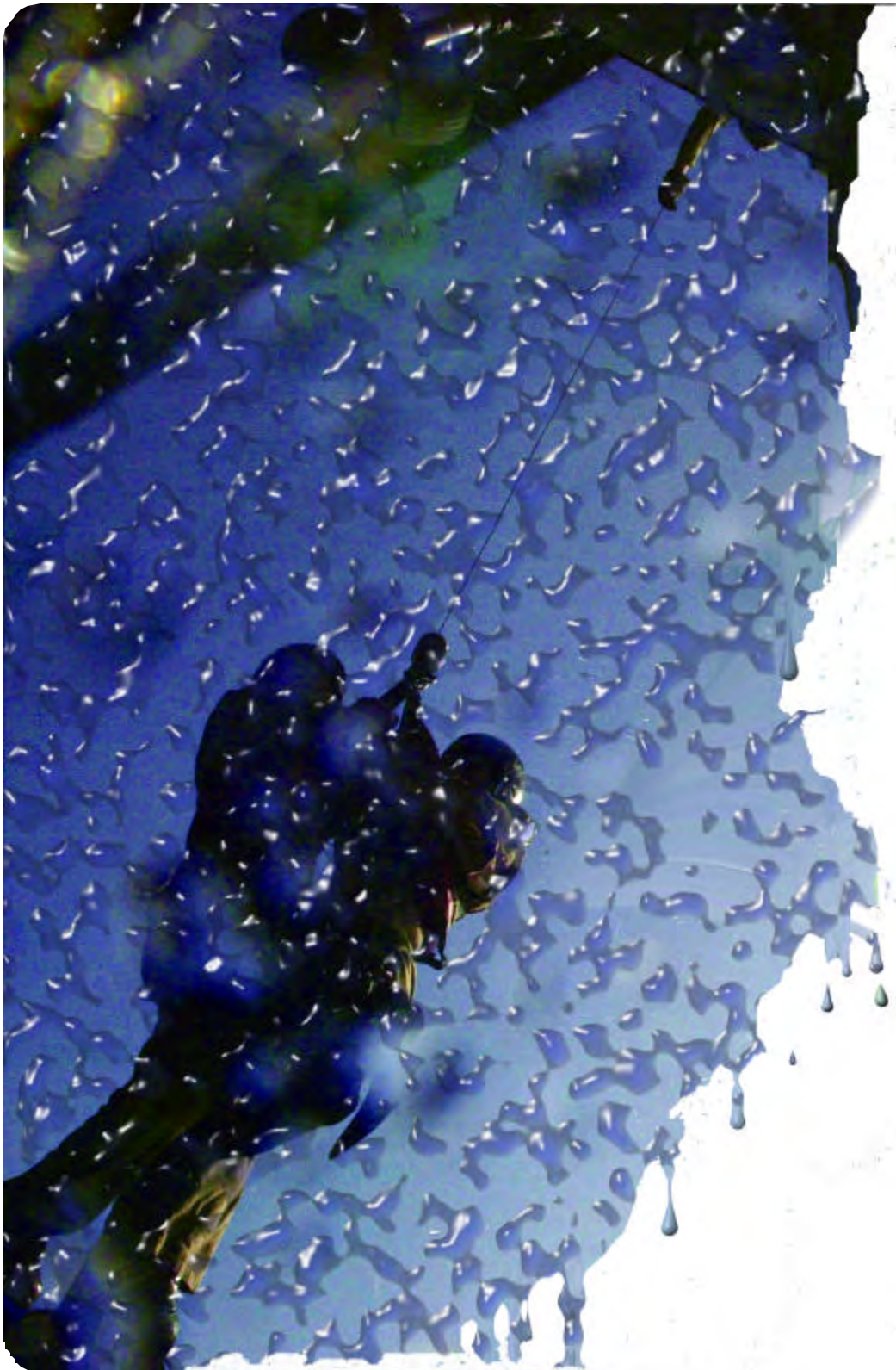


Volume 4, Edition 1

Winter 2004

# Journal of Special Operations Medicine

A Peer Reviewed Journal for SOF Medical Professionals

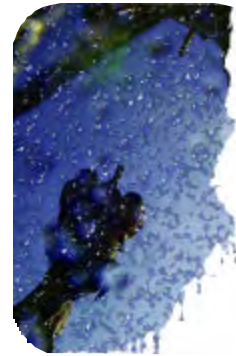


**Dedicated to the Indomitable Spirit & Sacrifices of the SOF Medic**

# COVER

Members of a Naval Special Warfare team conduct a simulated medical evacuation procedure using a horse collar device from an SH-60 Seahawk helicopter. The procedure enables injured Naval Special Warfare team members to be transported to medical facilities in a timely matter.

*Official US Navy photo by Mate 1st Class Arlo K. Abrahamson.*



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 in no way 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.

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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.

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## From the Staff

To assure the JSOM continues to be available to all who find value in it, we need to comply with the intent of the current distribution rules governing this publication. You can now obtain the Journal of Special Operations Medicine (JSOM) a number of ways, depending on your status. SOF units and the active editorial consultants will continue to receive the JSOM directly from us. SOMA members now receive the JSOM as part of membership. We strongly recommend this avenue, for SOMA has become a very valuable CME effort as well as an annual gathering of SOF medical folks to share issues. Please note, if you are a SOMA member and are not receiving the subscription, you can contact SOMA directly through their website at: [www.specialoperationsmedicalassociation.org](http://www.specialoperationsmedicalassociation.org).

For JSOM readers who do not meet the above criteria, we have arranged for the JSOM to be available as a paid subscription from the Superintendent of Documents, US Government Printing Office, for only \$30 a year.

And don't forget, we are online!!! Thanks to the cooperation and efforts of the Joint Special Operations University, the JSOM is now available online to Uniformed Services members and DoD employees at <http://www.hurlburt.af.mil/jsou>. Click on "Login" and follow the instructions. Once logged in, click on "Publications" and scroll to the bottom of the page. You can even link straight to the Government Printing Office to subscribe to the JSOM.

We are now in our fourth 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 an excellent and righteous tool that spans all the SOF services and shares medical information and experiences unique to this community. The JSOM has continued to survive because of generous and time-consuming contributions sent in by clinicians, researchers, and former medics from all the Services who were SOF-qualified and/or who served with SOF units. We need your help! Get published in a peer-review journal NOW! See page 99 for General Rules of Submission. We are always looking for SOF-related articles from current and/or former SOF medical veterans. We need you to submit articles that deal with trauma, orthopedic injuries, infectious disease processes, and/or environment and wilderness medicine. More than anything, we need you to write CME articles. Help keep each other current in your re-licensure requirements. Don't forget to send photos to accompany the articles or alone to be included in the photo gallery associated with medical guys and/or training. If you have contributions great or small... send them our way. Our E-mail is: [JSOM@socom.mil](mailto:JSOM@socom.mil).

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!

# From the Surgeon



Happy New Year from USSOCOM and the Surgeon's Office! Once again, those of us in the headquarters find ourselves in awe of the accomplishments of the medical folks in this command and all they do to ensure the deployment safety of our SOF war-fighters and the care given to them when they get sick or injured. Though the public focus remains within the OEF and OIF areas, we are well aware and appreciative of the activity of SOF operators in greater than 150 countries this past year and the impact it has on this nation. Several significant issues are coming up and our focus continues to be upon getting the correct tools and training to our medical operators.

1. The home for Combat Search and Rescue (CSAR) has been resolved and AFSOC is working the details on how this important mission will be incorporated into SOF. My career in SOF started at the old Aerospace Rescue and Recovery Service (ARRS) serving USAF PJs as we transitioned through 23rd Air Force (MAC) in the late 1980s and into AFSOC. The CSAR mission transitioned into USAF/ACC, and for many years our association with PJs was less than optimal in spite of the long history of successful interoperability. As AFSOC works through the transition we have the opportunity to again share capability with our PJ colleagues--their history is rich and goes back to WWII and the China/Burma/India theater. With the help of CMSgt Hickson, Commandant of the PJ School, we will find ways to share training successes and make the schools interoperable, giving us additional options in our training scenarios.

2. Since our efforts at fielding hemostatic dressings and agents, there has been tremendous activity in the fielding of products to stem battlefield hemorrhage. Our initial BISC initiatives were with fibrin/thrombin-containing dressings and we fielded them under an IND permitted by the FDA. Since then, other dressings and products have moved forward and are available. We hope they all prove efficacious in OUR SCENARIOS--that is a critical distinction! Our folks operate very far forward, isolated from conventional support, operating in the night with issues of weather (rain, snow, wind, etc.), heat and perspiration issues, cold and warmth issues, and any number of threats both operational and medical. They have limited resources of water for drinking, let alone for cleanliness and wound irrigation requirements. As a consequence, our policy to date is to support the use of Chitosan dressings until the scientific community (both Army and Air Force) can study all the agents coming onto the scene for efficacy and safety in our combat environs. You are probably aware of agents that the conventional forces have at their disposal and that we haven't endorsed, and that is simply because some of the early studies give us safety and efficacy concerns in SOF settings. We hope all the products work and are safe, giving you a host of options to build upon, but our job is to assure that the products work and are safe in the SOF environment and we are cautious until the data is clear.

3. "Artificial Blood" or HBOC (hemoglobin based oxygen carriers) is on the horizon. Hemorrhage control and replacement of oxygen-carrying blood is another critical step in resuscitation. Moving blood forward in SOF missions brings a nightmare of issues with temperature control, cross-match, and purity, let alone the

nursing skills in the actual administration oversight. HBOC has the potential to bring us a “blood-substitute” in future conflicts and we are dedicated to moving this technology forward. As such, the BISC is funding a push toward an IND within one of our units, and better yet, the big Navy is funding a study on a second product. Again, we hope all the products are safe and efficacious and you will have such a tool at your disposal soon.

