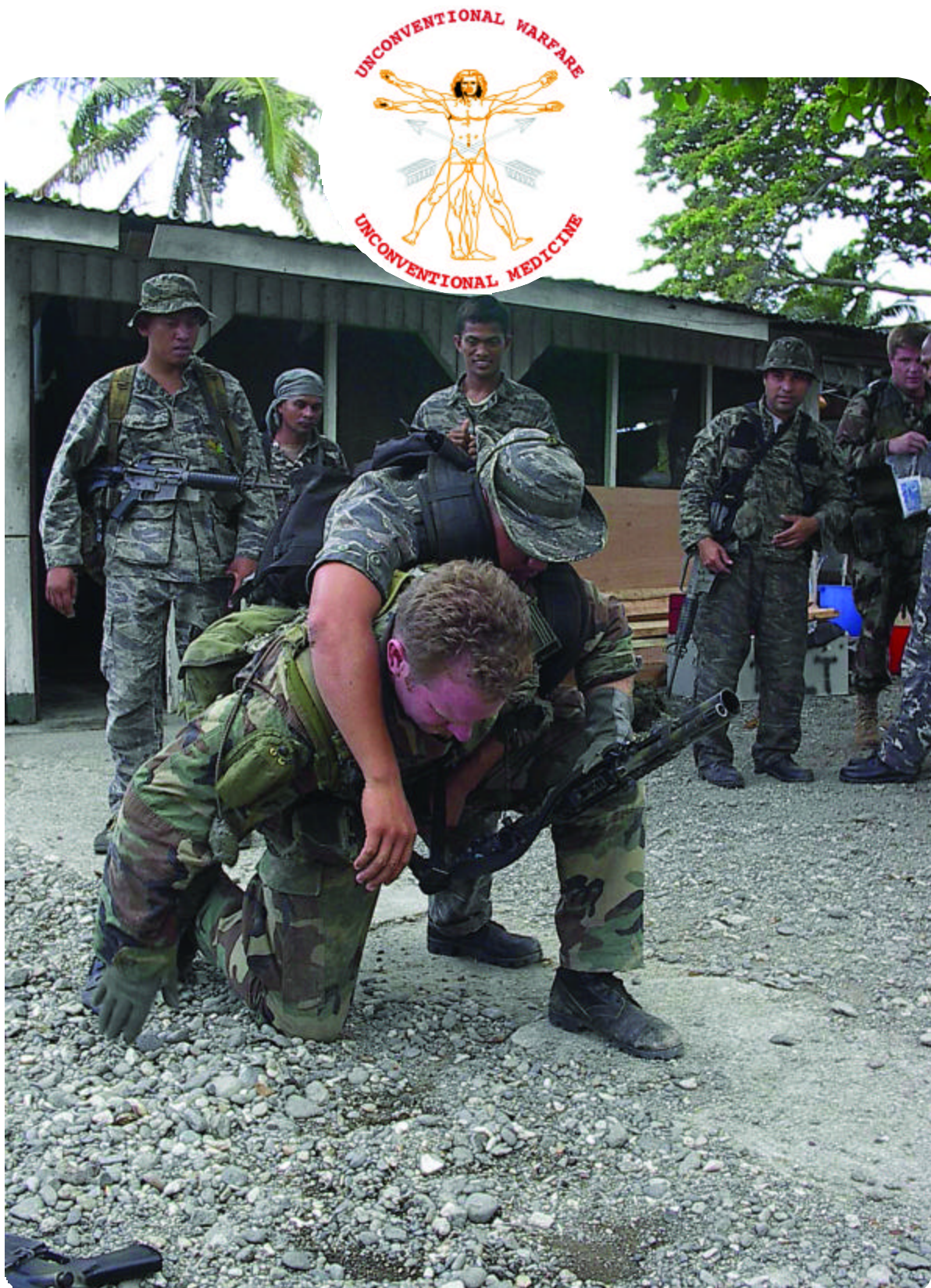


Volume 4, Edition 3

Summer 2004

Journal of Special Operations Medicine

A Peer Reviewed Journal for SOF Medical Professionals



Dedicated to the Indomitable Spirit & Sacrifices of the SOF Medic

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 2004		2. REPORT TYPE		3. DATES COVERED 00-00-2004 to 00-00-2004	
4. TITLE AND SUBTITLE Journal of Special Operations Medicine. Volume 4, Edition 3, Summer 2004				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) U.S. Special Operations Command,ATTN: SOCS-SG,7701 Tampa Point Blvd,MacDill AFB,FL,33621-5323				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 Approved for public release; distribution unlimited					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT Same as Report (SAR)	18. NUMBER OF PAGES 88	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			

COVER

A Navy SEAL is demonstrating the combat carry during buddy care medical training in the Philippines



The Journal of Special Operations Medicine is an authorized official quarterly publication of the United States Special Operations Command, MacDill Air Force Base, Florida. It is not associated with the civilian *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.

Disclosure: The views contained herein are those of the authors and do not necessarily reflect official Department of Defense position. 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.

Articles, photos, artwork, and letters are invited, as are comments and criticism, and should be addressed to Editor, Journal of Special Operations Medicine, USSOCOM, SOC-SG, 7701 Tampa Point Blvd., MacDill AFB, FL 33621-5323. Telephone: DSN 299-5442, commercial: (813) 828-5442, fax: -2568; e-mail JSOM@socom.mil.

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. Published works may be reprinted, except where copyrighted, provided credit is given to the Journal of Special Operations Medicine and the authors.

From The Editor

There are several ways for you to obtain the Journal of Special Operations Medicine (JSOM).

USSOCOM-SG distributes the JSOM to all our SOF units and our active editorial consultants. We will also email you the JSOM PDF; if you would like to be added to the PDF list please send your request to me at JSOM@socom.mil. However, keep in mind that the PDF ranges 3-4MB and is rejected due to size by most AOL, Yahoo, and Hotmail accounts. Make sure the address you give me can handle it.

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 www.specialoperationsmedicalassociation.org or contact MSG Russell Justice at justicer@soc.mil. SOMA provides a very valuable means of obtaining CME, as well as an annual gathering of SOF medical folks to share current issues.

For JSOM readers who do not fall into either of the above mentioned categories, we have arranged for the JSOM to be available as a paid subscription from the Superintendent of Documents, U.S. Government Printing Office, for only \$30 a year.

Don't forget, we are also online through the Joint Special Operations University to all DOD employees at <http://www.hurlburt.af.mil/jsou>. There are instructions on their homepage as to how to enter their medical link and access issues of the JSOM. From this site, you can link straight to the Government Printing Office to subscribe to the JSOM.

We are in our forth year of publication and continue to need your article submissions and photos. They are what keep us going and they're what makes this journal so unique. It is a sharing of your lives and missions as you go forth as instruments of national foreign policy. We can't do it without your input; you are what the journal is all about!

The JSOM remains the tool that spans all the SOF services and shares medical information and experiences unique to this community. 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.

Don't forget to do your CMEs!!!! The JSOM's CMEs are for our SF medics, PJs, and SEAL corpsmen as well as physicians, PAs, and nurses. We offer them to you in coordination with the Uniformed Services University of Health Sciences (USUHS).

Enjoy this edition of the journal, send us your feedback, and get those article submissions in to us!

Maj Michelle DuGuay

From the Surgeon



Frank Butler, MD
CAPT, USN
HQ USSOCOM Command Surgeon

Kudos

One of SOF's most distinguished members has just received a singular honor. SEAL CAPT Bill Shepherd was the first Commander of the International Space Station. His professionalism and force of personality were instrumental in the successful first flight of this platform. President Bush recently presented CAPT Shepherd with the Congressional Space Medal of Honor. This award has been presented only 13 times. Other recipients include Senator John Glenn, Alan Shepard, Neil Armstrong, and John Young. CAPT Shepherd's accomplishments in the space program clearly place him in the first rank of our country's heroes. Hooyah Shep – you make all of us in SOF proud.

COL Tom Deal, the Command Surgeon at the Joint Special Operations Command, has just been notified that he will be the next Commander at the Landstuhl Army Medical Center. COL Deal has spent much of his tour directly supporting our units engaged on the Global War on Terrorism. Landstuhl has been a critical point in the evacuation of our wounded warriors from OEF and OIF, providing expert medical and surgical care to those injured in these conflicts to prepare them for the rest of their journey home. Our deployed forces will benefit greatly from having someone of COL Deal's immense talents and experience in this critical position.

The BMIST (Battlefield Medical Information System-Tactical) has been developed by USSOCOM in partnership with the Army Medical Research and Materiel Command to meet the DOD requirements for health surveillance for deployed SOF forces. This has been a unique challenge in that the multiple requirements for completeness of the individual's medical record, operational security, information technology constraints, and HIPAA compliance all must be answered. Although the PDA-based system was approved by USSOCOM and has been adapted by the Army as well, funding to purchase the Compaq I-Pac PDAs chosen as the device to be fielded was not in the USSOCOM budget. Lt Col Jim Lorraine and MAJ Mike Salamy from the SOCOM Surgeon's office submitted a request to the Office of the Assistant Secretary of Defense for Health Affairs to help address this shortfall. This request was funded and \$500,000 was received by the office in June to help purchase additional units of the Compaq PDAs for distribution to our deploying units.

Tactical Combat Casualty Care Transition Initiative

Both Special Operations medics and non-medical SOF combatants may be required to provide care on the battlefield for their wounded teammates. Strategies for caring for the wounded in this setting are often radically different than the care that would be rendered in the civilian setting because of the austere tactical environment and the need to consider factors related to the conduct of the unit's mission. Guidelines for Tactical Combat Casualty Care (TCCC) are developed on an ongoing basis by a committee initiated by USSOCOM and now sponsored by the Navy Bureau of Medicine and Surgery. Updated TCCC guidelines are published every three years in the Prehospital Trauma Life Support Manual, which carries the endorsement of the American College of Surgeons and the National Association of Emergency Medical Technicians (EMTs).

These guidelines are now well-accepted and used widely throughout the DOD, but transitioning new medical techniques and equipment expeditiously to SOF units deploying in support of the Global War on Terrorism remains a challenge. There are a number of items that must be accomplished in order to meet this challenge. First, we must mitigate the inherent delays associated with updating allowed equipment lists and academic medical curricula to ensure that our warfighters go forward into theater with state-of-the-art medical equipment and strategies. Secondly, there is a need to have a coordinated program to train all SOF combatants in the essential lifesaving trauma care strategies outlined for non-medical combatants in the PHTLS chapter on TCCC. Lastly, we need to systematically gather input from SOF combat medics about unit casualties suffered and how well the new techniques and equipment worked in caring for these casualties.

A POM 06 initiative to address these issues has been initiated by the USSOCOM Surgeon's office and was endorsed by all four USSOCOM Component Surgeons during the POM process. The strong collective voice of the SOF medical community resulted in this initiative being supported by the USSOCOM requirements process in the first draft of the POM. As an interim measure, the USSOCOM Biomedical Initiatives Steering Committee is initiating a pilot program called the TCCC Transition Initiative to be conducted by the US Army Institute of Surgical Research (ISR). This research effort will start examining ways to expedite the transition of new trauma care strategies to our deploying SOF units.

The USSOCOM Surgeon's office in coordination with the Component Surgeons will identify SOF units that will be deploying in the near future. The deploying units will be contacted and commanders asked if they would like for their units to receive the updated Tactical Combat Casualty Care training and equipment for both their medics and non-medical personnel prior to the unit's deployment into theater. Focusing on units that will be deploying in the near future will ensure that all deploying forces have the opportunity to be optimally prepared to deal with battlefield trauma care during their deployment. The proximity of the TCCC training to leaving for a combat environment will also enhance the impact of the training and provide a second strong reason to focus the training on departing units.

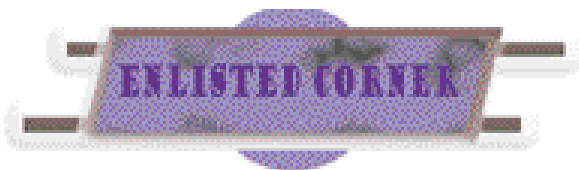
ISR representatives will coordinate a date for a three-day training session with the deploying units who wish to participate. They will also review the combat trauma equipment currently issued to the deploying SOF unit and compare it to a list of the newly-approved combat casualty equipment as recommended in the PHTLS Manual in order to identify any shortfalls. ISR will make arrangements to obtain any recommended new equipment not currently in the unit allowance list and bring or have it delivered to the unit for the training session.

The first day of the three-day training session will be devoted to training unit medics/corpsman on the new equipment to ensure that they are familiar with its use. "Train-the-trainer" sessions will also be held on Day One so that unit medics/corpsmen can assist in the small-group sessions in the subsequent two days. Days Two and Three will be devoted to teaching the basic combat trauma life-saving skills recommended by the PHTLS Manual for ALL combatants. This training will be conducted by the ISR team with assistance from the unit medics/corpsmen/PJs in the small-group practical skills sessions (tourniquets, airway management, management of specific casualty scenarios, etc.). Pre and post training tests will be given to provide a quantitative measure of improved medical readiness.

Upon the unit's return, ISR will coordinate an After Action Review (AAR) with the unit to document the effectiveness or shortfalls of the new techniques and equipment as they were used to manage whatever casualties occurred in their units while in tactical environments. This information will be fed back into the PHTLS process so that medical management strategies and equipment that worked well will be retained and those that don't will be re-evaluated. The ISR team member will collate all of the user evaluations from these specific casualty reports and prepare an annual report of their findings and recommendations.

SOF combat medics are already the best in the world at what they do. The only way to make them better is to put better tools in their toolbox and that's what we hope to accomplish with this initiative.

God bless you and God bless America –



SENIOR ENLISTED MEDICAL ADVISOR (SEMA),
HMCM GARY WELT

From the Office of the
SENIOR ENLISTED MEDICAL ADVISOR, USSOCOM

I send you greetings from the medical shop here at SOCOM. As most of you are already aware, the “Road Dog in the Big House” is now on the “Big Road to the Dog House”! Retirement comes to us all sooner or later, and by the time this is published and distributed, MSG (RET) Mike Brochu will be well on his way to establishing his new career in Special Operations support as one of USSOCOM’s valued contractors. He has dedicated many years of service to Special Operations, the SOF medical community, and the US Army. To look back on Mike’s career and try to sum it up in a few lines contained here on these pages would be a great disservice to the man himself and I’m sure I’d forget to add something extremely important about his endeavors. Therefore, I hope you will all join me in wishing him “Fair Winds and Following Seas” with the best of luck and continued success as he follows a higher calling now and in the future.

I’d like to take a small space to introduce myself for those of you who don’t know me, and some who wish they never did! I am HMCM (SEAL) Gary E. Welt, the new Senior Enlisted Medical Advisor to the USSOCOM Command Surgeon. I arrived in May from a very arduous three and a half year tour at the JSOMTC where I wore a couple of different hats. The JSOMTC is near and dear to all of our hearts, and I enjoyed doing my level best to represent the entire enlisted staff and students on many issues concerning methodology, medical training, and medical equipment. It was by far the most challenging assignment of my military career. My SOF assignments are many over my 28 year career with more than a couple of Joint assignments. I won’t bore you with the details now, but should we meet in a local inn over a cold frosty beverage of our choosing, stand-by, stand-by!

Well then, where do I start? First off, let me express my gratitude, excitement, and many thanks to those who have seen fit to assign me as your Senior Enlisted Medical Advisor. It is truly my extreme pleasure to serve and represent the most dedicated and finest forward thinking enlisted medical force in the entire US military inventory! I do not say that lightly and it is not just my impression. I am reminded daily of the great feats of bravery, adversity, and sheer guts that are displayed on the battlefield and in austere environments throughout the world. Our civilian counterparts in pre-hospital and Special Operations medicine are watching our every move and waiting for us to bring home to the streets the next great lifesaving widgit or technique. Although some of our methods could be questioned by God himself, the Special Operations Combat Medics, 18 Deltas, PJs, and IDCs have done some unbelievable work at saving lives all over the globe. From Afghanistan to Zimbabwe, SOF medicine continues to lead the way in innovative techniques, combat medical technology, and equipment. As I see it, my job is to ensure that you all have the tools, training, and equipment to continue to take the fight to the enemy in support of the War on Terror. The sad fact is that not all of your needs may have been addressed. Not from lack of trying on your part to get the requirements up the chain of command, but from being edited from the big picture. I will assure you that if your com-

ponent Senior Enlisted Medical Advisors are aware of the problems or needs, they will pass this to me during the JMEAC meetings that we hold quarterly. I will take your thoughts, recommendations, and issues to the big boss for resolution. Regardless of the outcome, I promise that I will at least have an answer or response.

I'm going to refrain from making predictions, policy statements, and promises that I might not be able to keep as I am just getting settled in here for the long haul. I will, however, be relying heavily on your direct support through the JMEAC. The JMEAC is your sounding board and entire Force advocate to the component Surgeons with a DIRECT link to the USSOCOM surgeon and myself. I will assure you that CAPT Butler is an "Action Guy" who has purple (as in Joint) blood running through his veins, and as his "Medic" it is my responsibility to patch him up as he takes the fight forward. Again, I thank all of you, for all you do every day, and only hope to represent you as well as you have represented SOF.

In closing, let me leave you with a thought to ponder as the words ring truer today than in any time in the history of our great nation.

"LET EVERY NATION KNOW, WHETHER IT WISHES US WELL OR ILL, THAT WE SHALL PAY ANY PRICE, BEAR ANY BURDEN, MEET ANY HARDSHIP, SUPPORT ANY FRIEND, OPPOSE ANY FOE TO ASSURE THE SURVIVAL AND SUCCESS OF FREEDOM"

John F. Kennedy



Meet Your JSOM Staff

EXECUTIVE EDITOR

Frank K Butler, MD
Butlerf@socom.mil



CAPT Frank Butler graduated from Basic Underwater Demolition/SEAL training in 1972 as a member of Class 64 and subsequently served as a platoon commander in both Underwater Demolition Team Twelve and SEAL Team One. After attending medical school at the Medical College of Georgia, he did his internship in Family Practice at Naval Hospital Jacksonville. CAPT Butler spent five years as a Diving Medical Research officer at the Navy Experimental Diving Unit in Panama City, where he helped to develop many of the diving techniques and procedures used by the Navy SEAL teams today. He then did a residency in Ophthalmology at the National

Naval Medical Center in Bethesda, where he was Chief Resident in 1989. CAPT Butler was then assigned to the Naval Hospital Pensacola where he was Chief of Ophthalmology from 1989 to 1994. He assumed the duties of Director of Biomedical Research for the Naval Special Warfare Command in 1989 as well. He was transferred to his current position as Command Surgeon, US Special Operations Command, in March 2004.

MANAGING EDITOR

Michelle D. DuGuay, RN
Duguaym@socom.mil



Maj DuGuay 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. Maj DuGuay has a Bachelors in Nursing and a Masters in Business Administration/Management. Her 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, Maj DuGuay's experience at USSOCOM includes an assignment in the Center for Force Structure, Resources, Requirements, and Strategic Assessments.

Contents

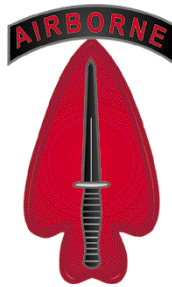
Summer 2004

Volume 4, Edition 3

Component Surgeon	7	CME Test Questions	53
Warner Farr, MD	USASOC		
Edward Woods, MD	NAVSPECWARCOM		
Dan Wyman, MD	AFSOC		
DEPARTMENTS		Expedient Medic	61
		SAM Spint II	
Education & Training	12	Legacy	66
Steve Briggs, PA-C		Al Maggio	
Bob McCumsy, EMT-P		Len Blessing Jr.	
FEATURE ARTICLES		Upcoming Events	69
Rapid Sequence Induction - Careful What You Wish For	18	SOF Related Book List	70
Eric C. Bruno, MD		Len Blessing	
CME		Correspondence Letters to the Editor & Apologies	73
Special Forces Battalion Aid Station in Support of a Direct Action Task Force	27	Med Quiz	74
Bryan Fisk, MD		Picture This....	
Beaten by the Bugs: The Soviet-Afghan War Experience	35	Daniel John Schissel, MD	
Lester W. Grau		Photo Gallery	77
William A. Jorgensen		Dedication	79
Antibiotics in Tactical Combat Casualty Care 2002	46	Senior Chief Michael George Fullerton	
Frank Butler, MD			
Kevin O'Connor, MD			
CME			
Editorials	52		
Rapid Sequence Intubation - Primum, Non Nocere			
Warner Anderson, MD			



USASOC



Rocky Farr, MD
COL, USA
Command Surgeon

It is summer as I write this and the Surgeon's Office is in its usual state of summer flux with folks coming and going. Several PCS-ing officers: Major Rick Barber will be missed, but his replacement, Major Ellingwood is already here, which softens the blow; Captain Bryant has departed and was replaced by Captain Michael in Medical Logistics; and most all of our mobilized reservists are gone with their duties being absorbed by others in various sections rather than having a "reserve" or "USACAPOC" section.

Me, I'm staying. Bought beer at the Green Beret Club on 23 April for having 37 years of service. Hope to see all of you at the Special Operations Medical Association meeting in Tampa in December.

I would like to pass the rest of this column to my Chief of Medical Operations, Lieutenant Colonel Frank Newton, to discuss some telemedicine initiatives:

Curbside consults in Jalalabad, Kirkuk and HOA too!

I was issued my first laptop in my freshman year of medical school at USUHS. It was a Zenith 286, and I didn't know what a dog it was. This was before Al Gore invented the Internet. Today, most of us have become comfortable with the information superhighway, and often turn to the Internet when we are treating our patients.

Army Telemedicine, Inc has been working at bridging the gap of information transfer between medics deployed to the four corners and consultants. This reach-back technology is especially good news for SOF, given the austere environs and immature theaters that we operate in. Two specialties are now up and running: Dermatology and Ocular Medicine.

Dermatology

Teledermatology has been available to deployed docs since May. Since its inception, there have been 129 consults by 47 different Army, Air Force, and Navy providers supporting OIF (1 consult from Pakistan). Digital images and short clinical notes are sent via e-mail to an AKO address derm.consult@us.army.mil. Consultants are committed to returning a recommendation within 24 hours and average response time for Telederm has been 3 ½ hours. In the first three months of operation, nine Soldiers' evacuations from theater were avoided. Many others received state of the art care aided by a timely dermatology consult. MEDCOM's goal is that Telederm be used prior to medevac from theater for dermatologic conditions.

Comments from the field have been positive:

“... awesome and great service for isolated providers who have email but not the right books and inability to get on certain Internet sites...”

“...this telederm service is a very useful resource...quick responses and have the pt tx or referred in a timely manner especially when no derm service is available locally...”

“...very user friendly and welcome tool for my practice...”

“... rashes can be tough...I am glad I am able to rely on this source for help in the care of these patients...”

Ophthalmology

Beginning in July, a teleconsult service for ocular complaints became operational. As with Telederm, a short clinical note, and when applicable, a digital image is sent via e-mail to eye.consult@us.army.mil. You should receive a response within 12 to 24 hours. A suggested format is free text within the email message:

Patient's age and gender

Patient's status (military service, civilian, or local)

Type of consult (routine, urgent, priority)

History of condition

Applicable medical/ocular history

Exam findings

Working diagnosis

Specific questions

Images (if applicable)

To maintain confidentiality, the consultation and accompanying digital images must be de-identified of the patient's name, social security number, birth date, medical record number, and other individually identifying information.

OK, thanks LTC Newton. For all you budding computer nerd digital camera aficionados out there, now is your chance to shine and make your commo man sent back clinical shots for diagnosis. If someone really uses this and has good, or bad, results, please let me know.

War is still our business; business is still good. Everybody keep his or her head down out there.





NAVSPECWARCOM



Edward Woods, MD
CAPT, USN
Command Surgeon

No input from NAVSPEC this edition.

COMPONENT SURGEON



AFSOC



Dan Wyman, MD
Col, USAF
Command Surgeon

Summer is usually the time of personnel changes in the military and this summer AFSOC/SG will undergo significant change. I would like to use this article to highlight some of these changes.

AFSOC/SG now has five divisions: SGA (Programming and Resources), SGO (Operational Medicine), SGP (Aerospace Medicine), SGR (Medical Modernization), and SGX (Expeditionary Medical Operations).

Programming and Resources Division is led by Col(s) Tim McCormick and is responsible for oversight of finance, manpower/personnel, facilities and infrastructure, health plans and benefits, contracting, and logistics . . . the typical administrative and resource allocation functions.

Operational Medicine is our newest division and is led by Lt Col Mike Curriston. SGO is responsible for clinical medicine, training, professional services, dental care, credentials and quality, life skills and operational psychology, and PJ medical oversight. This division will be the primary shaper of medical/clinical policy, procedures, practices, and equipment implementation.

Aerospace Medicine Division is led by Lt Col Tim Robinette and is responsible for flight medicine, bioenvironmental engineering, public health, and aerospace physiology . . . the classic Team Aerospace AOR.

Medical Modernization Division is led by Col Rob Michaelson and is responsible for the fielding of new technologies, from review of science and technology and the development of requirements from user needs, through project management and OT&E, to acquisition. IM/IT will also fall under SGR.

Finally, Expeditionary Medical Operations Division is led by Maj David Johnson and is responsible for development of operational medical plans, CONOPS, TTPs, current operations, and UTC MEFPK management.

Obviously all the divisions' responsibilities overlap and we will function as a team to meet the needs of our operational units. Please engage our SG staff with any questions, comments, problems, and/or concerns. We are here to help you in any way we can to execute the mission.

Finally, I would like to mention a few of the "big rock" issues that we are currently trying to work. We are diligently attempting to develop medical Casualty Evacuation (CASEVAC) TTPs, bringing together all the pieces of casualty treatment, management, and flow from the point of injury to delivery to level III/IV definitive care. Late summer we will receive final delivery of prototypes of three Combat Oxygen Systems which can be utilized to provide medical-quality oxygen within aircraft and in the field. We are also pursuing deployable oxygen generation and liquification capability to end our reliance on others to generate and deliver LOX. We are

teaming with USASOC to supplement our MFST/CCATT UTCs with increased patient holding capability (particularly nursing skills) so that we can stabilize and manage multiple casualties in a far forward area for 48 hours. Finally, we have undertaken efforts to improve trauma training, particularly in conjunction with the CSTARS program at Baltimore Shock Trauma Hospital. We are developing an AFSOC curriculum which would provide pre-hospital/operating room/ICU training for PJs, 4Ns, PAs, and physicians. I have personally visited Baltimore and I am very excited about the opportunities this program has to offer but will need your involvement and feedback to maximize our training.

Over the next several months I plan to get out to more of our units, to meet more of you, and learn more about your missions and unique challenges and successes. I thank you for the truly spectacular care you provide our warriors and their families. Take care and may God Bless the United States!



DEPARTMENTS

Education & Training

CPT Steve Briggs, PA-C

MSgt Bob McCumsey, EMT-P

USSOCOM Medical Training Update

A couple of brief notes from the training corner as to the progress and future of SOF medical training:

1. SOF Paramedic update: As reported in the last issue, the Requirements Board (RB) met in August 2003 and created the below critical task list. This task list was reviewed by all the Component Surgeons for their comments and suggestions. In effect, these critical tasks are synonymous with the Terminal Learning Objectives of the new Special Operations Medical Course (SOCM). As is, the list was approved by all the Component Surgeons with recommendations to delete or change the highlighted areas. There have been new Department of Defense policy changes in *Imminent Death Procedures* which has eliminated the need for this task. The Component Surgeons differed in opinions as to the degree of *Clinical Medicine* to be taught. It was the majority of the Surgeon's opinions that a minimum of Clinical Medicine (Sick Call) be taught. It was recommended that it not be called *Clinical Medicine* or *Sick-Call Medicine*, but *Diagnosis and Initial Management of Specific Medical Emergencies*. The below task list was staffed to the Board of Regents for their approval.

The Curriculum Examination Board (CEB) further reviewed the task list and provided recommendations for supporting tasks, or enabling objectives that will facilitate the overall comprehension and successful execution of the task.

On June 29, 2004, both the RB and the CEB reviewed the proposed critical task draft. A minimum of changes were made at the meeting. One additional suggestion was that basic x-ray interpretation be added (see table 1). Thirty days were given for making any other proposed changes. Once all the proposed changes are made the task list will be presented to the Joint Special Operations Medical Training Center for their input and requirements and then to the Board of Regents (BOR) for final approval. Meanwhile, the CEB is taking the task list and putting together a bank of questions for implementation as the societal "end of course" examination.

