

Diagnostic and Statistical Manual of Mental Disorders: DSM-IV-TR. American Psychiatric Association. American Psychiatric Publishing. 4th edition.  
Early Intervention for Trauma and Traumatic Loss. Brett T. Litz. The Guilford Press. 2003.  
Handbook of Clinical Psychopharmacology For Therapists. John D. Preston. New Harbinger Publications. 4th Edition. 2004.  
Kaplan & Sadock's Pocket Handbook of Clinical Psychiatry. Sadock and Kaplan. Lippincott, Williams & Wilkins. 3rd Edition. 2001.  
Trauma and Recovery: The Aftermath of Violence from Domestic Abuse to Political Terror. Judith Herman. Basic Books. 1997.  
Where There Is No Psychiatrist. Vikram Patel. Royal College of Psychiatrists. 2003.  
American Psychiatric Association Resource Links: [http://www.psych.org/public\\_info/resourcelinks.cfm](http://www.psych.org/public_info/resourcelinks.cfm)  
Diagnostic and Statistical Manual of Mental Disorders (DSM IV) Online: <http://allpsych.com/disorders/dsm.html>  
Psychiatry Practice: <http://www.emedicine.com/med/PSYCHIATRY.htm> ;  
<http://www.lib.uiowa.edu/hardin/md/psych.html> and <http://www.fpnotebook.com/PSY.htm>

## **PUBLIC HEALTH**

Case Studies in Emergency Medicine and Health of the Public. Edward Bernstein. (Editor). Jones and Bartlett. 1996.  
Embodying Inequality: Epidemiologic Perspectives. Nancy Krieger (Editor). Baywood Publishing. 2004.  
Health and Social Justice: Politics, Ideology and Inequity in the Distribution of Disease. Richard Hofrichter. (Editor). Jossey-Bass. 2003.

Managing Disaster Risk in Emerging Economies. Alcira Kreimer. World Bank. 2000.  
Public Health Management of Disasters: The Practice Guide. Linda Y. Landesman. American Public Health Association. 2001.  
Terrorism and Public Health: A Balanced Approach to Strengthening Systems and Protecting People. Barry S. Levy (Editor). Oxford University Press, USA. 2006.  
American Public Health Association: <http://www.apha.org/>  
American Public Health Association, Resources: <http://www.apha.org/programs/resources/>  
Centers for Public Health Preparedness: [http://www.asph.org/cphp/cphp\\_home.cfm](http://www.asph.org/cphp/cphp_home.cfm)  
Public Health Emergency Countermeasures: <http://www.hhs.gov/aspr/ophec/index.html>  
Global Public Health: <http://www.globalhealth.org/>  
Public Health Surveillance Toolkit:  
<http://siteresources.worldbank.org/INTPH/Resources/376086-1133371165476/PHSurveillanceToolkit.pdf>

#### **e-REFERENCES and e-TOOLS:**

Questia Online Research, Books, Journals: <http://www.questia.com/Index.jsp>  
Medical Student.com: <http://www.medicalstudent.com/>  
Anatomy Atlases: <http://www.anatomyatlases.org/>  
USUHS Learning Resource Center: <http://www.lrc.usuhs.mil/>  
Military Medical Technology: <http://www.military-medical-technology.com>  
Medical Algorithms: <http://www.medal.org/visitor/login.aspx>  
Medical References: <http://www.medtrng.com/medicaloperations.htm>  
Merck-Source Online Guide: <http://www.mercksource.com>  
Medical Dictionary Online: <http://cancerweb.ncl.ac.uk/omd/>  
National Center for Biotechnology Information: <http://www.ncbi.nlm.nih.gov/>  
Relief Web Library: <http://www.reliefweb.int/rw/lib.nsf/doc205?OpenForm>  
Virtual Medical Center: <http://www.martindalecenter.com/Medical.html>  
GIS and Public Health: <http://www.cdc.gov/nchs/gis.ht>  
Public Health Mapping and GIS: [http://www.who.int/health\\_mapping/en/](http://www.who.int/health_mapping/en/)  
Diagnostic Tests and Vaccines for Terrestrial Animals: [http://www.oie.int/eng/normes/mmanual/A\\_summry.htm](http://www.oie.int/eng/normes/mmanual/A_summry.htm)  
Medical Threats Briefing (by Topic): <http://usachppm.apgea.army.mil/hiomtb/>

#### **REFUGEE HEALTH**

Management of Severe Malnutrition: A Manual for Physicians and Other Senior Health Workers. World Health Organization. Geneva. 1999.  
Patronage or Partnership: Local Capacity Building in Humanitarian Crises. Jan Smillie Kumarian Press. 2001.  
Refugee Health: An Approach to Emergency Situations. G. Hanquet. Editor. McMillan Education. London. 1997.  
The Management of Nutrition in Major Emergencies. WHO: World Food Program. Geneva. 2000.  
Famine Affected Refugees:  
<http://www.brooksidepress.org/Products/OperationalMedicine/DATA/operationalmed/CDC/refugees/entire.htm>  
Multi Service Humanitarian Assistance:  
<http://www.brooksidepress.org/Products/OperationalMedicine/DATA/operationalmed/Manuals/FM100-23-1/FM100231TableofContents.htm>  
Refugee Handling:  
<http://www.brooksidepress.org/Products/OperationalMedicine/DATA/operationalmed/Manuals/HumanitarianAssistance/refugees/entire.htm>  
Refugee Medicine: <http://www.brooksidepress.org/Products/OperationalMedicine/DATA/operationalmed/CDC/refugees/entire.htm>  
Nutrition in Emergencies: <http://www.who.int/topics/nutrition/publications/emergencies/en/>  
Management of Severe Malnutrition: <http://whqlibdoc.who.int/hq/1999/a57361.pdf>  
Post Conflict Reconstruction Project: <http://www.csis.org/isp/pcr/>