So, we have continued technologic support work to do, but we are listening and trying to follow the guidance that you relay toward solutions to your issues as you dedicate yourselves to the lives and well-being of our SOF warriors.

Finally, this is my last JSOM as the USSOCOM/SG. It is time for me to retire and get some fresh blood in here to support you--it is hard to believe that my three years is up here. We have worked with the service surgeons generals and the component commanders and put a list of candidates in front of the USSOCOM/CC. GEN Brown has made a decision on my replacement. It is our privilege and pleasure to announce CAPT Frank Butler as the next USSOCOM Command Surgeon. He has a long SOF association, and is a SEAL and an ophthalmologist. He has been instrumental in PRK initiatives, has been a very productive member of the BISC, knows the risks of our missions, and is committed to the Medics/Corpsmen/PJs out there sworn to care for our forces. The folks here in this office are great and they will assure that the transition is smooth, your needs are met, and that nothing “falls through the cracks.” Please be aware that I transition to the civilian sector with tremendous pride in my association with you, and tremendous confidence in your dedication to our soldiers/sailors/airmen/marines operating worldwide in defense of freedom.

GOD BLESS YOU AND GOD BLESS AMERICA!

dhammer



MSG Michael A. Brochu  
SENIOR ENLISTED MEDICAL ADVISOR (SEMA)

From the ROAD DOG in the BIG HOUSE,

By the time you read this journal we will be well into the New Year so wishing you a “Happy New Year” is anti-climatic. My hope anyway is that you are content with your present situation and your year brings you many blessings. The following poem that I want to share with you was composed during WWII by an enlisted Medic First Class (EM1/C), USN. Through the years the names and faces have changed but the truth of these words ring as true today as when they were first penned. You have given your blood while your country has supported you. Thank you all for your sacrifice and may the request for Godspeed be granted to all troops who wage this war on terrorism.

“The American”

by George B. McPhail

“I am a mother’s son.  
I am the pride of the family and a part of the home.  
I love my life as you love yours.  
I am a youth in years and experience;  
Yet I am a gambler, betting the highest stakes a man can wager – my life.  
If I win, you win.  
If I lose, I have lost all. The loss is mine, not yours;  
And there is a grieved mother, a saddened family  
and a broken home to which I will never return.  
I ask only for the Godspeed and support of my country  
in return for lying upon the altar of the nation my all.  
For bravery and blood, will you furnish bullets and bread?  
Will you bet your gold while I bet my blood?  
Will you hazard your wealth while I risk my life?  
I am the flower of a nation’s manhood,  
I am the glory of a noble race.  
I am the AMERICAN.”

**SOMA MEDICS OF THE YEAR:** The following personnel were selected by their Senior Enlisted Medical Advisors (SEMA) for outstanding medical actions performed during the year 2003. By their demonstrated medical excellence in treatment rendered they have been awarded the Special Operations Medical Associations (SOMA) “Mike Hollingsworth” Medic of the Year Award for FY 2003:

USASOC: SFC Funes Dagoberto

AFSOC: MSgt Karl M. Grugel

NAVSPECWARCOM: HMC James D. Smith



NAVSPECWARCOM Component Surgeon CAPT Edward Woods presents HMC James D. Smith the Special Operations Medical Associations (SOMA) “Mike Hollingsworth” Medic of the Year Award for FY 2003.



**SOCM HONOR GRADUATES:** The following Special Operations Combat Medic graduates have excelled and achieved the titles of Distinguished Honor Graduate (DHG) and Honor Graduate (HG) respectively for SOCM class 02-03:

DHG: PFC James Anderson (75<sup>th</sup> RGR RGT)

HG: HM1 Westly Baldwin (SEAL Team 3)

**SFMS HONOR GRADUATES:** The following graduate from the Special Forces Medical Sergeants Course (SFMS) has excelled and achieved the title of Honor Graduate:

SGT Michael J. Lawson

**Long range dates for future JMEAC:** All enlisted folks are invited to these meetings. That is the main reason I select sites around the country. It gives ya'll a chance to be a participant instead of just being in the back of the patrol wondering where the next patrol base is! You are the blood of the Joint Medical Enlisted Advisory Committee. Link up with your SEMA and tell him you want to attend. We can only speak for you if we have your feedback.

14 – 15 April 04	USSOCOM Host (Tampa)
14 – 15 July 04	AFSOC Host (Hurlburt Field)
20 – 21 Oct 04	USASOC Host (Fort Bragg)

**If you have suggestions, concerns, and/or recommendations for the JMEAC, pass them along to your SEMA and it will be addressed. The only thing that is required is that you.....  
“SEND IT”**

# Meet Your JSOM Staff

## EXECUTIVE EDITOR

David L. Hammer, MD  
Hammerd@socom.mil



Colonel Hammer's military and medical career began in 1958 when he served as a US Navy Combat Medical Corpsman attached to US Marine Corps infantry, artillery, and communication/reconnaissance units. Following discharge, he completed his BS and MD degrees at the University of Michigan in 1967 and 1970, respectively. Following nine years of civilian medical practice in a multi-specialty group in Grand Rapids, Michigan, he reentered military service as a Flight Surgeon at Beale AFB, CA. In 1984, he completed the Air Force Residency in Aerospace Medicine at Brooks AFB, Texas, during which period he earned a Masters in Public Health degree from Harvard

University. Colonel Hammer has spent the majority of his career in aerospace medicine and direct line support assignments, has commanded three medical groups, and has been assigned to the ARRS/SG, the AFSOC/SG, and the USAFA/SG. He is a chief flight surgeon and a master parachutist.

## 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.



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## USASOC



Rocky Farr, MD  
COL, USA  
Command Surgeon

It's January 2004--truly amazing! I will have over 37 years of total army service in April of this year. One of the reasons I do not get very excited about changes in the military is that I have seen it swing both ways, good and bad, so very very often. I watched Special Forces get the glory early in Vietnam when I first came into the service, get the blame for Vietnam on our way out, and then grow into this tip of the spear growth industry we have now. I am confident that if I live and serve long enough I will see it get bad again. However, for now, times are definitely very good and very busy.

I enjoyed seeing everyone at the Special Operations Medical Association meeting in Tampa in December. It was bigger and better than ever with more old timers, me included, than I had seen in years. Even Colonel Harry Heinisch (thought he was dead!) was there. Colonel Al Moloff, who succeeded me as Company Commander at Company F (ABN) at Fort Sam Houston was elected president succeeding Colonel (retired) Steve Yevich. Try to attend next year. The presentations and the camaraderie were both excellent. The USASOC Surgeon's pre-conference, held the weekend before, was great. We let the units tell their tall tales of daring do on Saturday and gave all of our office's update briefs on Sunday. A thank you to all who presented on both days and to Major Abner, MSG Justice, and SFC Allen for organizing the conference.

Our Civil Affairs and Psychological Operations units in the Army Reserve are certainly getting a workout and pulling their load several times over. In my office, a special thanks to my outstanding USACAPOC soldiers, Major Dunn and Lieutenants Goins and Sheley, who all will be departing soon. We have been extremely busy helping units deploy and redeploy. Hats and berets off to our reserve component personnel who are soldiering just as hard and just as well as our active component soldiers. Our National Guard Special Forces soldiers also are decisively engaged and doing great things. As I was writing this, I received news of the death in Afghanistan of Sergeant Roy Wood, M.D., of the 20th SFG (A) from Florida.

We continue to make progress on new equipment and new fielding of equipment. I hope that all who were at the Special Operations Medical Association meeting in Tampa in December were able to see Mr. Joe Marak's display and presentation on medical equipment design and development. Thanks Joe.

I am in the midst of medical officer, physician assistant, medical service corps, physical therapist, etc., etc., assignments. All our “docs” are staying longer and becoming increasingly integrated into their units. I have tried to give the group and regimental surgeons more involvement and say in assignments. We continue to have many more volunteers than we have positions. A nice situation to be in. Let all the fine general medical officers that we have served with and who have left for residency training know that we want them back! Let all the fine ex-18Ds, now PAs, that we have served with and who have left for school and conventional assignments know that we want them back too!

I have been on a campaign to straighten out the Army Special Operations Diving Medicine. If you are a diving medical officer, read AR 611-75 and get properly certified. We are growing more DMOs, both docs and PAs. If you are a combat diver who now is a doc or PA, see AR 611-75 and then see me.

The Joint Special Operations Medical Training Center is running at maximum capacity and their graduates are moving toward the sound of the guns where they are doing very well. Colonel Kevin Keenan, the Dean of JSOMTC, was conspicuous in his absence at SOMA. He returned yesterday from Afghanistan. All 18Ds and SOCMS need to attend the sustainment training every other year. We are keeping book on you. Two 18Ds have been de-credentialed and their tabs pulled in the last two years.

With no slowdown in sight, let us all continue to drive on with the war effort. I think it is to be a long war, which is not necessarily bad.