Proposed Requirements for the Special Operations Combat Medic Course: USSOCOM Requirements Board Meeting 25-29 August 2003

Basic Sciences

Medical terminology
Anatomy and physiology
Medical math
Pathology and physiology

Joint Operational Medicine

Diving and aerospace medicine
NBC warfare
Preventive medicine
Defense health surveillance system
Medical mission planning
Medical retirement/imminent death procedures

Basic Dental Emergency Procedures

Basic dental procedures
Examine oral cavity
Manage fractured and avulsed teeth
Manage a periodontal abscess
Manage a periapical abscess
Perform dental extractions
Administer local dental anesthesia
Manage complications of dental extractions
Place temporary filling

Environmental Injuries

Manage a heat casualty
Treat a casualty for insect bites and stings
Treat a casualty for snakebite
Manage near-drowning
Environmental toxicology
Manage electrical and lightning injuries
Treat a casualty for cold injury
Manage high altitude illness
Manage allergic reactions

Pharmacology

Antibiotic protocols
Manage pain
Dispense common fluid/electrolyte solutions
Administer medications
Pharmacology
Dispense a medication

Emergency Cardiac Care

Basic life support for health care providers (BLS-C)
Advanced cardiac life support (ACLS)
Pediatric ACLS (PALS)

Clinical Medicine

Dermatology
Head, eye, ear, neck, and throat
Cardiovascular
Pulmonary
Gastrointestinal
Genitourinary
OB/GYN (minimal)
Orthopedics
Endocrine
Pediatrics
Neurology
Psychology
Sports medicine
Infectious disease

Clinical Medicine (Revised)

Treatment of common illnesses with over-the-counter medications
Recognition of medical emergencies
Diagnosis and initial management of specific medical emergencies
Sports medicine

Clinical Skills

Perform local and regional anesthesia
Wound care management
Determine death
Initiate a saline lock
Communicate with the patient
Perform urinary catheter care
Measure a patient's intake and output
Remove foreign body from the external auditory canal
Obtain a blood specimen using a vacutainer
Employ sternal intraosseous infusion device
Perform the surgical hand and arm scrub
Perform pulse oximetry monitoring
Perform a sterile dressing change
Put on sterile gown and gloves
Drain abscesses
Perform suturing
Write a SOAP note
Perform a complete physical examination
Administer oxygen therapy
Perform urinary catheterization
Establish a sterile field
Perform nasogastric intubation
Manage a patient with an intravenous infusion
Ventilate a patient with a bag-valve-mask system
Intubate a patient
Maintain a patient's airway
Employ an esophageal intubation detector
Perform exhaled carbon dioxide monitoring
Initiate an intravenous infusion

Trauma

Manage hemorrhagic/hypovolemic shock
Initial assessment and management of trauma
Perform Tactical Combat Casualty Care
Manage trauma of the genitourinary tract
Trauma system and mechanism of injury
Manage a burned casualty
Triage casualties on a conventional battlefield
Advanced airway management
Manage head and neck trauma
Perform rapid assessment of trauma
Trauma drugs
Hemorrhage control
Detailed physical exam
Manage thoracic trauma
Manage abdominal trauma
Manage spinal trauma
Manage extremity trauma
Rapid sequence intubation

Table 1. Medical Requirements Board meeting minutes 6/30/04

The board met 30 June 04. This meeting was conducted at the Wyndham Hotel in Tampa FL. The intention of this meeting was to review the work done by the CEB to make sure that all requirements are at RB standards. In attendance were:

MAJ Barber	Board Chairman (Non-voting)
LTC Lutz	Physician, JSOC Subordinate Unit
MAJ Wheeler	Physician, USASOC Subcomponent
LT Bestachio	Physician, NAVSPECWARCOM Subcomponent
MSgt Krenzke	AFSC 4N0X1, SEI 496
MSgt Donovan	AFSC 1T2X1
SSG Williamson	MOS 91-B/W (Rangers)
MSG Lamoreaux	MOS 91-B/W (160th)
MSG Rodriguez	MOS 18-D (Group)
SFC Sechrest	MOS 18-D (Psyops/CA)
HMCS Mercer	NEC 8491
HM1 Fiske	NEC 8492

The board began by reviewing the CEB group outline. Questions or concerns were brought up on the following:

- #1 Cut Down: The RB would like to see central venous access via femoral vein included.
- #2 Add category: X-ray recognition and familiarization at basic levels.
- #3 The board would like to see standard/joint protocols for field antibiotics.
- #4 Revise “Establish immunizations program” to “Conduct deployment immunization prophylaxis.”
- #5 Basic ventilator management should be included.
- #6 Revise “Establish a field sanitation program” to “Conduct field sanitation.”
- #7 ACLS - need American Heart Association card minimum.
- #8 Cover both CO and CO₂ toxicity.

2. Future Concept/Plan

a. Short-Term. It will be the RB’s mission to elicit input from all SOF medical assets and to identify all changing medical requirements. During the recent Requirements Board meeting there was one item (Rapid Sequence Intubation) that was felt to be needed by the SOF medical operators; however, this item was deleted by the Component Surgeons. As SOF medical operators you have the right to voice your opinion on this topic to the appropriate channels. There are many different conduits for getting medical requirements to the RB for review and possible incorporation as a critical task:

1. The Requirements Board members directly (see table 2)
2. The Chain of Command
3. The Component Surgeons
4. The Joint Medical Enlisted Advisory Council

This type of open dialogue is critical if we are going to keep SOF medicine out in front of the pack.

Table 2. Requirements Board points of contact with component occupational skills

USSOCOM Requirements Board (RB) Members	
Board Position	Member/Email Address
Board Chairman (NonVoting)	MSG Samuel Rodriguez rodrigus@soc.mil
Physician, JSOC Subordinate Unit	Major Robert Lutz lutzr@jdi.army.mil
Physician, USASOC Subcomponent	Major Lorykay Wheel wheelerl@soc.mil
Physician, NAVSPECWARCOM Subcomponent	Lt David Bestachio besachiod@nswg1.navy.mil
Physician, AFSOC Subcomponent	Capt Eric Bruno eric.bruno@hurlburt.af.mil
Physician, AFSOC Subcomponent-Alternate	Major Nabil Boutros nabil.boutros@hurlburt.af.mil
AFSC 4N0X1, SEI 496	MSgt Kristopher Krenzke Kristopher.Krenzke@kadena.af.mil
AFSC 4N0X1, SEI 496 Alternate	MSgt Daniel P Stanley daniel.stanley@mildenhall.af.mil
AFSC 1T2X1	MSgt John “Tim” Donovan john.donovan@hurlburt.af.mil
MOS 91-B/W (Rangers)	SSG Jeremy Williamson willjerm@soc.mil
MOS 91-B/W (160th)	MSG Cory Lamoreaux lamoreauxc@soar.army.mil
MOS 18D (Psyops/CA)	SFC Chester Sechrest sechresc@soc.mil
NEC 8491	HMCS Glenn Mercer mercerg@csbr2.navy.mil
NEC 8492	HM1 Ricardo Fiske fisker@nswg3.navy.mil
NEC 8403	HMC Eric Sine SineED@i-mef.usmc.mil
NEC 8427 and RB Secretary	HM1 Fletcher fletcherjg@pendleton.usmc.mil
NEC 8427 Alternate	HM1 Jeffrey “Steve” Markham markhamjs@1mardiv.usmc.mil
Note: Every position has an alternate position available. If there is no alternate listed and you wish to apply for a position, please contact MSgt Bob McCumsey at mccumsr@socom.mil	

The CEB is composed of both civilian and SOF medical operators and educators (see tables 3 and 4). They are charged with taking the critical tasks and reviewing tasks with what is taught at the Joint Special Operations Medical Training Center and then recommending adding, deleting, or changing curriculum based on changes in civilian technology and standards of care. This review process will occur on an annual basis.

Table 3. USSOCOM Curriculum and Examination Board (CEB) Primary Members

Board Position Name	Duty Title(s)
Civilian Physician, Neurologist	Chief, Department of Neurology, St. Joseph's Hospital (Tampa, FL), Medical Staff at Memorial Hospital and Kindred Hospital
Conventional Military Medical Educator	Commander, 375th Medical Group
AFSC 1T2X1 from an AFSOC Subcomponent	Standards Superintendent
SOF Physician, Flight Surgeon	Chief, Operational Medicine
SOF MOS 91W	Senior Medic
SOF AFSC 4N0X1, SEI 496	NCOIC, Flight Medicine
Conventional Dentist/Oral Surgeon	Staff Oral Surgeon, 55th Dental Squadron
SOF NEC 8491	Vacant
Civilian Sports Medicine Specialist	Medical Director, The Center of Orthopedics and Sports Medicine, Pope High School Team Physician, Southern Promotions Physician Consultant, Sutter Biomedical Corporation Consultant
Civilian Physician, Cardiologist	Vacant
SOF Physician, Family Practice	SOTF Clinic OIC
Civilian Curriculum Developer	Flight Paramedic, ER/ICU Nurse, Kellogg Community College EMS Faculty
SOF Physician, DMO/Hyperbarics	Staff Under Sea Dive Officer
Conventional Chemical/Biological Specialist	Aircrew Standardization and Evaluation for 167AW and Scientist for Geo-Centers at Fort Detrick, MD
Conventional Physician, Anesthesiologist	Senior Medical Officer, Submarine Development Squadron Five
Conventional Physician, Orthopedic Surgeon	Chief Consultant for Surgical Service, Office of the Surgeon General
Conventional Physician, Public Health	Director of Public Health Residency Program at Walter Reed Medical Center
Civilian Pharmacist	Senior Medical Marketing Leader, Work Group Leader on Healthcare Barriers for the National Space Society, Expert Panel Member in Therapeutics and Clinical Care Integration Project Team for NASA's Johnson Space Center Space Medicine Program
SOF Physician, General Emergency Medicine	Regiment Surgeon
Conventional Physician, Internal Medicine	Flight Medicine Staff Physician
SOF NEC 8492	LPO Medical Department
Civilian Physician, Pediatric Emergency Medicine	Medical Director for After Hours Pediatrics, Clinical Associate Professor of Pediatrics at University of South Florida, Assistant Professor at University of Florida School of Nursing
Conventional Physician, Dermatology	Staff Physician, Dive Medical Officer
Civilian Medical Educator	Director of Education at Florida Emergency Medicine Foundation/Florida College of Emergency Physicians, National Fire Academy Staff, NAEMSES Membership Chairman, CECBEMS Reviewer
JSOMTC Education Advisor (non-voting)	NCOIC of Trauma Module at Joint Special Operations Medical Training Center (JSOMTC)
SOF MOS 18D	Company Medic
SOF Physician, Trauma Surgeon	Staff Physician, FST Team member to USASOC
Board Chairman (non-voting)	Chief Medical Officer for Bureau of Immigration and Customs Enforcement and Medical Officer for Detachment 3 of the Maryland National Guard

Table 4. USSOCOM Curriculum and Examination Board (CEB) Alternate Members	
Board Position Name	Duty Title(s)
Conventional Military Medical Educator	W364 Element, Department of Military and Emergency Medicine, Physician Faculty
SOF MOS 91W	Staff Medic
SOF AFSC 4N0X1, SEI 496	NCOIC, Medical Services Flight
Civilian Physician, Cardiologist	Medical Coordinator for the Memorial Cardiovascular Health Center, President of Cardiac Care Critique, President of the Tampa Bay Cardiovascular Center
SOF Physician, Family Practice	Special Operations Forces Medical Element (SOFME), Physician
Civilian Curriculum Developer	EMS Faculty at Saint Petersburg College, St. Petersburg, FL
Conventional Chemical/Biological Specialist	Chief Nurse
Conventional Physician, Anesthesiologist	Assistant Professor, Department of Anesthesiology, Department of Military and Emergency Medicine
Conventional Physician, Public Health	Senior Surgeon of 20 th SFG and Professor at the Medical College of Georgia's Department of Emergency Medicine
Civilian Physician, Pediatric Emergency Medicine	Attending Physician at Elmbrook Emergency Department Hospital, WI
Conventional Physician, Dermatology	Student
Civilian Medical Educator	Associate Professor in the Department of Emergency Medicine at the University of Florida, College of Medicine
SOF MOS 18D	SOTF Medical Training NCO
Board Chairman (non-voting)	Clinical Associate Professor of Emergency Medicine University of North Texas Health Sciences Center

b. Long-Term. At present we are exploring the different ways with which to award graduates of our program with constructive college credits for successful completion of JSOMTC courses. Among some of the prospective institutes include the Uniform Services of the University of Health Sciences (USUHS) and other civilian universities and colleges. Many have expressed their interest and are waiting to review our curriculum. Once constructive college credits have been achieved we then can build bridge programs to other nursing, physician assistant, and medical doctorate programs.

See link: <http://rdu.news14.com/content/headlines/?ArID=51281&SecID=2>

3. Department of Transportation (DOT) Updates. Since 09/11/01, like USSOCOM, many agencies have requested changes in the current DOT curriculum. Like other medical communities, the “Paramedic” paradigm is witnessing a flux in requirements and ability to adequately serve the public. At present there is a population of tactical emergency providers, both civilian and military, that the current DOT and Emergency Medical Technician (EMT)-Paramedic (NREMT-P) does not adequately address. There have been many speculations as to the direction and the future look of the civilian paramedic model. A strong proposal, currently being reviewed, is to take the DOT curriculum and place it under the Department of Homeland Security. There is a proposal to make four new EMT occupational levels. As things unfold we will attempt to get our tactical paramedic level recognized as another level. This will help get us national recognition that much quicker.

4. It has been an exciting past year. A course correction in tactical emergency care is currently under investigation in the military and in the civilian/law enforcement arena. As the civilian arena is slow at executing, many agencies are watching and scrutinizing what we are doing, some with bitterness and others with great expectation! Stay tuned for more!

Rapid Sequence Induction -- Careful What You Wish For

Eric C. Bruno, MD

ABSTRACT

Airway management has been and remains the first priority in caring for the injured or seriously ill patient. Rapid sequence induction (RSI) is a resource-intensive, difficult step toward the attainment of a secured airway. Who performs the airway management using what tools and where remains issues of controversy. A review article based on both recent and older data attempts to clarify some of these issues. The approach was to use evidence-based medicine to assess whether RSI should be performed by Special Operations medics in the far forward, austere environment. While the vast majority of the information is civilian based, the numbers correlate well to the military model.

Results demonstrate that, despite advancement in technology and pharmacology, initial education, experience, and sustainment training are crucial to success rates of paramedic-performed intubations. Above all else remains the question of whether paramedics should be intubating trauma patients in the pre-hospital arena at all considering that evidence shows increases in both morbidity and mortality with pre-hospital intubation.

FINANCIAL DISCLOSURE: Capt Eric Bruno reported that his presentation will include discussion of commercial products and/or services. However, within the last two years, he has had no significant financial relationship with a commercial entity whose products/services are related to the subject matter of the topic he will be addressing or a commercial supporter of this educational activity.

OBJECTIVES

1. Discuss the steps involved in rapid sequence induction.
2. Identify medications used in rapid sequence induction.
3. Summarize the risks associated with performing rapid sequence induction.

THIS ARTICLE HAS BEEN AWARDED **1** CATEGORY 1 CREDIT TOWARD THE AMA PHYSICIAN'S RECOGNITION AWARD (CONTINUING MEDICAL EDUCATION CREDIT) AND **1.2** NURSING CONTACT HOURS.

Test on page 53, answer sheet on page 57

INTRODUCTION

Securing the difficulty airway -- in terms of "adrenaline" and bravado, the act may be just short of the resuscitative thoracotomy, the pinnacle of emergency medicine procedures. Airway management has been and remains the first priority in caring for the injured or seriously ill patient (although some argue control of major hemorrhage should occur initially). Airway control does not necessarily equal endotracheal intubation (ETI). Options vary from

the simple (like application of oxygen and proper patient positioning) to the complex (like a cricothyrotomy). The endpoints of definitive airway control include improved oxygenation, improved ventilation, and reduction in aspiration.

Administration of a sedative-hypnotic and a paralytic medication will facilitate endotracheal intubation. This is designed to decrease patient movement and muscle tone, and reduce autonomic stimuli.

The use of rapid sequence intubation (RSI) by non-physician providers is controversial, with evidence on both sides of the argument.

Intubation of trauma patients is the particular concern of the combat medic. Intubating a comatose patient, regardless of etiology, should not have any added complications, such as anatomy, foreign material, etc. Patient interaction is absent and therefore should not be a problem. Concerns center on the comatose, semi-conscious head injury patient, the burn (specifically facial) patient, the maxillofacial injury patient with potential airway collapse or obstruction, and the flail chest patient. Airway management, especially in the absence of pharmacological support, can be a daunting proposition.

The addition of RSI to the Special Operations combat medic's (SOCM) armamentarium was approved by the USSOCOM Requirements Board and has gone before the Curriculum and Evaluation Board. I am against the use of these medications by non-physician military medical personnel, regardless of the situation, based on the literature and my experience as an emergency medicine physician. The more popular stance is the enabling one, giving more tools and more autonomy to the far-forward medic, without necessarily showing that the evidence of doing so actually benefits patient morbidity or mortality.

There is irony to the controversy. During the 1970s and 1980s, as emergency medicine continued to stretch the boundaries set for it by other specialties, rapid sequence intubation tested the moxie of emergency physicians. At this stage of the development of emergency medicine, more than a few anesthesiologists refused to "back up" the emergency physicians who were using succinylcholine in the emergency department (ED). As experience and confidence grew, less permission and back up were necessary. More and more, the emergency physician is becoming the expert in the difficult airway (full stomach, facial or head trauma, unstable vitals signs) patient.

Even today in the United Kingdom, emergency physicians are struggling with anesthesia for the "rights" to use RSI as an advanced airway technique, despite British medical journal evidence showing no difference in success or complication rates.^{1,2,3} But attainment of the "rights" is through the development of skills over months (three to twelve) of intensive airway training.¹

PROTOCOLS

The focus of this article is to provide a generalized protocol and to discuss success rates, mortality,

and complications as well as other options. This article is not designed to replace the didactics related to RSI, but a brief overview is relevant for educational and discussion purposes. RSI is designed to induce anesthesia in patients requiring emergency airway control. The steps involved are numerous, necessary, and some must occur concurrently. Preparation is the key to success.

Preoxygenation with 100% oxygen for two to five minutes is intended to denitrogenate the lungs, building an oxygen reserve in the lungs. While preoxygenating, the airway manager or his assistants obtain intravenous access, assess potential airway difficulty (based on anatomy, obstruction, or tissue destruction), draw up medications, and perform equipment checks. Cardiopulmonary monitoring is necessary to observe any changes in patient status prior to, during, and after intubation.^{4,5} A suction device should be available in the event of emesis, blood, or secretions. Up to five people are necessary to perform RSI, handling tasks from medication preparation and administration, cricoid pressure, preoxygenation, vital signs, and intubation.⁶ Another position paper states a minimum of two educated personnel are required to initiate RSI.⁷

Medications for RSI are staples in most emergency departments, and tend to be on the formularies of the military's field surgical and critical care transport teams. Succinylcholine is the standard depolarizing medication used in RSI. A dose of 1.0 – 2.0mg/kg, given two to three minutes prior to intubation attempts is usually adequate to provide complete muscle relaxation. A defasciculating dose of a non-depolarizing neuromuscular blocking agent, such as vecuronium, administered two to three minutes before the succinylcholine is recommended for most trauma patients, including head injury victims.

A critical and often overlooked step in the recipe is administration of a sedative/hypnotic drug. One must be *absolutely* certain that the benzodiazepine, barbiturate, or barbiturate-like medication is administered prior to or in conjunction with the neuromuscular blockade. A paralytic has *no* effect on the level of consciousness, and the patient may be completely awake, aware, and unable to convey the absolute torture associated with the suffocation that he/she is experiencing. Numerous legal cases have been lost for failure to provide adequate sedation.

The sedative used affects the likelihood of successful intubation. Salvotti et al. showed that etomidate, ketamine, or a benzodiazepine prior to neuromuscular blockade were associated with a lower like-

likelihood of successful intubation, when compared to thiopental, methohexital, or propofol. They showed that when using a barbituate or propofol, the intubator had a two-, three-, and fourfold greater first pass intubation response compared to benzodiazepine, etomidate, or ketamine.⁸ The military dilemmas of these findings are many. First is that etomidate is not “scheduled” by the DEA, does not drop blood pressure like propofol, and is relatively simple to dose.^{9,10} Etomidate, regardless of high or low dose, results in higher endotracheal intubation success rates.¹⁰ Second, ketamine is a necessary evil in the deployed environment based on its heat stability as a powder. Finally, the versatility of benzodiazepines for numerous uses, such as sedation, seizure cessation or prophylaxis, vertigo, muscle spasm, withdrawal, and esophageal impaction encourages their placement on most formularies.⁵

Once neuromuscular blockade is present (apnea, muscle fasciculations, relaxation of the masseter muscles), direct laryngoscopy and passage of the endotracheal tube follow. Failure to intubate, regardless of the etiology, leads the manager of the airway to alternate methods. Bag-valve mask ventilation is usually the initial step, and if adequate ventilation is delivered, may be continued until the paralytic medication is metabolized. Some argue that proficiency with the bag-valve mask is the most critical skill in airway management, not intubation.¹¹ Other advanced airway techniques for obtaining a functioning, secure airway include laryngeal mask airway (LMA), Combitube™ intubation, cricothyrotomy, retrograde intubation, or fiberoptic visualization.⁴ Remember that the LMA offers no aspiration protection. Consideration can also be given to the use of a topical anesthetic and an awake intubation.¹¹

After the airway is secured, confirmation of correct tube placement is imperative. Confirmatory tests for recognition of esophageal intubation are not completely reliable, but can assist the provider. Failure to recognize esophageal intubation can be fatal. Direct visualization of the endotracheal tube passing between the vocal cords is the “gold standard” for proper tube placement. Further confirmatory tests include bilateral breath sounds over the chest with absence of breath sounds over the epigastrium, symmetric chest rise and fall with ventilation, vapor in the ETT, improvement or stabilization of hemoglobin-oxygen saturation, ease of ventilation, capnography, and portable chest X-ray.

Capnography has been most effective in recent years, but still has false positives when facing

low cardiac output states, severe pulmonary disease, and pulmonary embolism. The quantitative devices are more sensitive in the low cardiac output states, identifying waveforms at varying levels of expired carbon dioxide.¹² Infrared CO₂ detection with direct laryngoscopy is the ideal method for correct ETT placement detection. Additionally, the use of a chest X-ray to assess depth and location of tube placement is another way to evaluate placement.¹³ Ventilation via Ambu-bag® or ventilator follows, permitting adequate oxygenation and ventilation.

SUCCESS RATES

Who performs the actual management of the airway in the critically ill patient, regardless of etiology, has been an area of controversy. Training and performance of endotracheal intubation and other advanced airway techniques are performed by a broad spectrum of medical personnel, from emergency medical technicians to trauma anesthesiologists. Who is best at it, intuitively, are those who have the knowledge, training, experience, and sustenance to address the airway, with the resources necessary to maintain control. Success rates by physicians tend to be higher than those of non-physicians, specifically paramedical personnel.¹⁴ *This is not designed to state that combat medics should not be intubating. On the contrary, the combat medic must intubate in the areas in which they are trained and where strict protocols dictate.* While the act itself is essentially a set of taught motions, practiced, and repeated to develop muscle memory, every surrounding decision directly impacts the outcome. Making a breathing patient an apneic one via neuromuscular blockade becomes a life and death decision.

When categorizing according to occupation, the success rates are variable. Prehospital intubations performed by physicians are successful 99.1% of the time and cricothyroidotomies are rarely required.¹⁴ More specifically, Salvotti et al. showed that physicians other than anesthesiologists or emergency physicians had a three-to-sevenfold greater risk of missed first pass intubations.⁸ Sloane et al. evaluated the use of RSI in the prehospital patient, looking at success and complication rates. The attempts were performed by physicians, or nurses and paramedics, but were always under the direct supervision of the physician. They showed that there was no significant difference in intubation that received RSI in the field vs. the hospital. The success rates in both groups were remarkably high (over 97%), yet patients receiving prehospital RSI still suf-

ferred a higher complication rate than those who were intubated in the emergency department.¹⁵

Arguments over whether paramedics should carry paralytics will focus on a specific subset – the difficult airway. Of all emergency airways, between 3% and 10% are considered difficult.^{1,14} The combative head injury patient and the facial burn patient usually are brought up during this discussion. Basically two thirds of all severely head injured patients, who have a GCS of three or greater, can be intubated without RSI. Success rate of field intubations, regardless of GCS, was 85.9%.¹⁶ Karch et al. demonstrated a lower success rate (53.2%) in comparison to previous studies, but did not use RSI. After combativeness, the second most common reason stated for failure was blood or vomitus in the airway. The value of suction, although not mentioned completely in the protocols, cannot be understated. Do all of our medical personnel carry suction devices?¹⁷

Studies from the 1980s showed a paramedic prehospital intubation success rate of between 66.7% and 97%.^{13,18} Subsequent studies have reconfirmed those rates.^{15,19-25} Some have shown a high rate of unrecognized esophageal intubations.²⁶ One evaluation showed that esophageal intubations occurred in 26 of the 114 patients receiving RSI and laryngoscopy by paramedics.²² Determination of correct placement of the endotracheal tube, generally made by direct visualization of the passage of the ETT between the vocal cords, can still be inadequate, including cases of tracheo-esophageal fistulas or tube dislodgements.¹³ When quantitative capnometry is available, success rates tend to increase.

Wang et al. showed that 90.5% of patients were intubated without the use of RSI. Failures to intubate were attributed to inadequate relaxation (49%), difficult anatomy (20%), and airway obstruction (10%). Based on their evaluation, only 3.9% of all airways needed RSI medication.²⁷ In a more recent study, Davis et al. in the San Diego experience showed that orotracheal intubation with RSI in the discussed population (GCS 3 to 8, transport time greater than 10 minutes, and inability to intubate without RSI medications) showed a success rate of only 84%.²⁸ The use of RSI has been proven successful in some studies. Slater et al. showed an intubation success rate of 97% using RSI, but there was no statistical difference between number of attempts or complications when comparing scene versus en route intubations.²³ This was an air medical service that saw 325

patients in a 31-month period. Intubations occurred on scene and in the hospital; however, multiple intubation attempts occurred more often in the scene group.²³ Pace and Fuller showed a 92% success rate with paramedics using RSI to intubate patients, with a first try success rate of 82%.²⁵

Ma et al. showed successful intubation rates of 93.5% and 90.5% in two different aeromedical transport teams using neuromuscular blockade. Providing the paralytics to the aeromedical paramedic/nurse crews increased the percentage of successful intubations from 66.7% (without RSI) to 90.5% (with RSI). They also showed an increase in success rates and a decrease in cricothyrotomy rates when using neuromuscular blockade. This involved the same crews who received the RSI protocol within the framework of the study. However, the intubators had a successful intubation rate of only 48% (successful intubations:total intubations). This may be an accurate comparison group for our Special Operations medics, since the study involved aeromedical transport within a trauma system. The volume review in this study was in the range of 675 to 700 critical transports and greater than 200 intubations, which may be considerably higher than the number of transports USSOCOM medics perform within a year. The authors suggest that the improvement in the success rates may be due to increased experience and improved technique, and maybe not due to the use of neuromuscular blockade. The group involved professed significant turnover in the paramedics, similar to the military with its PCS tempo.²⁰

Wayne et al. hypothesized that the use of succinylcholine to assist endotracheal intubation would be a safe and effective way to assist in securing a patient's airway. The group's conclusion was that succinylcholine-assisted intubations must occur under close physician supervision and monitoring. The use of midazolam or diazepam provided the sedative-hypnotic necessary for RSI. Success rate in the study was 96.2% over a 20-year period. Explanation of the high success rate is experience. The paramedics in the study were required to obtain *2500 hours* of airway training prior to certification. The paramedics must also complete a minimum of 20 human intubations in the operating room under the supervision of anesthesia personnel. Sustainment skills are necessary as well, requiring paramedics to perform at least one intubation per quarter and one operating room intubation per year.⁷

MORTALITY

Intubation of the critically ill trauma patient makes intuitive sense, with expected improvements in oxygenation and ventilation. The intuition has not played out in the literature. Mortality and complications have fallen on both sides of this argument, both for and against. More recent work is showing that field or prehospital intubations lead to increases in mortality.

Studies demonstrating increased mortality are presenting disconcerting numbers. Chesnut et al., as well as Stochetti et al., showed increases in mortality with prehospital and preintubation hypoxia. Davis, DP et al. also showed, when compared to the control group, mortality increased from 23.6 to 31.4%.²⁹ Bochicchio et al. showed that those patients intubated in the pre-hospital arena had almost a two-fold greater mortality.³⁰ The greatest benefit tends to occur in those patients with a Glasgow Coma Score of greater than three.²²

Murray et al. showed that the mortality in patients intubated or unsuccessfully intubated in the prehospital arena were significantly higher. Those who died in greater proportions were more likely to be older, have lower GCS scores, and have penetrating injuries. The mortality risk for intubated or unsuccessfully intubated was 1.7 and 1.5 times higher than the nonintubated patients.³¹ Cooper et al. attempted to reappraise the previously studied numbers showing an increase morbidity and mortality. While the results showed that those patients who were intubated had less associated morbidity, they were unable to prove improvement in mortality with any degree of statistical significance.³²

Only Winchell et al. showed that those patients receiving field endotracheal intubation had a significant decrease in mortality (36% to 26%) in all studied categories, but later said that survival in patients who were transported via aeromedical means was better in the group of patients who were not intubated. The aeromedical model probably resembles the military transport system, especially the USAF's SOFME. However, the rates to discharge home or any improvement in functional recovery were unaffected by whether the patient was intubated or not. Ultimately, this study was unable to demonstrate that prehospital endotracheal intubation led to a functional improvement independent of the survival benefit when compared to those patients whose airways were managed without intubation.^{16,33}

COMPLICATIONS

Even if successful in the process of intubation and if the patient survives to the next level of care,

complications must concern us. Once again, studies support both sides, but some of the strongest evidence is against RSI by paramedics.