## **SEARCH AND RESCUE**

Confined Space Rescue. Chase Sargent. Fire Engineering Books. 2000.  
Technical Rescue Operations: Common Emergencies. Larry Collins. Fire Engineering Books. 2006.  
Disaster Search and Urban Rescue: <http://www.disastercenter.com/search.htm>  
Combat Search and Rescue Procedures: [http://www.army.mil/usapa/epubs/pdf/r525\\_90.pdf](http://www.army.mil/usapa/epubs/pdf/r525_90.pdf) and  
<http://www.au.af.mil/au/aul/school/sncoa/sandr.htm>  
National Institute for Urban Search and Rescue: <http://www.niusr.org>  
NIUSR Online Journal <http://www.niusrjournal.org/main.html>  
Technical Rescue Resource Guide: <http://www.techrescue.org/>  
Naval Search and Rescue Model Manager: <http://www.hsc3.navy.mil/sarimm/>  
National Association for Search and Rescue: <http://www.aams.org/>  
Search and Rescue Links: <http://www.nasar.org/nasar/links.php>

## **SURGERY**

Surgery Guide: <http://www.steinergraphics.com/surgical/index.html>  
Surgery for Victims of War: <http://www.icrc.org/web/eng/siteeng0.nsf/html/p0446>  
War Wounds: Basic Surgical Management: <http://www.icrc.org/web/eng/siteeng0.nsf/html/p0570>  
Best Practice Guidelines for Surgical Care in Emergencies: [http://www.who.int/surgery/en/ESC\\_in\\_disasters.pdf](http://www.who.int/surgery/en/ESC_in_disasters.pdf)  
Surgical Care at the District Hospital: <http://www.who.int/surgery/publications/en/SCDH.pdf>  
Integrated Management of Essential and Emergency Surgical Care:  
<http://www.who.int/surgery/publications/imeesc/en/index.html>  
Essential Surgical Care: Toolkit: <http://www.steinergraphics.com/surgical/index.html>

## **TACTICAL EMS**

Combat Medicine: Basic and Clinical Research in Military, Trauma, and Emergency Medicine. George C. Tsokos. (Editor). Humana Press. 2003.  
Tactical Emergency Care: Military and Operational Out-of-Hospital Medicine. Robert A. De Lorenzo. Prentice Hall. 1999.  
Tactical Medicine: An Introductory To Law Enforcement Emergency Care. Ian McDevitt Paladin Press. 2001.  
Terrorism Handbook for Operational Responders, Armando S. Bevelacqua. Thomson Delmar Learning. 2nd Edition. 2003.  
PHTLS Basic and Advanced Pre hospital Trauma Life Support: Military Version. National Association of Emergency Medical Technicians.  
Centers for Tactical Medicine: <http://www.mcg.edu/ems/COM/> ; <http://www.gwemed.edu/opmed/tacmed.htm> ;  
<http://www.mcg.edu/ems/COM/Tactical/> and  
<http://www.casualtycareresearchcenter.org/OPM%20Main%20Page.htm>  
Journal of Tactical Emergency Medicine: <http://www.tems.org>

## **TELEMEDICINE**

Handbook of Telemedicine. Olga Ferrer-Roca. IOS Press. 1999.  
Essentials of Telemedicine and Telecare. A. C. Norris. John Wiley & Sons. 2002.  
Telemedicine and Telehealth: Principles, Policies, Performance and Pitfalls. Adam William, MD. Springer Publishing Company. 2002.  
U.S. Army Telemedicine: <http://www.tatrc.org/>  
US HHS Telehealth: <http://www.hrsa.gov/telehealth/>  
Telemedicine Resources: <http://tie.telemed.org/links/>  
Telemedicine Links: <http://www.quasar.org/21698/textfodder/telelink.htm>  
Center for Telehealth Law: <http://www.ctel.org/>  
Journal of Telemedicine and Telecare: <http://www.rsmppress.co.uk/jtt.htm>

## **TROPICAL MEDICINE**

Oxford Handbook of Tropical Medicine. Michael Eddleston. Oxford University Press, USA. 2nd Edition. 2004.  
Rapid Infectious Diseases and Tropical Medicine. Rachel Isba. Blackwell Publishing Professional. 2003.  
Sexually Transmitted Infections and AIDS in the Tropics. O. P. Arya. CABI Publishing. 1998.  
Tropical Infectious Diseases: Principles, Pathogens & Practice. R.L. Guerrant. Churchill Livingstone. 1998.  
American Society of Tropical Medicine: <http://www.astmh.org/>  
Institute of Tropical Medicine: <http://lib.itg.be/bibhome.htm>  
The International Registry of Tropical Imaging: <http://tmcr.usuhs.mil/toc.htm#>  
Training in Tropical Diseases: <http://www.who.int/tdr/index.html>  
Neglected Tropical Diseases Project: <http://tdrtargets.org/>  
Military Tropical Medicine: <http://tmcr.usuhs.mil/>  
Tropical Medicine Links: <http://www.astmh.org/links/index.cfm>  
American Journal of Tropical Medicine and Hygiene: <http://www.ajtmh.org/>