*Office of the Command Surgeon, USASOC*



### **The Germans, 1944:**

*“The reason the American Army does so well in wartime is that war is chaos and the American Army practices chaos on a daily basis.”*

### **The Soviets, 1960:**

*“One of the serious problems in planning against American doctrine is that the Americans do not read their manuals nor do they feel any obligations to follow their doctrine.”*



## NAVSPECWARCOM



Edward Woods, MD  
CAPT, USN  
Command Surgeon

Navy medicine is standing by to serve. Our successes include outstanding preventative medicine efforts downrange, a fit force, and increased TRICARE benefits for the retirees we will all someday become. In general, Navy medicine does an outstanding job managing its resources. At WARCUM Force Medical, human resources that support operational needs take precedent. In a small community with 16 physicians, 5 physician's assistants, 250 SEAL hospital corpsmen, and numerous non-SEAL corpsmen representing 11 NECs, defining the requirement for operational support is essential. In cases where support may be pulled from outside the NSW community, requests must go through the chain of command through WARCUM Force Medical to BUMED Code 931 for action. This is the only way that outside medical resources will be allocated. WARCUM Force Medical is in lock step with 931 on this issue. That brings us back to the point: defining the requirement. When requesting a resource either internal or external to NSW, it is mandatory to define the requirement for the job. This not only gives credibility to the request but also teaches all parties about the needs of the community.

Truthfully, over half of the NSW physicians have less emergency trauma training than the SEAL hospital corpsmen who fall under their medical licenses. Even though most of the NSW physician community are not trauma specialists, they make great contributions to their dynamic community through the knowledge of their specialties. Medicine is a broad-based field and the best care comes from the objective practitioner who is selected to meet the mission requirements. Our human nature is to gravitate to people and friends we know because they provide us with index of comfort, but downrange substance over form is essential. Corpsmen must maintain their trauma skill set, and physicians and PAs when in support need to be able to contribute with the skill they are trained to. Asking for a physician who is a well-trained internist or rehab specialist in order to gain a warm fuzzy that the doctor will be around if things really go bad may sometimes be a valid argument but not always if the SEAL corpsman is competent in his paramedic training. All else being equal, opportunities for physician and physician's assistants do come up for professional development to gain better understanding and experience. WARCUM Force Medical is obligated to support the chain of command using resources from within the NSW community first. The bottom line is that mission requirements should always drive request for medical support. We are committed to providing the right human resource in the right place.

In order to support multiple missions, defining the requirement is key. With numerous electronic means to communicate our needs at our fingertips, we can only get better at doing exactly this. My hats off to the SEAL hospital corpsmen and their professional colleagues. Navy medicine will always be standing at your side.



COMPONENT SURGEON

AFSOC



Dan Wyman, MD  
Col, USAF  
Command Surgeon

My first SOMA was outstanding! It was a fantastic opportunity for me to meet our SOF medics (AFSOC and sister services) who are doing incredible things every day and listen to their stories, comments, suggestions, needs, and requirements. I was singularly impressed with the true joint cooperation that is ensuring the delivery of world class medical care in the field. To all our medics, a humble and sincere “thank you” from the new guy. Let me know what I can do to make the SOF Medical Weapon System better!

Prior to SOMA, AFSOC has a one day “Surgeon’s Conference.” One day was not enough. . . next year plan on two days because we definitely needed more time to discuss/debate all the great issues and ideas that are out there. Despite the limited time, I do think we got some good work done during the one day. Thanks again to all who attended, especially those who presented.

I would like to reiterate some of the items that were presented at SOMA and that we continue to build on. First is the stand up of a Medical Modernization Division (SGR) within AFSOC/SG. I mentioned it in the last edition but would like to foot stomp it again. SGR’s mission is to take inputs from the field (emails, AARs, Lesson Learned, MedRed reports, etc.), tease out new needs, formally develop new “validated AFSOC requirements,” and then work toward solutions for those requirements (R&D, POM, acquisition, and field deployment). Each and every AFSOC medic has an important role in this process. Obviously it’s up to those of you in the field to identify the needs which lead to future requirements. As we try to meet the requirements with new technology, equipment, and procedures, we will involve the medics in the field to test and evaluate this new stuff: Is it the right size, shape, weight for your ops? Does it work reliably in the SOF environment? Does it satisfy the need? Maj Jeff Ellis has established an AFSOC/SG Medical Modernization Users’ Group (MMUG) to do just that. The MMUG will basically oversee the Operational Test and Evaluation (OT&E) process and help to determine the way ahead for AFSOC medical modernization. Please find out who your MMUG rep is and get involved in building our future.

We also spent some time reviewing the Table of Allowances (TAs) for a couple of our equipment Unit Type Codes (UTCs). Several of the SOFMEs did a lot of work sorting through lots of equipment--researching, testing, evaluating, and making recommendations. I thank those folks for their hard work. Hopefully these changes and modifications will take place soon . . . please take the time to get familiar with these new TAs and the new equipment.



Putting medical modernization and UTCs together, AF/SG has recently directed AFSOC/SG to assume all Manpower and Equipment Force Package (MEFPAK) responsibilities for SOF-specific UTCs. In a nutshell, we will be responsible for our UTC personnel, equipment, mission capability, future requirements and modernization, funding, and training. Because of all the hard work our predecessors (and some of you) have done in standing up these SOF-specific UTCs, we are more than prepared for these responsibilities and welcome the opportunity for more authority and control. AFSOC/SG staff will present

our way ahead to AF/SG in the next month or so. When able, I will share this plan with the field and then we can all get down to accomplishing the tasks ahead.

Master Sergeant Karl M. Grugel, a Pararescue craftsman assigned to the 123rd Special Tactics Squadron, was our AFSOC Medic of the Year. Unfortunately he was not able to attend SOMA to receive the award but members of his unit stepped in and told his story. As usual, there were many deserving medics for this award. If you run into MSgt Grugel during your travels, please congratulate him and listen to his experiences. We can all learn--always be prepared and expect the unexpected!

Again, thanks for all the miraculous things you do, day in and day out, for the world's mightiest military and our great nation. May God Bless America!



# DEPARTMENTS



LTC Will Schiek, RLTW

The USSOCOM Surgeon's Office will go through several personnel changes in the second and third quarter of 2004. Col (Dr) Hammer, the command surgeon, will retire on 23 January. COL Heintz, the deputy command surgeon, retires in the third quarter. MAJ Bill Darby, our command Environmental Science Officer, wraps up his third year at USSOCOM and will be reassigned all the way to the other side of MacDill AFB, where he will serve as the CENTCOM ESO. The command has and will continue to benefit from their hard work and dedication over the years. We wish them continued success. Many thanks.

In January, I had the pleasure of attending the SOCEUR J4 coordination conference. While there, I spent some time with Maj Elmo Robison, the European Theater Special Operations Command medical planner. The goal of the trip was to review current and future planning efforts with SOCEUR and to visit several areas of medical significance for our SOF warriors deployed overseas.

Our first stop was to Ramstein AB to see the Theater Patient Movement Requirement Center (TPMRC) and Contingency Aeromedical Staging Facility (CASF). The mission of the TPMRC is to coordinate inter-theater evacuation for troops deployed to CENTCOM and EUCOM areas of responsibility. The CASF serves as the holding area for patients who are through-regulated from the theater back to CONUS. Both of these organizations play a vital role in the evacuation system. They are trained, staffed, and equipped to provide first rate support to our deployed forces requiring evacuation.

Next on our list of things to see was Landstuhl Regional Medical Center (LRMC) located just south of Ramstein AB. Maj Robison and I met with the deputy commander, the operations officer, and the chief of the Patient Administration Division. The rumors you may have heard about soldiers being sent home on commercial planes in their hospital gowns are false. Because of overwhelming dona-

tions of socks, underwear, sweat suits, and personal hygiene gear, the chaplains at LRMC are now in the retail clothing business. I met with the SOF LNO at Landstuhl who personally tracks and assists every SOF soldier, sailor, and airman who transits through the hospital. Our SOF LNO for the next 6 months is SSG Lopez from 5th SFG. The operation at LRMC is very professional and provides first rate support.

The last stop on our trip was to the US Army Medical Materiel Center Europe (USAMMCE) in Pirmasens. I spoke with the commander, the chief of the materiel management division, and several others to discuss some of the unique needs of deployed SOF. I urge each of you who deal with medical logistics to visit USAMMCE's unclassified web site at <https://www.pirmasens.amedd.army.mil>. They are very customer oriented and are excited about providing SOF the best possible support possible.

After this three day quick trip to Germany, I feel more comfortable with the medical support we receive on a daily basis. My thanks to Maj Elmo Robison for making this trip possible.





CPT Steven Briggs, PA-C  
MSgt Bob McCumsey, IDMT

All of us here at the USSOCOM Surgeon's Office, and specifically the training staff (all two of us), hope that you had a memorable and safe holiday season. In light of the world situation, we hope that 2004 will be a more peaceful year. We wish all our friends, families, and military community the best in the future.

In an effort to bring about world stability, USSOCOM will continue to lead the way on the Global War on Terrorism (GWOT). Our SOF medics, now and in the future, will continue to be an integral part in supporting this mission. As the USSOCOM mission evolves, so too will the medical requirements to include technology, training, doctrine, and policy. Inevitably, this will affect how we equip and train our force. However, the inevitable future is now, and we are in a time crunch to maintain the high standard of training and to concurrently change with the altering requirements.

We would like to give you an update as to our progress as we are going through this transitional period. As reported in the last issue of the journal, we convened a Requirements Board in August to identify the no joke, boots on the ground, requirements. In November, we took those identified requirements and presented them to another board to develop a critical task list and a societal curriculum to be used as a basis for credentialing our medics. This Curriculum and Examination Board (CEB) is presently in the process of developing the curriculum task list (Terminal and Enabling Learning Objectives). A draft copy is due back to this office

on 15 Feb 04. Somewhere, between the end of February and April, it is our intention to re-convene the Requirements Board to review the CEB's product. Once this curriculum has met the scrutiny of the Requirements Board, we will then present it to the Board of Regents (BOR) for the final approval process and then forwarded to the JSOMTC for implementation.