Complication rates range from 18% up to 33%, and vary from nosocomial pneumonia to arrhythmias (cardiac arrest, symptomatic bradycardia).^{17,21,23,34} These problems may even be multiple in one patient, making mortality even more likely. Failures occurred in five patients, with cuff leaks and multiple intubations attempts punctuating the reasons for failure. Mishaps from RSI include multiple attempts, aspiration, esophageal intubation, arrhythmia, repeated drug administration, and failure to intubate. Davis et al. again in the San Diego experience found a high incidence of adverse outcomes and inadvertent hyperventilation despite end-tidal CO₂ monitoring capability and defined parameters.^{28,35}

Li et al. showed a greater number of complications both in number and severity when intubation attempts were performed with drug-assisted intubation as opposed to RSI.³⁶ The study suggested that patients with traumatic airways should receive sedation without paralysis to prevent the loss of protective airway reflexes or the loss of spontaneous respirations.³⁶ Sing et al. showed that paramedics intubating pediatric patients using RSI had intubation mishaps 33% of the time. Therefore, while RSI may assist in intubation of the pediatric patients, there is a high complication rate.³⁴

Bochicchio et al. may have compiled the project most relevant to the Special Operations medical model. In their recent article, set at the Maryland Shock Trauma Center, the very location that the United States Air Force Special Operations Command sends its pararescuemen to refresh their trauma skills, showed that use of endotracheal intubation in the field did not reduce brain injury in trauma patients. Paramedics from the Maryland Emergency Medical System performed prehospital intubations. Their evaluation prospectively took those patients who did not have an acutely lethal traumatic brain injury and compared those who were intubated in the field versus those who were intubated immediately upon arrival to the ED. After excluding those patients who expired within 48 hours due to non-salvageable traumatic brain injury, the patients were assessed by the following variables: hospital length of stay, intensive care unit length of stay, ventilator days, and mortality. Patients were generally male adults (81%) and transported via air (67%). Consistent with civilian traumas, the majority of patients were victims of blunt trauma. Patients were categorized as receiving either pre-hospital intubations or bag-valve mask venti-

lation until arrival at the emergency department. Interestingly, patients who were intubated on arrival at the trauma center were more likely to receive neurosurgical intervention (34% vs. 14%). The study showed that those patients intubated in the pre-hospital arena were more likely to have prolonged ICU stays, prolonged hospital stays, higher incidence of pneumonia, a greater number of ventilator days, and almost a two-fold greater mortality. The results of this study may be the most damning to pre-hospital intubations.³⁰

In looking at this study, one must remember that the Maryland Emergency Medical System is one with a highly trained paramedical system, like USSOCOM medics. Unlike the USSOCOM medics, the Maryland paramedics have significant levels of experience, see a high volume of critically ill patients (both trauma and medical), and have strict protocols.³⁰

DRUG-ASSISTED INTUBATION

A definite alternative to RSI is an induction without paralytics, also known as drug assisted intubation (DAI). Evidence is not conclusively in favor of DAI when compared to RSI. Protocols are available, and many more are under construction. The process basically involves the use of sedative-hypnotic medications, minus the paralytics to induce the anesthesia and amnesia. Therefore passage of the ETT is permitted in patients with traumatic airways without the loss of protective airway reflexes or the loss of spontaneous respirations.³⁶

Gerich et al. showed a success rate of 97% using RSI, and had only 0.5% of patients with unrecognized esophageal intubations. Crews were made up of a physician and a paramedic with ten years or greater experience. Advanced airway management was only engaged in by the physician, based on a strict protocol, required on patients with repeated failed intubation attempts or inability to maintain adequate saturation during attempts. Those patients received emergency cricothyrotomy. With this strict protocol, using RSI without paralytics, only 2.4% of the studied patients required a surgical airway. Interestingly enough, this study references the very patient populations that the non-physician providers state that they want the RSI medications for: intoxication, entrapment, head injury, facial trauma, and burns. And only twice was failure to intubate the only indication cited for cricothyrotomy. The patient who received the surgical airway was more likely to die from the severity of their injuries. This study is actu-

ally DAI. Cricothyrotomy rate for failure to intubate ranges from 2.6% to 18.5% when performed by paramedics or nurses. Rates when physicians are attempting the airway range from 1.7 to 2.7%. Fewer complications resulted from cricothyrotomy when physician-performed vs. nurses/paramedics.³⁷

Sagarin et al. showed that intubation using RSI was more successful on first attempt (78%), but that the intubation was more successful when using sedation alone (89% vs. 85%). The sedated intubation was actually performed less often, despite being more successful.³⁸ Sakles et al. showed an overall success rate of DAI as 91.5% and a 94.7% success rate during first two attempts.²⁴

TRAINING/PROTOCOLS

Lack of definitive evidence breeds controversy, leading to varied and potentially dangerous protocols. The author's argument is that those performing endotracheal intubation must have extensive airway training, and continuing training and experience. What has not been assessed and determined are the actual training requirements necessary to certify a non-emergency physician or non-anesthesia provider in providing RSI, and what is necessary to maintain this certification.

Frequently, authors of prehospital airway management articles endorse RSI by non-physician pre-hospital personnel.³⁹ These endorsements come with the caveat that prehospital RSI must be under the strictest of protocols with extremely well trained personnel. Creation of those protocols translates into direct responsibility for the actions of the prehospital personnel. One study showed that 12 of 150 (8%) patients could not be intubated even after the administration of succinylcholine. In those cases the paramedics made a breathing patient into an apneic one. In nearly all studies referenced, the authors state that strict protocol adherence is focal to success. In that same study, 96 of 150 cases had protocol violations. Does the end justify the means?²⁵

Dilemmas arise not only from the use of the paralytics, but also from the certification of those permitted to use them. In each of the successful studies, the intubators had one of two significant advantages. They either had a lot of experience in the management of difficult airways, with real-world airway emergencies, or they had direct, close physician supervision and short transport times.

Also, the authors believe that the ideal training location is the operating room. That belief is also

subject to controversy, as the airways in the OR tend to be different from the typical trauma patient (empty stomach vs. full stomach, intracranial pressure issues, etc.).³²

Another argument in the center of this controversy: who should be doing the training? Most will agree that the anesthesiologist is the expert in the maintenance of the airway, as well as the newer technologically advanced equipment. However, in many emergency departments and trauma bays in the United States, anesthesia is not present or available, and management of the traumatic or difficult airway falls to the emergency physician. In conjunction with this trend, some would argue that the emergency physician is the expert in the full stomach, vomiting, combative, trauma patient. Support for this changing belief was demonstrated in a recent article by Bushra et al., showing with statistical significance that emergency physicians are more successful than anesthesiologists at obtaining the trauma airway at a Level One inner city trauma center.⁴⁰

CONCLUSION

Universally, articles regarding intubation or RSI state that control of the airway is of paramount importance. Rapid sequence intubation is not a benign procedure. The process makes a breathing patient an apneic one. At the same time, the importance of maintaining oxygenation and preventing hypercarbia in caring for the trauma patient cannot be understated. I am willing to concede that RSI is a valuable tool in the field, especially with trauma patients. An emergency physician has a significant advantage over the pre-hospital provider. Sufficient lighting, oxygen, and support all help when pushing succinylcholine, but experience and training from an inner city, level one trauma center provide the most confidence.

Concerns arise when intubation is addressed. The argument of "Should paramedic personnel intubate any patients?" is an unnecessary one. The use of endotracheal intubation in the comatose patient or cardiac arrest patient has been established in previous studies. However, advanced airway techniques for use in trauma patients remains controversial. Prevention of secondary brain injury is the goal of RSI in trauma patients. Evidence over time has shown that well-trained paramedics with sustainment training are fully capable of intubating patients in the field.³³

My concerns are numerous, but tend to focus on training, protocols, experience, and patient volume. This is not a skill that one can learn once and only prac-

tice on cadavers or porcine models to remain proficient. In an unofficial survey of selected SOF medics, most have never intubated a live person – ever. Some have performed controlled intubation on surgical patients at the medical treatment facility or on cadavers as part of a recurring training plan, but not on a real world combat casualty with potential airway issues. The enlisted personnel and those requesting RSI medications are willing to embrace a dangerous medication and procedure despite a lack of evidence to support its use.

A goal of military medicine leadership is to attain and, in some cases, exceed the standard of care set forth by the civilian medical system. Necessity and technology tend to be driving forces behind this goal.

The impetus for this article followed a sequence of events related to the USSOCOM Requirements Board meeting in August 2003. The board voted, with a single objection, to place RSI on the list as required learning for the SOCM course. Concerned about the decision, I requested clarification on the topic from a senior enlisted military medical advisor. His response to me was that "We must be better than other civilian counterparts." I am in complete agreement. To be better, we must not only teach; we must guarantee proficiency, experience, sustainment, and strict protocols for the medics to fall back on. I have no doubt that the USSOCOM medical education departments will generate an excellent training program (didactics, simulations, etc.). Can USSOCOM afford to devote medics to 2500 hours of airway training necessary to reach that 96% success rate?

All EMS activity must have physician-directed, online medical command. In my opinion, this is an extremely unreliable option, considering communication snafus that routinely occur during combat operations and the fog of war. Even with online medical command, the physician is not physically standing next to the paramedic providing cricothyroid pressure, in case the non-physician provider fails on his/her third or fourth attempt.

The military literature does not even support the use of RSI for paramedics. One study showed that the military medical providers failed to intubate over 30% of the time showing that the military endotracheal intubation success rate was lower than the community standard.⁴¹

Questions that must be answered by those deciding whether the combat medic truly needs the formula-ry to perform RSI are as follows:

Are individuals who have never had formal training or performed RSI making the decision to enable the pre-hospital providers?

Do USSOCOM combat medics see and treat enough critical patients to require RSI as an option for airway management?

Do USSOCOM combat medics perform enough controlled (OR, mannequin) endotracheal intubations to be proficient in airway management?

Do USSOCOM combat medics perform enough real-world emergency endotracheal intubations to justify using a medication, which makes a patient apneic without protective reflexes through RSI?

What will the sustainment training requirements be? And how will those sustainment requirements be achieved?

Who will train and rate the combat medic in difficult airway management?

The use of paralytic medications by non-physician medical personnel is and will continue to be a controversial topic. Outcome-based studies as well as anecdotal evidence falls on both sides of this fence. Until the evidence clearly shows that the use of paralytics by the prehospital non-physician is safe, effective, and beneficial, the rapid sequence intubation should remain a procedure reserved for the emergency physicians, nurse anesthetists, or anesthesiologists with the experience, equipment, and environment to perform it adequately.

References

- Nolan J, Clancy M. Editorial IV: Airway management in the emergency department. *British Journal of Anaesthesia*. 2002; 88 (1).
- Mackey CA, Terris J, Coats TJ. Prehospital rapid sequence induction by emergency physicians: Is it safe? *Emergency Medicine Journal*. 2001; 18 (1).
- Graham CA, Meyer AD. Prehospital emergency rapid sequence induction of anesthesia. *Journal of Accident and Emergency Medicine*. 1997; 14 (4).
- Roberts JR, Hedges JR. *Clinical Procedures in Emergency Medicine*, 4th Edition. Saunders, Philadelphia, PA 2004.
- Tintinelli JE, Kelen GD, Strapczynski JS. *Emergency Medicine - A comprehensive study guide*. 6th Edition. McGraw-Hill, 2004.
- Knopp RK. Rapid sequence intubation revisited. *Annals of Emergency Medicine*. March 1998; 31 (3).
- Wayne MA, Slovis CM, Pirrallo RG. Management of difficult airways in the field. *Prehospital Emergency Care*. 1999; 3 (4).
- Silvotti MLA, Filbil MR, Murray HE, Slasor P, Walls RM. *Academic Emergency Medicine*. Philadelphia: 2003; 10 (6); 612.
- Smith DC, et al. A trial of etomidate for rapid sequence intubation in the emergency department. *Journal of Emergency Medicine*. 2000;18 (13).
- Bozeman WP, Kleiner DM, Huggett V. Intubating conditions produced by etomidate alone vs. rapid sequence intubation in the prehospital aeromedical setting. *Academic Emergency Medicine*. 2003; 10 (5).
- Fowler RA, Pearl RG. The airway: Emergent management for nonanesthesiologists. *Western Journal of Medicine*. 2002; 176 (1).
- Dittrich KC. Delayed recognition of esophageal intubation. *Journal of the Canadian Association of Emergency Physicians*. 2002; 4 (1).
- Jemmett ME, Kendal KM, Fourre MW, Burton JH. Unrecognized misplacement of endotracheal tubes in a mixed urban to rural emergency medical services setting. *Academic Emergency Medicine*. 2003; 10 (9); 961.
- Adnet F, Jouriles NJ, Le Toumelin P, Hennequin B, Taillandier C, Rayeh F, Couvreur J, Nourgiere B, Nadiras P, Ladka A, Fleury M. Survey of out-of-hospital emergency intubations in the French prehospital medical system: A multicenter study. *Annals of Emergency Medicine*. 1998; 32 (4).
- Sloane C, Vilke GM, Chan TC, Hayden SR, Hoyt DB, Rosen P. Rapid sequence intubation in the field versus hospital in trauma patients. *Journal of Emergency Medicine*. 2000;19 (3).
- Winchell RJ, Hoyt DB., for the Trauma Research and Education Foundation of San Diego. Endotracheal intubation in the field improves survival in patients with severe head injury. *Archives of Surgery*. 1997; 132 (6).
- Karch SB, Lewis T, Young S, Hales D, Ho CH. Field intubation of trauma patients: Complications, indications, and outcomes. *American Journal of Emergency Medicine*. 1996; 14 (7).
- Stewart RD, Paris PM, Winter PM. Field endotracheal intubation by paramedical personnel: Success rates and complications. *Chest*. 2001; 85 (3).
- Wayne MA, Slovis CM, Pirrallo RG. Management of difficult airways in the field. *Prehospital Emergency Care*. 1999; 3 (4).
- Ma OJ, Atchley RB, Hatley T, Green M, Young J, Brady W. Intubation success rates improve for an air medical program after implementing the use of neuromuscular blocking agents. *American Journal of Emergency Medicine*. 1998; 16 (2).
- Sing RF, Rotondo MF, Zonies DH, Schwab CW, Kauder DR, Ross SE, Brathwaite CCM. Rapid sequence induction for intubation by an aeromedical transport team: A critical analysis. *American Journal of Emergency Medicine*. 1998; 16 (6).
- Ochs M, Davis D, Hoyt D, Bailey D, Marshall L, Rosen P. Paramedic-performed rapid sequence intubation of patients with severe head injuries. *Annals of Emergency Medicine*. 2002; 40 (2).
- Slater EA, Weiss SJ, Ernst AA, Haynes M. Preflight versus en route success and complications of rapid sequence intubation in an air medical service. *The Journal of Trauma, Injury, Infection, and Critical Care*. 1998; 45 (3).
- Sakles JC, Laurin EG, Rantapaa AA, Panacek EA. Airway management in the emergency department: A one-year study of 610 tracheal intubations. *Annals of Emergency Medicine*. 1998; 31 (3).

25. Pace SA, Fuller FP, Out-of-hospital succinylcholine-assisted endotracheal intubation by paramedics. *Annals of Emergency Medicine*. 2000: 35 (6).
26. Katz SH, Falk JL, Misplaced endotracheal tubes by paramedics in an urban emergency medical services system. *Annals of Emergency Medicine*. 2001: 37.
27. Wang HE, Sweeney TA, O'Connor RE, Rubinstein H. Failed prehospital intubations: An analysis of emergency department courses and outcomes. *Prehospital Emergency Care*. 2001: 5 (2).
28. Davis DP, Ochs M, Hoyt DB, Marshall LK, Rosen P. The San Diego paramedic rapid sequence intubation trail: A three-year experience. *Academic Emergency Medicine*. 2003: 10 (5).
29. Davis DP, Hoyt DB, Ochs M, Holbrook T, Fortlage D, Marshall LK, Rosen P. The effect of paramedic rapid sequence intubation on outcome in severe traumatic brain injury. *Academic Emergency Medicine*. 2003: 10 (5).
30. Bochicchio GV, Ilahi O, Joshi M, Bochicchio K, Scalea TM. Endotracheal intubation in the field does not improve outcome in trauma patients who present without an acutely lethal traumatic brain injury. *The Journal of Trauma, Injury, Infection, and Critical Care*. 2003: 54 (2); 307-311.
31. Murray JA, Demetrios D, Berne TV, Stratton SJ, Cryer HG, Bongard F, Fleming A, Gaspard D. Prehospital intubation in patients with severe head injury. *The Journal of Trauma, Injury, Infection, and Critical Care*. 2000: 49 (6).
32. Cooper A, DiScala C, Foltin G, Tunik M, Markenson D, Welborn C. Prehospital endotracheal intubation for severe head injury in children: A reappraisal. *Seminars in Pediatric Surgery*. 2001: 10 (1).
33. Winchell RJ, Hoyt DB, for the Trauma Research and Education Foundation of San Diego. Endotracheal intubation in the field improves survival in patients with severe head injury. *Archives of Surgery*. 1997: 132 (6); 592-597.
34. Sing RF, Reilley PM, Rotondo MF, Lynch MJ, McCans JP, Schwab CW. Out-of-hospital rapid-sequence induction for intubation of the pediatric patient. *Academic Emergency Medicine*. 1997: 3 (1).
35. Davis DP, Dunford JV, Ochs M, Hoyt DB. Inadvertent hyperventilation following paramedic rapid sequence intubation of severely head-injured patients. *Academic Emergency Medicine*. 2003: 10 (5).
36. Li J, Murphy-Lavoie H, Bugas C, Martinez J, Preston C. Complications of emergency intubation with and without paralysis. *American Journal of Emergency Medicine*. 1999: 17 (2).
37. Gerich TG, et al. Prehospital airway management in the acutely injured patient: The role of surgical cricothyrotomy revisited. *The Journal of Trauma, Injury, Infection, and Critical Care*. 1998: 45 (2).
38. Sagarin MJ, Chiang V, Sakles JC, Barton ED, Wolfe RE, Vissers RJ, Wall RM. Rapid sequence intubation for pediatric emergency airway management. *Pediatric Emergency Care*. 2002: 18 (6).
39. Gausche M, Henderson DB, Brownstein D, Foltin GL, for the Pediatric Education Task Force. Education of out-of-hospital emergency medical personnel in pediatrics: Report of a national task force. *Annals of Emergency Medicine*. 1998: 31 (1).
40. Bushra JS, McNeil B, Wald DA, Schwell A, Karros DJ. A comparison of trauma intubations managed by anesthesiologists and emergency physicians. *Academic Emergency Medicine*. 2004: 11 (1).
41. Gerhardt RT, US Army air ambulance operations in El Paso, Texas: A descriptive study and system review. *Military Medicine*. 166 (2).



Capt Eric Bruno is a graduate of the Pennsylvania State University and the Medical College of Pennsylvania and Hahnemann University School of Medicine (now Drexel University College of Medicine). Upon graduate of medical school, Capt Bruno matriculated to the MCP-Hahnemann University Emergency Medicine Residency Program which he completed in 2002. To serve his active duty commitment, he is a board certified emergency physician at Eglin Air Force Base and Hurlburt Field, FL.

Special Forces Battalion Aid Station in Support of a Direct Action Task Force

Bryan Fisk, MD

ABSTRACT

A Special Forces battalion aid station (BAS) executes a wide range of medically-related missions during deployment. However, this does not typically include attachment to a small-unit direct action team. The BAS for Forward Operating Base (designation censored) had an uncommon opportunity when it received such a mission during Operation IRAQI FREEDOM (OIF). This article discusses the planning involved and the configuration used to accomplish this mission. Furthermore, we discuss lessons learned during the execution of these missions, with their relevance to current tactical combat casualty care guidelines.

CONCEPT FOR DIRECT ACTION MEDICAL SUPPORT

While deployed to Iraq in support of OIF, the Battalion Aid Station (BAS) for a Special Operations Forward Operating Base (FOB) executed a variety of tasks and missions. These included the development and constant revision of medical evacuation (MEDEVAC) plans, patient tracking, routine sick call, and responding to non-battle medical emergencies. The BAS also provided care for injured Iraqis, conducted a survey of a local Iraqi hospital (Yarmouk Hospital in Baghdad), relayed their medical requirements to Civil Affairs, and participated in a local medical civilian assistance program (MEDCAP). The FOB BAS provided care and evacuation for US combat casualties, including a casualty evacuation (CASEVAC) by MC-130 based in Kuwait into Iraq to retrieve a seriously wounded US Special Forces Soldier, stabilization and evacuation of four 10th Mountain Division Soldiers injured in a vehicle rollover outside the FOB perimeter in Baghdad, stabilization and evacuation of two US Marines seriously wounded in a gun battle near the FOB, and stabilization and evacuation of two 10th Mountain Division Soldiers injured in a gun battle with an armed combatant who attempted to infiltrate the FOB with a sniper rifle.

In addition to these tasks, the BAS picked up a new assignment, one not often tasked at the BAS level, during the final three months of deployment to Iraq.

During the summer of 2003, the FOB Operational Detachments-Alphas (ODAs) collected a

considerable amount of actionable intelligence and relayed it to other US military units for action. However, when it became apparent that the amount of intelligence was too voluminous, the command ordered the FOB to stand up its own Direct Action (DA) Task Force. The use of direct medical support to the team was broached during initial staff mission planning. There were several advantages to having such an asset, due to the increased risk of violent action associated with DA missions. Besides improving the chances of an operator surviving serious wounds, the knowledge of having an increased level of medical care on site has a positive psychological effect and further enhances mission effectiveness. The medical package would also treat any enemy wounded, increasing their survival (and our ability to gather intelligence). Further, Special Forces medical assets would treat collateral civilian casualties. This is not only an ethically sound policy, but it also ameliorates the negative impact in the surrounding community following a raid.

With agreement on the benefits of direct medical support to the DA Task Force, the next step was to determine the composition of the medical package. The BAS, which is normally a five-man section, was down to three men: the battalion surgeon, physician assistant (PA), and preventive medicine (PM) NCO. The two Special Forces Medical Sergeant (18D) slots for one BN medical NCOIC and one medical treatment

NCO were vacant due to reassignment and medical evacuation. The remaining 18Ds in the BN were assigned to other missions and unavailable for support. Of the BN surgeon and PA, one needed to remain at the FOB during missions to provide base medical coverage. Planners decided to have the BN surgeon provide the medical support for the DA missions and the PA provide base medical coverage. The risk of losing a BN asset was offset by the benefit to the DA team. Also, the FOB medical plans and procedures were already firmly in place and repeatedly tested by use, and there were numerous conventional medical assets in the FOB vicinity. The PM NCO rounded out the medical package, acting as the driver and assistant to the BN surgeon.

Once the medical personnel were designated, the next task was to determine the necessary medical supplies and equipment. The first issue was the type of vehicle. The two choices were either the readily available BN Front Line Ambulance (FLA) or a Non-Standard Tactical Vehicle (NSTV). The benefits of using the FLA included increased capacity to carry both patients and supplies compared to available NSTVs. Furthermore, a US Army FLA is easily recognizable and decreases the risk of a friendly-fire misidentification incident. This is of particular concern during high-speed emergent ground evacuations through other units' sectors, and while attempting rapid transit through US military checkpoints. However, the clear recognition of an FLA was also a drawback. The majority of the vehicles used in the Task Force were NSTVs and there was concern that the presence of the FLA might raise the Task Force profile. Several US Army FLAs had already come under attack by insurgents. Furthermore, the FLA lacked the quickness and speed of NSTVs and would thus be a limiting factor in Task Force movement. However, we decided that the benefits of the FLA outweighed the drawbacks for the majority of missions, though this issue was always reconsidered during planning for each mission. On a few occasions, a Defender truck was configured as a medical vehicle, and for one mission there was no medical vehicle (the surgeon rode in the command and control vehicle).

The next step was to configure the FLA for the new mission set. One issue was communications. It was important for the medical team to have communications with the rest of the DA team for two reasons: to facilitate convoy movement and for notification of any emergencies. This presented a problem of communications interoperability. To correct this, a

radio was installed in the FLA and secured by cargo strap to the top of the old radio. We also added a bullhorn with both voice amplification and siren functions. The BAS had originally purchased this to facilitate communication in mass casualty situations. However, the siren had proved useful in a prior emergent ground evacuation by alerting a security checkpoint of our arrival.

The patient cargo area of the FLA contained the standard four-litter set-up, along with two backboards, head restraints, and cervical collars. Two pole-less litters were also stowed in case a casualty required movement through restrictive passageways. For a crisis, several intravenous access kits (one liter bag of lactated Ringer's solution, IV tubing, a 16-gauge and 18-gauge IV catheter, and two alcohol pads wrapped together with a piece of surgical tape) were held in place along the walls of the patient cargo area with Velcro® straps. Similarly, a hanging aid bag was fashioned to have easy access to trauma supplies. A nylon M5 bag was cut to isolate each of the individual pockets and pouches that were then secured to a cloth surgical drape using 3-0 nylon sutures. The bag was secured to eyelet fixtures on the FLA wall with 550-cord through re-enforced holes in the cloth. It was stocked with trauma supplies, to include field dressings, cravats, tourniquets, chitosan dressings, scalpels, chest tubes, Heimlich valves, endotracheal and tracheostomy tubes, a F.A.S.T.-1® interosseous introducer (Med-Tech Systems, Ltd.), and 14-gauge needles for chest decompression. Both the hanging IV sets and hanging trauma bag would later be of great use.

The FLA was also equipped with two oxygen cases. One was a standard oxygen kit containing two D-cell cylinders, regulators, suction apparatus, nasal cannulae, and facemasks. The other had one D-cell cylinder along with an Autovent 3000® (Allied Healthcare Products, Inc., St. Louis, MO), a mechanical ventilator cycled by the pressure from the oxygen tank. It is very compact and durable without any requirement for electricity, making it ideal for tactical situations. The ventilator in a tactical situation optimizes manpower if a casualty requires assisted ventilation. The ventilator avoids tying up a team member to manage a bag-valve-mask assembly. Another new piece of equipment added to the FLA, an Access® automated external defibrillator device (AED) (Access Cardiosystems, Concord, MA), is also very small and durable. It was not intended for the treatment of cardiac arrest secondary to trauma, but for the

possibility of a civilian cardiac emergency at the objective. The majority of objectives were houses occupied not only by the targeted personnel, but also family members of both sexes and all age groups. Along with the AED, there was a small Otter® box that held ACLS medications, as well as a small Pelican® case containing other emergency and critical care-type medications and a central venous kit.

For personal gear, both the surgeon and the PM NCO were equipped with a Kevlar helmet, Interceptor body armor, night vision goggles, and M4 rifles. In addition, the surgeon had a Petzl® headlamp and an M9 pistol, and certain items (e.g. an oral airway, a 14-gauge catheter, syringes, bandage scissors, and a Garmin Etrex GPS to mark alternate Helicopter Landing Zones [HLZs]) secured by the body armor retaining straps. The surgeon also carried a Black Hawk SOMP bag configured for trauma management.

War-gaming suggested the medical support vehicle could be stationed at a distance from the objective in some cases, while in others, it might be moved closer. On the objective, the 18Ds were responsible for determining the initial responses required for any casualties. It was their call whether the casualty needed to be moved off the objective or if the surgeon was needed on the objective. If required on the objective, a team member would come out and escort the surgeon inside. Once the surgeon reached the patient, the 18D was relieved of that medical responsibility. If further assistance from the 18D was not required then he continued with his mission objectives. If any Soldiers providing the cordon security were injured, they were to move to the FLA if possible, to keep the medical team in a central location and in proximity to the objective. Urgent medical evacuations were by air. Routine medical evacuation of stable patients was by FLA with a security truck.

After departing the objective, but prior to arriving at the detention facility, the BN surgeon was also responsible for medically screening the prisoners. It was at this point that minor injuries, not previously requiring attention, were treated. General health assessments were also performed for those detainees with chronic medical conditions, such as diabetes and coronary artery disease. Information on those individuals was passed to the detention facility so that they would be aware of any medication requirements and risk for potential future complications.

MISSION EXECUTION

During the execution of the missions the BN surgeon was called to the objective several times to treat a variety of medical emergencies in host nation personnel on target. On one objective an older Iraqi male complained of non-radiating substernal chest pain and dyspnea. He relayed through the interpreter a history consistent with angina and that he occasionally took a medication which he did not have available. On exam he had a BP and oxygen saturation within normal range but a pulse of 135 bpm; cardiac exam was regular rhythm without murmur, rub, or gallop, nor evidence of jugular venous distention; lungs were clear to auscultation. The AED was used to evaluate the cardiac rhythm, which was confirmed as sinus tachycardia. He was treated with oxygen via nasal cannula, aspirin, and two nitroglycerin tablets. His chest pain and dyspnea fully resolved after the second nitroglycerin tablet and did not recur during the remaining time on target. At the same objective an emotionally distraught older woman also complained of dyspnea. She relayed through the interpreter a vague chronic medical condition for which she took medication (unavailable). Her only findings were a pulse of 120 bpm and a BP of 195/120. We also treated her with oxygen, an aspirin, and a single nitroglycerin tablet as well as removal to a quiet room, along with her daughters to calm her. We planned to give metoprolol (Lopressor®) 5mg IV, but aborted because of the need to depart the objective. By the time of departure her pulse was in the 90s, her BP was approximately 165/95, and her symptoms improved. Both individuals were instructed to seek immediate medical care if their symptoms recurred and to follow up for routine medical care (this was a family with the means to do so).

At another objective an occupant received a gunshot wound to the left upper arm and the surgeon was called into the courtyard for treatment. After we cleaned the wound, there was no significant vascular, neurological, or orthopedic injury, and we bandaged it with a 4x6-inch field dressing. The patient was complaining of pain and we administered a 10mg IM injection of morphine sulfate and cefazolin (Ancef®) 1 gram IM. Upon completion of the mission objectives, we took the patient by FLA and gun truck escort to a Forward Surgical Team (FST). We gave promethazine (Phenergan®) 25mg IM en route to the

FST due to nausea and one episode of emesis, likely a result of a combination of motion sickness and narcotic administration. The patient subsequently underwent wound debridement at the FST.