## **VETERINARY MEDICINE**

Animal Management in Disasters. Sebastian E. Heath. Mosby. 1999.  
Merck Veterinary Manual. Cynthia M. Kahn. Editor. John Wiley & Sons 9th Edition. 2005.  
Where There is no Animal Doctor. Peter Quesenberry. Christian Veterinary Mission. 2000.  
American College of Veterinary Clinical Pharmacology: <http://www.acvcp.org/>  
Advanced Veterinary Information System: <http://www.aviscollege.com/>  
American College of Veterinary Emergency and Critical Care: <http://acvecc.org/>  
World Veterinary Association: <http://www.worldvet.org/>  
Biosecurity Resource Center for Animal Health Emergencies: <http://www.biosecuritycenter.org/>  
Veterinary Environmental Health Center: <http://www.emc.ncsu.edu/>  
Animal and Plant Health Inspection Service: [http://www.aphis.usda.gov/about\\_aphis/](http://www.aphis.usda.gov/about_aphis/)  
Animal Disease Notification Online: [http://www.oie.int/eng/info/hebdo/A\\_INFO.HTM](http://www.oie.int/eng/info/hebdo/A_INFO.HTM)  
Veterinary Public Health and Zoonoses: <http://www.who.int/zoonoses/vph/en/>  
Global Early Warning System for Animal Diseases <http://www.who.int/zoonoses/outbreaks/glews/en/index.html>  
World Organization for Animal Health: [http://www.oie.int/eng/en\\_index.htm](http://www.oie.int/eng/en_index.htm)

# Human Performance Forum

SOCM GLENN MERCER

## INTRODUCTION

“...It is not enough for language to have clarity and content: it must also have a goal and an imperative...”  
*Rene Daumal*

Earlier this year SOCOM issued an updated policy on performance enhancing substances. I discussed the bullet points of this policy memorandum (PM) in the Winter 2008 SEMA editorial. Since January, questions to the Human Performance website have asked for expanded definitions of the technical vocabulary. Specifically, the first six queries to the SOFNET portal asked about recommendations or lists of “approved substances” for use within MFP 11.

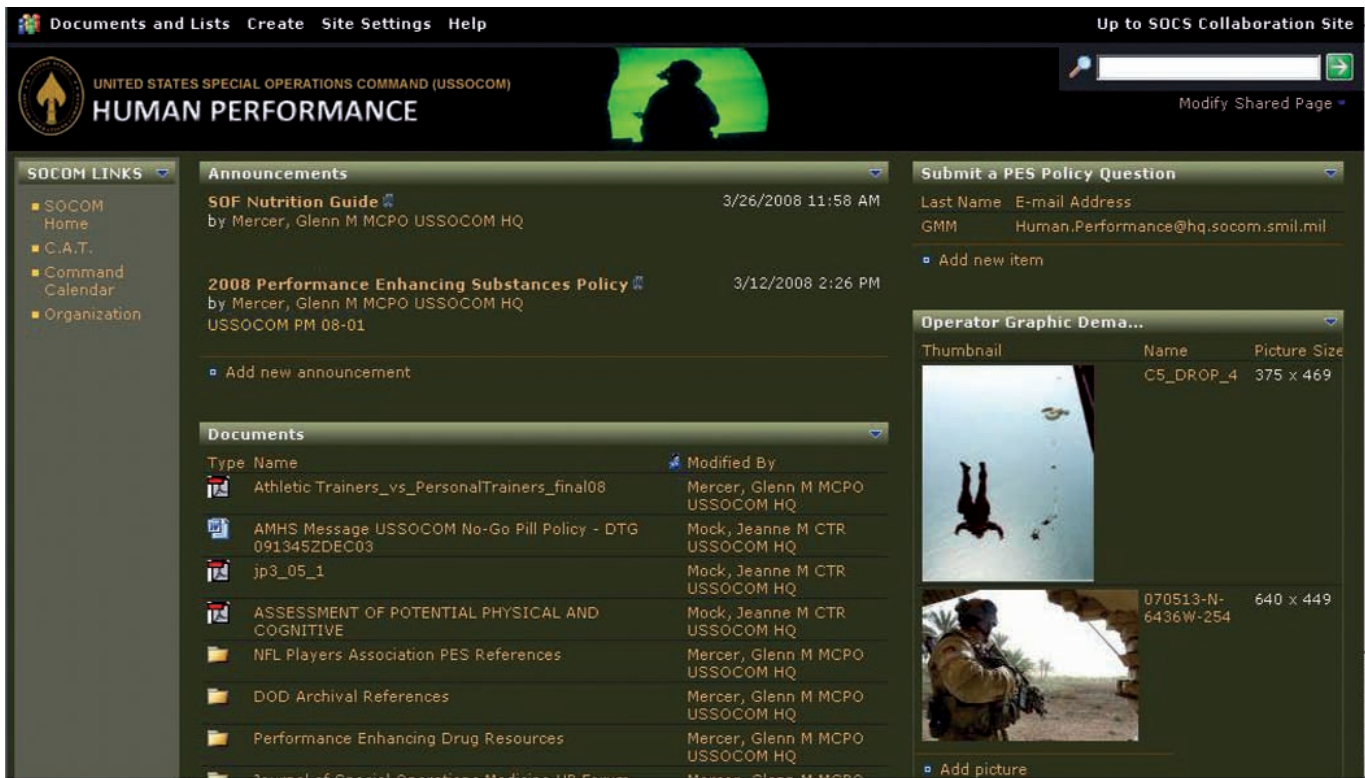


Figure 1 Human Performance SOCOM Website

Our case in point for this forum is the descriptor “supplements.”<sup>1,2</sup> Beyond its possibilities for use as a noun, verb, adjective, or topic title, the word clearly has a diverse level of application, a place in casual dialogue, and some very specific, ingrained (vendor driven) misconceptions. Additionally, no federal agency has eminent domain to provide us with the bottom line. Relevant, if not critical, agencies like the DoD, DoJ, FDA, National Institute for Health, and the United States Pharmacopeia (USP) all take liberties and cannibalize each others defi-

nitions. Beyond the glossaries in the recently released SOF Nutrition Manual and the Nutrition Committee COTS list there are clearly multiple interpretations of the word that are, and can be equally relevant to the Operator.