As you might know, we have attempted to streamline the bureaucratic stalemate that often developed at previous BOR meetings. It is our hope that the new BOR, composed of each component's Chief of Staff, will be able to make actionable decisions. Because the Component Surgeons do not own the troops and assets, this added another level of bureaucracy and often hindered the decision making process. The Surgeons and Dean of the JSOMTC will be held in an "ex-officio" status and will continue to advocate on behalf of commander and component requirements.

There has been much speculation, rhetoric, and criticism as to what we are attempting to accomplish. Many of the comments that get back to us are based on unfounded speculation and misinterpretation by those who wish to see us fail.

For the record, each of the components' medics are fully qualified in their fields of operation and mission readiness. It is our goal to maximize their interoperability in their support of USSOCOM's mission on the GWOT. The only piece we hope to have an effect on is the Special Operations Combat Medic Course (SOCM).

## A SUMMER OF TRAINING, A LIFETIME OF SKILLS

ENS Diana M. Macian

As part of my requirements as a first year medical student at USUHS (Uniformed Services University of Health Sciences), I had the fantastic opportunity to integrate into an operational unit. The choice was clear for me: the Combat Dive Medical Technician (CDMT) course at the Special Forces Underwater Operations School in Key West, Florida. CDMT is designed to teach Army 18Ds and Air Force PJs treatment procedures for dive-related injuries and care. Only 15% of my specific class had previous dive experience, but dive qualification is not required for the course. I felt privileged to attend, not only because I am a Naval Officer, but more importantly because I am a woman, and the three-week class is normally open only to enlisted men.

CDMT can be broadly categorized in two intermixed parts: classroom instruction and practical operational application. The classroom instruction, which comprised the bulk of the course, was expertly taught by enthusiastic and experienced Army, Navy, and Air Force divers. The curriculum included understanding the dive tables (incorporating decompression stops, no "D-dives," and dives at high altitudes); the signs, symptoms, and treatment of dive injuries; the differing characteristics of Type I and Type II decompression sickness, arterial gas embolisms, and pulmonary obstructions; and potential but life-threatening conditions like carbon monoxide/dioxide poisoning, oxygen toxicity, and barotraumas.

Practical coursework was informative, challenging, and ultimately rewarding. These hands-on training sessions included how to perform a complete neurological exam on an injured diver in less than five minutes, even in the most demanding of conditions. The class was also placed in the pressure chamber to realistically simulate the physiological effects on divers with increasing depth. Each lesson built on the last. For example, while at a simulated depth of 165 feet, the students had to perform venipunctures and neurological exams on each other while combating the effects of nitrogen narcosis.

One of the greatest benefits from being able to participate was learning technical skills that could be used not only to treat combat swimmers, but

also in any discipline as a physician or a medic. The class was able to practice many diverse techniques, including venipuncture, placement of an airway, thoracostomy, and endotracheal intubation. The thoracostomy, a chest tube insertion, and venipunctures are skills that I had not previously been exposed to in my education, and I was thrilled to experience practical medicine in action. The medic instructors in the class were quite proficient, demonstrating some of the real-world tricks that they had acquired over the years that allowed them to be efficient and successful in emergent situations with limited resources and manpower. Being exposed to creative yet ingenious uses of medical equipment is an important skill to have in today's ever changing medical environments, especially when the physician may be called to do their duty beyond the conventional hospital.

At the swimming pool located at the school, the class also learned how to effectively deal with the difficult tasks of both finding casualties in the water and managing dive casualty evacuations, including separate training for conscious vice unconscious patients. I also learned the different rescue approaches to drowning victims depending on whether the medic is swimming from shore, located in a boat, or jumping from a helicopter. Deep water rescue breathing and evacuation planning were covered extensively. Most importantly, several different types of water extractions were taught, beginning at the various holds in the water and continuing with the procedures for lifting patients into waiting boats and helicopters. The skills taught are important not only to the Special Forces medic but are useful in the everyday military (for example, if an injured sailor or soldier falls off a dock or ship). The skills that I learned in that short period in the pool made me feel confident that if I came upon a drowning individual, in military or civilian life, I would have a base knowledge of what to do in that situation. As a future physician, I see the practical application of this skill set and invaluable training opportunity.

The training culminated in a series of written tests and a field exercise combining the CDMT students with the dive supervisor class divers. The CDMT students were required to retrieve the dive

supervisor students, who were simulating a wide array of dive injuries. For each victim, a complete exam was performed on the boat, a preliminary assessment given, and the diver was then taken to the dive chamber, where an appropriate treatment plan was executed.

Through it all, I found all the instructors highly competent and professional, and the male students treated me as one of their own. My sponsor, MAJ James Grady, Dive Medical Officer, was help-

ful and informative. The CDMT course was an outstanding choice to really begin a better understanding of the medical world of the combat diver and Special Forces medic.

ENS Diana M. Macian is currently a second year medical student at the Uniformed Services University of Health Sciences located in Bethesda, Maryland.





Bob Clayton, SVERDRUP

The USSOCOM Biomedical Initiatives Steering Committee (BISC) met on 11 December to review FY03 projects, FY04 new starts, and begin planning on FY05 projects. A brief description of those projects will be listed below. The numbers preceding the project refer to the Task Statement which is used to initiate a project.

The Special Operations Computer Assisted Reference (SOCAMRS) 2003 should be in the field by the time you read this article. As I have mentioned before, the work that the BISC does is for your benefit; make sure that you pass your needs and ideas up to your component surgeons.

### **USSOCOM MEDTECH PROGRAM PROJECT DESCRIPTIONS**

#### **DIVING MEDICINE**

1999-6 DIVE COMPUTER (DC) DIVING SURVEILLANCE AND CONFIGURATION MANAGEMENT PROGRAM (Year 3 of 3)

Conduct NAVSEA required monitoring of the DC for three years to track its reliability and to obtain dive profile data of interest to SOF. Collect and recommend changes/modifications to the NavyDC Configuration Management Board suggested by the operational users to the Navy DC and continue to update the VVAL18 Dive Planner software. Compare the Navy DC calculated decompression schedules with other commercial DCs in dive profiles of interest to SOF forces.

2001-1 SWIMMING INDUCED PULMONARY EDEMA (SIPE) (BRONCHOALVEOLAR LAVAGE/CARDIOPULMONARY FUNCTION STUDIES)

Studies incidents of immersion pulmonary edema (IPE) that are reported sporadically in the medical literature, but are being seen with increasing frequency in SEAL training. The condition typically

resolves without sequelae but may progress, especially during Hell Week. Some individuals have been dropped from BUD/S training because of recurrent episodes and the possibility of permanent injury to the students must be considered.

2000-4 ADVANCED SEAL DELIVERY SYSTEM/ UNDERWATER BREATHING APPARATUS (ASDS/UBA) (Year 3 of 3)

The lack of a DMO, dive supervisor, or master diver in the pressurized compartment of the ASDS will not allow the use of the NSW Dive Planner in its current format, so alternative means of calculating decompression obligation must be explored. The use of higher PPO<sub>2</sub>s in the breathing mix should be considered. The lack of a boat air option makes the presence of an emergency open-circuit air capability in the UBA an important feature. This study will formally address these issues and new diving UBAs and techniques will be established as necessary.

2001-3 TREATMENT STANDARDS FOR DCS/AGE (Year 3 of 3)

Form a standing Undersea and Hyperbaric Medicine Society (UHMS) committee to review the literature on treatment of decompression sickness and gas embolism and make recommendations for therapy based on the best clinical series, case reports, and animal studies available. Provide emphasis on the pre-recompression phase of treatment and recommendations to study the most promising new treatment modalities or otherwise enhance SOF ability to treat dysbaric disorders.

#### **REBREATHING APPARATUS APPLICATIONS**

Develop novel sensors and control system for close-loop diving rigs and associated applications to enhance safety and effectiveness. Control system has standard PDA open architectures to allow expansion. (NOTE: Congressional funded interest item)

## **PERFORMANCE ENHANCEMENTS**

### **2001-7 IMPROVING SOF MISSION PERFORMANCE (MSN COMMANDER TRAINING PACKAGE) (Produce CDs)**

Conduct a review of the medical literature and material in the Special Operations Computer-Assisted Medical Reference System (SOCAMRS) and prepare a concise set of specific recommendations regarding techniques for SOF units during operations. Provide a list of recommendations regarding strategies to optimize SOF operator performance for each type of operation and provide results to SOF mission commanders in a format suitable for training at the unit level.

### **1999-3 PROSPECTIVE EVALUATION OF WAVEFRONT-GUIDED PRK (Year 1 of 3)**

Conduct a prospective, randomized clinical trial to compare PRK for the treatment of naturally occurring myopia and astigmatism using wavefront-guided excimer laser treatment. Evaluate safety and effectiveness of procedure and compare wavefront-guided results with matched groups of conventional PRK treatment from historical data in order to provide guidelines and recommendations for SOF.

### **2002-5 MEDICAL SUPPORT OF HIGH SPEED BOAT (HSB) SHOCK MITIGATION (Year 1 of 2)**

Determine mechanisms of injury/shock impact caused while conducting small boat operations. These impacts have resulted in both acute and chronic injuries to Naval Special Warfare operators. Data will be collected and used to support engineering efforts to reduce operator injuries.

### **2002-6 STRESS FRACTURES IN BUD/S TRAINING (Year 1 of 3)**

Determine methods to reduce stress fractures of students while undergoing Underwater Demolition/SEAL training. This problem is multi-dimensional and may include such factors as running mileage base, body mass, changes in running surfaces, footwear factors, the training schedule at BUD/S, and individual metabolic factors.