At still another objective, the surgeon was called in because of concern that a pregnant woman was going into pre-term labor. Upon arrival to the bedroom, we found a distraught woman in the third trimester of pregnancy, lying in bed. Questioning, with the assistance of the interpreter, determined there was no vaginal fluid or spotting. Her vital signs were stable, there were no palpable uterine contractions, and a fetal heartbeat was detectable on auscultation and within normal limits. Vaginal exam was deferred. The woman was placed on her left side and given O₂ at 5 L/min by nasal cannula. Prior to administering diazepam (Valium®) 5mg IM, the surgeon was notified by the 18D that she had taken a pill just prior to his arrival, which turned out to be from her own supply of Valium. She improved prior to our leaving the objective and did not enter pre-term labor.

On one particular mission, US Special Forces sustained casualties. For this mission the FLA held up at the RP. While waiting, the medical team heard an explosion that seemed too early for the expected breaching charge, followed by a barrage of gunfire. Shortly afterwards, the team leader called for the FLA to immediately move up to the objective. The first team member on the objective had been hit by a grenade that incapacitated both legs. He continued to engage the enemy from his knees until he received a gunshot wound to the left lateral chest, though we did not know this information until later. The other team members extracted him through the gate and carried him to the corner of the alleyway that ran along the side of the house to the street.

The FLA pulled up behind the C2 vehicle and the team leader waved the surgeon to the casualty. The initial assessment began immediately but the team leader ordered the casualty back because of fire coming from the alleyway and roof. Two 18Ds carried the casualty behind the FLA and the surgeon followed with his aid bag. Initial evaluation demonstrated the casualty to be unresponsive with a very weak pulse and extensive tissue loss and burn injuries to the medial aspects of both lower extremities, though there was not a large amount of active bleeding. While the surgeon performed the initial assessment, one 18D began an IV line and a second noted a gunshot entrance wound to the left lateral chest, and placed an Asherman® chest seal. There was little bleeding from this wound and no evidence of an exit wound. We

heard equal bilateral breath sounds at the apices, along with spontaneous respirations and a normal arterial blood oxygen saturation. We began hetastarch (Hespan®) and maintained the airway with application of oxygen via a facemask. At this point the casualty began to make some limited movements. The surgeon was notified that CASEVAC would not come to the objective because it was too “hot” as the battle continued heavily with rounds hitting the street and around the vehicles.

Since the CASEVAC would not come to the objective, the casualty would have to be transported by ground to the HLZ, approximately 10 minutes away. While waiting to extract, the surgeon turned to make a quick assessment of two other casualties that had been brought to the rear of the FLA, both shot through the left calf, just distal to the knee. One had already been dressed with an Israeli bandage by an 18D, who was concerned that he might have an arterial injury because of continued bleeding. While there was a fair amount of bleeding, no pulsatile flow was noted. Because of the continued requirement for all available assaulters, a chitosan bandage covered with a new pressure bandage was chosen over a tourniquet. After approximately ten minutes of lying near the curb pulling security and firing at the enemy from behind the FLA, the bleeding fully ceased and he was able to go back on the objective to assist the assault.

After attending to this casualty, the surgeon was notified that the first casualty’s condition had rapidly deteriorated. He was no longer breathing spontaneously and his pulse was barely palpable despite administration of hetastarch, now wide open. We could not initiate a second IV line due to vascular collapse. The assisting 18D was passed supplies for endotracheal (ET) intubation and the surgeon placed a F.A.S.T.-1 intraosseous catheter. During application of the F.A.S.T.-1 there was no obvious “give” to indicate entrance of the introducer into the marrow space, though this indicator may have gone unnoticed due to the ongoing commotion of battle. After approximately 30 seconds of strong continuous pressure, the introducer was removed and a liter bag of lactated Ringer’s was connected to the catheter. The fluid flowed freely and there was no extravasation; the catheter was assumed to be in the marrow space. By this time the 18D had completed intubation and was ventilating with a bag. Auscultation revealed equal bilateral breath sounds. The surgeon quickly went to check on the status of the ground evacuation vehicle and upon his return the 18D noted concern about ET tube placement because of a rising abdomen. Re-

evaluation again confirmed equal breath sounds, but also adventitious sounds in the epigastrium. Since there was doubt and no capability present to determine end-tidal CO₂, the 18D was instructed to remove the ET tube. Subsequently, an oral airway was placed and ventilation via bag-valve-mask resumed.

The evacuation truck backed up to the scene and the patient was placed by stretcher into the back of the truck, accompanied by the surgeon with his aid bag and a team XO who came to assist the surgeon. The patient displayed no improvement en route to the HLZ, despite continued ventilation and fluid resuscitation. The patient was reassessed for evidence of tension pneumothorax but breath sounds at the apices and axillae remained equal and there was no evidence of jugular venous distention. However, with few treatment options left, a needle decompression of the left chest cavity was attempted using a 14-gauge needle, but without benefit.

At the HLZ, 3rd Armored Cavalry Regiment had a medical unit on-site to assist, including a physician, physician assistant, medics, and a tracked ambulance. Despite further aggressive attempts at resuscitation, the casualty did not appear to respond. However, the BN surgeon detected a weak pulse and requested a rhythm strip, which revealed that there was still some coordinated electrical activity, although it was bradycardic and interspersed with uncoordinated rhythms. Epinephrine 1mg IV was administered along with chest compressions and the casualty was loaded on the CASEVAC for transport to the FST, along with a flight medic and a US Special Forces representative.

The surgeon proceeded to return to the objective to treat further casualties, but he was waved down by the PA from 3rd ACR. He reported that a second casualty was being transported to the HLZ. The FLA and a HMMWV approached the medical station and unloaded a casualty who had received a gunshot wound to the head (entering the left zygomatic arch and exiting the left occipital bone), left neck (with damage to the great vessels), and left upper chest. He had fallen from the roof of a two-story house into an adjacent courtyard. An 18D and the PM NCO extracted the unresponsive casualty over the courtyard wall. His wounds were quickly bandaged and he was placed in a vehicle for emergent transport to the HLZ, receiving CPR en route.

At the HLZ, CPR continued while venous access was attempted. This was initially unsuccessful so the BN Surgeon obtained a central line kit to

attempt a femoral line (use of the F.A.S.T.-1 was precluded by the chest wound). However, the medical team obtained access before venipuncture by the surgeon. At this point, the neck was still bleeding so the dressing was removed and a chitosan bandage placed and then rebanded. The operator of the bag-valve mask noted increased resistance to ventilation so needle decompression was also done, though in the anterior axilla due to the gunshot wound in the infra-clavicular area. By this point a second CASEVAC had arrived and the casualty was quickly transferred to the aircraft with the 18D still performing CPR.

Once the CASEVAC aircraft departed, the BN surgeon, PM NCO, and an 18D left the HLZ to return to the objective. En route, the FLA linked-up with several vehicles from the team carrying more casualties. The medical team accompanied the casualties to the 3rd ACR aid station, since there would be a delay for the CASEVAC aircraft to return. The BN surgeon continued treatment of the two Soldiers with gunshot wounds to their lower legs, as well as the team leader with shrapnel to the right lower leg and another team member with shrapnel to his face. All of the leg wounds were unbandaged, cleaned, and rebanded. Each received cefazolin 1 gram and morphine sulfate as needed. The service member who had been treated with the chitosan bandage to his left leg exhibited increased circumference and firmness compared to the right leg as well as decreased motor function and sensation, raising concern for compartment syndrome. Two CASEVAC aircraft arrived and transported the three with lower extremity wounds along with an 18D and the BN Surgeon, who wanted to ensure that the casualty with signs of compartment syndrome was evaluated for compartment pressures immediately upon arrival to the 28th CSH. There, the two with gunshot wounds underwent wound debridement and fasciotomies for compartment syndrome. The surgeons decided not to remove the shrapnel from the team leader's leg.

The remainder of the team consolidated at the FOB, where the BN PA and team medics began evaluation and treatment of other team members with less serious injuries. Two Soldiers had very large perforations of the eardrums secondary to an explosion. One also had second-degree burns and shrapnel to the face while the other had shrapnel in the back. A third team member received shrapnel to the neck. Another team member took a 7.62 round into the anterior plate of his body armor from about ten feet. He denied any symptoms except minor chest soreness but a chest X-

ray was obtained to rule out a pulmonary contusion. A final WIA was not realized until two months later in CONUS when a team member relayed a history of tenderness over the left temporal region. Small nodules were noted on exam and a skull film confirmed the presence of multiple small metal fragments.

DISCUSSION

One of the first lessons learned was the benefit of including an enhanced medical package to support a Direct Action Task Force. Some may disagree with the use of a BN surgeon in this role because of the risk of a battalion asset that is not readily replaced in theater. This is most valid during the early phases of an operation, when the surgeon is responsible for coordinating the medical operations for the battalion. A loss during this time could degrade mission effectiveness since he is responsible for consolidating medical evacuation plans and casualty tracking procedures, identifying available theater medical assets, ensuring medical readiness, and advising the commander and ODAs on medical threats and appropriate responses for upcoming missions. However, once these plans and procedures are in place, the benefit of supporting a DA team becomes more feasible, particularly if there are redundant medical systems available. In this instance, the DA team felt that the addition of the BN surgeon provided a clear benefit to the mission, and the command supported this view. After the last mission discussed above, the team leader felt that having the medical element on-site resulted in fewer casualties because of the increase in the number of assaulters available to renew the attack. The two 18Ds from the team provided initial assistance with the casualties but were then able to return to their team. An additional man was returned to duty after use of the chitosan bandage, a pressure dressing, and on-site observation. The use of a physician in direct support on the ground is current practice for many civilian law enforcement SWAT teams.^{1,2} The augmentation of SWAT teams with physicians and paramedics has developed into a new scope of medical practice termed tactical emergency medical support (TEMS). As discussed by LTC Heck at the SOMA conference,³ the procedures for some SWAT/TEMS teams parallel those developed by the FOB. In particular, the physician will advance with the team as far as the last point of concealment. A casualty is brought out to him or, if required on the objective, a SWAT member escorts him in. However, comparisons between a US Special Forces DA team

and a civilian SWAT team must be tempered by the realization that US Special Forces operate in combat environments where there is a greater potential for hostile fire in areas where the medical team is positioned.

The next lesson learned was the need for an improved FLA. Our current FLA does not have sufficient speed or acceleration to allow it to keep up with other tactical vehicles. This resulted in increased risk during movement, allowing greater exposure to risk for ambush and greater risk for convoy separation during moving contact. Placing the FLA on a newer M1113 HMMWV may provide a solution to this problem.

Another lesson learned was the need to be prepared and configured to manage a spectrum of non-traumatic medical emergencies occurring in both genders and various age groups. These constituted the bulk of the responses for the medical element. However, when casualties are sustained, it is important to select the best site to stage the casualty collection point. Besides the safety of the casualty collection point, proximity is also a consideration during ongoing contact as it is important for the medical team to keep situational awareness, the ability for rapid response, and for team members to quickly bring casualties and return to the fight. The objectives of tactical combat casualty care (TCCC) have been described as: (a) treat the patient, (b) prevent additional casualties, and (c) complete the mission.^{4,5} The relative importance of these objectives will vary upon the specific situation and in the final scenario, objective (b) was leveraged in order to maximize success in the other two objectives. Ultimately, the DA team leader will determine the location of the casualty collection point based on METT-T and the medical packages input.

Lessons regarding the effectiveness and limitations of level III body armor were re-emphasized. The ability of modern body armor to decrease fatalities from penetrating chest injuries has been previously demonstrated.⁶ Further evidence was provided when one team member received a 7.62 round at close range but suffered no significant ill effects. However, the obvious limitation is exemplified by the team member who was shot in the lateral chest, where there is no protection afforded.

Several new medical supplies were useful during this operation. Inserting an intraosseous catheter was a valuable tool for treating a patient with hypovolemic shock when vascular collapse precluded the placement of a second venous catheter. The ventilator would have been more helpful if the initial patient had not required extubation. During the ground evacuation

to the HLZ, the Soldier who was assisting had to man both the ventilation bag and maintain control of the IV fluids while the BN surgeon attempted needle decompression. This would have been more efficient with the use of the ventilator. An end-tidal CO₂ monitor or a capnograph to confirm ET tube placement would have been very valuable. In hindsight, with the extent of injuries now known, it is possible that the ET tube was correctly positioned and the rise in the abdomen was due to accumulating hemoperitoneum and the adventitious epigastric sounds were due to an abnormal communication between the left hemithorax and abdomen. An unnecessary extubation may have been avoided if a means to assess CO₂ exhalation was available. Alternatively, use of a laryngeal mask airway or a Combitube® could have alleviated concerns about esophageal intubation.

There were also multiple lessons learned related to treatment during these operations. First, the chitosan bandage played a role in returning one team member with a lower extremity wound to action. Some may argue that a patient with an extremity wound, who has continued heavy bleeding after use of a pressure dressing, should be treated with a tourniquet. However, we felt that the bleeding was controllable with the combination of a chitosan bandage and pressure dressing, while a tourniquet would have likely rendered him combat ineffective. The use of the chitosan bandage was possible in this instance because of the ability to observe the patient to ensure that he did not bleed further, in which case a tourniquet would have been used. Returning a casualty to complete the mission is in line with the updated care under fire guidelines: “expect casualty to stay engaged as a combatant if appropriate”^{5,7} and in this instance was warranted.

The second issue was whether to place a chest tube in the casualty with a gunshot wound to the chest. We performed many interventions to stabilize the patient and these had to be prioritized according to the probability of benefit and weighed against the detriment of delaying evacuation to definitive surgical care. Priority was given to vascular access and fluid resuscitation, treatment of the chest wound with an Asherman® chest seal, and ventilation, by which time transportation was available. The decision was made to not delay evacuation to place a chest tube, though needle decompression was performed en route to the HLZ. The initial pathology report listed the cause of death as exsanguination due to a gunshot wound that entered the left lateral chest

and traversed through the upper abdomen, with resulting hemothorax and hemoperitoneum. Given the rapid rate of development of hypovolemic shock and loss of consciousness (within fewer than 15 minutes), it is most likely that the round damaged a great vessel and possibly the liver. Based on data presented at SOMA by Dr. Howard Champion,⁸ the rate of hemorrhage in this patient can be assumed to have been 200 cc/minute or greater. The ability to correct the condition of patients with such a rapid rate of hemorrhage, even with immediate transport to the operating room, is nearly non-existent. Still, had evacuation been further delayed, a chest tube would have been attempted as a further last resort.

The final treatment issue regards fluid resuscitation, which was given top priority in the casualty with penetrating chest trauma. Opinions about if and when intravenous fluids should be administered to combat casualty victims have been in flux. Doctrine has evolved from treating all battlefield casualties with immediate large-bore IV access and fluids to the current viewpoint that casualties should not receive IV access until the tactical field care phase, that an 18-gauge catheter should be used instead of large-bores in most patients, and fluids not be administered unless there is evidence of shock. In general, IV fluid resuscitation is not recommended during the care under fire phase, but in our situation there was no distinct division between the care under fire and tactical field care phases. Given the rapid rate of uncontrolled hemorrhage and development of severe shock as demonstrated by loss of consciousness, immediate fluid resuscitation was indicated for the casualty to have any chance of reaching the operating room.⁹ The initial choice of hetastarch was in keeping with TCCC guidelines during the tactical field care phase.⁵

In conclusion, it is feasible for a BAS to provide effective medical support for DA teams. Based on numerous informal discussions with operators, it is not only feasible but also desirable. Important considerations for the effective employment of such support include the insurance that there is already an efficient medical plan in place for the battalion, preparation for a wide range of non-combat medical emergencies, and fastidious pre-mission attention to contingency plans for care under fire and medical evacuation. Finally, it is important to know and understand the Tactical Combat Casualty Care guidelines, as they are a great aid to decision making during combat. At the same time, one should remember that they are guidelines and the provider on the scene may need to make modifications as dictated by the actual combat situation.

REFERENCES

1. Heck JJ, Pierluisi G. Law enforcement special operations medical support. *Prehospital Emergency Care* 2001; 5 (4); 403-406.
2. Rinnert KJ, Hall WL. Tactical emergency medical support. *Emergency Medicine Clinics of North America* 2002; 20 (4); 929-952.
3. Heck JJ. TEMS in Sin City. *SOMA Conference* 2004: Tampa FL.
4. Butler F, Hagmann J, Butler E. Tactical Combat Care in Special Operations. *Military Medicine* 1996; 161; Supplement 1-16.
5. McSwain N, ed: *Military Medicine*. Prehospital Trauma Life Support, revised 5th ed. St Louis, MO: Mosby; 2003: 374-408.
6. Mabry RL, Holcomb JB, Baker AM, Cloonan CC, Uhorchak JM, Perkins DE, Canfield AJ, and Hagmann JH. United States Army Rangers in Somalia: An analysis of combat casualties on an urban battlefield. *Journal of Trauma* 2000; 49 (3); 515-528.
7. Giebner SD. Tactical Combat Casualty Care – 2003. *Journal of Special Operations Medicine* Fall 2003; 3 (4); 47-54.
8. Champion HR. Patterns of injury and treatment delay: Effects on survival. *SOMA Conference* 2004: Tampa FL.
9. Butler FK, Hagmann JH, and Richards DT. Tactical management of urban warfare casualties in special operations. *Military Medicine* 2000; 165 (4 Suppl); 1-48.



CPT Bryan Fisk graduated from Texas A&M University in 1990 with a BS in Biomedical Sciences, from the University of Texas, Houston Graduate School of Biomedical Sciences in 1993 with a MS in Immunology, and the University of Texas-Houston Medical School in 1999 with a MD. CPT Fisk authored/co-authored 22 scientific articles, mostly in the field of tumor immunology. He completed an Internal Medicine Residency at Walter Reed Army Medical Center in Washington, DC in 2002 and was the Battalion Surgeon for 3/5th SFG (A) from September 2002 through June 2004. CPT Fisk is currently in a Critical Care Medicine Fellowship at Walter Reed Army Medical Center.

Beaten by the Bugs:

The Soviet-Afghan War Experience

Lester W. Grau
William A. Jorgensen

The views expressed in this article are those of the authors and do not purport to reflect the position of the Department of the Army, the Department of Defense, or any other government office or agency. -Editor

ABSTRACT

The US Army has an excellent record of disease prevention, field sanitation, and disease control. However, since the United States belongs to several multinational alliances, the Army will support allies whose disease prevention record is not as good. The Soviet experience in Afghanistan is an example of a force which was seriously hampered by disease and poor field sanitation, further stressing the commander's role in protecting the force.

Recent US Army deployments have been relatively disease-free, thanks to the efforts of the US Army medical professionals, a solid inoculation program, and a high standard of field sanitation and small-unit leadership.¹ This has not always been the case. As the US Army deploys in conjunction with allies or United Nations forces, the US Army medical professionals find themselves providing medical support to the forces of other nations whose experience in field sanitation and disease prevention differs from ours. In this case, our medical team often needs to prepare to fight epidemics rather than isolated cases.²

Throughout history, armies and disease have been constant companions. Death from disease often exceeded battlefield deaths. Typhus, plague, cholera, typhoid, and dysentery have decided more campaigns than the great generals of history. In the Crimean War of 1853 to 1856, the English and French combined forces against Russia. The French sent 309,000 men into the theater. Of these, some 200,000 were hospitalized—50,000 for wounds and 150,000 from disease.³ The English and Russian experience was similar.

Modern medicine and inoculations have significantly decreased wartime deaths due to disease,

but disease continues to sap the strength of modern armies. Some armies do a better job of practicing preventative medicine than others. As the Soviet Army learned in Afghanistan from 1979-1989, a strong preventive medicine program and field sanitation program are essential for maintaining a force in a foreign climate.⁴

For the first six years of the war, the Soviet press barely mentioned the war. When they did, it was in terms of happy Soviet soldiers building hospitals and orphanages. The Soviet combat role was not mentioned, nor was the fact that the Soviets filled more hospitals and orphanages than they constructed. When General Secretary Gorbachev's glasnost policy was implemented in the Soviet Union, the true casualty picture slowly began to emerge. Of the 620,000 Soviets who served in Afghanistan, 14,453 were killed or died from wounds, accidents, or disease. This is a modest 2.33% of the total who served. The rate of hospitalization during Afghanistan service, however, was remarkable. The 469,685 personnel hospitalized were an astounding 75.76% of those who served. Of these, 53,753 (or 11.44%) were wounded or injured. Fully 415,932 (or 88.56%) were hospitalized for serious diseases. In other words, of those who served in Afghanistan, 67.09%

required hospitalization for a serious illness. These illnesses included 115,308 cases of infectious hepatitis and 31,080 cases of typhoid fever.⁵ The remaining 233,554 cases were split between plague, malaria, cholera, diphtheria, meningitis, heart disease, shigellosis (infectious dysentery), amoebic dysentery, rheumatism, heat stroke, pneumonia, typhus, and paratyphus.⁶

The medical problems that the Soviet Army fell prey to in Afghanistan were markedly different than those which threatened the Red Army of World War II. The chart below outlines those differences.

The chart shows a dramatic increase in hospitalization for infectious disease and noncombat injuries—a result of deployment to a foreign climate where there are new strains of disease and the increased number of motorized vehicles in the Soviet Army in Afghanistan. The chart shows modest increases in hospitalization for bones, joints, and muscles as well as skin and subdermal tissue. Most other categories show a decrease, probably due to the fact that the Soviet combatants in Afghanistan were young conscripts, while the World War II Soviet Army included many conscripted middle-aged men.

Category of diseases treated in Soviet Army hospitals by percentage ⁷

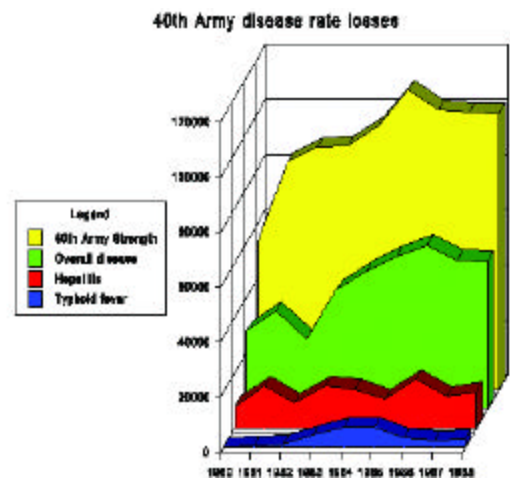
Category of Disease	Afghanistan 1980-1988	World War II 1941-1945
Infectious disease	56.50%	35.27%
Vitamin deficiency and eating disorders	0.09%	4.93%
Growths and tumors	0.26%	0.41%
Nervous and psychological	2.21%	4.58%
Eye disease	0.93%	2.34%
Ear, nose, and throat	0.97%	1.61%
Lung disease	4.10%	7.93%
pneumonia (in above)	1.30%	3.72%
Circulatory system	1.80%	6.46%
Digestive system	3.90%	13.88%
Uro-genital system	1.30%	3.11%
Blood and blood-producing organs	0.02%	0.12%
Bones, joints, and muscles	2.10%	1.39%
Skin and subdermal tissue	9.90%	7.67%
Poisoning	0.13%	0.63%
Noncombat injuries	15.10%	8.62%
Other disease	0.60%	1.00%
Total	100%	100%

The following chart shows the breakdown of infectious diseases in Afghanistan by type.

Percentages of infectious disease treated by type in Soviet Army Hospitals ⁸									
Disease	1980	1981	1982	1983	1984	1985	1986	1987	1988
Typhus-paratyphus	1.8	2.3	5.9	13.5	18.5	16.9	7.8	7.5	10.6
Shigellosis	11.4	6.1	13.1	14.1	20.8	21.1	15.3	13.7	12.9
Viral hepatitis	46.1	50.1	40.9	47.4	34.8	28.2	42.5	36.0	50.5
Amoebic dysentery	—	—	—	0.1	1.3	3.1	6.5	10.2	6.1
Tonsillitis	4.9	4.1	5.2	2.6	2.6	4.0	6.1	3.7	3.2
Upper respiratory	30.6	30.2	29.0	18.0	14.3	16.2	14.5	14.0	10.9
Malaria	0.8	0.9	2.7	3.2	4.2	6.6	4.7	4.2	2.7
Other	4.4	6.3	3.2	1.1	3.5	3.9	2.6	10.7	3.1

Despite the best efforts of Soviet preventive medicine teams, hospitals, vector control teams, and water purification units, they were never able to get control of the spread of infectious disease. The main reasons for the high rate of disease among Soviet servicemen were lack of sufficient supplies of clean drinking water; lack of enforcement of basic field sanitation practices (a historic Soviet problem, partly due to the Soviet's exclusive use of short-term conscript NCOs); failure of cooks to wash their hands after defecation; infestations of lice and rodents; poor diet; and failure to provide soldiers with clean uniforms and underwear on a regular basis.

The 40th Army was the primary Soviet force in Afghanistan. In addition, Soviet KGB and MVD forces served in Afghanistan along with some Soviet advisors to the Afghan Army and a Soviet civilian work force which supported the Soviet Army.⁹ The graph on the right shows that the Soviet 40th Army had a very serious problem with disease prevention and that at any time over one-quarter of the troop strength might be unavailable due to disease. In October through December of 1981, the entire 5th Motorized Rifle Division was rendered combat ineffective when over 3000 of its men (over one-quarter of its strength) were simultaneously stricken with hepatitis. The sick included the division commander, most of his staff, and two of the four regimental commanders.¹⁰ Every year, one-third of the entire 40th Army was stricken with some form of serious infectious disease.¹¹



Author's Note: The problem was that the Soviets had conscript NCOs. They were selected upon induction, given a six-month course, and were then sent to units as the NCOs. They were the same age as their charges and had no age and experience advantage. These "NCOs" did a miserable job of supervising and leading the men. This meant that the lieutenant had to be platoon leader, platoon sergeant, and three squad leaders simultaneously. He could not be everywhere and could not closely supervise field sanitation (like an experienced NCO would). When I followed these guys around in East Germany, they lived in very unsanitary conditions in the field. In Europe, they were used to a lot of the

local bugs and there were more than enough men available if disease broke out. In Afghanistan, they were not used to the local bugs and they did not have enough men, so every soldier on quarters or in hospital was a liability to mission accomplishment.

HEPATITIS

The major causes of hepatitis are viruses, alcohol abuse, and drug abuse. Vaccines could protect personnel from hepatitis B and Soviet troops going to Afghanistan received this vaccination. There were no vaccines against hepatitis A and hepatitis nonA-nonB. Hepatitis A was the most prevalent form of hepatitis among Soviet soldiers in Afghanistan (95%; the remaining 5% was hepatitis nonA-nonB).¹² Hepatitis A is a highly infectious disease and is spread by the fecal oral route—normally the result of failure to wash one's hands or drink clean water. The incubation period in Afghanistan was normally 37 days and recovery took six to eight weeks with relapses.

The combat tour was 18 months for conscripts and two years for officers. First-year soldiers were 2.5 times more likely to contract hepatitis A than second-year soldiers. The greatest number of hepatitis cases were contracted in the fall and winter.¹³ Epidemiologic analysis showed that from 31% to 74% of cases of infectious hepatitis were contracted in base camp, 13% to 45% were contracted in the field, 8% to 15% were contracted in outposts, and 5% to 14% were contracted while on convoy duty.¹⁴ This analysis is surprising, because one would expect that the best sanitation prophylaxis would be in the base camps. Instead, most of the hepatitis was contracted where it could have been best prevented.

UPPER RESPIRATORY DISEASE

Pneumonia and bronchitis were serious problems for the 40th Army, especially during the first four years of the war. The chart below depicts the percent-



Underfed Soviet troops supplemented their diet locally, and met a whole host of new germs and viruses for which their immune systems were no protection.



Soviet soldier with a can of cold soup. The Soviet field ration of canned food did not provide a balanced diet, and weakened the body's resistance to disease.

Percentage of respiratory diseases treated by type¹⁵

Disease	Enlisted Personnel			Officers		
	1982	1983	1984	1982	1983	1984
Acute pneumonia	52.0	57.0	65.1	39.0	52.0	47.8
Acute bronchitis	30.0	24.0	25.8	41.0	22.0	34.0
Chronic bronchitis	5.4	3.5	3.0	8.1	12.0	11.2
Chronic pneumonia	2.0	0.5	0.1	---	1.0	0.7
Acute respiratory infection	10.6	15.0	6.0	11.9	13.0	6.3
Totals	100	100	100	100	100	100



Getting clean water to soldiers in the field was a problem.

age various types of upper respiratory disease during 1982-1984.¹⁵

Servicemen contracted acute pneumonia all throughout the year, but the majority of the cases (and more serious and contagious cases) occurred in the fall and winter (65% versus 35% in the spring and summer). Approximately 10% of the cases initially diagnosed as acute respiratory infection were actually typhoid fever.