This edition’s forum will refine two critical terms and concepts in our role as the human performance proponent. While there is no intent to subvert the federal usage or contradict any commercial vocabulary, it is imperative that common, if not joint, language is present. Our policy and technical responses can be consistent in



both external and internal communications. We will also provide our readers with a facilitator perspective on using a battery of supplements.

#### VOCABULARY

**Basic Sustenance:** The specific caloric intake that humans require to maintain homeostasis. Caloric sources may be from livestock, produce, or crops, but are usually characterized as organic.

**Amplification:** Items and elements that are synthetically produced regardless of the motive are not categorized as part of this term. Great liberties are often taken with this descriptor when it is removed from textbooks and placed in context of the DOD. The lay descriptor is the word food, however even that has liability in a vendor driven conversation.

**Supplement:** Almost exclusively an exogenous substance in any form that is deliberately obtained and ingested to amplify, increase, regulate, or stabilize physiologic functions from their baselines.

**Amplification:** It must be stressed that in the venue of military HP a supplement is an element that is “in addition to” the baseline of basic organic sustenance. In many discussions, advertising and faux technical articles this descriptor is often used in an “in lieu” capacity, especially when the word dietary is casually placed in front of it. The rationale and purpose for ingesting a supplement is determined by the individual who uses it (e.g., performance, recovery, health, or wellness). Where or how a substance is obtained does not qualify it, nor establish its status, as a supplement. Our first litmus test

when asked about a specific substance is, “is it a food, foodstuff, medicinal or supplement.”<sup>3</sup>

**Policy Note:** Regarding use of supplements for human performance, some disagreement exists within the DoD, military medicine, and research complexes regarding the acronym that will be used to describe this topic. Currently, three letters are circulating as candidates to be attached to HP, if not in fact competing to be the final adjudicated acronym. They are all contextual adjectives. **Optimize**, **Enhance**, and **Modify** all are easily located in literature searches within the MIL MED libraries. It is the authors’ opinion that because HP within the larger DoD has yet to be sufficiently defined, any process or program unilaterally anchoring an adjective will have inherent conflict. In the SOF environment, clarity and assignment of boundaries for each term is essential because of the parochial and dissimilar executive agents for the sub-components of HP.

#### THE SUPPLEMENT EXPERIENCE

In the last 18 months I have been asked repeatedly what product (supplement) should be taken to derive or realize benefit X. I verbally negotiated most of these queries by advertising the upcoming Nutrition Manual. Now that it is out and being utilized by the SOF claimancy I am ready to submit an AAR on a personal experience. While this gains no ground towards a coherent document on what is, or might be “recommended,” I will post the reference inventory and rationale for each of these selections on the SIPR website. In November 2007, I concluded my project research



Figure 2

on supplements for this unit of one review. The following conditions were in effect:

1. This panel of supplements is limited to oral vitamins, minerals, amino acids, and anti-oxidants. I wanted the focus to remain on the concept of supplementing the basics and addressing the results of assumed dietary deficiencies.
2. The selection of product vendors would be known only to me; however, it is a reasonable facsimile of what would be available for patronage by any military personnel in the exchange services. I especially sought out any product that achieved an FDA, USP, or third party laboratory validation.
3. Each selection would be taken at or below the recommended daily allowance.
4. My basic daily intake of food would remain unchanged for the term of six months, concurrent with the term of supplement usage.
5. My PT and occupational demands would remain consistent with the last five years of SOF service, presently a focus on anaerobic conditioning patterns and modalities with sparse competitive events.
6. Each product had to have a supported scientific basis for selection and usage.<sup>4</sup>



Figure 3

## Substance List

### AM Supplements

	Amount	Characteristic
Green Tea EGCG	150mg	Anti-Oxidant
CQ-10	30mg	Co-Enzyme
Calcium Citrate	333mg	Mineral
Vitamin D – in Calcium Citrate	204 International Units	Fat Soluble Vitamin
Magnesium – in Calcium Citrate	189mg	Mineral

### Mid Day Supplements

Fish Oil, 1gm	225 DHA yield	Omega 3 EFA
Vitamin E – in fish Oil	30 International Units	Fat Soluble Vitamin
Vitamin E – capsule form	30 International Units	Fat Soluble Vitamin
Glucosamine / Chondroitin	1500 / 1250mg	Amino Sugar

### PM Supplements

Zinc	30mg	Mineral
Lysine	500mg	BCAA
Vitamin C Active	500mg	Water Soluble VIT
Green Tea EGCG	150mg	Anti-Oxidant
Vitamin E	30 International Units	Fat Soluble Vitamin
Vitamin D	400 International Units	Fat Soluble Vitamin

### Nighttime Supplements

Fish Oil, 2gm	450mg DHA	Omega 3 EFA
Vitamin E in Fish Oil	30 International Units	Fat Soluble Vitamin
Melatonin	1mg	Pineal Hormone

### Supplements that I considered but did not elect to use:

Quercetin	1gm
Glutamine	500mg
Capsicum	500mg
Conjugated Linolenic Acid	

## OBSERVATIONS

Figure 2 depicts the amount of bulk product that is necessary to materially support even this simple profile of basic supplements. In total this requires the ingestion of over 20 capsules, pills, or tablets every 24 hours. Several of the substances have timing considerations and specific complements to maximize their half life or release considerations. The fiscal outlay for Figure 1 (pictured bulk stocks) which sustains approximately 40 days of usage would total over \$1200.00 per year. My vendor choices are analogous to a mid-tier automobile so this price point could certainly be higher if I elected to patronize some of the custom companies that are available on the commercial market. A battery of performance supplements designed on similar criteria would price at almost double the outlay of the basic panel.