### **2002-7 COMPUTER-ASSISTED THERMAL PROTECTION TRAINING IN SOF (Year 2 of 2)**

Selection of appropriate thermal protection garments is currently done without the benefit of science-based guidelines. Develop computer based pro-

gram to assist in the selection of appropriate cold weather protection of SOF maritime operators while conducting operations in high risk cold stress environments.

### **2002-9 EFFECTS OF LOW GRADE HYPOXIA AT NIGHT IN SOF AIRCRAFT OPERATIONS (Year 2 of 2)**

Determine effects of long duration flight on cognitive function and night vision using Night Vision Goggles (NVGs) at 10,000 feet and below. Determine levels of performance degradation on cognitive function in relation to reaction time, fine motor coordination, and visual performance, both aided and unaided.

### **EVALUATION OF THE "HYDRO TECH AQUA HEAT SYSTEM" DURING SEAL DELIVERY VEHICLE (SDV) DIVING OPERATIONS (Year 2 of 2)**

Long duration SDV operations in cold water and cold stress significantly impacts human performance and the success of the mission. Conduct a comparative investigation of the "Hydro Tech Aqua Heat System," now used on a limited basis by SDV Team Two, to more precisely define the capabilities and limitations of this technology.

### **2004-4 HYPOXIC EXPOSURES TO IMPROVE PERFORMANCE AT ALTITUDE (Year 1 of 2)**

Review medical literature and develop guidelines to address the issue of using the most-acclimated individuals in a unit for quick-reaction operations at altitude as well as the possible use of aircraft travel in the acclimatization process. Develop tables for hypobaric exposure limits for SOF that are safe (no altitude sickness) at a defined rate of ascent to 4k, 6K, 8K, 10K, 12K, and 16K feet of altitude.

### **2004-14 SOF PERFORMANCE ENHANCING DRUGS (Year 1 of 3)**

Establish the effects of various performance enhancing drugs on sleep architecture during recovery sleep following 68 hours of continuous wakefulness. Evaluate whether performance can fully recover from a 3-day period of sleep deprivation using a late evening/early morning nap followed by a full night of sleep. Determine whether there are operationally significant side effects associated with administration of these drugs. Compare the effects of various doses of stimulants in order to provide more

clear guidance regarding dosage levels and timing strategies.

#### 2004-17 TYMPANIC MEMBRANE INJURIES (Year 1 of 1)

Determine if a pharmacologic compound is best suited to treat tympanic membrane injuries and develop protocols for the administration of prophylactic medications, determine if any side effects are relevant to this protocol, and if this protocol can be used to prevent noise induced hearing loss (NIHL).

### **TACTICAL COMBAT CASUALTY CARE**

#### 2001-6 ANTIBIOTIC PROPHYLAXIS (Year 1 of 1)

Provide specific recommendations regarding the timely use of antibiotics in both penetrating abdominal trauma and penetrating extremity trauma in treating battlefield injuries of SOF combat casualties.

#### ADVANCED POLYMER-BASED SPLINTING SYSTEM FOR USE IN TACTICAL ENVIRONMENTS (Year 2 of 2)

Develop a rapidly setting polymeric casting system that provides structural rigidity, is easy to apply in any scenario, and yet is light-weight. Provide a better solution than currently available by other methods, allowing limited mobility of the limb without causing permanent harm to the soldier, thus enabling the soldier to perform in a limited duty capacity and allowing the team to complete the mission.

#### 2004-8 DEVELOPMENT OF ALGORITHMS FOR REMOTE TRIAGE (Year 2 of 3)

Determine if using a pulse oximeter is a reliable method of ascertaining SOF casualty status, if the Glasgow Coma Scale (GCS) and the pulse oximeter have any correlation to patient status, and provide recommendation on the most reliable field method for SOF medics to determine patient status. Provide research report suitable for publication and changing current protocols in SOF medical training.

#### 2004-11 COLD STERILIZATION (Year 1 of 3)

Investigate technologies for sterilization of surgical and dental instruments that will not require external power and that can be operated far-forward by SOF medical personnel. Provide device that will operate at significantly decreased temperatures (cold sterilization), does not require rinsing of instruments before use, and capable of sterilizing standard surgical and dental tray packaging or individual pieces as needed.

#### 2004-18 COMBAT CASUALTY CARE AFTER-ACTION REVIEW (Periodic based on real-world events)

Establish a panel of SOF medical personnel who were deployed in support of OEF/OIF and other real-world events in support of GWOT to be debriefed on any issues that impacted medical training, equipment, organization, and capabilities. Focus of SOF medical panel should be on determining deficiency areas and recommendations for improvement on any training, equipment, communications, logistics, information management, environmental, and other health-related issues. The panel will also be charged with identifying innovative solutions or procedures which resulted in enabling SOF to overcome situational limitations.

### **MEDICAL INFORMATICS**

#### SPECIAL OPERATIONS COMPUTER-ASSISTED MEDICAL REFERENCE SYSTEM (SOCAMRS) 2003 (Annual)

Develop a fully self-contained, user-friendly single CD-ROM medical reference set designed to support Special Operations medical personnel during operational deployments in remote locations. Incorporate annual transformation of hard-copy biomedical research data covering a wide spectrum of relevant topics of interest for USSOCOM Headquarters and its component commands.



## WANTED

The Fibrin Dressings are no longer to be used in the field (Fibrin Dressing is packaged in a hard plastic container inside of a foil pouch). They have been replaced with the Chitosan Dressing (NSN 6510-01-502-6938) (thin OD green package). Fibrin Dressings were only authorized for use under an Investigational New Drug (IND) protocol, which is closely monitored by the Food and Drug Administration (FDA). Stringent criteria concerning the use of this device was established to collect the data necessary for the Fibrin Dressing to be FDA approved. The data and associated information needs to be refined before this bandage is to be used outside of the IND protocols.

As of this time there are still about 425 of these devices that are unaccounted for or that have not been turned in. If you have or know of the location of any Fibrin Dressings, return them to your medical supply system and draw the Chitosan Dressing (contact your component Surgeon's Office for procedure). The efficacy and safety of the FDA approved Chitosan have proven to be equal to the Fibrin. If you are in possession of a Fibrin Dressing return the dressing to your Component or HQ USSOCOM (address of the Journal) and we'll make sure they are shipped to the Institute for Surgical Research (ISR). Please note that use of the Fibrin Dressings could result in serious consequences since such use would not comply with the FDA guidance. If you are not sure which bandages you have, contact anyone in the USSOCOM Surgeon's Office; they will be glad to assist you.



SOCAMRS CD 2003

# Improved Communications and Hearing Protection in Helmet Systems: The Communications Earplug

John A. Powell, MD

Kent A. Kimball, PhD

Ben T. Mozo

Barbara A. Murphy

## ABSTRACT

Despite significant advances in hearing protection and compliance with protective standards, military personnel are still subject to noise-induced hearing loss in many combat and combat support operations. Although the Army has experienced a decrease of some 15% in primary hearing loss disability cases since 1986, a fiscal year 2000 report documents a 27.5% increase in audiograms, which demonstrated significant threshold shifts in assessed personnel (N=841/1,077).<sup>1</sup> Compensation for noise-induced hearing loss disability for the Army alone exceeded \$180 million in 1998.<sup>2</sup> Thus, communications and hearing protection remain critical issues for personnel involved in Army operations. Aircraft, ground vehicles, and weapons produce noise levels in excess of the limits defined in current hearing conservation standards. Performance of most helmets, improved over the years, remains marginal with regard to speech intelligibility. Furthermore, these helmets do not provide adequate hearing protection. The communications earplug, which consists of a high-quality earphone coupled with an earplug protector, provides the needed extra protection. It weighs less than 15g and is comfortable when worn over extended periods. It is considered highly acceptable by seasoned Army aviators and crewmembers.

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**Disclosure:** Col John Powell has indicated that, within the past 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.

The following presenters(s) reported that their presentations will include discussion of commercial products or services and within the last two years, they have had a 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. Ben T. Mozo (Communication & Ear Protection, Inc - Vice President of Engineering, Development, and Quality); Kent A. Kimball (Private Consultant to CEP, Inc on ISO 9000 Quality, Human Factors Engineering, and Research Matters); Barbara Murphy (Communication & Ear Protection, Inc - Employee).

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## OBJECTIVES

1. Identify adjuncts that improve communication while maintaining a safe level of ambient noise in combat systems.
2. Discuss helmet capabilities in the aviation environment.



**Completion of this article and test offers  
1 CME and 1.2 CNE/CEH  
Complete test on Page 58  
Answer sheet on Page 61**

**INTRODUCTION**

Soldiers are frequently exposed to high levels of noise and routinely face the challenge of effective voice communications. Although the Army has experienced a decrease of some 15% in primary hearing loss disability cases since 1986, a fiscal year 2000 report documents a 27.5% increase in audiograms, which demonstrated significant threshold shifts in assessed personnel (N = 841-1,077.)<sup>1</sup> In addition, compensation for noise-induced hearing loss disability for the Army alone exceeded \$180 million in 1998.<sup>2</sup> Noise levels inside many military systems have been found in many instances to exceed noise exposure limits established by Department of Defense Instruction 6055.12, "Department of Defense Hearing Conservation Program" as implemented by Army Regulation 40-501.<sup>3,4</sup> For example, noise levels in military helicopters with high load capacities (such as the CH-47, CH-46, and H-53) are extremely high and often exceed the aircrews' helmet's capacity to provide adequate hearing protection.<sup>5,6</sup> Similarly, both mounted and dismounted soldiers occupy and/or operate systems that generate high noise levels (e.g., armor, artillery, and small arms). Serious noise and speech communication problems are evident in these systems. The Bradley Fighting Vehicle is known to be one of the noisiest environments in the Army vehicle inventory. An infantry squad riding in the back of a moving Bradley fighting vehicle is exposed to noise levels as high as 117 dBA, which is more than 30 dB higher than the 85 dB permissible steady-state noise limit set by Military-Standard-1474D, Department of Defense Design Criteria Standard, Noise Limits.<sup>7</sup> Although a properly inserted yellow-foam earplug provides protection for the user to operate in that environment for about 2 hours, it completely obscures verbal communication. On the other hand, the DH-132 combat vehicle crew helmet that is used in tactical ground vehicles provides marginal hearing protection and allows speech communication. However, the practice of issuing helmets to the vehicle rather than to the individual also poses significant problems in attaining proper fit, which compromises both protection and communications.