Comparing time of service when pneumonia was contracted (%)¹⁶

Time when infected	Afghanistan service	Army-wide norm
1st year of service	82.0	80.1
2nd year of service	18.0	19.9
1st month of service	17.1	29.1
1st 3 months of service	43.9	44.1
1st 6 months of service	70.7	59.3
6-12 months of service	29.3	20.9

Hospitalization time required for pneumonia (%)¹⁷

Time	Afghanistan service	Army-wide norm
Hospitalization 1-2 days	42.0	40.9
Hospitalization 3-4 days	24.0	36.6
Hospitalization 5-7 days	22.0	15.3
Hospitalization 8-10 days	4.0	4.3
Hospitalization over 10 days	8.0	2.9

Severity and complications of pneumonia (%) ¹⁸		
	Afghanistan service	Army-wide norm
Mild cases	22.0	48.0
Moderate cases	50.0	39.3
Severe cases	28.0	12.2
Grave cases	30.0	16.7
Complications, pleural infusion, mild case worsens	14.0	4.2
Delirium	65.8	15.0

Comparing pneumonia symptoms (%) ²⁰		
Symptoms	Afghanistan service	Army-wide norm
General weakness	92	100
Headache	54	97
Insomnia	22	87
Thirst, dryness of mouth	26	98
Chills	44	84
Loss of appetite	30	99
Aching muscles and joints	16	48
Dizziness	38	92
Fatigue	8	97
Paleness	26	97
Inflammation of the upper respiratory tract	52	97
Cough	96	94
Paroxysms (over 25 per minute)	32	12
Shortness of breath	42	67
Wheezing: dry/damp	38/70	46/5
Tachycardia (over 100 per minute)	22	66
Low blood pressure	24	72
Weakened tone	8	85
Hyper-resonance	8	19
Stomach ache	8	57
Coating of the tongue/swelling	34/2	100/100
Flatulence/diarrhea	4/6	68/55
Hepatomegaly	20	95
Splenomegaly	4	67

The chart labeled “Severity and complications of pneumonia”¹⁸ shows some double counting as the types of pneumonia total over 100%. Some of this must be due to the instances where a mild case worsens and the patient is double-counted.

began inspecting the cooks and conducting monthly medical examinations. Their laboratory results are presented in the chart below.²²

These laboratory results are staggering. It only takes a few sick cooks to keep the hospital sick-

Laboratory findings of pathogenic intestinal bacteria among cooks (%)									
Organism	1980	1981	1982	1983	1984	1985	1986	1987	1988
Shigellosis	0.2	0.3	3.7	3.1	3.1	3.3	5.3	5.2	4.5
Typhus-paratyphus	---	0.1	1.4	3.7	2.8	2.7	3.1	3.0	1.2
E. coli & other salmonella	---	---	0.2	0.2	0.3	0.7	1.2	4.1	2.1

Statistics show that 6% of Soviet soldiers in Afghanistan who developed pneumonia also had an illness of the digestive tract and that 30% were 10-15% below ideal body weight. The possibility of servicemen in Afghanistan contacting a severe or grave case of pneumonia was twice as high as the Soviet soldier serving elsewhere. Incidents of bronchial pneumonia in Afghanistan were also double the army-wide average.¹⁹

Physicians had difficulty making the correct diagnosis, since the laboratory results and patients symptoms varied so widely from the usual results and symptoms. This created a delay in starting the correct treatment and in returning the soldier to duty. The chart labeled “Comparing pneumonia symptoms” shows a wide variance with common symptoms.²⁰

LESSONS LEARNED?

In Afghanistan, many of the combat units were spread out in small outposts where hot meals and clean water were not available. Initially, the Soviet soldiers in isolated outposts ate nothing but dry rations.²¹ The lack of regularly-prepared, balanced meals weakened the soldiers’ resistance to disease, since their dry rations failed to provide proper nutritional requirements over time. The accumulation of ration cans and other trash provided breeding grounds for rats and disease. As the war progressed, an effort was made to serve everyone a hot meal and tea for breakfast and dinner. Isolated units still had a dry ration for lunch. To get hot meals to some of the troops, the Soviets developed air-droppable containers.

Yet, hot meals were a mixed blessing since one of the primary sources of infection was the cooks. Cooks had lice, intestinal pathogens, and little officer supervision. The personal hygiene of the cooks was no better, and sometimes worse, than the rest of the Soviet soldiers. The Soviets recognized this and

bays filled and the Soviets were never able to keep all the cooks clean and sanitary.

Physical conditioning and acclimatization are very important in disease prevention. Eventually, most soldiers trained for six months in mountain warfare schools before they arrived in Afghanistan. Physical conditioning was stressed as was field craft, first aid, and field sanitation. However, physical training in the Soviet Union did not fully prepare the soldiers for the realities of the rugged field conditions of Afghanistan. The average field combat load in Afghanistan was 32 kilograms (70.5 lbs). Despite the rigorous physical conditioning program, soldiers were unable to routinely carry this much weight at high altitudes. The Soviets eventually developed special, light-weight field gear, but never produced it in enough quantity to get it to all the troops who needed it. Troops were rapidly debilitated by the harsh field conditions and consequently more prone to disease.

Rats, lice, and mosquitoes were a constant problem. Garbage was not quickly policed up and properly disposed of. Garbage dumps were often collocated with camps and base camps. Stagnant pools of water were not drained or treated for mosquito larvae. Troops were dusted with DDT, but since clothing and bedding were seldom washed or exchanged, lice were a constant feature of life in the 40th Army. Typhus and malaria were two consequences of inadequate vector control.

The water in Afghanistan has a high bacteriological content. Despite warnings and training, Soviet troops often drank untreated water. This was often due to the failure of the Soviet logistics system to provide clean water to troops at remote locations. Sometimes, Soviet soldiers drank untreated water because they did not like the taste of treated water and had grown up drinking water from all sources without apparent ill effects. The untreated water often carried typhus

and amoebic dysentery. The Soviets began issuing boiled water treated with pantocides to their soldiers. Water purification points were set up at mess halls and cisterns were installed to store purified water. Large garrisons built pumping stations with chlorination units.²³ Despite these efforts, the Soviets were unable to guarantee adequate supplies of clean water to all the force or ensure that the troops drank it.

Basic field sanitation remained a Soviet problem throughout the war. Although field latrines were dug and flush latrines were installed in base camps, Soviet soldiers often did not bother to use them and relieved themselves close to the living and dining areas. The troops often did not wash their hands after relieving themselves. Troops could shower (or visit the steam bath) weekly at base camps, but seldom bathed in the field. Hepatitis, shigellosis, and other diseases resulted.

The Soviets underestimated the amount of medical support necessary to support the 40th Army. They were well-equipped to handle the wounded, but they were unprepared to deal with the large number of sick soldiers. In order to relieve overcrowded hospitals, the Soviets evacuated large numbers of their sick and wounded to military hospitals in the Soviet Union and in Warsaw Pact countries. They also established an infectious disease hospital at Bagram, Afghanistan, with a rehabilitation center annex for recovering infectious disease patients. The Bagram Rehabilitation Center consisted of a command element, eight companies, a medical station, and a supply element. Each company had six combat arms officers and six warrant officers to administer the program and control the patients. The rehabilitation program included medical treatment, a two hour rest after dinner, five meals a day, therapeutic physical training, vitamin therapy, psychotherapy, and occupational therapy. Patients were discharged after full recovery.²⁴ Despite these efforts, the Soviet medical establishment was hard-pressed to deal with their patient load resulting from disease.

After the war, the Soviets and then the Russians studied the US Army deployment to the Persian Gulf for Desert Storm. Among the disease prevention measures taken by the Americans which impressed the Russians were the supply of 80 liters of water per person per day, the wide use of bottled water, the ration heating units on US tanks and personnel carriers, the MRE ration, the issue desert chocolate bar which can withstand 150 degrees Fahrenheit without melting, and the issue field clothing and load-bearing equipment.²⁵

In 1994, Russian military doctors recommended the following measures be taken when deploying troops to another region:²⁶

- conduct a rate of personnel illness forecast, taking into account the particular environmental factors which will impact on servicemen, and then coordinate logistic, engineer, and medical support to deal with the problem;

- immunize personnel well in advance of the deployment and train them on field sanitation practices for the new region;

- perform an advance reconnaissance of water sources and conduct a laboratory analysis of water quality;

- seize and protect water sources;

- establish a system to deliver clean water to field sites and maintain water stores on site;

- routinely repurify any piped water from local city systems;

- provide units and soldiers with water purification tablets or filters;

- establish reserves of bottled water;

- plan for the early delivery of water purification systems such as filtration systems, boilers, etc;

- stock clean water reserves for raiding parties, combat operations, security outposts, and guards;

- train the soldiers how to maintain the purity of drinking water and operate water purification equipment;

- plan and conduct environmental protection measures, ensure that the troops use field latrines and dispose of garbage properly, ensure that troops wash regularly, and that latrines and garbage dumps are disinfected regularly;

- ensure that troops receive regular hot meals and do not subsist on canned food for extended periods;

- supply battalions and companies with enough mermite-type containers to keep food hot until it is delivered;

- start issuing multivitamins to the troops immediately when the redeployment order is received;

- supply enough equipment to supply each mess with at least 20 liters of water (including 16 liters of hot water) per person per day;

- provide adequate sites for personnel to wash their mess kits;

- monitor prepared food portions to ensure that soldiers are receiving their full ration;²⁷

- routinely issue clean underwear and bedding;

- build a steam bath for every battalion, sepa-

rate company, or platoon;

- enforce scheduled bathing schedules for the troops;

- regularly inspect for lice and disinfect when necessary;

- disinfect the site within three hours whenever a soldier with an infectious disease is discovered;

- immediately isolate soldiers with infectious disease and hospitalize them within 24 hours;

- maintain sufficient contingency stocks of immunoglobulins, vaccines, anatoxins, and antibiotics to protect all personnel whether prior to deployment, upon deployment, during combat, and during convalescence.

CONCLUSIONS

The Soviet Army in the field was never a particularly clean army. They dug latrines, but seldom used them. They defecated in their mess and bivouac areas. They dumped unwrapped bread directly on the ground and left it there until they served it. They seldom washed their hands and did a poor job on washing their mess kits. They threw cans, trash, and uneaten bits of food around the bivouac area. Showers and clean clothes in the field were occasional at best. Barracks life was not always much of an improvement.

In a European peace-time environment, the above was not much of a problem. Most of the soldiers had natural immunities to many of the local diseases and the command never had to pay a price for sick soldiers. Soldiers were cheap and plentiful. This was not the case in Afghanistan, however, where every soldier was necessary and in short supply. The 40th Army began to pay the price for years of Soviet neglect and poor field craft and hygiene. The Soviets were unable to logistically support the size army they felt they needed to successfully prosecute the war in Afghanistan. Their inability to effectively control infectious disease drastically cut into their present-for-duty strength. Combat units were often understrength by a third of their authorized strength. Two-company battalions and two-battalion regiments were common due to disease and other problems.

Part of the reason that the Soviets could not control infectious disease was their lack of a professional NCO corps. The Soviet NCO was a conscript who had attended a special six-month course. He had no moral or actual power over his fellow soldiers. The business of discipline, inspection, and enforcing standards fell on the platoon leader—a junior lieutenant. He personally had to ensure that all his troops were lice-free, washed their hands, drank clean water, dis-

posed of their trash properly, prepared food correctly, and dug and used latrines. He was also responsible for maintenance, training, and combat. Without proper NCOs, the lieutenant was unable to accomplish all his duties correctly and lack of adequate field sanitation was one of the results.

The Soviets received brutal lessons in Afghanistan on the importance of diet, physical conditioning, pure water, field sanitation, vector control, and adequate medical support. Yet, the heir to the Soviet Army, the Russian Army, did not immediately learn these lessons or take them to heart. In 1988, Soviet soldiers were rushed into Armenia to provide earthquake relief. Their poor food, lack of field sanitation, and lack of clean clothing resulted in mass illnesses which required rescuing many of the rescuers. In 1989, the Soviet Kostroma airborne regiment, the Akhalkalaki motorized rifle regiment, and the Kutaisi air assault brigade moved into Tbilisi, Georgia to put down rioting. The troops had one or no changes of underwear for an extended tour.²⁸ In 1992, the Russian 14th Army fought in Tirasapol, Moldova. Only the brevity of the combat prevented a serious outbreak of disease from the lack of clean water for drinking and cooking. In 1992, the Russian 201st Motorized Rifle Division deployed to the border between Afghanistan and Tajikistan to help guard the border of this newly-independent republic against the Mujahideen. In the rush to get forces forward to the border, the command again neglected to establish sanitary mess halls and field mess facilities and to provide adequate, pure water for drinking and washing. As a result, viral hepatitis, intestinal infections, and malaria mowed down the 201st Motorized Rifle Division and filled hospital wards with entire squads and gun crews.²⁹ Initial fighting in Chechnya showed that disease was again a limiting factor in the number of troops that the Russians can deploy. However, when the Russians returned to Chechnya in 1998, they apparently applied some preventative measures and their disease rates appear to be reduced.

The US Army medical record in Afghanistan has been much better. This can probably be traced to the development and fielding of a vaccine for Hepatitis A and an aggressive field sanitation program. Self-contained wash stands, complete with soap and water, are located outside of latrines and mess halls and NCOs are ensuring that troops wash their hands. Porta-potty® toilets are maintained and cleaned regularly in garrisons. Regular garrison mess halls provide nutritious meals. Waterless soap is issued to troops for field use. Still, US and coalition

soldiers get sick in Afghanistan, although the numbers and scope of the diseases have not been released yet.

REFERENCES AND ENDNOTES:

1. The overall health of US armed forces in Somalia was excellent. The endemic diseases in Somalia are high yet the weekly rate of disease and non-battle injuries was approximately 11.5% with a 0.5% hospitalization rate. Expected medical problems with diarrhea and heat injuries were minimal. Only 72 cases of malaria were recorded. The excellent health record can be attributed to controlled food and water, command emphasis on heat injury prevention, aggressive field sanitation, a program for protecting personnel from mosquitoes, and disease surveillance, rapid diagnosis, and early treatment. AMEDD Archives, Somalia-Operation Restore Hope D +70 (Summary), <http://139.232.160.63/lessons/Archived/11002139.htm>.
2. This article is an adaptation of "Medical support in a counter guerrilla war: Epidemiologic lessons learned in the Soviet-Afghan War" which appeared in the March/April 1995 issue of *US Army Medical Department Journal* and an update of "Beaten by the Bugs: Epidemiologic Lessons of the Soviet-Afghan War" which appeared in the November/December 1997 issue of *Military Review*.
3. Zinsser H. *Rats, Lice and History*, Boston: Little, Brown and Company, 1934, 165.
4. The Soviet invasion of Afghanistan on 25 December 1979 thrust Soviet ground forces into the middle of a civil war to fight a guerrilla enemy on some of the roughest terrain on earth. Their vain attempt to prop up an unpopular Marxist regime ended with their withdrawal which they completed on the 15th of February 1989. Discontent with the Soviet leadership's handling of the Afghanistan War was one of the causes of the disintegration of the Soviet Union. In Afghanistan, the US and coalition forces are not fighting the same scale or intensity insurgency, but the local medical situation is worse. Afghanistan now leads the world in death during childhood and should soon lead the world in infant mortality.
5. Krivosheev GF. Grif sekretnosti snyat [The secret seal is removed], Moscow: Voenizdat, 1993, 401-405. In the original, the figures are given as 415,932 hospitalized for disease, including 115,308 cases of infectious hepatitis, 31,080 cases of typhoid fever, and 140,665 cases of other existing disease. This leaves 128,889 cases or 39.99% of the total unaccounted for. We added the 128,889 to the 140,665 figure.
6. Perepelkin V S, Korol'kov V F, Kolkov V F, Mandrik V A, Ogarkov P N. "Uroki bor'by s kishhechnymi infektsiyami v period voyny v Afganistane" [Lessons in the struggle with intestinal infections during the war in Afghanistan], *Voenno-meditsinskiy zhurnal* [Military medical journal, hereafter VMZ], July 1991, 27-31.
7. Ivashkin V T. "Opyt organizatsii meditsinskoy pomoshchi bol'nym 40-i armii v Afganistane" [The experience of the medical care to the sick servicemen of the 40th Army in Afghanistan], VMZ, November 1992, 13.
8. Perepelkin, 28. What is missing from this chart is typhoid fever. According to official statistics, typhoid fever accounted for 7.47% of infectious cases, yet it is not in this chart. It is probably included in the upper respiratory category.
9. KGB was the Committee for Government Security. Their duties included intelligence, counter-intelligence, prison camp administration, and border guards. They also fielded a potent field force. The KGB role in Afghanistan was supporting the Afghan equivalent, the KHAD, and manning border guard posts within Afghanistan. The MVD was the Ministry of Internal Security. They were a large armed force which ran prison camps, provided crowd control and anti-riot forces, and performed a rear-area security function in wartime. The Soviets advised the Afghan Combat Police, the Sarandoy.
10. Gromov B V. *Ogranichenny kontingent* [Limited contingent], Moscow: Progress Publishers, 1994, 275. The chart only shows personnel in hospital with hepatitis, so the personnel confined to quarters with the disease are not shown. The 5th Motorized Rifle Division, roughly one-fifth of the total strength of the 40th Army, exceeded the annual rate for hepatitis in two months. Thus the official statistics, although staggering, are on the low side.
11. Nechaev E A. "Meditsinskaya reabilitatsiya uchastnikov voyni lokal'nykh vooruzhennykh konfliktov" [Medical rehabilitation of veterans of wars and local conflicts], VMZ, February 1994, 5.
12. Perepelkin, 29.
13. Korol'kov V F, Ogarkov P I, Mandrik V A. "Profilaktika kishhechnykh antropozov sredi lichnogo sostava" [Prophylaxis of intestinal anthroponoses in servicemen], VMZ, April-May 1992, 73.
14. Perepelkin, 29.
15. Zakurdaev V V. "Kharakter patologii organov dykhaniya u voennoclyzhchikh v usloviyakh Afganistana" [Traits of respiratory system pathology in servicemen in Afghanistan], VMZ, June 1992, 39.
16. Ibid.
17. Ibid.
18. Ibid.
19. Ibid.
20. Ibid, 40.
21. Dry rations are similar to the old US Army C ration. There were three types of dry rations. The first contained a can of meat, some crackers or toast, some jam, and a tea bag. The second contained two cans of meat mixed with oatmeal. The third contained a can of meat and a can of vegetables or fruit.
22. Perepelkin, 30.
23. Konyshchev I, Grib A, "Opyt, kotoryy nichemu ne uchit" [Experience which teaches nothing], *Armeyskiy sbornik* [Army assembly], No 2, August 1994, 36.
24. Nemytin Y V, Boldyrev V V, "Organizatsiya reabilitatsii infektsionnykh bol'nykh pri mnogokratnoy peregruzke gosptaley" [Rehabilitation management of infectious patients in over crowded hospitals], VMZ, April-May 1992, 38-39.
25. Ibid, 38.
26. Ibid, 39.
27. Theft and resale of soldiers' food has a long history in the Russian and Soviet Army.
28. The Soviet (and Russian) Army issues three sets of underwear per soldier. Theoretically, the soldier wears one, one set is held in regimental stores, and one set is at the division laundry point. Underwear is supposed to be changed once a week, but due to shortages, losses, and breakdowns in the supply system, the soldier often wears his single set of underwear for months at a time. The situation with uniforms is not much better. The soldier has one field/work uniform and pair of boots. He wears these continually for six months. When he washes his uniform, he wears it damp the next day.
29. Konyshchev, 36-37.



Lester W. Grau is a Military Analyst for the Foreign Military Studies Office at Fort Leavenworth, Kansas. He is a graduate of the US Army Defense Language Institute (Russian) and the US Army's Institute for Advanced Russian and Eastern European Studies. He retired from the US Army in 1992 at the grade of Lieutenant Colonel. His Baccalaureate and Master's degrees are in International Relations. He served a combat tour in Vietnam, four European tours, a Korean tour, and a posting in Moscow. He has traveled to the Soviet Union and Russia over forty times. He has also been a frequent visitor to the Asian subcontinent. His latest trip to Afghanistan was May 2002. He returned from a trip to Iraq in October 2003.

Les has published over ninety articles and studies on Soviet and Russian tactical, operational, and geopolitical subjects. His book, "The Bear Went Over the Mountain: Soviet Combat Tactics in Afghanistan," was published in 1996. "The Other Side of the Mountain: Mujahideen Tactics in the Soviet-Afghan War," co-authored with Ali Jalali, was published in 1998. "The Soviet-Afghan War: How a Superpower Fought and Lost," was published in 2001. He is currently working on a book about the recent wars in Chechnya and a book on Operation Anaconda.

Antibiotics in Tactical Combat Casualty Care 2002

Frank Butler, MD

Kevin O'Connor, MD

Previously published in MILITARY MEDICINE. 168. 11:911.2003

ABSTRACT

Care of casualties in the tactical combat environment should include the use of prophylactic antibiotics for all open wounds. Cefoxitin was the antibiotic recommended in the 1996 article "Tactical Combat Casualty Care in Special Operations." The present authors recommend that oral gatifloxacin should be the antibiotic of choice because of its ease of carriage and administration, excellent spectrum of action, and relatively mild side effect profile. For those casualties unable to take oral antibiotics because of unconsciousness, penetrating abdominal trauma, or shock, cefotetan is recommended because of its longer duration of action than cefoxitin.

FINANCIAL DISCLOSURE: The authors reported that their presentations will include discussion of commercial products or services. However, within the last two years, they have had no significant financial relationship with a commercial entity whose products/services are related to the subject matter of the topic they will be addressing or a commercial supporter of this educational activity.

OBJECTIVES

1. Use the optimal antibiotic when caring for casualties in the tactical environment.
2. Discuss the rationale for the choices made.
3. Discuss and appropriately prescribe timely and efficacious antibiotics for wounds sustained in a combat or austere environment.

THIS ARTICLE HAS BEEN AWARDED **1** CATEGORY 1 CREDIT TOWARD THE AMA PHYSICIAN'S RECOGNITION AWARD (CONTINUING MEDICAL EDUCATION CREDIT) AND **1.2** NURSING CONTACT HOURS.

Test on page 55 answer sheet on page 58

Introduction

Infections are an important cause of late morbidity and mortality in combat trauma. The need for early administration of antibiotics was recognized 50 years ago, when Poole¹ stated that "the greatest lesson learned from World War II may have been the benefit of the use of penicillin prophylactically in the surgical units closest to the front." Scott² commented after the Korean War that "In any tactical situation where the casualty cannot reach the aid station until four or five hours or longer after wounding, antibiotic therapy by the aidman in the field is most desirable." Sepsis was the major cause of mortality in rear echelon hospitals during the Vietnam conflict, partic-

ularly in the setting of extensive burns or penetrating trauma to the head or central nervous system.³ Hell⁴ states that "a single injection of a broad-spectrum drug with a long half-life should be given prophylactically to personnel on the battlefield to provide bactericidal coverage from the earliest moment after injury occurs." Civilian trauma care also includes the use of prophylactic antibiotics. One standard surgical text notes, "All injured patients undergoing an operation should receive preemptive antibiotic therapy."⁵

Despite these observations and the lessons of past conflicts however, as recently as the 1993 Mogadishu action, antibiotics were not being used by

US combat medics, Mabry et al.⁶ reported that four of the five open fractures of the tibia from gunshot wounds sustained in this battle became infected. Both open fractures of the femur also became infected. In all, there were 15 wound infections in 58 casualties. Mabry noted, "Current US Army doctrine on prehospital care does not call for antibiotic administration by medics in the field." Why has this seemingly simple step in battlefield trauma care been so difficult to implement?

One reason that the military has been slow to adopt the practice of using battlefield antibiotics is that antibiotics are not routinely given in civilian prehospital trauma care. One text notes, "Antibiotics are widely utilized for the prophylaxis of infections in trauma care. It is emphasized that they should be applied early, before an operation is carried out, to be of any use. So far, however, their prehospital use has not been validated."⁷ The current edition of the American College of Surgeons-sponsored *Prehospital Trauma Life Support Manual* contains no mention of prehospital antibiotics in civilian care.⁸ This practice is quite reasonable given the short transport times to the hospital in most urban trauma centers.

Combat medical personnel who provide prehospital care for their wounded teammates on the battlefield, however, do so under conditions profoundly different from those found in civilian emergency medical systems. The treatment strategies that they use need to take into account the prolonged delays to evacuation commonly encountered in combat operations. There was a 15-hour delay to definitive care for most casualties in Mogadishu.⁶ Because of these differences, there has been a renewed call for antibiotics to be included in the care provided by combat medics when there is penetrating abdominal trauma, massive soft tissue damage, a grossly contaminated wound, an open fracture, or when a long delay until casualty evacuation is anticipated.⁹ In acknowledgment of the differences between the civilian and the military prehospital settings, this recommendation has now been included in the *Prehospital Trauma Life Support Manual* for battlefield trauma, and it is clear that battlefield antibiotics should be added to the care provided by combat medics.¹⁰

For prophylaxis with antibiotics to be practical and effective, the regimen chosen must be as simple as possible, and the antibiotic should be administered as soon as possible after the injury occurs. The antibiotic coverage has to be maintained at least until surgical debridement has been performed.⁴ Coverage must be appropriate for the organisms implicated in

combat wound infections. Klein et al.¹¹ noted that combatants in the Yom Kippur War were treated with penicillin. The most common organism found in wound infections in that conflict was *Pseudomonas*, comprising 25.6% of clinical isolates. Gram-negative bacilli were found to be 70.2% of isolates overall.¹¹ Mabry et al.⁶ also found that *Pseudomonas* and polymicrobial infections were a significant cause of morbidity after the Mogadishu action. Reports from the Russian experience in Afghanistan stated that clostridial species remain an important pathogen on the modern battlefield.^{12,13}

The timing of administration is likewise important. Intramuscular benzyl penicillin, begun within one hour of wounding, was effective in preventing streptococcal infections in a pig model of fragment wounds. If administration was delayed until six hours after wounding however, the medication was not effective.¹⁴

Cefoxitin (2g intravenously) has previously been recommended for battlefield use.^{9,10} This drug is an accepted monotherapeutic agent for empiric treatment of abdominal sepsis¹⁵ and provides good coverage for patients with penetrating abdominal trauma.^{16,17} Cefoxitin is effective against Gram-positive aerobes (except some *Enterococcus* species) and Gram-negative aerobes (except for some *Pseudomonas* species).¹⁸ It also has good activity against anaerobes (including *Bacteroides* and *Clostridium* species).¹⁸ Cefoxitin is supplied as a dry powder, which must be reconstituted by the combat medic with 10ml of sterile water for injection before administration. It may be given as a slow intravenous push over three to five minutes.¹⁸ Cefoxitin may also be given intramuscularly if necessary.¹⁸ Additional doses should then be administered at six-hour intervals until the casualty arrives at a treatment facility.

Gatifloxacin for Oral Antibiotic Prophylaxis

The logistical burden of reconstituting and injecting parenteral medications makes the use of oral antibiotics an attractive alternative if feasible. In some casualties, oral antibiotics are clearly not an option (penetrating abdominal trauma, unconsciousness, shock). In patients without contraindications, however, oral antibiotic prophylaxis is practical and appropriate. The United States Special Operations Command-sponsored workshop on Tactical Management of Urban Warfare Casualties held in Tampa in December 1998 focused on the Battle of Mogadishu and identified a number of potential improvements in the battlefield care of combat casu-

alties. Participants in this workshop noted that an orally administered antibiotic would have several advantages.¹⁹ Giving antibiotics to a wounded teammate would require no more than swallowing a tablet with a sip of water from a canteen and would eliminate the need for mixing and parenteral administration. With a long-acting oral antibiotic, Special Operations (SOF) combat medics could easily carry an adequate supply of antibiotics for several days for the entire unit.

Penicillins are not a good choice in this setting because they: (1) cause too many severe allergic reactions, (2) require too frequent dosing, and (3) are not active against most Gram-negative organisms. The fluoroquinolones, on the other hand, have an excellent spectrum of antibacterial action. Ciprofloxacin has good coverage against *Pseudomonas* species but little activity against anaerobes.^{20,21} Levofloxacin has more action against Gram-positive organisms than ciprofloxacin, but it is less effective against *Pseudomonas* and is also not reliably effective against anaerobes. Levofloxacin has some activity against *Pseudomonas* and is indicated for urinary tract infections caused by this organism.²² Trovafloxacin is effective against Gram-positive, Gram-negative, and anaerobic organisms.²⁰ Moxifloxacin and gatifloxacin are also fourth-generation fluoroquinolones that have an enhanced spectrum of activity. Trovafloxacin, gatifloxacin, and moxifloxacin yield low minimum inhibitory concentrations against most groups of anaerobes.^{21,23} One study found that moxifloxacin activity against *Clostridium* and *Bacteroides* species was in the same range as metronidazole and superior to that of clindamycin.²⁴ Another study found that "In general, moxifloxacin was the most potent fluoroquinolone for Gram-positive bacteria while ciprofloxacin, moxifloxacin, gatifloxacin, and levofloxacin demonstrated equivalent potency to Gram-negative bacteria."²⁵ A third study found that moxifloxacin was almost as active as trovafloxacin, as active as gatifloxacin, and more active than levofloxacin and ciprofloxacin against the anaerobes tested (including *Clostridium* species).²⁶ Blood levels of the fluoroquinolones achieved with oral dosing are similar to those achieved with intravenous dosing; therefore, oral administration does not significantly reduce the bioavailability of these agents.

Fourth-generation fluoroquinolones have an additional benefit in SOF casualties. Because SOF operations often entail immersion in sea or fresh

water, infections with pathogens found in these environments must be considered as well. Wounds contaminated with seawater are susceptible to infections with *Vibrio* species, Gram-negative rods that can result in an overwhelming Gram-negative sepsis with a 50%-mortality rate.²⁷ Contamination of wounds with fresh water may result in infections with *Aeromonas* species, also a Gram-negative rod.²⁷ The excellent Gram-negative coverage of fourth-generation fluoroquinolones make them good choices in these circumstances.