I feel no different today than I did 90 days ago. While I have no unusual expectations from this trial, I am surprised that there is not even the slightest up tick in any of the subjective benefits ascribed to several of these products. The barometer for me is recovery time between workouts and in that regard, recovery times have not narrowed.

Objectively, there are no changes in any of my labs that are available to the military member in a preventative health capacity. While I believe that if some of the more specific tests that measure endocrine and blood chemistry were available my objective metrics would have some sort of measurable improvement.

## SOME BULLET POINTS FOR OUR READERS

- There is an unusual amount of contradictory, authoritative data about the “right” dosages. It is most contrarian in the .org versus .com websites.
- If you take the exact manufacturers recommended dose you will need to replace stocks 33% sooner.
- I encountered the word toxicity far too many times in my research. I encountered the phrase “highly recommended” even more.
- Using the common sense to the common man principle I believe that most of the inertia to supplementation comes from convincing the population that they are nutritionally deficient in some form. I read five books, from five different authors and all of them prefaced their arguments with this postulate. Selection decisions based on the creation of anxiety regarding personal health will seldom be objective.

- If you experience side-effects I believe it would be near impossible to figure out the singular source of those effects. Many elements have the ability to attain synergy with others and in fact many are co-dependant on specific ratios of related elements to release correctly and be effective at the cellular level.
- Taking 20 capsules per day and complying with the “with food” - “without food”- “with specific foods” directions is an absolute pain. If you paid as much attention to your food intake as you do complying with these restrictions, I would submit that you probably don’t require the supplements.
- If you have an opinion about your supplements it will take you minimal time on the internet to discover literature that can reinforce or corrupt that opinion. There are an exceptional amount of castles out there that both defend and advocate depending on their commercial positioning.

It is my intent to follow this through a six-month term and evaluate for efficacy at that time. While many of the research investigators that have championed each of the substances make substantial health / wellness arguments and observations, I feel that without centralized guidance similar to what is found in the Nutrition Manual it is near impossible to locate definitive supplement protocols. At an elementary level many of these supplements work because you believe or decide that they do. Evidence-based and laboratory level assessments that would be needed to substantiate the benefits are simply not available to the Operator and therefore, rationale for usage must be an extrapolated thought process, if not a belief that because it was established in a relevant peer study I must need it, and it is safe for me to use.

## REFERENCES

1. Webster’s New World College Dictionary
2. Dorland’s Medical Dictionary (27th)
3. Webster’s New World College Dictionary, noun
4. Research Papers and Documents posted to SOCOM HP website

# Med Quiz

## Picture This...

Walter Greenhalgh MD; Daniel Schissel, MD

A 38 year old male Airman presents complaining of multiple itchy and occasionally very painful (searing, tearing sensation) furuncular lesions on his scalp, both arms, and his left lower leg that are enlarging in size over six to eight weeks. Close inspection reveals a central puncta on each lesion which, when probed, is actually a fairly deep pore. There is no appreciable lymphadenopathy, and vital signs are normal. During the previous two weeks, the nodules have started to drain a serosanguinous discharge from a central punctum, to the point where his bed sheets and pillow cases have to be changed nightly. Recent travel history includes a vacation to Costa Rica 10 weeks earlier, but no recent deployments.

Each puncta is probed with fine needle-nosed forceps, the tissue within is grasped and the mass shown is delivered with light to moderate traction.



Photo 1



Photo 2

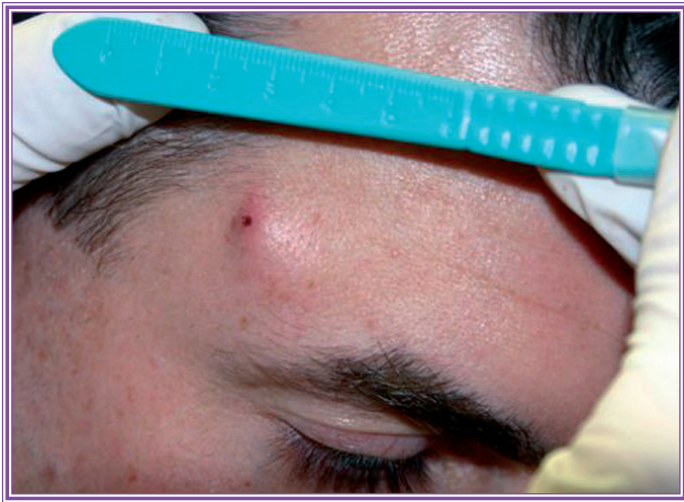


Photo 3



Photo 4

Photo 5



**Question 1:**

Using the primary lesion definitions outlined in your SOF medical handbook, how would you describe the morphology of these lesions prior to delivering their contents?

**Question 2:**

What is your differential diagnosis for these nodular draining lesions prior to probing? How about after you deliver the contents?

## ANSWERS

### Question 1:

Morphology: these lesions are non-fluctuant nodules that vary in size from 6mm to over 22mm in diameter. They are surrounded by mild to moderate erythema, and have a central puncta draining serosanguinous fluid.