Impulse noise from artillery firing is also a

major cause of hearing damage. For example, a survey of the firing crews testing the XM198 155-mm towed howitzer indicated that they were experiencing adverse health effects associated with high zone firing of the cannon. In fact, field measurements showed the blast overpressures to be in the range of 170- to 183-dB sound pressure level, well in excess of the 140-dB peak pressure unprotected limits referenced in Military Standard-1474D.<sup>8</sup> In some of these circumstances, double hearing protection is required to avoid hearing damage. However, when double protection is needed, voice communications are severely degraded, which then creates the potential for compromise in mission performance and safety.

Noise damage is insidious; hearing loss can overcome some individuals before they are aware of their impairment. The Veteran's Administration compensation for hearing loss, as a result of Army noise exposure, continues to increase each year. In fact, in 1998, the Army reported 34,851 hearing loss cases, representing compensation costs of more than \$180 million.<sup>2</sup> The cost of hearing loss can be described in dollars of compensation after retirement. But the hidden cost of property loss, lower performance, and loss of productivity are more difficult to determine. Soldiers' commitments to serve their country should not result in decreased quality of life caused by preventable hearing loss.

There are three fundamental classifications of hearing protective devices. Inserts or earplugs are inserted directly into the ear canal, creating a barrier between the user's internal ear and the outside ambient noise environment. Circumaural hearing protectors encircle the pinna and are held tightly to the head of the wearer. The canal cap is a supra-aural protector that covers the external ear canal opening. There is usually a soft cushion between the head of the user and the earcup of the canal cap; this cushion serves as an interface to improve comfort. The efficiency of the barrier depends on the interface of the earplug to the ear canal, or the cushion to the head, as well as the attenuation characteristic of the earplug, canal cap, or earcup. There is a fine balance at the interface; tightness or rigidity can cause discomfort for the user, whereas looseness can allow too much sound energy through to the ear.

Helmets used by today's military aviator and combat vehicle crewman represent an evolutionary product wrought by many years of designers' attempts to meet goals and requirements of combat developers. Though initial factors driving helmet

design sought to provide ballistic and/or impact protection, equipment such as microphones and receivers were added to facilitate communications. This need to communicate led to improvements in sound attenuation. During the 1950s and 1960s, improvements in hearing-protection capability of helmets became a requirement as the Army began to acknowledge the military noise environment's deleterious effect on hearing and communications. The sound protective helmet (SPH-4) of the late 1960s was the first helmet designed primarily to protect hearing. Subsequently, the DH-132 combat vehicle crew helmet also incorporated enhancements in hearing protection. The specification for the sound protective helmet-4 also included significant improvements in impact protection and limits on helmet weight in order to enhance the survivability of helicopter crewmen involved in accidents.

Since the advent of night vision goggles, head-up displays, and helmet mounted displays, the helmet has become a mounting platform for devices designed to improve the warfighting performance of the aviator. Although using the helmet in this manner provides the developer with increased latitude for overcoming operator/systems interface problems and creates the potential for significant enhancements to mission performance, it also places the operator in a vulnerable situation. These more complex, multi-purpose helmets may pose health risks from extended use and immediate risk in the event of a mishap.

Recently, earplugs worn in addition to the helmet have provided adequate hearing protection in most Army noise environments. However, sound attenuation of the speech signal by the earplug compounded communications problems.

Presently two techniques seek to reduce noise exposure and improve communications. Active Noise Reduction (ANR) uses electronic circuitry to manipulate and reduce the noise found inside the earcup of a helmet or headset. On the other hand, the Communications Earplug (CEP) relies on passive sound attenuation of the earplug in combination with the attenuation of the earcup to achieve the required noise reduction, while directing the communications signal directly into the ear canal.

Recent technological advances have made application of ANR practical. ANR reduces noise levels in personal hearing protectors by measuring the noise in the earcup and reinserting a dampened out-of-phase noise signal back into the earcup through an earphone. The reinserted sound signal

combines with the noise originally measured and causes it to be cancelled. This out-of-phase canceling technique is usually very effective for low frequencies (below 800 Hz), but it is generally ineffective for higher frequencies. Indeed it may increase noise levels in the 1- to 2- kHz frequency range by as much as 10 dB when activated.

The CEP incorporates a miniature earphone coupled with a replaceable foam earplug tip. It can be used to improve hearing protection and speech communications.<sup>9</sup> It can be worn in combination with a helmet or muff, thus providing double hearing protection with communication capability. The device consists of a miniature receiver encapsulated in a plastic housing; a threaded adapter is used for attaching the replacement earplug. The earplug tip has an internally threaded insert channel that extends through the center from the base to the tip; it mates with the threaded adapter on the transducer housing (Fig. 1). The speech signal is delivered directly from the receiver into the occluded portion of the ear canal. The small wire used to connect the CEP into



Figure 1 CEP



Figure 2 CEP inserted

the communications system is highly flexible for comfort and small enough to reduce the potential for leakage when the wire is routed between the earseal and the wearer's head (Fig. 2). The CEP thus requires an additional step for canal insertion during the donning process. Non-earplug users may require time to accommodate the addition of a device in the ear canal. However, the CEP demonstrably provides adequate hearing protection for 8 hours of duty even in the high noise environment found in the H-53 helicopter. The device also provides voice intelligible communication that approaches asymptotic limits near 100% in those high noise environments.

The weight of the helmet is critical in determining its ultimate effectiveness in today's military environment. Individuals riding in aircraft or vehicles are subject to significant forces on the head and neck--forces amplified by cumbersome headgear. These forces become critical during high accelerations of the head caused by rough terrain, direction changes to evade or escape, and especially during mishaps. The weight of the communication system is typically about 25% of a helmet's total weight. Table I indicates the weight of each communications component of the CEP, the HGU-56/P, and an ANR earcup system. Use of the CEP as a complete replacement of the earcup system would result in saving about 198 g for the HGU-56/P or about 290 g for the ANR communications system (Fig. 3).



Figure 3 Helmet-mounted CEP

We have found that the earcup is comfortable and provides a necessary role for the helmet system as a protective device and mounting platform. The earcup is a very useful feature of the helmet system. It maintains stability of the helmet/head relationship and thus supports the visual performance of the user, who may be using displayed image systems. The

earcup also serves to isolate the pinna from helmet pressure and reduces this cause of discomfort. The CEP will provide the primary hearing protection and transmit voice communications signals, whereas the earcup will supplement the protection, thereby offering adequate protection from any noise environment found in Army aviation. This combination is particularly advantageous when impulse noise is added to the cockpit. Hearing protection plus communication is paramount when large numbers of rounds are fired from open cockpit aircraft with weapon muzzles located near the crewmember's ear. ANR systems do not reduce impulse noise levels in these noise environments.

## RESULTS

Comparative studies of sound attenuation and hearing protection of the HGU-56/P helmet with the ANR and the CEP were conducted during 1996.<sup>10</sup> The sound attenuation provided by the CEP and HGU-56/P helmets was measured by means of the American National Standards Institute S 12.6 real-ear attenuation test procedure. The sound attenuation provided by the ANR helmet was measured by means of the Military Standard-912 microphone in the real-ear procedure. The devices were worn alone and in combination with spectacles and a chemical-biological (CB) mask. Tables II and III display the mean and standard deviation of the real-ear attenuation test measurement results for each of the test frequencies.

Generally, the standard deviations of the attenuation measures for real-ear attenuation test and microphone in real-ear are greater while wearing spectacles or a CB mask than when the device is worn alone, whereas the sound attenuation mean values are greater when wearing the helmet alone. Head shape and fit of the device account for most of the variability of the attenuation measurement. Significantly, the mean attenuation values are greater when wearing ancillary devices with the CEP than is the case for the HGU-56/P with or without ANR. Exposure calculations shown in Table IV demonstrate the effects of using spectacles or a CB mask on the hearing protection capability of the CEP, ANR, and HGU-56/P. The effects of wearing a CB mask remove any hearing protection advantage the ANR device has over the HGU-56/P, but does little to affect the performance of the CEP.

Table V shows the results of speech intelligibility tests of the helmets while wearers use the same

combination of ancillary devices. The speech intelligibility tests were conducted in an ambient noise environment of 105 dB, simulating a UH-60 helicopter flying at 120 knots. The results clearly show degraded speech intelligibility for the circumaural devices when combined with spectacles or a CB mask. During the course of the data collection, the circumaural devices were determined to provide inadequate protection for the subjects performing the test. Ambient noise levels were reduced 10 dB to 95 dB, so the circumaural conditions ensured adequate protection was available. However, the CEP condition was assessed at the 105 dB ambient noise level for the CB mask condition. Most certainly, at the original noise level (105 dB), the difference in intelligibility between the CEP and the circumaural devices would be even greater than indicated in Table V.

Operational tests were conducted on the same devices with 39 aviators from four operational Army units. Aviators used each of the devices for about one week and reported their subjective assessments of rank order of the devices in areas of comfort, speech clarity, sound reduction, and ease of use. Results of these assessments are shown in Table VI, along with the aviators' subjective evaluation of overall preference among the devices. The CEP was preferred even though donning/doffing and comfort were scored at slightly lower levels.