In addition to the ease and the logistical advantages of oral administration, the fluoroquinolones require less frequent dosing. Both moxifloxacin and gatifloxacin are given as a single daily 400mg dose. Imagine a SOF team with three seriously wounded individuals that cannot be extracted for 48 hours. To maintain antibiotic coverage with cefoxitin (as previously recommended) for all three casualties would require 24 parenteral doses, a quantity that SOF corpsmen and medics are not likely to carry. In contrast, six tablets of one of the fluoroquinolones would suffice for the same period.

In contrast to the penicillins and the sulfa-based antibiotics, the fluoroquinolones also have an excellent safety profile. A review in the October 1999 Mayo Clinic Proceedings stated that they are tolerated as well or better than any other class of antibacterial agents.²⁰ The best known toxic effect of the fluoroquinolones has been the severe hepatotoxicity seen with trovafloxacin, but this was seen in only 140 patients of 2.5 million prescriptions and was usually seen after long-term (more than 28 days) use of the medication.²⁰ Another disadvantage of trovafloxacin is that its absorption is delayed by morphine, which will often be used on combat casualties. Gastrointestinal upset is seen in approximately 5% of patients treated with fluoroquinolones, and mild allergic reactions (rash, urticaria, and photosensitivity) are seen in 1% to 2% of patients. Mild central nervous system symptoms (headache and dizziness) are also encountered in 5% to 10% of patients treated with the fluoroquinolones.²⁰

Based on the discussion above, either moxifloxacin or gatifloxacin would be a good choice for an oral antibiotic to use on the battlefield. A cost comparison of these two agents performed by the Naval Hospital Pensacola pharmacy in August 2002 found that the cost to the US government for a single dose of moxifloxacin was \$5.09, whereas a single dose of gatifloxacin was only \$1.86. This cost com-

parison is based on the Department of Defense-wide pricing schedules. Based on the much lower cost of gatifloxacin with other factors being approximately equal, gatifloxacin emerges as the best choice for an oral antibiotic. Use of an oral antibiotic means that gatifloxacin can be carried by individual combatants, if they have been trained in its use, and self-administered in the event of penetrating trauma.

One of the considerations in a medication chosen for use by ground troops in the field is its ability to maintain its activity in hot and cold environments. The recommended storage temperature for gatifloxacin is 25°C with 15°C to 30°C listed as the acceptable temperature range.¹⁸ If true, this would limit the drug's usefulness to ground combat troops. Correspondence on this issue with the manufacturer, Bristol-Myers Squibb, has indicated that gatifloxacin tablets packaged in polyvinyl chloride/polyvinylidene chloride blisters have excellent stability at a wider range of ambient temperatures with documented maintenance of efficacy for 260 weeks at temperatures of 30°C and lower. Efficacy was maintained for 56 weeks at 40°C/75% relative humidity and for 27 weeks at 50°C (P. Carpenter, J. Bergum, Bristol-Myers Squibb, unpublished data).

Gatifloxacin is a good choice for single-agent therapy based on its excellent spectrum of coverage, good safety profile, and once-a-day dosing. Moxifloxacin would be an acceptable second choice. A third choice might be levofloxacin, but because levofloxacin has only limited activity against anaerobes, another drug must be added to achieve coverage against these organisms. The most active drugs for the treatment of anaerobic infections are clindamycin and metronidazole.²⁸ Relatively few anaerobes are resistant to clindamycin and few, if any, are resistant to metronidazole.²⁸ Metronidazole has the additional advantage of having a less severe side effect profile than clindamycin.

Cefotetan Instead of Cefoxitin When Parenteral Antibiotics Are Needed

There are some casualties in whom the use of oral antibiotics is not advisable. An unconscious casualty is not able to take the medication. An individual in shock will have a reduced mesenteric blood flow that might interfere with absorption of an oral agent. Casualties with penetrating abdominal trauma may have a mechanical disruption of the gastrointestinal tract that would impede absorption of an oral antibiotic. Effective antibiotic prophylaxis is espe-

cially important in this group of patients. One study of 338 patients with penetrating trauma to the abdomen were reported by Dellinger et al.²⁹ Even in this civilian trauma center setting, 24% of patients developed wound infections, and nine died as a result.

Use of cefotetan as an alternative to cefoxitin as a battlefield antibiotic, was first proposed by O'Connor.³⁰ Cefotetan is a similar medication with the same broad spectrum of action, but with a longer half-life that allows every 12-hour dosing. Osmon recommended both cefoxitin and cefotetan³¹ as prophylactic agents for adults undergoing colorectal surgery and by Conte³² for trauma victims with a ruptured viscus.

A meta-analysis on antibiotic prophylaxis in penetrating trauma was published by Luchette et al.³³ in 2000. The more successful regimens included: cefoxitin, gentamicin with clindamycin, tobramycin with clindamycin, cefotetan, cefamandole, aztreonam, and gentamicin alone. Nichols et al.³⁴ compared cefoxitin to a gentamicin/clindamycin combination in penetrating abdominal trauma and found them to be equivalent. Jones et al.³⁵ compared cefoxitin, cefamandole, and a tobramycin/clindamycin combination in patients with penetrating colon trauma. They concluded that both cefoxitin and the tobramycin/clindamycin combination were superior to cefamandole. In 1992, Fabian et al.³⁶ compared cefoxitin with cefotetan directly. This study included 515 patients, and they found no difference in efficacy between the two agents.

Whereas cefoxitin and cefotetan appear to be equal in efficacy, the longer half-life and comparable cost make cefotetan a better choice for use by combat corpsmen and medics. Cefoxitin remains a viable alternative and a good second choice. With both choices, dry powders must be reconstituted manually with appropriate diluents. Packaging that allowed for streamlined handling in tactical environments would represent an invaluable advance in the military application of these products. Current recommendations for storage of cefotetan in the powder form are that the vials not be stored at temperatures above 22°C (72°F) and that they be protected from light.¹⁸ Expanded storage and handling guidelines for use in the field should be addressed with the manufacturer should this agent be chosen for use by combat medical personnel.

Antibiotics may be useful to prevent the development of wound infections, but there is no guarantee that they will be effective in all casualties. Wound infection is a function of the number and type of contaminating organisms, the amount of devitalized tissue, the presence of foreign bodies in the wound, and the

delay to surgical care. Wounds with large quantities of organisms, foreign bodies, or dead tissue may become infected despite the early use of antibiotics. The use of antibiotics for combat trauma does not lessen the importance of timely surgical treatment of the wound, and there should be no decreased emphasis on the need to obtain definitive care as soon as feasible. In the event of a prolonged delay in evacuation, antibiotic use should be continued until the casualty reaches a medical treatment facility.

The widespread use of a particular antibiotic eventually produces organisms that have developed a resistance to it. It is common practice to use antibiotics for a variety of minor upper respiratory infections, and these infections are common in deployed troops. Should these recommendations be implemented by the military, the importance of avoiding the use of gatifloxacin for the treatment of minor infections in deployed troops should be emphasized to decrease the development of resistant organisms.

Conclusion

We propose that combat medical personnel use prophylactic antibiotics for all open combat wounds. Where there is no contraindication to the use of oral antibiotics, (1) gatifloxacin, 400 mg, by mouth once a day and (2) if unable to take oral medications (shock, unconscious, or penetrating abdominal injury), cefotetan, 2g, intravenously (slow push over 3-5 minutes) or intramuscularly every 12 hours.

Acknowledgments

The authors thank COL John Holcomb, CAPT Roger Edwards, CDR Scott Flinn, CDR Jeff Timby, CDR Les Fenton, Dr. Dave Perlman, LT Roger Bunch, and LCDR Tony Capano for assistance in the preparation of this article.

References

- Poole LT. Army progress with penicillin. *British Journal of Surgery* 1944; 32; 110-111.
- Scott R. Care of the battle casualty in advance of the aid station. Presentation at Walter Reed Army Medical Center Conference on recent advances in medicine and surgery based on professional medical experiences in Japan and Korea. April 19, 1954.
- Feltis JM. Surgical experience in a combat zone. *American Journal of Surgery* 1970; 119; 275-278.
- Hell K. Characteristics of the ideal antibiotic for prevention or wound sepsis among military forces in the field. *Review of Infectious Diseases* 1991; 13 (Suppl2); S164-9.
- Burch JM, Franciose RJ, Moore EE. *Trauma. In Principles of Surgery*. 1999; Ed 7; 172. Edited by Schwartz SI, Shires GT, Spencer FC, Daly JM, Fischer JE, Galloway AC: New York, McGraw-Hill.
- Mabry RL, Holcomb JB, Baker AM, et al. United States Army Rangers in Somalia: An analysis of combat casualties on an urban battlefield. *Journal of Trauma* 2000; 49; 515-529.
- Ricard-Hibon A, Schou J. Analgesia, sedation, and other pharmacotherapy. *Prehospital Trauma Care*. 376-377. Edited by Soreide E, Grande C. New York. Marcel Dekker, Inc. 2001.
- Prehospital Trauma Life Support Committee of the National Association of Emergency Medical Technicians in cooperation with the Committee on Trauma of the American College of Surgeons. *PHTLS Manual*. 1999; Ed 4, Chapter 2. St Louis, MO. Mosby.
- Butler FK, Hagmann JH, Butler EG. Tactical combat casualty care in special operations. *Military Medicine* 1996; 161 (Suppl); 1-16.
- Prehospital Trauma Life Support Committee of the National Association of Emergency Medical Technicians in cooperation with the Committee on Trauma of the American College of Surgeons. *PHTLS Manual*, 1999; Ed 4. Chapter 17. St Louis, MO. Mosby.
- Klein RS, Berger SA, Yekutieli P. Wound infection during the Yom Kippur War. *Annals of Surgery* 1975; 182; 15-21.
- Badikov YD, Krylov KM, Minnullin IP. Etiological structure and antimicrobial susceptibility of Clostridium in war wound infections (Russian). *Antibiotic Khimioter* 1997; 42; 33-35.
- Badikov YD, Krylov KM, Minnullin IP. The microflora of gunshot and explosive mine wounds in victims delayed for a long time at the prehospital stage (Russian). *Voen Med Zh* 1996; 317; 34-37.
- Mellor SG, Cooper GJ, Bowyer GW. Efficacy of delayed administration of benzylpenicillin in the control of infection in penetrating soft tissue injuries in war. *Journal of Trauma* 1996; 43 (Suppl); S128-134.
- Shands JW. Empiric antibiotic therapy of abdominal sepsis and serious preoperative infections. *Surgical Clinics of North America* 1993; 73; 291-306.
- The Medical Letter Handbook of Antimicrobial Therapy. 1994; 53.
- Bowen TE, Bellamy RF (editors). *Emergency War Surgery: second United States revision of the Emergency War Surgery NATO Handbook*. 1988; 175. Washington. DC. US Government Printing Office. .
- Physicians Desk Reference*. 2002; Ed 56. Montvale. NJ, Medical Economics Data Production Company. .
- Butler FK, Hagmann JH. Tactical combat casualty care in urban warfare. *Military Medicine* 2000; 165 (Suppl); 1-48.
- Walker RC. The fluoroquinolones. *Mayo Clinic Procedures* 1999; 74;1030-1037.
- Appelbaum PC. Quinolone activity against anaerobes. *Drugs* 1999; 58 (Suppl 2); 60-64.
- Mosby's General Rx*. Ed 11. Quoted on MD Consult Website. 2001 Available at www.mdconsult.com: accessed July 2001.
- Hoellman DB, Kelly LM, Jacobs MR, Appelbaum PC. Comparative antianaerobic activity of BMS 284756 *Antimicrobial Agents and Chemotherapy* 2001; 45; 589-592.
- Seciale A, Musumeci R, Blandino G, Milazzo I, Caccamo F, Nicoletti G. Minimal inhibitory concentrations and time-kill determination of moxifloxacin against aerobic and anaerobic isolates. *International Journal of Antimicrobial Agents* 2002; 19; 111-8.
- Mather R, Karenchak LM, Romanowski EG, Kowalski RP. Fourth generation fluoroquinolones: New weapons in the arsenal of ophthalmic antibiotics. *American Journal of Ophthalmology* 2002; 133; 463-466.
- Ackermann G, Schaumann R, Pless B, Claros MC, Goldstein EJ, Rodloff AC. Comparative activity of moxifloxacin in vitro against obligately anaerobic bacteria. *European Journal of Clinical Microbiology and Infectious Diseases* 2000; 19; 228-232.
- Auerbach PS, Halstead B. Injuries from nonvenomous aquatic animals. *Wilderness Medicine* 2001; Ed 4; 1418-1449. Edited by Auerbach PS, St Louis. M. Mosby.
- Brooks GF, Butel JS, Morse SA. Infections caused by anaerobic bacteria. *Medical Microbiology*. 2001; 268-269. New York. Lange Medical Books.

29. Dellinger EP, Oreskovich MR, Wertz MJ. Risk of infection following laparotomy for penetrating abdominal injury. *Archives of Surgery* 1984; 119-120.
30. O'Connor K. War Wound Prophylaxis. Special Operations Medical Association Presentation. 2000.
31. Osmon DR. Antimicrobial prophylaxis in adults. *Mayo Clinical Procedures* 2000; 75: 98-109.
32. Conte JE. *Manual of Antibiotics and Infectious Diseases*. 1995; Ed 8. Baltimore, MD. Williams & Wilkins.
33. Luchette FA, Borzotta AP, Croce MA, et al. Practice management guidelines for prophylactic antibiotic use in penetrating abdominal trauma: The EAST practice management guidelines work group. *Journal of Trauma* 2000; 48: 508-518.
34. Nichols RL, Smith JW, Klein DB, et al. Risk of infection after penetrating abdominal trauma. *New England Journal of Medicine* 1984; 311; 1065-1070.
35. Jones RC, Thai ER, Johnson NA, Gollihar LN. Evaluation of antibiotic therapy following penetrating abdominal trauma. *Annals of Surgery* 1985; 201; 576-585.
36. Fabian TC, Croce MA, Payne LW, Millard G, Pritchard FE, Kudsk KA. Duration of antibiotic therapy for penetrating abdominal trauma: A prospective trial. *Surgery* 1992; 112; 788-795.



CAPT Frank Butler graduated from Basic Underwater Demolition/SEAL training in 1972 as a member of Class 64 and subsequently served as a platoon commander in both Underwater Demolition Team Twelve and SEAL Team One. After attending medical school at the Medical College of Georgia, he did his internship in Family Practice at Naval Hospital Jacksonville. CAPT Butler spent five years as a Diving Medical Research officer at the Navy Experimental Diving Unit in Panama City, where he helped to develop many of the diving techniques and procedures used by the Navy SEAL teams today. He then did a residency in Ophthalmology at the National Naval Medical Center in Bethesda, where he was Chief Resident in 1989. CAPT Butler was then assigned to the Naval Hospital Pensacola where he was Chief of Ophthalmology from 1989 to 1994. He assumed the duties of Director of Biomedical Research for the Naval Special Warfare Command in 1989 as well. He was transferred to his current position as Command Surgeon, US Special Operations Command, in March 2004.

Editorials

Rapid Sequence Intubation – Primum, Non Nocere

Warner Anderson MD

Dr. Bruno's review of rapid sequence intubation (often erroneously called "rapid sequence induction") provides several studies on the overall usefulness of field intubations, but with warnings that it's difficult to import street experience into SOF medicine, just as it's difficult to export Level One trauma center experience to SOF medicine.

I worked several years in an emergency department in an EMS jurisdiction that used RSI in the field. Their success rate was so high that I rarely had to intubate in the ED.

But one of the real problems with RSI is emphasis. Bruno's analysis, like most paramedics analyses, focuses on the act of intubation itself, although he does outline (and test) the requirements for preparation and personnel.

But the really central feature to RSI is pre-oxygenation. This misnomer should instead be "hyper-oxygenation." Administering oxygen for several minutes prior to the procedure, either by high-flow non-rebreathing mask or assisted ventilations, is what makes the procedure relatively safe. Here is the secret, expressed but often overlooked – the oxygen has to be given in sufficient quantity, over enough time, to dissolve in the blood and displace nitrogen. We are not looking for an "O₂ sat" of 100%; we literally want more. Not just the hemoglobin is to be saturated, but the whole blood, including the plasma.

The reason? This hyper-oxygenation provides about eight minutes to get the patient paralyzed, intubated, and ventilated before the oxygen saturation drops below 90%.

The only field expedient is to load the patient FiO₂ of nearly 100% for three minutes, then eight tidal capacity breaths on high-flow oxygen just prior to paralysis. This expedient is nearly as good as ten minutes of high-flow pre-intubation hyperoxygenation.

Note that hyperventilation merely drops the pCO₂ without increasing oxygen saturation. Giving rapid breaths with a bag is not hyperoxygenation.

So, regardless of your level of skill in intubation, if you don't have good suction, a pulse oximeter, a trained assistant who can manage IV and ET tubes, and a large amount of oxygen on hand, you don't have RSI. You have something less safe, less effective. You have a serious gamble with the patient's life.

The major influences on patient survival from closed head injury are not burr holes, mannitol, or bagging fast; the major determinants are blood pressure and oxygen delivery to the brain. Both of these are systemic, not local, events and rest in the hands of the operator.

At JSOMTC, we do not teach RSI to the SOCM students. We do familiarize the SFMS and SOIDC (one-year) students with the procedure, if only to be sure they know its limitations. We teach it in SOFMSSP for the same reason. It is the Special Forces or Special Operations IDC (SEAL) who is more likely to be in an aid station with trained help and sufficient equipment. The SOCM medic on the battlefield should be thinking twice before intubating at all, never mind RSI.

Every year the American College of Emergency Physicians hosts about eight hours of RSI review – it's well worth the money for unit medical officers and physician assistants, and lays out the research and science eloquently. RSI is not some "make it up as you go" or "adapt and overcome" technique. It is a step-by-step sequence which, properly and judiciously applied, allows intubation without increasing intracranial pressure or vomiting.

CONTINUING MEDICAL EDUCATION TEST

Rapid Sequence Induction - Careful What You Wish For

1 CME or 1.2 CNE

JSOM



1. The “gold standard” for endotracheal tube placement is _____.
 - a. Bilateral breath sounds
 - b. Vapor in the endotracheal tube
 - c. Direct visualization of the endotracheal tube passing through the vocal cords
 - d. Colorimetric change on end-tidal carbon dioxide checker
2. Which of the following medications does not affect the patient’s level of consciousness?
 - a. Midazolam
 - b. Succinylcholine
 - c. Etomidate
 - d. Thiopental
3. Which is not an acceptable alternative to failed intubation?
 - a. Bag-valve mask ventilation until paralytic is metabolized
 - b. Cricothyrotomy
 - c. Laryngeal mask airway
 - d. All of the above are acceptable
4. Preoxygenation prior to endotracheal intubation is intended to _____.
 - a. Denitrogenate the lungs
 - b. Build an oxygen reserve
 - c. Relax the patient
 - d. Both a and b
5. Rapid sequence induction is designed to _____.
 - a. Decrease patient movement
 - b. Decrease patient muscle tone
 - c. Decrease patient autonomic stimuli
 - d. All of the above
6. Which of the following improves prehospital intubation success rates?
 - a. Equipment improvements
 - b. Training
 - c. Both a and b
 - d. None of the above

7. _____ is recommended for improved success when intubating.
- Functioning suction
 - Adequate lighting
 - Appropriate cricoid pressure
 - All of the above
8. Up to ____ trained personnel may be necessary to safely perform RSI.
- 1
 - 2
 - 5
 - 9
9. Which medication is not used for sedation or anxiolysis?
- Vecuronium
 - Midazolam
 - Diazepam
 - Etomidate
10. Cardiopulmonary monitoring is necessary during RSI.
True or False

CONTINUING MEDICAL EDUCATION TEST

Antibiotics in Tactical Combat Casualty Care 2002 1 CME or 1.2 CNE



1. Ciprofloxacin has good coverage against *Pseudomonas* species but little activity against anaerobes.
True or False
2. Which antibiotic is effective against all of the following: Gram-positive, Gram-negative, and anaerobic organisms?
 - a. Levofloxacin
 - b. Ciprofloxacin
 - c. Trovafloxacin
 - d. Penicillins
3. Because SOF operations often entail immersion in sea or fresh water, infections with pathogens found in these environments must be considered as well. Wounds contaminated with seawater are susceptible to infections with *Vibrio* species. Contamination of wounds with fresh water may result in infections with *Aeromonas* species. Therefore, the excellent Gram-negative coverage of fourth-generation fluoroquinolones makes them good choices in these circumstances.
True or False
4. The most serious adverse effect of the fluoroquinolones drug Trovafloxacin has been:
 - a. severe hepatotoxicity
 - b. delayed absorption with the use of morphine
 - c. gastrointestinal upset
 - d. mild allergic reactions (rash, urticaria. and photosensitivity)
 - e. headache and dizziness
5. The most active drugs for the treatment of anaerobic infections are clindamycin, levofloxacin, and metronidazole.
True or False
6. Wound infection is a function of:
 - a. the number and type of contaminating organisms
 - b. the amount of devitalized tissue
 - c. the presence of foreign bodies in the wound
 - d. the delay to surgical care
 - e. all of the above
7. Delays in starting antibiotics of more than one hour after wounding have been shown to reduce the effectiveness of the medication in preventing wound infections.
True or False

8. What are the advantages of using a PO antibiotic when feasible?
 - a. No need to mix medication
 - b. No need for IV or IM injections
 - c. Smaller and lighter to carry per dose
 - d. All of the above
9. Which of the following factors might require that a casualty be given an injectable rather than a PO antibiotic?
 - a. unconsciousness
 - b. chest wound
 - c. multiple extremity wounds
 - d. none of the above
10. The correct dosing for gatifloxacin is 400mg:
 - a. q 6h
 - b. q 12h
 - c. qd
 - d. none of the above

Continuing Education Evaluation Form
Journal of Special Operations Medicine, Volume 4, Edition 3 / Summer 04

Date of original release: 1 Sep 04

Expiration Date: 1 Sep 05

Certificates: Certificates will be mailed. Please allow up to 4 weeks for delivery.

Physicians and Nurses: Read the article designated for continuing education credit. Complete the Continuing Education Evaluation Exam and Post-test, providing correct responses to at least 80% of the questions and evaluation. Fax or mail the Post-test and the Continuing Education Evaluation Form to:

USSOCOM-SG

Attn: Capt Debbie Parsons (Officer)

MSgt Robert McCumsey (Enlisted)

United States Special Operations Command

7701 Tampa Point Blvd.

MacDill AFB, FL 33621-5323

Phone # Comm: (813) 828-5442; DSN 299; Fax # -2568

Accreditation Statements

CME: This activity has been planned and implemented in accordance with the essential areas and policies of the Accreditation Council for Continuing Medical Education (ACCME) through joint sponsorship of USUHS and the Journal of Special Operations Medicine. USUHS is accredited by the ACCME to provide continuing medical education for physicians. USUHS designates **Article 1--** Rapid Sequence Induction - Careful What You Wish For by Eric C. Bruno, MD for a maximum of **1.0** hour of category 1 credit. **Article 2--**Antibiotics in Tactical Combat Casualty Care 2002 by Frank Butler, MD and Kevin O'Connor, MD for a maximum of **1.0** hour of category 1 credit toward the American Medical Association Physician's Recognition Award.

CNE/CEH: **Article 1**, for **1.2** contact hours; **Article 2** for **1.2** contact hours provided by the Uniformed Services University of the Health Sciences (USUHS), which is accredited as a provider of continuing nursing education by the American Nurses Credentialing Center's Commission on Accreditation.

Name: _____ EmailAddress: _____

Discipline: ___Physician ___Nurse ___other_____

Mailing Address:

POST-TEST – Answer Sheet

**Article 1: Rapid Sequence Induction -
Careful What You Wish For**

Page 18

- | | |
|------------|----------------|
| 1. a b c d | 6. a b c d |
| 2. a b c d | 7. a b c d |
| 3. a b c d | 8. a b c d |
| 4. a b c d | 9. a b c d |
| 5. a b c d | 10. True False |

Article 2 Antibiotics in Tactical Combat Casualty Care 2002

Page 46

- | | |
|---------------|---------------|
| 1. True False | 6. a b c d e |
| 2. a b c d | 7. True False |
| 3. True False | 8. a b c d |
| 4. a b c d e | 9. a b c d |
| 5. True False | 10. a b c d |

Continuing Education Evaluation Form

Journal of Special Operations Medicine

Volume 4, Edition 2 / Spring 04

Date of Original Release 20 June 04

Article 1

Page No.18

Strongly Agree Strongly Disagree

Article 2

Page No.46

Strongly Agree Strongly Disagree

Educational Value:

5 4 3 2 1

I learned something new that is important.

— — — — —

I verified some important information.

— — — — —

I plan to discuss this information with colleagues.

— — — — —

Readability Feedback:

I understood what the authors were trying to say.

— — — — —

Overall, the presentation of the article enhanced

— — — — —

my ability to read and understand it.

5 4 3 2 1

— — — — —

— — — — —

— — — — —

— — — — —

— — — — —

Were the educational objectives of the article(s) met? YES___NO___

YES___NO___

If no, please

explain:_____

Do you think that the article(s) unduly emphasized one company's products?

YES___ NO ___

YES___NO___

Comments:

How long did it take to complete Article 1? ___ minutes

Article 2? ___ minutes

What changes will you make in your practice as a result of reading the article(s)?

I hereby certify that I have read the article(s) of the activity identified above and am eligible to claim credit.

Print Name: _____

Signature: _____

Date: _____

JOURNAL OF SPECIAL OPERATIONS COMMAND READERSHIP SURVEY

The JSOM staff wants to get your feedback so we can better meet your needs. Our goal is to constantly improve the quality of this publication. Your feedback is critical in order for us to meet our goal. Please take a few minutes to fill out this survey and mail it to the address provided on the reverse side or fax it to DSN 299-2568 or commercial (813) 828-2568. Feel free to make copies of this survey and give them to everyone in your unit or office. E-mail: JSOM@socom.mil

Name: _____ E-mail: _____
Branch of Service: _____ Rank: _____ Years in Service: _____ Career Field: _____

(Please use the scale to rank the following statements)

Poor	Fair	Satisfactory	Good	Excellent
1	2	3	4	5
How do you rate the Journal of Special Operations Medicine (JSOM)?				
How do you rate the JSOM overall readability?				
How do you rate the layout of this journal?				
How do you rate the quality of the articles?				
How do you rate the variety of articles?				
How do you rate the usefulness in enhancing your SOF medical knowledge/awareness?				

How much of the issue do you usually read?

Cover-to-Cover	75%	50%	25%	Less
----------------	-----	-----	-----	------

What is your favorite section of the JSOM? (Circle one)

Departments	Component Surgeon Offices	Education & Training
Features	Research & Development	Legacy
There I was	Correspondence	Editorials
SOMA Update	Photo Gallery	Med Quiz
Dedication		

What is your least favorite section of the JSOM? (Circle one)

Departments	Component Surgeon Offices	Education & Training
Features	Research & Development	Legacy
There I was	Correspondence	Editorials
SOMA Update	Photo Gallery	Med Quiz
Dedication		

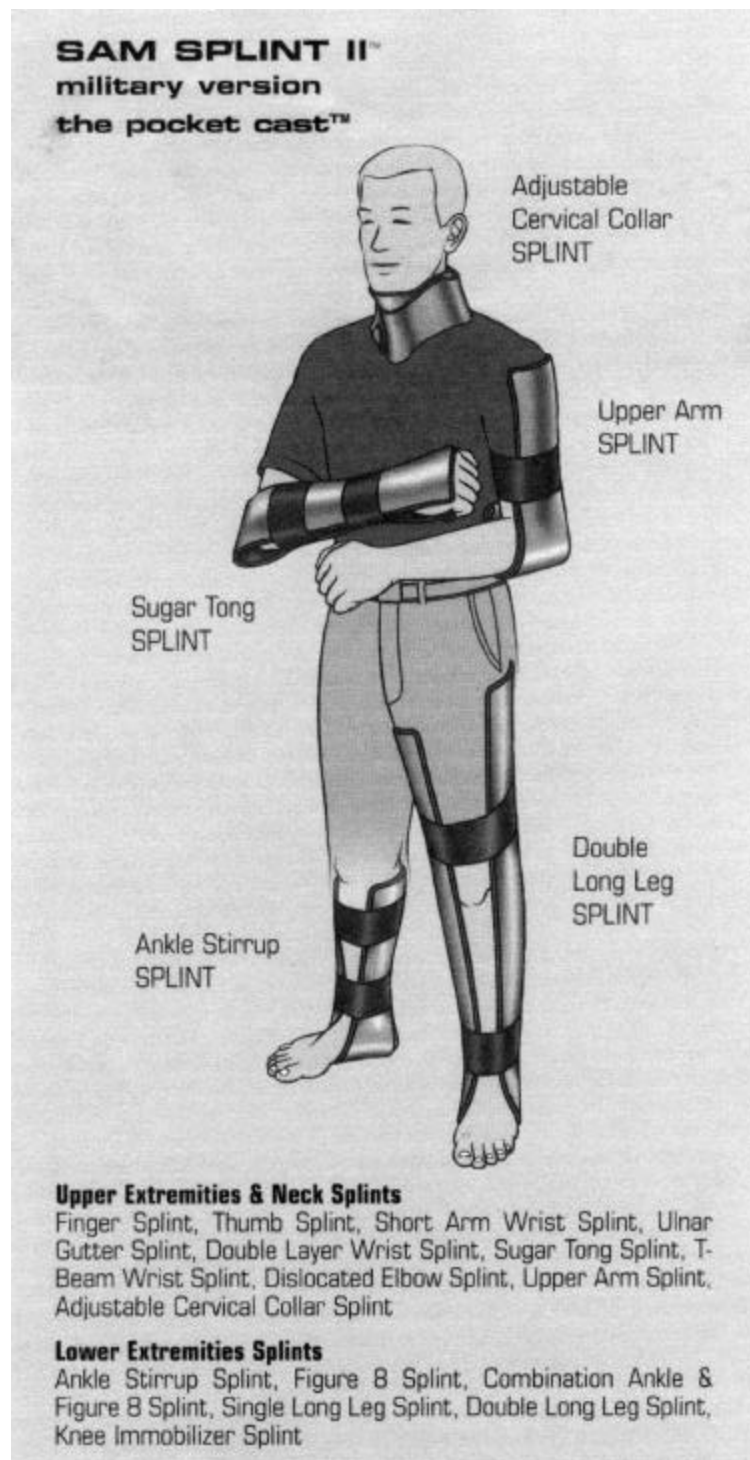
What improvements would you make to the JSOM?