### Question 2:

Prior to making the obvious diagnosis based on the lesions' content, your differential diagnosis should include carbuncles and furuncles, sebaceous cysts, skin malignancies, local insect bite reactions, and myiasis. Clues to help differentiate this from a malignancy would be the number of lesions that developed, and their acute development. Sebaceous cysts also usually take much longer to develop. The local intense inflammation and pain also steers us away from typical malignancies. Carbuncles and furuncles can look very similar to these lesions, and usually present in multiple polymorphic stages, but you might expect more local tenderness and fluctuance to palpation, as well as lymphadenopathy. The serosanguinous drainage, when cultured, will often be sterile in the case of myiasis, whereas in carbuncles and furuncles the discharge is purulent and usually grows a staph species. Local reactions to insect bites should generally subside after several days to a week.

## MYIASIS

### EPIDEMIOLOGY

Myiasis, first described by Hope in 1840,<sup>1</sup> is the term used to describe the invasion of tissues and organs of humans and other animals by the larvae of flies of the order Diptera. Diptera are two-winged flies whose first stage larvae require a warm-blooded animal as host for maturation.<sup>2</sup>

*Dermatobia hominis*, otherwise known as the human botfly, belongs to the family Cuterebridae. The botfly is endemic from central Mexico down through Central and South America, and can grow to 18mm in length. They populate areas of forests and jungle, usually near rivers and streams or along coastal areas.<sup>3</sup> After it mates, the female catches a biting arthropod, such as a mosquito or tick, to act as a mechanical vector. It will hold the arthropod with its hind legs while it deposits 15 to 30 eggs on its abdomen. Multiple depositions may occur during the nine day life cycle of the female botfly, as up to 400 eggs are produced per female botfly. If an insect vector cannot be found, the female botfly may deposit its eggs on plant leaves instead.

### CLINICAL COURSE

In addition to humans, wild and domestic animals as well as birds can act as host to the fly's development. Domestic cattle are a common target, which can have significant local economic impact.<sup>4</sup> Once the host comes into contact with these plant leaves or has an egg carrying vector land on it, the eggs are deposited on the host animal. The eggs increase in temperature due to contact with the warm blooded host, causing the eggs to hatch and resulting in a first stage larva. The larva then enters the skin, anterior end first. It may enter through a hair follicle, a pore, or through a breach in the skin created by the aforementioned biting arthropod. This entire process usually takes less than 60 minutes, and sometimes in as little as 5 minutes. Initial penetration is usually not felt by the host. Within a day a small papule develops, gradually enlarging up to 15 to 20mm in diameter.<sup>5</sup>

The larva stays in the subcutaneous skin from four to 14 weeks. During this time it may grow to over 20mm in size, developing into an instar, or third-stage larva. At this point, the larva emerges from the skin, falls to the ground, pupates for 14 to 30 days in the soil, and emerges as a mature botfly, living for an additional two weeks. This entire life cycle lasts approximately three to four months.<sup>5,6</sup>

The botfly larva itself has two curved oral hooks. These help it to grasp and tear tissue for the purposes of feeding, and are responsible for the searing and tearing feeling patients often describe with this infestation. The larva also has several rows of parallel concentric rows of posterior pointing spines that help it to remain anchored within the subcutaneous tissue. The larva breathes through a spiracular plate in its posterior end, resulting in the oft cited description of bubbles appearing through the puncta or of movement of the column of fluid just inside the puncta. The fluid itself may be serosanguinous or even purulent an appearance, however it is not common for secondary bacterial infection in these lesions, thus antibiotics are not usually required once the lesions are evacuated.<sup>7</sup>

### TREATMENT



There are numerous treatments described for furuncular myiasis. The most common involves suffocating the larvae while in the skin. This is done by occluding the puncta and spiracular plate through which the larvae breathe. This results in death of the larva within the skin making removal easier, and if not then usually the larva migrates out of the skin as it attempts to breathe, again making complete removal more easy.<sup>3</sup> Many substances have been used to occlude the puncta, including wax, gum, nail polish, tape, raw meat, and petroleum jelly. A benefit to the use of raw meat or bacon is that it may attract the larva out of the skin completely as it looks for a tastier meal.

Injection of lidocaine directly into or under the larvae is also described as a treatment.<sup>2</sup> Often the pressure of this fluid in the space below the larva is enough to partially force it out of the pore. This also facilitates any surgical excision required in the removal of the larvae. Dissection or debridement should be minimized, however, as these lesions, once evacuated of their passengers, usually heal very well and have minimal, if any, scarring. Antibiotics should only be given in cases where bacterial infection is clearly demonstrated. Factors complicating myiasis treatment include incomplete organism removal, in which case a persistent foreign body reaction may occur or a granuloma may appear. Only rarely has myiasis resulted in death and has usually been in cases where the larva has inadvertently migrated into a body cavity, such as the skull via the soft fontanel of a young child, resulting in meningitis. Tetanus has also been described as a rare complication.<sup>8</sup> Systemic symptoms are rare in myiasis,<sup>7</sup> with the typical presentation being just as with this patient. Aside from an acute case of the heeby geebies, the patients usually suffer no after effects.