A follow-on study comparing the CEP and the HGU-84 using Navy and Marine Corps aviators assigned at Quantico, Virginia, was accomplished over a 4-month period.<sup>5</sup> A preference questionnaire was used to measure the volunteers' assessments of the CEP when compared to their personal helmets. The areas surveyed were comfort, compatibility, communications performance, use, and overall value added as assessed by each of the individual volunteers.

The rating scale was based on comparisons between the CEP and the helmet normally used by the volunteer with the midpoint (rating of 4) indicating no difference between the two. A rating of 7 indicated the user's highest CEP preference value, whereas a rating of 1 indicated the user's highest helmet preference value. The rating system was as follows: 7, significantly better; 6, moderately better; 5, slightly better; 4, same; 3, slightly worse; 2, moderately worse; 1, significantly worse.

Results of the questionnaire responses were analyzed to determine the overall acceptability of the CEP for use in the H-53 missions when compared to

the HGU-84 helmet. Table VII shows the results from questionnaires administered at the mid-point of the study and at the end of the study. For most of the questions, results showed slightly stronger preference for the CEP at the end of the study, indicating users found the CEP more acceptable with continued use. The fit and comfort of the CEP were judged to be the same as their standard helmet, indicating the user did not realize the perceived potential for discomfort after four months of use. There was a difference in favor of the standard helmet in the donning/doffing process because of the extra step required to install the CEP. (Users will become more proficient in the procedure with continued use of the CEP. Proper training in the donning process will limit or eliminate problems for even the most time critical mission start.) All of the noise reduction and speech clarity responses indicated a strong preference for the CEP over the standard helmet.

Table VIII shows several important factors that should be reviewed when considering techniques for improved hearing protection and speech intelligibility of helmet systems. Considerations of these factors are necessary for aviator's health, safety, and performance during flying duties. While the list is not all-inclusive, it does provide a starting point for the helmet developer.

## DISCUSSION

ANR and CEP offer viable approaches to improving auditory performance while providing adequate hearing protection in Army noise environments. Both systems are far along in their respective development process and show promise for near-term fielding. However, the cost of vehicle modification and helmet system cost, logistics, and reliability should be evaluated carefully when considering the use of ANR or CEP in these environments. The CEP system is lightweight, cost effective, and does not require modification of communication wiring because the earphone element is dynamically designed. We believe that the CEP provides the best available solution for all aspects of hearing protection and auditory performance in most high-noise Army environments. Additional demonstration of this device is planned. It will be introduced into the armor and artillery communities in which there is considerable threat of hearing loss and inadequate communication. Future fielding of this superior product will do much to enhance soldier performance and prevent the deleterious effects of noise-induced hearing loss for our soldiers.

The opinions, interpretations, conclusions, and recommendations are those of the authors and are not necessarily endorsed by the US Army and/or the Department of Defense.

**Table I**  
**WEIGHT OF THE CEP AND HELMET COMMUNICATIONS COMPONENTS**

<b>Item</b>	<b>Weight (g)</b>
CEP with HGU-56/P interface cable and blown-air port adapter	18.8
CEP	8.0
Interface cable	5.0
Blown-air port adapter	5.8
HGU-56/P earcup with foam inserts, 2990 earseal, and earphone (Model 996) x 2	215.0
HGU-56/P earcup with foam inserts and 2990 earseal x 2	175.0
Earphone, Model 996	19.8
ANR earcup and earseal x 2	308.4

**TABLE II**  
**REAL-EAR ATTENUATION CHARACTERISTICS OF THE HEARING PROTECTORS**

<b>Device</b>	<b>Frequency in Hertz</b>								
	<b>125</b>	<b>250</b>	<b>500</b>	<b>1000</b>	<b>2000</b>	<b>3150</b>	<b>4000</b>	<b>6300</b>	<b>8000</b>
<b>HGU-56/P Mean</b>	18.0	19.2	22.7	33.3	31.7	40.4	42.5	43.8	43.4
<b>SD</b>	3.5	3.2	3.5	6.0	4.6	5.0	4.1	6.1	5.8
<b>HGU-56/P Mean with CEP SD</b>	29.1	26.0	33.0	30.6	40.1	50.2	55.6	54.1	53.5
	6.2	6.6	6.4	3.9	3.9	4.4	6.7	5.7	5.7

**TABLE III**  
**PHYSICAL-EAR ATTENUATION CHARACTERISTICS OF ANR1 HEARING PROTECTORS**

<b>Device</b>	<b>Frequency in Hertz</b>								
	<b>125</b>	<b>250</b>	<b>500</b>	<b>1000</b>	<b>2000</b>	<b>3150</b>	<b>4000</b>	<b>6300</b>	<b>8000</b>
<b>ANR1 Mean</b>	21.2	31.2	29.7	34.4	39.9	43.7	47.7	48.8	48.8
<b>SD</b>	4.9	4.9	2.5	3.8	2.5	1.5	2.6	1.6	3.2

**TABLE IV  
DEVICES SHOWN IN ASCENDING ORDER OF MEAN EFFECTIVE EXPOSURE LEVEL IN  
DECIBELS FOR CH-47C NOISE.**

	<b>Alone</b>	<b>Spectacles</b>	<b>CB Mask</b>
CEP	75.2	75.7	75.8
Active Noise Reduction 1 <sup>a</sup>	73.6	76.6	92.1
HGU-56/P	82.0	86.7	96.1

Significant differences are shown, using letters to indicate mean levels.

<sup>a</sup> Refers to Bose Active Noise Reduction System

**TABLE V  
SPEECH INTELLIGIBILITY HEARING PROTECTORS WORN ALONE,  
WITH A CB MASK, AND WITH SPECTACLES AT CONSTANT SPEECH LEVEL**

<b>Test Condition</b>	<b>HGU-56/P</b>	<b>ANRI</b>	<b>CEP with HGU-56/P</b>
Alone			
Mean	57	93	89
SD	15.2	3.6	7.6
Spectacles			
Mean	38	87	89
SD	20.7	10.0	5.4
CB mask			
Mean	39 <sup>a</sup>	75 <sup>a</sup>	84
SD	24.4	23.3	12.1

<sup>a</sup> Ambient noise decreased 10 db

**TABLE VI  
MEAN RESULTS OF OPERATIONAL ASSESSMENT**

<b>Test Device</b>	<b>Speech Clarity</b>	<b>Noise Reduction</b>	<b>Donning</b>	<b>Comfort</b>	<b>Outside Sounds</b>	<b>Stability</b>	<b>Preference (Percent)</b>
HGU-56/P	3.6	3.6	1.4	2.2	3.4	2.4	6
ANR1	2	2	2.4	2.2	2.6	2.4	30
CEP	1.6	1.7	3.3	2.6	1.2	2.5	58

Rank ordered for 1 (best) to 4 (worst).

**TABLE VII  
RESULTS OF MIDPOINT AND FINAL QUESTIONNAIRE ASSESSMENTS**

	<b>Midpoint</b>	<b>Final</b>
Average number of flight-hours using CEP	30.5	40.7
Fit and comfort of CEP	4.2	4.1
Donning/doffing	3.5	3.5
Intercommunications system clarity	6.3	6.5
Radio communications clarity	6.3	6.6
Gender clarity (male)	6.1	6.6
Gender clarity (female)	6.0	6.6
Overall clarity	6.3	6.6
Noise reduction	6.3	6.4
Ability to hear warning signals	6.0	6.6
Ability to hear environmental sounds	4.1	4.1
Overall value of CEP	6.1	6.3

n = 15

**TABLE VIII  
FACTORS FOR CONSIDERATION DURING THE SELECTION PROCESS**

<b>FACTOR</b>	<b>ANR</b>	<b>CEP</b>
Cost	\$450.00-\$1750.00	<\$100.00
Added weight	90 to 312 g	-28 to 11 g
Aircraft modification cost	\$1000-\$5000	Not required
Compatibility	Reduced performance	Unaffected



Colonel John A. Powell was awarded a four-year ROTC scholarship to St. Lawrence University. Upon graduation in 1979, he received his BS degree and was named Distinguished Military Graduate. Afterwards, he obtained an MA and PhD from the State University of New York at Buffalo in 1983. Colonel Powell then attended the Uniformed Services University of the Health Sciences where he received his MD degree. He completed his internship and residency training in Internal Medicine at Letterman Army Medical Center in 1990. He has been Board Certified in Internal Medicine since 1991, and recertified in 2000, and is a Fellow in the American College of Physicians.

Upon completion of his medical training, Colonel Powell served as the Chief of Internal Medicine at Lyster Army Hospital beginning in July 1990. In September 1990, he deployed to the Persian Gulf and served as a medical company commander with the 101st Airborne Division. After Desert Storm, Colonel Powell returned to Fort Rucker and served as the Chief of the Department of Medicine until 1993 and then as the Battalion Surgeon for the 160th Special Operations Aviation Regiment. In March 1994, Colonel Powell was named the Aviation Center Flight Surgeon of the Year.

Colonel Powell served as a staff internist at Womack Army Medical Center during 1996 and then as the Division Surgeon for the 82nd Airborne Division at Fort Bragg, North Carolina, until June 1999. On 11 June 1999, Colonel Powell was reassigned to Fort Rucker, Alabama, to serve as the Commander for the US Army Aeromedical Research Laboratory and on 14 June 2002, Colonel Powell assumed command of the 10th Combat Support Hospital, Fort Carson, Colorado. He deployed with the hospital in March 2003 to Kuwait and Iraq in support of Operation Iraqi Freedom. During the deployment, Colonel Powell was designated as the 30th Medical Brigade Commander, Kuwait. His hospital provided area medical support along a 50-mile line of seven Rear Assembly Areas (RAA) in northern Kuwait, each holding 7,500 to 10,000 troops. Upon completion of the deployment in August 2003, Colonel Powell was awarded the Bronze Star Medal for his outstanding meritorious service and support of thousands of soldiers and units that participated in Operation Iraqi Freedom.