FOLD ALONG THIS LINE

UNITED STATES SPECIAL OPERATIONS COMMAND
ATTN: SOCS-SG
7701 TAMPA POINT BLVD
MACDILL AFB, FL 33621-5323
OFFICIAL BUSINESS

HQ USSOCOM/ SOCS-SG
ATTN: JSOM EDITOR
7701 TAMPA POINT BLVD
MACDILL AFB, FL 33621-5323

FOLD ALONG THIS LINE





A. The basic bend



Curve the SAM® Splint lengthwise to create a longitudinal bend which gives the splint strength.



B. Add strength with a different bend



Curve the outside edges the opposite direction to make it even stronger.



C. Make the SAM® Splint even stronger



Double the SAM® Splint or create a "T-bend" for extra strength.



SAM Splint use for Elbow Flexion Control



The SAM Splint can be used to fix the elbow in flexion as seen in the pictures to the right. A sling can be attached at the wrist and worn around the neck for extended use and greater comfort.



SAM® Splints for Special Ops Medicine Part 1

Samuel Scheinberg, MD

In 1984, a thin, foam covered “dead soft” strip of radiolucent aluminum created a paradigm shift in emergency fracture immobilization. This new product, known as the SAM® Splint, was clearly different from its predecessors. It was extremely lightweight and soft - seemingly far too weak and flimsy to function as a splinting device.

On closer examination, however, its apparent weaknesses were actually strengths. Its light weight was appreciated by those carrying heavy backpacks, and the soft aluminum allowed the splint to be easily rolled or folded for storage.

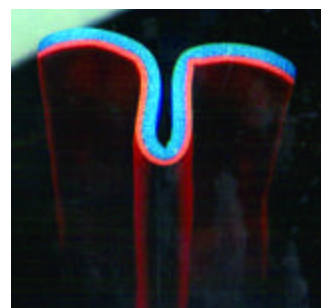
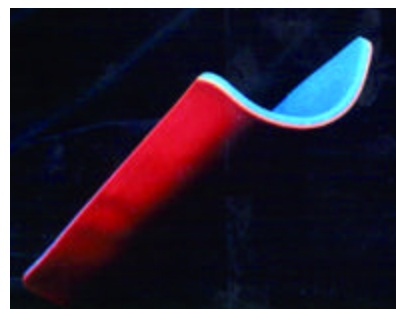
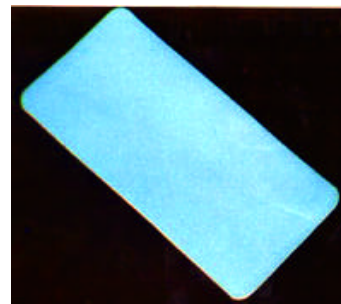
In addition, a single curve or bend placed in cross section along any longitudinal axis imparted remarkable rigidity. This strength along with the versatility permitted by malleability made the SAM® Splint suitable for splinting almost any body part.

This article reviews the general properties of the splint. It contains information regarding construction, principles of use, and environmental tolerance - plus comments on cutting, cleaning, and precautions. It describes the classic applications on the upper and lower extremities as well as three lesser-known techniques for use in the field.

The SAM® Splint is a long rectangle of zero temper, very thin aluminum alloy sandwiched between two layers of high quality dermatological safe ethylene vinyl acetate closed pore foam. In its virgin state (without any bends) the splint is completely malleable.

The SAM® Splint is radiolucent, almost invisible on x-ray, and should not be removed for radiographs. It is designed to function through the extreme ranges of normal ambient temperatures. It is waterproof, but not fireproof. The closed pore EVA foam will not flash when exposed to flame, but will begin to melt and eventually ignite after approximately 8 seconds.

The SAM® Splint is easily cut with ordinary scissors; trauma shears are not required. Cutting exposes the thin aluminum core. Unless a serrated scissor has been used, the aluminum is usually not sharp. To prevent any injury from the exposed edge, fold the edge on itself one or two times. Covering the edge with tape is also effective.



The foam used on the SAM® Splint was selected for its “clean-ability.” Whether cut or used intact, the splint can be cleaned with antiseptic soap and water or with almost any protocol cleaning solution. I prefer a half percent hypochlorite solution (9 parts water to 1 part common household bleach). The closed pore foam, which promotes effective cleaning, does not absorb perspiration or allow the passage of air. This does not present a problem during short-term use. If, however, the splint is to be worn for prolonged periods (hours to days), some absorbent materials, such as cotton cloth, cast padding, or a double layer of tubular stockinet, should be placed over the splints to prevent skin maceration and odor. Although the EVA foam does provide some padding, additional soft padding should be placed around all bone prominences when prolonged use is contemplated.



Unusual Uses....



Picture showing how to form Sam Splint for protection of an impaled object



Veterinary Uses

An Alaskan animal rehab center sent us this great photo of an “eagle boot.”

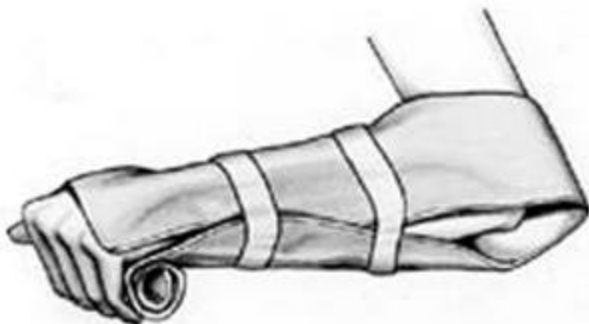
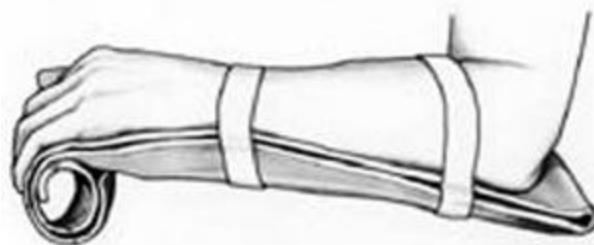


The SAM® Splint is suited for both adults and children, and can immobilize almost any bone in the body, including the neck. The SAM® Splint is lightweight, weighing only 4 oz., and may be rolled or folded for easy storage in emergency kits or back packs. It will not puncture and is not affected by extreme temperature or altitude. From outer space to the ocean depths, in every terrain and weather condition, as the standard for pre-hospital and outdoor medical care, the SAM Splint is recognized in emergency and wilderness medicine text.



Splinting of a fractured ankle

Splinting of a fractured wrist



Splinting of a fractured forearm

Samuel Scheinberg, MD, graduated from the University of Tennessee Medical School in 1965. He did his general surgical residency from 1966 to 1967 at Mount Zion Hospital in San Francisco, CA where he received the Abe Serbue Award for most outstanding resident in orthopedics. He served in the Army from 1967 to 1969 during which time he was a surgeon in the Republic of Vietnam from 1968 to 1969. Upon discharge from the military he completed his orthopedic residency at the University of Louisville, KY from 1969 to 1972 and the University of Edinburgh, Scotland from 1972 to 1973 under a National Arthritis Foundation Grant. Dr. Scheinberg went into a private general orthopedic surgical practice in 1973 to 1993 in Lincoln and Tillamook counties, Oregon. He is a Board Certified Orthopedic Surgeon.

Dr. Sam Scheinberg is the inventor of the SAM® Splint, SAM™ Soft-Shell Splint, the SAM® Instructional Anatomical Manikin, and the SAM™ Blist-O-ban Skin-Friction Relieving Device. He is the co-inventor of the SAM® Pan Flexible Container.

Dr. Scheinberg is the co-founder and CEO of The Seaberg Company, Inc., Newport, Oregon, also known as Sam Medical Products, CYA™ Publications, Medical Operations Management Co., Denver, Colorado and Co-Founder/CEO/Chairman of the Board of Advanced Wound Systems, LLC Newport, Oregon.

Legacy

Leonard D Blessing Jr



Al Maggio, near Techpone, Laos - 1962 Operation WHITESTAR. Small pack horses such as this one, found in the region, were used to carry various supplies in the rugged Laotian mountains. These little creatures could carry up to 120 pounds of gear. Maggio's unit recruited Kha tribesmen from the region, took them to secret locations for military training, and led them back to their vil-

lages to conduct hit and run operations against the Communist Pathet Lao and increasing North Vietnamese activity along what would become known as the Ho Chi Minh Trail.

Back on May 10, 2001, it never occurred to me that I would become so attached to the people I was starting to meet during the research process for the book. This was my first visit to Ft. Bragg, NC. I was quite nervous about finally taking the next step with meeting people I had thus far only spoken with by telephone. Was it fate that MSG Alan B. Maggio (Ret) was the first person I would spend time with? In hindsight, I believe it was.

Al Maggio was an original member of the 10th Special Forces Group (Airborne), an original training cadre member of the newly formed 77th Group, a member of the second class to ever attend the newly developed Special Forces Aidman Course at Ft. Sam Houston Texas, and original member of the 1st Special Forces Group on Okinawa. He served his country in World War II, Korea, and Vietnam. I am not sure what I expected when we first met, but it certainly wasn't what greeted me on that warm day in front of the John F Kennedy Special Forces Warfare Museum.

He was quite unassuming wearing gray sweats, driving an SUV, and toting a fluffy little dog he called "Punky." We shook hands and off we went, Al serving as my personal tour guide around the post.

We visited many places and I learned a great deal about the history of Special Forces from this grandfatherly man who had experienced it first hand.

I thought I would share some of the more memorable moments (the entire day would fill a book) that gave me some insight into this special person. We visited the Wall of Honor at the Special Operations Command HQ. This wall contains the names of every special operator who gave his life in defense of this country. It was here that I began to realize the emotion behind what I was attempting to convey in the book. Al quietly read the names he knew, reached out, gently touching the nameplates, as if to stroke their foreheads in an attempt to comfort them. I had just learned that compassion and caring never leaves the medic's heart.

A sense of humor and mischievous demeanor counterbalances these complex individuals. My day with Al was going to prove that. We drove around the base, Punky on the driver's side floorboard between Al's legs, sleeping and oblivious to the fact that during our drive we would accelerate and decelerate from 10 to 50 mph and swerve into lanes which were not ours to drive in depending on what Al was pointing out to me and where he thought we should go next. I thought he was completely unaware of the other moving vehicles and pedestrians around us except when he would stop at a crosswalk to allow a "Troop" to cross the street. He would speak a few words of encouragement to each and every one of them – not only making me silently smile but pasting a grin on the face of the young "Troop" (as he called them) going about his business.

As noon approached I offered to buy Al lunch at the NCO Club. We entered as he explained to me that since he was retired, he could get us a free lunch. I wasn't interested in hearing any of this and declined and told him it was the least I could do for him. He said, "You know what you can do for me? Go back to the truck and get my ID hanging on the mirror. They will not let us in without ID." I gladly did this, thinking I had convinced him to allow me to buy lunch and that he had forgotten to grab his ID when we parked. I went back and couldn't find the ID anyplace. I should mention that Punky was sitting on the driver's

seat – windows wide open – awaiting our return. I went back into the foyer of the club and there sat Maggio with a grin on his face and his military ID around his neck! I had just been had and had learned another lesson. Accept goodwill when it is offered. There is no loss of dignity or pride; if anything, it is gained. Our free lunch was the all-you-can-eat bar. Al piled his plate high. I thought this was great! He had a nice healthy appetite. Well, here came that caring and compassion once again. While we sat and talked he picked two chicken drumsticks clean. Mind you, this was not the scrap from our portions. The pickings were placed on a napkin and when he finished, he rolled it up and placed it in his pocket, all the while looking around to be sure nobody caught him. We went back out to the truck where a very happy little Punky eagerly awaited. There we sat, with Punky on my lap being hand fed prime choice bits of chicken by what couldn't possibly be a big, tough, combat hardened veteran Green Beret.

As the day wound down we stopped for a cup of coffee at a fast food establishment which now sits on what was once known as Smoke Bomb Hill. It is also the very place that Al was awarded the Soldiers Medal for his heroism when a C-119 plane crashed into the mess hall in 1959. Al had been across the street in the dispensary when the plane hit just a few hundred yards away. With complete disregard for his own safety, he pulled the pilot and co-pilot from the burning wreckage, saving their lives. Anyway, we went through the drive thru and pulled up to the window. We had no sooner come to a complete stop when Al began blowing the horn! The shocked worker inside opened the window and was immediately informed by Al that “this is not fast service for ‘fast food’ service.” The stunned worker was speechless, as was I. Al broke into a wide grin and told the poor youthful soul “I’m just jerking your chain, but you really should be prepared for the worst customer. You have a great day.” Our young server just learned a lesson he will never forget. You should always be prepared to handle what comes your way. What did I learn? Try to impart your knowledge and experience in a positive and humorous manner; it’s only life, so have fun and smile.

I saw and spoke with Al frequently over the next several years. He was always being the medic, the mother hen looking out for his charges. During one of my visits he arranged for me to stay on the base so I didn’t have to drive to the archives or pay a lot of money for a hotel. The problem, I felt, was that

the room was at the Leal House where TDY personnel stayed. When I objected to this he politely but firmly told me that I was TDY on special assignment. He made sure I had clean towels, a working telephone, flushing toilet, hot water, etc., and then insisted on taking me to the PX to buy groceries, utilizing his ever-present box of coupons. I had learned my lesson from the first visit. I graciously accepted his assistance and hope to only be able to do the same for someone else someday. It was during this visit that Al presented me with some of his most prized possessions. At the time, I knew they were important to him, but it wasn’t until a few years later that I learned just how special. He had this case of treasures saved and set aside to be given to one of his three sons. This attaché case that was worn with age was filled with photos and documents of his past. He leant these to me for scanning without a word spoken of their return and without condition of their use.

The next to the last time I saw Al was during the 50th Anniversary Special Forces Reunion. We finally linked up at the Special Operations Command HQ where a ceremony for memorial stones being laid was held. Though he was tired and in some pain, he wore a smile as wide as the horizon as he worked the crowd, seeking faces and names he had not seen in many years. His mind was as sharp as ever. When he saw me across the crowd he motioned for me to come and join him. He had the ears of two young “Troops” – medics – and he was telling them stories of lore and legend. From the smiles on their faces, they were being treated to a memory of a lifetime. When I got over to him, he grabbed my hands, pulled me to him, hugging and patting my back and finished off this unfettered display of emotion with a kiss on the cheek and the now familiar Al Maggio greeting “Love Ya Babe.” I can’t describe how happy I am that I did not shy away nor fail to respond in kind with an equally hearty hug, kiss, and greeting of, “I love you too, Al.” He looked good, but I knew he was tired and getting a little overheated during the emotional day. I had to force him to sit down in the shade of the tent and drink a glass of water. I turned my back for one second to answer to my name being called and Al was off and running again. I just smiled, knowing he would be OK; he always was. Unfortunately, I didn’t link up with Al again during the next few days. We were supposed to go to the tour of the medical training facilities with the first tour group but I was running late when he called me on the cell phone. I told him to go ahead and get on

the bus, don't miss this; I'll get the next tour. He did go, and his pride and elation with how much the program had grown was more than evident when I spoke to him a week later. I think he was having trouble realizing that it was him, and men like him from those first classes in the early 1950s, that had created the potential for the state of the art facility he saw that day.

The next time I saw Al was March 10, 2004. He looked so peaceful and dignified. His Class A uniform was studded with medals and commendations attesting to his astounding military contributions and accomplishments. A warrior who had done more than his share in peace and at war. On March 5, 2004, MSG Alan B. Maggio (Ret) passed away. When I was alerted to this, it was almost unbelievable. I didn't think Al would ever die. He didn't; his tired body just left us. His spirit and soul will always be alive and well. Writing this, I still get teary eyed. I traveled to Ft. Bragg for his funeral. The emotion of this event caught me completely unguarded. During the drive to Ft. Bragg I attempted to prepare myself to maintain my composure. Al would expect nothing less. Yes, he would condone the sadness of the loss being felt but he would want us (me) to rejoice in his life. What a life it was. I was able to share some things with his children that they didn't know. Of more importance, I learned some things I never knew. He was also "Daddy" to 6 wonderful children who adored, admired, and respected him. Their childhood memories gave cause to smile – because it was Al; that is just the way he was; he brought out the best in people. One story, of how he came to the hospital when one of his daughters was born, exemplifies what and who Al was. He arrived shortly after her birth, wearing his fatigues. From the big oversized pocket of the jacket he pulled out a gift that I am convinced only he could imagine – a new puppy.

I thought certain events would cause me great distress: when the "Ballad of the Green Beret" was played at both the viewing and funeral at the John F. Kennedy Memorial Chapel, the firing of the 21-gun salute, or the playing of Taps by the full Special Forces Honor Guard. To my amazement, it was none of these. I stood tall and proud as we (I) said farewell to my friend. The event which caused me to cry almost uncontrollably, and still does, was the procession to the cemetery. I was not prepared for this trip. It was damn near identical to that which Al had taken me on that warm day in May 2001. We passed so many of the places he had taken me. Still, it wasn't so much the route; it was what occurred along that route. A full

Military Police escort led the way. We are all familiar with the right-of-way being yielded to a funeral procession but not with the acts of respect and honor displayed on this warm, sunny March day. All along the route, cars stopped. Not just at intersections but all along the road wherever they were. Some soldiers saluted, others bowed their heads in silent prayer. They simply sat still, no horns honking or cars zooming by in frustration with the delay in their busy lives. I had more difficulty attempting to navigate that route than the worst ice/snow/fog I have ever driven in combined. I admit, without shame or embarrassment, to losing complete control of myself, guided by what I am convinced was the hand of God, as we exited the post. I saw the guards at the gate stop, turn to face the trail of vehicles, and stand ramrod straight at attention as the entire convoy slowly passed.

These soldiers, these American Soldiers, had no idea who was in the hearse. That did not matter. It was a fallen warrior, a brother, and a sight getting all too familiar. I couldn't help but think how appropriate it was that Al received such an honoring and anonymous salute of respect as he departed his beloved Special Forces on Ft. Bragg for the final time in a way in which he led his life. Quietly, unassuming, without fanfare or recognition for a job with little thanks and none expected. He loved his country without question and gave to its security unselfishly.

Farewell my friend. You have taught me how to be a better person, man, and American – gifts which I can never repay, but will always attempt to do so by following your example.

De Oppresso Liber

Al Maggio (L), an original medic of 10th Special Forces Group. Al is one of the finest men I have ever had the pleasure to meet. He embodies the spirit of Special Forces medics.





Tactical Element, Incorporated

**380-H Knollwood Street, Suite 140
Winston Salem, North Carolina 27103-1840
(336) 945-2289**

Wilderness EMT 6-9 SEP 04

Hosted by: Florida Counterdrug Training Academy
Camp Blanding Training Site
Starke, Florida

Stay tuned, as future Tactical Element courses are currently being scheduled for the following venues:

Nelsonville, Ohio
Plymouth Meeting, Pennsylvania
Pittsburgh, Pennsylvania
Uwharrie National Forest, North Carolina
Winston Salem, North Carolina

If you would like a registration packet or additional information, contact Tactical Element at info@tactical-element.cc or visit online at www.tacticalement.cc!

SOF RELATED BOOK LIST

The following is an compiled list of SOF related books recommended for your reading by those that were there. The list is complements of Len Blessing with the assistance of all of you. If anyone has other books they would like to add to the list, let us know. I have not read each selection personally. It's intent is to present a concise list of the vast array of reading material available that pertains to the mission of Special Operations - both past and present.

Every attempt is made to maintain the list's integrity with respected and legitimate works. Readers who feel a selection does not merit inclusion are encouraged to contact me with disputes. I also strongly encourage readers to write a short review for the books they have read and/or have personal first hand knowledge concerning a specific selection. This will help maintain a high degree of content validity.

I am happy to submit your comments/reviews on your behalf if you prefer to not write directly to the JSOM editor staff. I can be contacted at lenblessing@comcast.net.

Len Blessing

TITLE	AUTHOR
00:19:57	Dave Stafford
15 Months In SOG	Thom Nicholson
A Concise History of US Army Special Operations	Geoffrey T Barker
Forces, with Lineage and Insignia	
A Very Short War	John F Guilmartin Jr
(about the last gunfight and the last sacrifices of the Vietnam-era war in the recovery of the crew and ship SS Mayaguez in 1975)	
Advice and Support: The Early Years	Ronald H Spector
Airborne and "Special Forces"	Hans Halberstadt
(non-fiction, good quick references, especially for family or civilians)	
Battle for the Central Highlands: A Special Forces Story	George E Dooley
Beyond Nam Dong	Roger Donlon
Blackjack -33: With Special Forces in the Viet Cong Forbidden Zone	James C Donahue
Blackjack -34 (Previously titled "No Greater Love")	James C Donahue
Bravo Two Zero	Andy McNab
Break Contact Continue Mission	Raymond D Harris
(fiction)	
Bunard: Diary of a Green Beret	Larry Crile
Che Guevarra on Guerrilla Warfare	Ernesto Gueverra
Code Name Bright Light	George J Veith
Code Name:Copperhead	Joe R Garner (SGM Ret)
Covert Warrior	Warner Smith
Edward Lansdale: The Unquiet American	Cecil B Currey
Elite Warrior	Lance Q Zedric
Fighting Men: Stories of Soldiering	Jim Morris
Five Years To Freedom	James N Rowe
From OSS to Green Berets	Aron Bank (COL Ret)
Ghost Soldiers: The Epic Account of World War II's	Hampton Sides
Greatest Rescue Mission	
(Ranger operation to free POWs in the Philippines)	
Green Berets At War	Shelby L Stanton
Green Berets at War: US Army Special Forces in Asia 1956-1975	Shelby L Stanton
Green Berets in the Vanguard: Inside Special Forces 1953-1963	Chalmers Archer Jr
Guerrilla Warfare: On Guerrilla Warfare	Mao Tse tung
Hard To Forget	Steven M Yedinak
Hazardous Duty	Jack Singlaub (MG Ret)
Ho Chi Minh: A Life	William J Durker
In The Village of the Man	Loyd Little
Inside Al Qaeda, Global Network of Terror	Rohan Gunaratna
Inside Delta Force: The story of America's elite counterterrorist unit	Eric L Haney

TITLE	AUTHOR
Inside the Green Berets: The First Thirty Years	Charles M Simpson III
Killing Pablo: The Hunt for the World's Greatest Outlaw (read by current SF medic that knows some of the guys involved in getting Pablo; told him that the book is pretty accurate, except what happened in the actual killing.)	Mark Bowden
Laos: War and Revolution	Nina S Adams (Ed.)
Logistical Support of Special Operations Forces During Operations Desert Shield and Desert Storm	Donald W Betts
Long Shadows (fiction)	Kent White
Lost Crusade: America's Secret Cambodian Mercenaries	Peter Scott
MAC-V-SOG Command History Vol. I & II	Charles F Reske
Medal Of Honor	Roy P Benavidez
Mike Force	LH Burrus
Mobile Guerrilla Force: Wth the Special Forces in Warzon D	James C Donahue
My Secret War	Richard S Drury
Night Jungle Operations	Thomas B Bennett
Night of the Silver Stars: The Battle of Lang Vei	William R Phillips
No Surrender (Japanese soldier who evaded capture and survived 30 years in the Philippines; it's a great book about perseverance and commitment to warrior ideals)	Hiroo Onoda
Once A Warrior King: Memories of an Officer in Vietnam	David Donovan
One Day Too Long	Timothy N Castle
OSS to Green Berets	Aaron Bank
Parthian Shot	Loyd Little
Peoples' War, Peoples' Army	Vo Nguyen Giap
Perilous Options: Special Operations as an Instrument of US Foreign Policy	Lucien S Vandenbroucke
Phantom Warriors, Book II	Gary A Linderer
Phantom Warriors: LRRPs, LRP's, and Rangers in Vietnam, Book I	Gary A Linderer
Prairie Fire (fiction)	Kent White
Project Omega: Eye of the Beast	Ernie Acre
Rangers at War: Combat Recon in Vietnam	Shelby L Stanton
Reflections Of A Warrior	Franklin D Miller
Rescue Of River City	Drew Dix
SF Bibliography: Collection of articles and other readings with Special Forces topics	Radix Press/Dan Godbee
Shadow War: Special Operations and Low Intensity Conflict	HT Hayden
Shadow Warriors: Inside the Special Forces	Carl Stiner and Tomy Koltz
Sideshow (the US, Khymer Rouge & Cambodia)	Robert Showcross
SOG and SOG Photo Book	John Plaster
SOG: Volume 1	Harve Saal
Soldier Under 3 Flags	H A Gill (PB)
SPEC OPS: Case Studies in Special Operations Warfare: Theory and Practice	William H McRaven
Special Forces 1941-1987	LeRoy Thompson
Special Forces of the US Army	Ian Sutherland
Special Forces, the US Army's experts in Unconventional Warfare	Caroll B Colby
Special Forces: A guided tour of US Army Special Forces	John Gresham
Special Men and Special Missions: Inside American Special Operations Forces, 1945 to the Present	Joel Nadel and JR Wright
Spies And Commandos	Kenneth Conboy
Strategy and Policy Background Umbrella Concept for Low Intensity Conflict	Alex & Hamilton Booz
Street Without Joy	Bernard B Fall

TITLE	AUTHOR
(French in Indochina; Good groundwork for SF in Vietnam)	
Talking with Victor Charlie: An Interrogator's Story	Sedgwick D Tourison Jr
Tam Phu	Leigh Wade
The Chindit War	Shelford Bidwell
(good section on Merrill's Marauders)	
The Company They Keep	Anna Simons
The Devil's Brigade	Robert H Adleman
The Dying Place	David A Maurer
(fiction)	
The Green Berets	Robin Moore
The Green Berets in Vietnam, 1961-71	Francis J Kelly
The Last Confucian	Denis Warner
The Making of a Quagmire	David Halberstam
The Montagnards of South Vietnam	Robert L Mole
The New Legions	Donald Duncan
The One That Got Away	Chris Ryan
(This is the other half of the Bravo Two-Zerostory [a very good read on human endurance and tenacity])	
The Politics of Heroin in SE Asia	Alfred McCoy
(essential reference for understanding the Golden Triangle)	
The Protected Will Never Know	Leigh Wade
The Raid	Benjamin F Schemmer
The Ravens	Christopher Robbins
(the classic about our Bird Dog brothers)	
The Rescue Of Bat-21	Darrel D Whitcomb
The Road to Arnhem: A Screaming Eagle in Holland	Donald R Burgett
The Secret War Against Hanoi: The Untold Story of Spies, Saboteurs and Covert Warriors in North Vietnam	Richard H Shultz Jr
The Secret Wars: A Guide to Sources in English, Volume II, Intelligence, Propaganda and Psychological Warfare, Covert Operations, 1945-1980	Myron J Smith
Tragedy in Paradise: A country Doctor at War in Laos	Charles Weldon MD
Umbrella Concept for Low Intensity Conflict	Alex & Hamilton Booz
Unconventional Operations Forces of Special Operations	Mark D Boyatt
Uneasy Warrior	Vincent Coppola
Urgent Fury: The Battle for Grenada	Mark Adkin
U S Army Special Operations in World War II	David W Hogan Jr
U S Special Forces	Peter McDonald
U S Army Special Forces 1952-84	Gordon L Rottman
U S Army Handbook for North Vietnam Dept. of Army: 550-57	
U S Army Handbook for Cambodia Dept. of Army: DA Pam: 550-50	
U S Army Handbook for Laos Dept. of Army: DA Pam: 550-58	
U S Army Handbook for South Vietnam Dept. of Army: DA Pam: 550-55	
U S Army Handbook: Minority Groups in the Republic of Vietnam: Ethnographic Series Dept. of Army:DA Pam: 550-105	
Vietnam Above The Tree Tops: A Forward Air Controller Reports	John F Flanagan
Vietnam in American Literature	Philip H Melling
Vietnam Military Lore: Legends, Shadow and Heroes	Ray E Bows (MSG Ret)
Vietnam Order of Battle: A Complete, Illustrated Reference to the US Army and Allied Ground Forces in Vietnam, 1961 - 1973	Shelby Stanton
Vietnam Studies: Command and Control 1950-1969	
Vietnam: A History	Maj Gen George Eckhardt
Vietnam: The Origins of Revolution	Stanley Karnow
Vietnam: The Secret War	John T McAlister Jr
War Stories of the Green Berets: The Vietnam Experience	Kevin M Generous
War Story	Hans Halberstadt
Who's Who From MACV-SOG	Jim Morris
	Stephen Sherman



This is a letter that was sent to MSG Brochu that he wanted to share with you.