#### REFERENCES

1. Hope FW. On insects and their larvae occasionally found in the human body. *Trans R Soc Entomol.* 1840, 2:256-271.
2. White, GM and Cox, HC. (2000). *Diseases of the Skin, a Color Atlas and Text.* pp. 380-381. Harcourt Publishers Limited.
3. Siraj DS, Luczkovich, J. (2005). Nodular skin lesion in a returning traveler. *J Travel Med.* 12(4):229-31. Retrieved from <http://www.ajtmh.org/cgi/content/full/76/3> Abstract
4. Anna M. Parasites and Pestilence: Infectious Public Health Challenges Program in Human Biology. *West Hum Bio 103.* Stanford University. Retrieved from <http://www.stanford.edu/class/humbio103/ParaSites2001/myiasis/Anna%20West's%20Myiasis%20Page.htm>.
5. Purych, Dale. (2005) Dermatobia-Cutaneous Myiasis, Case Presentation. Retrieved from <http://www2.provlab.ab.ca/bugs/webbug/parasite/botfly.htm>.
6. Hall, MJR, Wall, R. (1995) Myiasis in humans and domestic animals. *Advances in Parasitology*, 35, 258-334.
7. *Parasitol Int.* (2007) Dec; 56(4):330-3. Epub Jun 14.
8. Yébenes, M, Muñoz, C, Sábat, M, Palacio, L, San Vicente, B, Travería, FJ, Luelmo, J. Multiple furunculoid myiasis on the scalp of a child *Dermatology Online Journal* 13 (2):13. Retrieved from [http://dermatology.cdlib.org/132/case\\_presentations/myiasis/yeben.html](http://dermatology.cdlib.org/132/case_presentations/myiasis/yeben.html).



Commander Walt Greenhalgh graduated from Jefferson Medical College, Thomas Jefferson University, Philadelphia Pennsylvania, in 1992. After completing an internship in General Surgery at the National Naval Medical Center in Bethesda Maryland, he attended the Naval Aerospace Medical Institute in Pensacola Florida as a Student Naval Flight Surgeon. After a 3 year tour as a Flight Surgeon at the Marine Corps Base, Quantico, Virginia, he completed a residency in Family Medicine at the Puget Sound Family Medicine Residency Program at the Bremerton Naval Hospital in 1998. His next tour of duty was in as Family Physician and Senior Medical Officer at the Branch Medical Clinic, Gaeta, Italy. In 2001 he returned to Marine Corps Base Quantico, where he was the Director for Primary Care and the Chief of the Professional Staff. In 2003 he transferred to the Pentagon, Washington, DC, where he worked as Family Physician and Flight Surgeon for the US Air Force's 11th Medical Group Aviation Medicine Clinic. His current duty station, since 2006, is at the U.S. Naval Hospital, Rota, Spain, where he serves as the Senior Medical Executive/Chief of Professional Staff as well as Staff Family Physician and Flight Surgeon.



COL Daniel Schissel originated "Picture This" for the Med Quiz. He is a 1993 graduate of the Uniformed Service University of the Health Sciences and completed his internship with the family practice department at Fort Bragg in 1994. He then served as the 2/10th Special Forces Group (Airborne) Surgeon and followed on as the 10th SFG(A) Group Surgeon. He completed his residency training in dermatology at the Brooke Army Medical Center in 1999. LTC (P) Schissel is presently stationed in Heidelberg, Germany as a staff physician and the European Regional Medical Command Dermatology Consultant. He has been selected as the U.S. Army OTSG Dermatology Consultant. LTC (P) Schissel has authored the dermatology section of the new SOF manual, serves on the USSOCOM Medical Curriculum and Examinations Board, and is the U.S. Army Aviation Dermatology Consultant.

# Meet Your JSOM Staff

## EXECUTIVE EDITOR

Warner Dahlgren Farr, MD

warner.farr@socom.mil



COL “Rocky” Farr was the distinguished honor graduate of his Special Forces 18D class in 1968 and completed 40 years of active service last April. He served as a recon team member with the 5th SFG(A) in SOG-Studies and Observations Group. He attended the DLI (German) and joined Detachment A, Berlin Brigade, an early special mission unit. He became the SF instructor at the ROTC Detachment, Northeast LA University and completed his BS. As a SFC, he taught in the 18D course and was selected for MSG. COL Farr was accepted to the Uniformed Services University of the Health Sciences and while a medical student, he was the medical platoon leader for the 11th SFG(A). He received his MD in 1983 and has completed residencies in aerospace medicine, and anatomic and clinical pathology. He commanded Company F (ABN), 3rd BN, Academy BDE, Academy of Health Sciences as Course Director of the Special Operations Medical Sergeant’s Course; and advisor to the 12th SFG(A). He was Chief, Department of Pathology, Blanchfield Army Community Hospital, and Flight Surgeon, 50th Medical Company (Air Ambulance), 101st ABN Division (Air Assault). COL Farr was the Division Surgeon of the 10th Mountain Division (Light Infantry) until becoming Deputy Commander of the U.S. Army Aeromedical Center. He attended the Air War College before becoming the Deputy Chief of Staff, Surgeon, U.S. Army Special Operations Command; Command Surgeon, U.S. Army Special Forces Command; and Command Surgeon, U.S. Army Civil Affairs and Psychological Operations Command. He became the Command Surgeon of the U.S. Special Operations Command in Tampa, FL in July 2006. He has numerous operational tours to include Bosnia, Kosovo, Kuwait, Vietnam, Cambodia, and Afghanistan.

## MANAGING EDITOR

Michelle DuGuay Landers, RN

duguaym@socom.mil



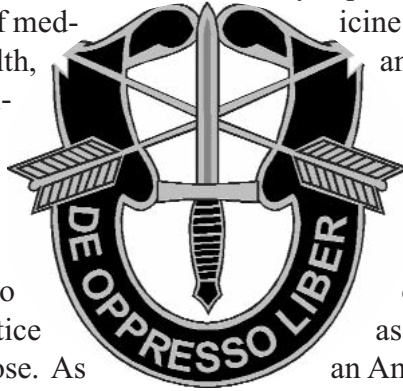
Lt Col Landers joined the Army Reserve in 1987 and served as a nurse in a Combat Support Hospital unit for three years before switching services in 1990 to become an Air Force C-130 Flight Nurse. She is currently an IMA reservist attached to the SOCOM/SG office where she has been in charge of management, 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 22 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 her 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.