I am a group surgeon from the 19th SFG. Currently I am in Iraq. I have been here since March and am going home on 21 June. I volunteered to help out a National Guard unit from Washington (1-161 IN) attached to the 3rd BCT, 1st CAV DIV. I am now attached to 2nd BN, 5th SFG here at BIAP.

I met you at SOMA this year and would like to thank you all for the training I received at the conventions for the past two years.

I was here during the bloodiest month of the war and have had numerous opportunities to assist medically and to revisit my 11B skills I learned as a young enlisted man.

On 12 May 04, I had the misfortune of being in a convoy that was hit by an ambush south of Baghdad. My vehicle was hit by an IED and my medic was killed instantly when a large piece of shrapnel hit him just under the lip of his helmet.

Our vehicle was damaged but still able to move slowly. All of the soldiers in our vehicle were WIA including myself. The driver was blinded and semiconscious but was able to follow commands I gave him from the TC position. I steered while he operated the pedals. We made it back to the green zone and were taken to the CSH. I am proud to have served with the CAV and was inspired by the troops of the 161 National Guard unit.

I am writing this to emphasize the importance of constant training and how to react to a stressful situation, no matter what the MOS or unit assignment.

Again, thank you for the great courses and lectures given. They lend confidence to those of us who travel forward into harm's way.

My last couple weeks here are with the 5th SFG. I have been well received here and am proud to say there are some great Americans serving over here.

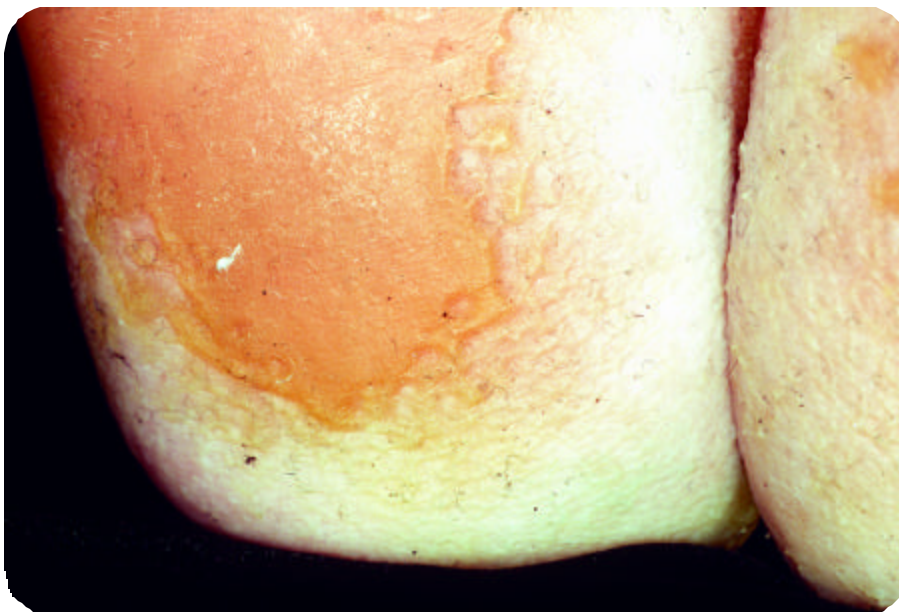
Pete C. Chambers
CPT, MC, USA
HHC 19th SFG(A)

Med Quiz

Picture This....

Daniel J. Schissel, MD

As you approach the tail end of a three-week recon trek through the Mount Sikaram region outside of Kabul your team sergeant catches you on a break. “Hey Doc! My feet keep breaking out despite the tough acting Tinactin you gave me and man, do they stink! Is this some strange smelly fungus or what?” He is otherwise very healthy, taking only mefloquine, and has no allergies. He states that the lesions are more prominent after long treks like this or when the foot gets wet.



Using the primary lesion definitions outlined in your SOF medical handbook, how would you describe the morphology of these lesions?

What is your differential diagnosis for malodorous, multiple white, wet, scalloped bordered plaques on the weight bearing aspects of the plantar surface and the great toes within which were coalescing shallow pits? There was no edema, erythema, and only minimal scale noted.

While evaluating the patient back at the FOB with your unit surgeon you were able to observe the web spaces between the toes with a Wood's lamp (black light) and it revealed a coral-red fluorescence.



ANSWERS:

Morphology: Plaques -- multiple white, wet, scalloped bordered plaques on the weight-bearing aspects of the plantar surface and the great toes within which there are coalescing shallow pits.

Differential Diagnosis: Pitted Keratolysis (PK). Tinea--moccasin type presentation [not uncommon to coexist with PK. Must do the potassium hydroxide preparation test (KOH).]

Callosity (not malodorous; will not have pits nor areas of fluorescence)

Hyperkeratosis Plantaris (not malodorous; will not have pits nor areas of fluorescence)

Pitted Keratolysis

Pitted keratolysis occurs on a worldwide front and was first seen in those who went barefoot during the rainy season in the Bengal region. Actin and McGuire delineated five clinical types among the barefooted-Bengali people.¹ Amputations of the toes were needed in the most severe cases associated with sepsis and ulceration.² These severe cases were originally found more commonly in tropical regions and only rarely in temperate zones. This apparently tropic disease then found a new niche with the world-traveled soldier. The warm, wet, occlusive microenvironment of a soldier's boot is very conducive to fungal and bacterial growth. Gill and Bucels reported an incidence of 58% in 52 military personnel during a three-day field exercise in the United States under continual wetness and an incidence of 48.5% in 144 soldiers engaged in tactical training in South Vietnam.³

Clinically the extent of the lesion is related to the bacterial load maintained in the stratum corneum of the feet or hands. The lesions may vary from less than 1mm to involve the entire heel, as noted in this case, or the entire plantar surface. The most common location for pitting is the weight bearing surfaces. The palms can also be involved, but since 1930, only plantar lesions have been described in the literature. When palmar lesions are present one typically sees scaled collarettes rather than pits.⁴ These characteristic lesions can be accentuated if the patient soaks for 10 to 15 minutes in water.¹ The infection is usually asymptomatic, but if a soldier is required to maneuver for any extended period one can easily see how the area can become tender.

The pungent odor, the clinical location, and the characteristic appearance of this foot rash is usually sufficient to make the diagnosis clinically. Biopsies are occasionally submitted by clinicians unfamiliar with this condition or to rule out any neoplastic change in the rare ulcerated presentation. Multiple organisms have been implicated as the etiological agent in pitted keratolysis. The most common agents are species of *Corynebacterium* and *Actinomyces*, *Micrococcus sedentarius*, and *Dermatophilus congolensis*.^{5,6} These organisms release proteolytic enzymes that degrade the horny layer and in the process release a mixture of thiols, thioesters, and sulfides resulting in the pungent odor.⁶ In addition, *Corynebacterium* can be quickly identified under Wood's lamp as it will produce a characteristic bright coral-red fluorescence due to the porphyrin production by the bacteria. (Refer to your SOF Manual CD for a video clip – Fungal and Wood's light exam procedure for assistance.)

Various treatments have been advocated for pitted keratolysis. Initially one should limit excessive moisture and reduce friction. Properly fitting boots and absorbent socks will aid greatly in controlling excessive moisture. Shelly and Shelly advocate Drysol (20% aluminum chloride) for controlling the often-associated hyperhidrosis, which may be a predisposing factor for not only PK but for friction blisters as well.⁷ Aluminum chloride should be applied to a dry foot three to four times a week. Washing before applying increases the water content of the skin and should be avoided. The skin must be dry before the application of Drysol and washed off after six to eight hours to avoid irritation. Since the drying agent possesses no antibacterial activity, a conjunctive topical antimicrobial should be used to eradicate the bacterial elements and clear the pitting. Effective topical antibiotics include clindamycin phosphate, erythromycin, gentamicin sulfate, mupirocin, and tetracycline hydrochloride.^{4,6,8,9} Systemic erythromycin may also be used for more severe cases. With proper treatment, pitted keratolysis should clear within three to four weeks without sequelae.

If you're deployed and have a concern about a puzzling skin lesion you can email your clinical photos and with the aid of your SOF manual a concise morphologic description of the difficulty to our Operational Teledermatology site at derm.consult@us.army.mil or myself directly at Daniel.Schissel@US.Army.Mil. The lesion you describe just may make its way to **Picture This...** Thanks for all you do.

References:

1. Acton HW, McGuire C. Keratolysis plantare sulcatum. Lesions due to an actinomycotic fungus. *Indian Medical Gazette* 1930: 65; 61-65.
2. Zaia N, Taplin D, Rebel G. Pitted Keratolysis. *Archives of Dermatology* 1965: 92; 151-154.
3. Gill A, Buckels LJ. Pitted keratolysis. *Archives of Dermatology* 1968: 98; 7-11.
4. Zaia N. Pitted and ringed keratolysis: A review and update. *Journal of the American Academy of Dermatology* 1982: 7 (6); 787-791.
5. Takama H, Tamada Y, Yano K, Nitta Y, Ikeya T. Pitted Keratolysis: Clinical manifestations in 53 cases. *British Journal of Dermatology* 1997: 137; 282-285, .
6. Nordstrom KM, McGinley KJ, Cappiello L, Zechman JM, Leyden JJ. Pitted Keratolysis: The role of *Micrococcus sedentarius*. *Arch 7. Dermatology* 1987: 123; 1320-1325.
7. Shelley WB, Shelley ED. Coexistent erythrasma, trichomycosis axillaris, and pitted keratolysis: An overlooked corynebacterial triad? *Journal of the American Academy of Dermatology* 1982: 7(6); 752-757.
8. Gardner TL, Elston DM. A foot rash with a foul odor. *Physician and Sports Medicine* 1998: 26 (2); 104-107.
9. Vasquez-Lopez F, Perez-Oliva N. Mupirocin ointment for symptomatic pitted keratolysis, (letter), *Infection* 1996: 24 (1); 55.



LTC Daniel Schissel is a 1993 graduate of the Uniformed Service University of the Health Sciences. He completed his internship with the family practice department at Fort Bragg in 1994. He then served as the 2/10th Special Forces Group (Airborne) 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 Schissel is presently stationed in Heidelberg, Germany as a staff physician and the European Regional Medical Command Dermatology Consultant. He has authored the dermatology section of the new SOF manual, serves on the USSOCOM Medical Curriculum & Examinations Board, and is the US Army Aviation Dermatology Consultant.

Photo Gallery



During Desert Rescue XI, Navy SEALs carry a survivor on a stretcher to be loaded on an HH60 helicopter and returned to the Joint Search and Rescue Center. Desert Rescue XI was a joint service Combat Search and Rescue (CSAR) training exercise that simulated downed aircrew behind enemy lines enabling other air crew to perform CSAR related missions as well as experiment with new techniques in realistic scenarios.

A pararescue team at Baghdad International Airport performs a team movement exercise through urban streets in support of OIF.





PJs practicing their advanced military medicine training skills by administering an IV and splinting another pararescue member for a broken leg and dehydration during a simulated parachute accident at an undisclosed location in support of Operation Enduring Freedom.



Dedication



**Senior Chief Corpsman
Michael George Fullerton
United States Navy
(1963-2004)**



How is it that as Special Operators we manage to defy death on a daily basis? Whether we are jumping HALO from extraordinary heights, diving to unbelievable depths and time exposure, exiting submarines while underway, climbing mountains with just our bare hands, or dodging bullets in combat, it never ceases to amaze me how many times we have cheated death while laughing in the face of danger. I used to be able to count all of my teammates and swim buddies who had died on one hand. The number has grown so high that I now am out of appendages on my body to count, but they are forever etched in my memory banks. Each and every one of them leave that special memory that will always remain in the forefront of my brain.

Mike Fullerton was not just another "Team Guy"—he was the epitome of what a true leader, SEAL, and Corpsman should always strive to be. No more of a professional could any man hope to be than Mike. His keen sense of humor, quick wit, and endless "Jack-of-all-trades" knowledge made the term "Go ask the Chief" a platoon hut phrase in the Naval Special Warfare medical community.

Senior Chief Fullerton enlisted in the United States Navy on September 15, 1981, in Seattle, Washington. He attended basic training at the Recruit Training Center in San Diego and graduated as the Class Honor Man. He then went on to complete Hospitalman "A" School in March of 1982 in Bethesda, MD.

In 1983, he received orders to UDT/SEAL training and graduated with Class 123 in the summer of that year. Upon graduation, HM3 Fullerton received orders to SEAL Team THREE (plank owner), completed SEAL Basic Indoctrination, and following the Airborne Course at Ft. Benning, GA, he was assigned to Delta Platoon and deployed to Subic Bay in the Philippines.

In October 1983, HM3 Fullerton completed the Special Operations Technician Course, followed by the Emergency Medical Technician (EMT) Qualification Course in March 1984. Also in 1984, HM3 Fullerton completed Survival Evasion Resistance and Escape (SERE) training at Werner Springs, California, and the Pararescue Casualty Care Course of Instruction in New Mexico. In September 1985, he re-enlisted while at SEAL Team THREE, then transferred to SEAL Team FOUR, and deployed onboard USS Whidbey Island (LSD 41) to the Mediterranean with MARG 2-87. Then in February 1988, HM2 Fullerton completed Special Operations Spanish Language Course at US Army JFK Special Warfare Center. He completed the course with Honors and the admiration of his instructor. Later that year, he deployed with SEAL Team FOUR Third Platoon on a UNITAS Cruise to South America.

HM2 Fullerton transferred to Naval Medical Center, Portsmouth, VA in August 1989. While stationed there, he deployed as a medic with the USMC 1st Force Reconnaissance Company in support of Operation Desert Storm. In September 1991, he reenlisted at Naval Medical Center Portsmouth, VA; then in October 1991, HM3 Fullerton completed Special Operations Independent Duty Corpsman (IDC/18 Delta) training at the Naval School of Health Sciences (NSHS) Fort Sam Houston, TX and the US Army JFK Special Warfare Center.

In 1990, HM2 Fullerton qualified as a Master Instructor for Emergency Medical Technician (EMT) vehicle operators while acting as the Naval Special Warfare Medical Training Liaison Coordinator at Naval Medical Center Portsmouth, VA. He returned to SEAL Team FOUR in 1992, and deployed to Naval Special Warfare Unit EIGHT in Panama for six months. Following this deployment, he assumed the position of LPO in the Close Quarters Combat (CQB) Training Cell. HM1 Fullerton participated in Project North Star during 1994, assisting United States Police Forces and SWAT Teams to improve shooting capabilities and tactical skills.

In 1995, HM1 Fullerton participated in JTF-6 Counter Drug Operations assisting State and Local Police Forces improving surveillance and detection capabilities. While at SEAL Team FOUR, HM1 Fullerton was hand-picked by the Commanding Officer to function as the GOLF Platoon Medical Department Head in support of Operation SUPPORT DEMOCRACY in Haiti. During deployment, his platoon conducted numerous Visit Board Search and Seizure (VBSS) real-world operations.

HMC Fullerton re-enlisted in September 1977 while at SEAL Team FOUR. After a near catastrophic fire which damaged the majority of the Team spaces, he designed and supervised the reconstruction of the entire command. In August through December 1998, HMC Fullerton deployed to Naval Special Warfare Unit EIGHT in Panama as the CHARLIE Platoon LCPO. During this deployment, his platoon conducted humanitarian assistance and disaster relief operations in Honduras following Hurricane Mitch. Numerous high-risk rescues involving the recovery of over 1,000 personnel and the delivery of more than 30,000 pounds of food and medical supplies were executed.

In 1999, he was promoted to the rank Senior Chief and transferred to Naval Special Warfare Group TWO as the Medical Department LCPO in June of that year. Recognizing funding and manpower shortfalls, HMCS Fullerton designed, personally constructed, and implemented both facilities and systems to revolutionize SEAL Authorized Medical Allowance List (AMAL) building and distribution. From there, he transferred to SEAL Delivery Vehicle Team TWO as Task Unit ALFA LCPO, and deployed to Naval Special Warfare Unit TEN Rota, Spain. During this deployment, he conducted sensitive ground-breaking advance force operations paving the way for Special Operations Forces to combat the Global War on Terrorism.

HMCS Fullerton served in Operation DESERT SHIELD/STORM, Operation SUPPORT DEMOCRACY, and Operation ACTIVE ENDEAVOR. His awards and decorations include the Navy and Marine Corps Commendation Medal (4 awards), Navy and Marine Corps Achievement Medal (5 awards), Joint Meritorious Unit Award, Navy Unit Commendation (2 awards), Navy "E" Ribbon, Good Conduct Medal (5 awards), Fleet Marine Force Ribbon, National Defense Service Medal (2 awards), Armed Forces Expeditionary Medal, and various other campaign and service awards. He was authorized to wear the SEAL Breast Insignia, Naval Parachutist Wings, and the Special Operations HALO-HAHO Parachutist device.

Upon retirement from the United States Navy in December of 2003, Mike began his transition to work in other government venues. During this interim, Mike hoped to realize his dream of restoring his vintage Series-3 Safari Land Rover and completing a transcontinental overland expedition. On Sunday March 7, 2004, Mike was killed in a single-vehicle accident while traveling home from Florida. His truck sustained catastrophic tire failure, and Mike was unable to avoid the fatal crash. HMCS (Ret) Mike Fullerton is survived by his wife, daughter, parents, and a sister.

HMCM GARY WELT



Journal of Special Operations Medicine

EXECUTIVE EDITOR

Butler, Frank K, MD
Butlerf@socom.mil

MANAGING EDITOR

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

EDITORIAL BOARD

Senior Editor: Anderson, Warner J, MD

Heintz, David S, MSPM
Parsons, Deborah A, BSN

Schissel, Daniel J, MD (*Picture This*)
Clayton, Robert T, SVERDRUP

CME MANAGERS

Officer

Parsons, Deborah A, BSN

Enlisted

McCumsey, Robert A, EMT-P

CME REVIEW BOARD

Wayne, Barry A, MD

Johnson, Troy R, MD

PEER-REVIEW EDITORIAL CONSULTANTS

Ackerman, Bret T, DO
Allen, Robert C, DO
Bourne, Peter G, MD
Bower, Eric A, MD
Brannon, Robert H, FACHE
Briggs, Steven L, PA-C
Brochu, Michael A, EMT-P
Cloonan, Clifford C, MD
Darby, William M, MPH
Davis, William J, COL
Descarreux, Denis G, OD
Durck, Craig H, DO
Ed Eacrett, PA-C
Frame, Robert T, DMD
Gandy, John J, MD
Garsha, Larry S, MD
Gerber, Fredrick E, MMAS
Giebner, Steven D, MD
Giles, James T, DVM
Godbee, Dan C, MD
Hlavnicka, John P, CRNA
Holcomb, John B, MD
Hoyt, Robert E, MD
Jackson, Michael A, PA-C

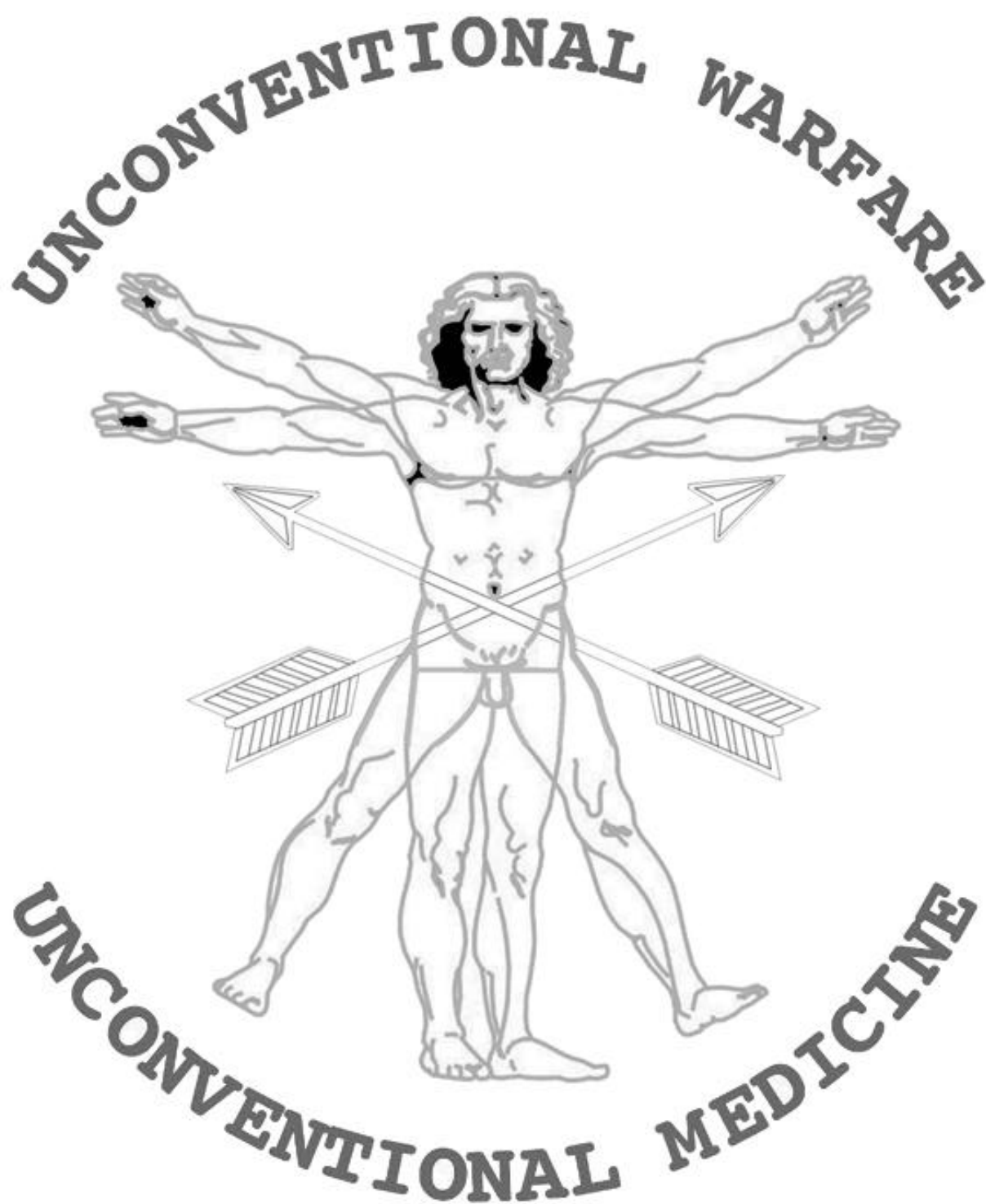
Kinthead, Bert E, MBA
LaPointe, Robert L, SMSgt (Ret.)
Llewellyn, Craig H, MD
Lorraine, James R, BSN
Lundseth, Paul, MD
Lutz, Robert H, MD
Mahaffey, Kevin G, MD
McAtee, John M, PA-C
Miller, Robert M, EMT-P
Mouri, Michael P, MD
Pennardt, Andre M, MD
Porr, Darrel R, MD
Richards, Thomas R, RADM (Ret.)
Riley, Kevin F, MS
Schiek, William F, MS
Schoomaker, Peter J, GEN
Shipman, Donald G, PA-C
Singer, Darrell, MD
Swann, Steven W, MD
Wedam, Jack M., DVM
Wilkinson, Michael D, PhD
Wightman, John M, EMT-T/P, MD
Yevich, Steven J, MD
Zastawny, Edward M, RPh

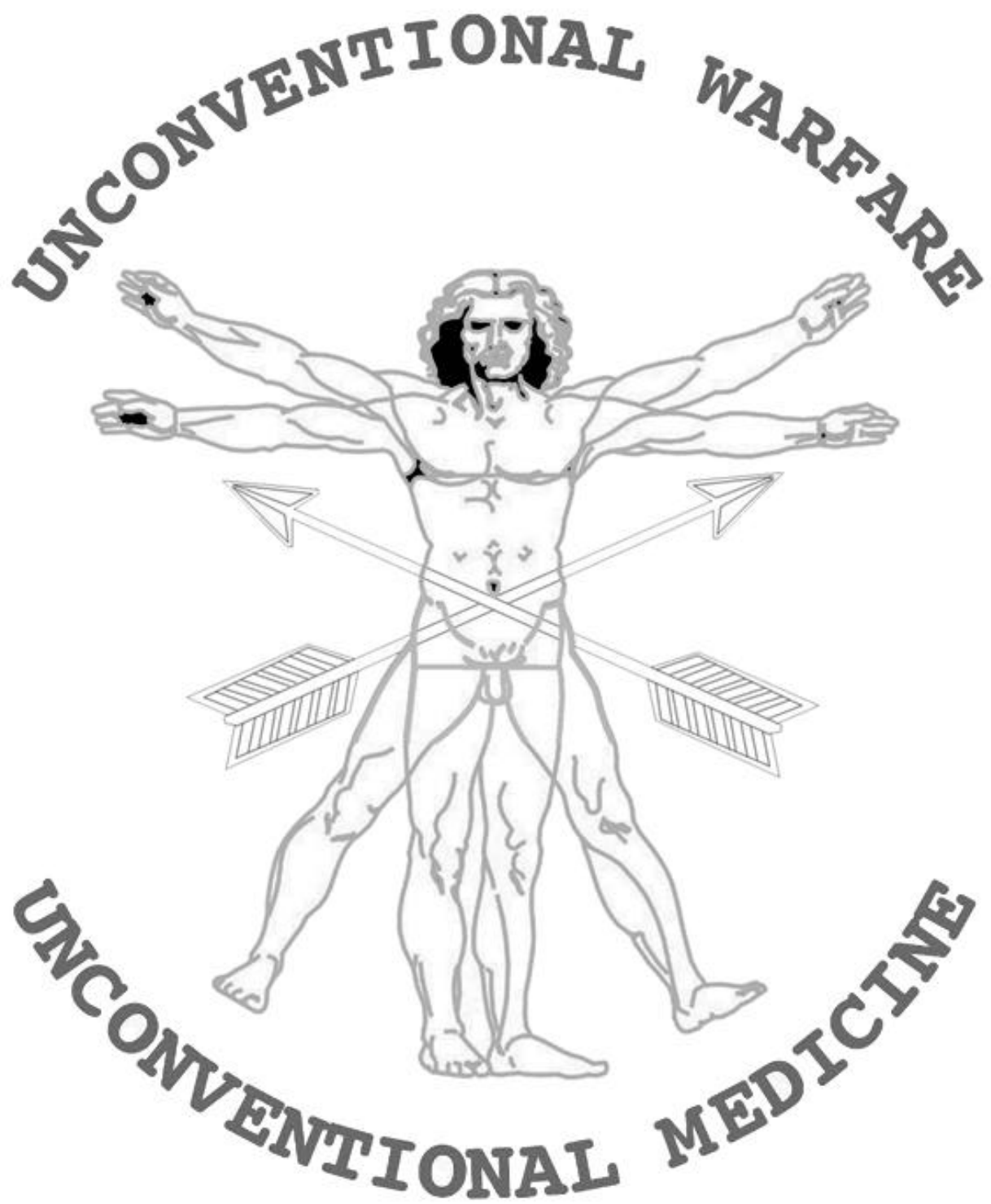


GENERAL RULES FOR SUBMISSIONS

1. Use the active voice when possible.
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. Articles should be double-spaced, twelve point font, aligned on the left and justified on the right.
4. Important: Include an abstract, biography, and photo of yourself as part of the article.
5. Use of acronyms should be held to a minimum and when used they must be spelled out the first time.
6. Remember that your audience is inter-service, civilian, and international.
7. Every article has a point to make, which is traditionally stated in the introductory paragraph and restated in the closing or summary. Subtlety is not usually a virtue in a medical publication.
8. All references **MUST** be cited in the text in chronological order (in the order of use). Use the full name of the journal, no abbreviations.
Please note that you cannot use “et al.” in the listed references. Et al. is only used when citing references in the body of the article. In the references section at the end of the article, you need to list all the authors. Please refer to this website for assistance on how to cite; the JSOM uses the Chicago Manual of Style:
http://www.lib.duke.edu/libguide/bib_books.htm#Book%20with%20a%20Single%20
Please use the following style of citation:
Last name, initial of first and middle name. Title of article. *Journal name* (in italics and spelled out-no abbreviations) year: Vol (edition); pg-pg.
Example: Beecher HK. Preparation of battle casualties for surgery. *Annals of Surgery* 1945;121(12);769-792.
9. **Do not use footnotes or imbed anything into the document.** If unsure, please contact us at JSOM@socom.mil.
10. Photographs with your article are highly encouraged. Photos must be sent separately from the document so they can be converted into a publishing format. Where possible, traditional (“hard copy”) photos should be sent, however, scanned and digitized copies can be used but please make as large as possible, even if you have to send them one at a time. Every attempt to return your original pictures will be made, but the JSOM will not be held accountable for lost or damaged items.
11. Send submissions by e-mail, diskette, CD, or plain paper to the Editor. E-mail: JSOM@socom.mil or by mail to: USSOCOM Surgeon’s Office. Submissions may also be sent to the physical address at: United States Special Operations Command ATTN: SOCS-SG/ JSOM CME Department 7701 Tampa Point Blvd MacDill AFB, FL 33621-5323.
Retain a copy for yourself.
12. 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.
13. Again, the JSOM is your journal. It is a unique chance for you to pass your legacy to the SOF medical community.

Take advantage of the opportunity.





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



Pararescue Creed

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



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

Navy Poem

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



~ Harry D. Penny, Jr. USN Copyright

UNITED STATES SPECIAL OPERATIONS COMMAND
ATTN: SOCS-SG
7701 Tampa Point Blvd.
MacDill AFB, FL 33621-5323
OFFICIAL BUSINESS



MEDIA MAIL