## Submission Criteria

1. Use the active voice when possible. This is our most common editorial problem and often requires extensive re-writes. Use the sequence “subject - verb - object.”
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. Important: Include an abstract, biography, and headshot photo of yourself as part of the article. Include three learning objectives and ten test questions if article is submitted for continuing education.
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.
7. We do not print reviews of particular brands of items or equipment unless that brand offers a distinct advantage not present in other products in the field. The author must specify in the article the unique features and advantages the product offers in order to justify an exception to this rule. The author must also specify whether the article was purchased by him or his unit, or supplied for free by the seller or manufacturer. Finally, the author must disclose any relationship with the manufacturer or seller, whether financial, R&D, or other.
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 or magazine article** - Sztajnkrzyer, Matthew D. MD, PhD; Callaway, David W. MD; Baez, Amado Alejandro, MS, MPH. (2007). Police Officer Response to the Injured Officer: A Survey-Based Analysis of Medical Care Decisions; 22(4):335–341. **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** - Okuda, M., & Okuda, D. (1993). *Star Trek chronology: The history of the future*. New York: Pocket Books. **Book article or chapter** - James, N. E. (1988). Two sides of paradise: The Eden myth according to Kirk and Spock. In D. Palumbo (Ed.), *Spectrum of the fantastic* (pp. 219-223). Westport, CT: Greenwood. **Website** - Lynch, T. (1996). DS9 trials and tribble-ations review. Retrieved October 8, 1997, from Psi Phi: Bradley's Science Fiction Club Web site: <http://www.bradley.edu/campusorg/psiphi/DS9/ep/503r.html> If unsure, please contact us at [jsom@socom.mil](mailto:jsom@socom.mil).
9. Submit high resolution (300dpi) quality photographs with your article. Send photos separately from the document to facilitate high resolution conversion into a publishing format. Images imbedded into word documents do not transfer to publishing programs and lose resolution when pulled out of the word document, resulting in a poor quality image. We prefer that images be sent electronically in a jpeg format. Please name all images as to what they are (i.e., Figure 1, Figure 2, etc.) and designate placement in the article using the filename. If you send original pictures, we will make every attempt to return your pictures, but will not account for lost or damaged items.
10. Send submissions by email (preferred method) to [JSOM@socom.mil](mailto:JSOM@socom.mil), or you may send articles on diskette, or CD, by mail to: USSOCOM Surgeon's Office ATTN: JSOM Editor, 7701 Tampa Point Blvd. MacDill AFB, FL 33621- 5323. Retain a copy for yourself.
11. We reserve the right to edit all material for content and style. We will not change the author's original point or contention, but may edit clichés, abbreviations, vernacular, etc. Whenever possible, we will give the author a chance to respond to and approve such changes. We may add editorial comments, particularly where controversy exists, or when a statement is contrary to established doctrine. However, the author must assume responsibility for his own statements, whether in accordance with doctrine or not. Both medical practice and the military doctrine are living bodies of knowledge, and JSOM's intent is not to stifle responsible debate.
12. Special Operations require sensitivity to natives of host countries, occupied regions, and so on. We feel that patronizing terms generally are inappropriate for our pages. Realistic language of operators (including some “four-letter” words) may be tolerated in anecdotal and historical articles, especially when used as direct quotes or when such use is traditional among operators. We will delete or change blatantly offensive use.
13. **All articles written by USSOCOM members must be reviewed and pre-approved by your commander, component surgeon, and PAO prior to submission to the JSOM. Authors must adhere to standard OPSEC practices and refrain from mentioning specific units, specific locations, troop strengths, names of actively serving SOCOM personnel, TTPs, vulnerabilities, and any other information that could be of use to an adversary.**
14. Authors must adhere to standard OPSEC practices and refrain from mentioning specific units, specific locations, troop strengths, names of actively serving SOCOM personnel, TTPs, vulnerabilities, and any other information that could be of use to an adversary.
15. The JSOM is your journal and serves as a unique opportunity for you to pass your legacy to the SOF medical community!

### 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.



icine. 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 do, I did what others failed to do. I asked And reluctantly accepted the I fail. I have seen the face of terror; joyed the sweet taste of a moment's hoped...but most of all, I have lived ten. Always I will be able to say, that my duty as a Pararescueman to save a my assigned duties quickly and efficiently, placing these duties before personal desires and comforts.**



**be. I went where others feared to go, and nothing from those who gave nothing, thought of eternal lonliness ... should felt the stinging cold of fear, and en- love. I have cried, pained and times others would say best forgot- I was proud of what I was: a PJ It is life and to aid the injured. I will perform**

**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 answered the call together, on sea for help was given, I've been on the ocean or in the jungle wear- man, be it Sailors or Marines. and you think of calling him "squid," 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...*



*my own title of pride. We've an- and foreign land. When the cry there right at hand. Whether I am ing greens, Giving aid to my fellow So the next time you see a Corpsman think of the job he's doing as those before*

*I'm the one called "Doc".*

*~ Harry D. Penny, Jr. USN Copyright 1975*

UNITED STATES SPECIAL OPERATIONS COMMAND  
ATTN: SOCS-SG  
7701 Tampa Point Blvd.  
MacDill AFB, FL 33621-5323  
OFFICIAL BUSINESS



**MEDIA MAIL**