Dr Kent A. Kimball received his Bachelors and Masters of Arts degrees in Psychology with Honors from the University of South Dakota. He continued his education, receiving his Doctorate in Human Factors Psychology in 1971. He entered active duty as a Medical Service Corps officer and was posted to the United States Army Aeromedical Research Laboratory (USAARL) as a Military Aviation Psychologist. While acting as a Deputy Division Director with a research staff of 15, he participated as the laboratory representative and technical expert on several national and international working groups on operational flight research, aviator performance, and flight systems.

Leaving active duty, Dr Kimball remained at USAARL as the Chief of the Field Performance Research Group until his promotion to Director of the Aviation Psychology Division. During this time, Dr Kimball served as the consultant to the Army Surgeon General on Aviation Psychology, developing and validating capabilities to enhance human performance in the low speed, fixed-wing, and rotary-wing aviation community. He also conducted basic/applied research in many areas of psychology as they related to aviation, and published several papers concerning aerodynamics, night vision, auditory and tactile display inputs, and workplace studies in basic performance elements.

In 1979, he was promoted to the role of Director, Biomedical Applications Research Division. He served as a scientific consultant to the Surgeon General, advising on overall planning, development, and execution of Army research programs for the aviation environment, as well as disciplines of biochemistry, biophysics, physiology, optics, experimental psychology, engineering, and medicine as well. He became the Director of Programs and Plans and the Scientific Program Advisor in 1984 and was selected to serve as the Deputy Director of USAARL in 1999.

Dr Kimball was named a Fellow of the Aerospace Medicine Society and a Fellow of the Aerospace Human Factors Association, serving as President from 1995-1996. He also served as the Army coordinator for the International Air Standardization Coordinating Committee, Working Party 61, with involvement in all NATO countries. He is recognized as an international expert in the field of human factors research and has chaired numerous panels for NATO in this field of endeavor. In 1998, he was awarded the Superior Civilian Service Award for his accomplishments within the aviation community and the field of aviation medicine in particular.



Mr. Ben T. Mozo received a Bachelor of Sciences degree in physics from the University of West Florida in 1971. Upon completion of the degree he accepted a position at the US Army Aeromedical Research Laboratory at Fort Rucker, Alabama. There, he managed programs in noise research aimed at reducing continuous and impulse noise exposure of soldiers during the performance of their normal duties.

During the last few years of federal service, Mr. Mozo served as Deputy Director of Aircrew Protection Division, leading a group of scientists in a research program directed toward preventing and reducing injury of Army personnel during training and combat. Areas included injuries resulting from biodynamic stress and high intensity noise. He published more than 80 laboratory reports and articles of research findings pertaining to psychophysical effects and hearing hazard associated with prototype equipment and/or issues relating to training and combat doctrine.

Upon retirement from federal service, Mr. Mozo founded Communications and Ear Protection, Inc. (CEP), a small business dedicated to providing US Army aviators with state-of-the-art personal communications equipment. This equipment has enabled the user to understand vocal messages, even in the highest noise environments of the Army helicopter. Since the business started in 1999, CEP has produced more than 50,000 devices that are used worldwide. The device has been recognized as having capabilities to vastly improve and safeguard the aviator's auditory function, making it a very desirable addition to their ensemble.



Ms. Barbara A. Murphy is a physical science technician with more that 18 years federal service at the US Army Aeromedical Research Laboratory. She holds a Bachelor of Science degree from Auburn University and is a Certified Occupational Hearing Conservationist. Her work at the Laboratory was focused on assessing all facets of hearing protectors and personal communications devices. Since accepting a position with CEP, Inc. in 1999, she has served as Quality Assurance Manager for all CEP product lines, certifying that all products forwarded for final inspection, packaging, and delivery meet customer specification/requirements.



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# Medical Aspects of Air Evacuation from a Tactical Environment

Barry A. Wayne, MD, EMT-T, FAAEM

## ABSTRACT

Aircraft have been used to move military casualties for nearly a century, and rotary wing assets have been used for more than half that time. During this time there have been considerable changes in both the technology employed in the aircraft, and the technology available to the personnel providing medical care on these aircraft. The doctrine guiding the use of rotary wing aircraft in military operations has also undergone considerable modification since its inception. What has not changed, however, are the principles of physiology and the pertinent principles of physics that impact medical operations at altitude. This article will review the pertinent physiology, discuss some of the challenges that are present (pressure changes, vibration, noise, etc), and describe specific actions and modifications to standard care that should be taken to maximize the potential for a good medical outcome.

**Disclosure:** Barry A. Wayne has indicated that, within the past 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. Describe the effect of decreased atmospheric pressure on a patient's physiology and anatomy.
2. Discuss the limitations CASEVAC places upon in-flight patient monitoring.
3. Given a hypothetical critically-wounded patient, list and explain modifications in the patient's care necessary prior to unpressurized ascent.

## Completion of this article and test offers

**1.25 CME and 1.50 CNE/CEH**

**Complete test on Page 59**

**Answer sheet on Page 62**

## INTRODUCTION

The spectrum of tactical medical care can be divided into three stages: care under fire, tactical field care (not under effective fire), and casualty evacuation care.<sup>1,27</sup> Casualty evacuation is usually done by ground transportation, but air transportation of sick and injured patients is increasingly employed in a variety of military and civilian settings. This transportation includes a broad spectrum of activities, from the United States Department of Defense worldwide aeromedical evacuation (AE) system to small aeromedical programs with a single rotary wing

asset. The system of medical evacuation by air is a highly regulated and complex subject involving technical, logistic, and legal issues. This article explores certain underlying physiological and medical considerations common to all these issues. We will focus on the physical environment of flight, the physiological changes that accompany flight, and the particular medical conditions that require specialized management during flight because of these changes.

Although it would be convenient, it is impossible to completely separate operational issues from medical. Compared to civilian non-tactical aeromedical transportation, there are a number of operational considerations that impact the patient and the aircrew. The "mission first" aspect of tactical medical care

imposes constraints on medical care, and thus affects the condition of the patient: extractions may be delayed, medical supplies may be limited or absent due to weight/size restrictions, and common procedures may be unavailable due to absence of time, equipment, or physical space. Both patient and crew may start the CASEVAC physiologically challenged due to the tactical environment (stress, continuous operations/fatigue, nutritional depletion, dehydration, etc.) in ways that would be uncommon in the non-tactical environment. The environment itself may have added constraints--altitude, heat, cold, noise, vibration--that, although not strictly speaking medical issues, certainly impact the care of the patient.

As a last non-medical consideration, it is important to question the usefulness of air transport in urban areas. We have become conditioned to using technology simply because it is available. Previously, aeromedical crews often brought ALS care to a scene that would otherwise be treated with BLS care. Currently, the level of care available in aircraft is comparable to ground transport, where ALS-level care is now increasingly common. Aeromedical evacuation from a metropolitan scene of patients suffering from non-cranial penetrating injuries, or victims of cardiopulmonary arrest, does not improve outcome over ground transportation in several studies.<sup>2,3,4</sup> With trauma patients in general, the results are, again, similar between air and ground evacuation.<sup>5</sup> When undertaking the care of any patient we must always consider the risks, benefits, and alternatives, and, in this respect, there is nothing unique about aeromedical evacuation.

## **HISTORICAL BACKGROUND**

After centuries of dreaming, speculation, planning, and experimenting, the first sustained free flight (in a hot-air balloon in 1783) was manned by a physician and a military officer. Within days of the first sustained free flight, a solo flight was made to an altitude of 2750 meters (approximately 8525 feet), and during the descent the pilot encountered and described the first case of aviation-related dysbarism--a case of middle ear squeeze--thus starting the field of aviation medicine.<sup>6</sup> Many years later, aircraft were used in a military context, with the Italian reconnaissance flights during the Tripolitan War in 1911. Despite some speculation about the (unlikely) removal of injured from Paris by hot-air balloon in 1870, the first documented use of an aircraft for ambulance service was by the French squadron during the retreat of the

Serbian army from the Albanian mountains in 1915, with the transport of twelve casualties in an unmodified aircraft.<sup>7,8</sup> The French later started the first airplane ambulance service with six aircraft that were modified to carry two litter patients each.<sup>9</sup> Following the example of the military, the first noteworthy civilian aeromedical operation was in Australia, where the Reverend John Flynn organized a system of radio technicians, physicians, missionaries, and pilots into what was eventually the Royal Aerial Medical Service. The first flight was flown in 1928, and the service continues to this day.<sup>7</sup>

During the time between the World Wars, technology advanced rapidly. By the start of WWII, not only were aircraft improved, but the planned use of aircraft in medical evacuation, at higher echelons of care, had also begun. By the end of the war, more than 90 percent of allied casualties were evacuated by air.<sup>7</sup> Although the helicopter was used in 1944 for the evacuation of casualties in Burma, there was no extensive use of this platform until the next large conflict.<sup>10</sup> In the Korean War most of the transport of wounded was by ground vehicle, though the helicopter was used for the first time in a systematic fashion to evacuate the wounded from collection points to mobile army surgical hospital (MASH) units, and from these to the evacuation hospitals.<sup>11</sup> The Vietnam War saw an important change in the role of the helicopter in casualty evacuation in that, for the first time, casualties were evacuated from the battlefield to medical treatment directly by helicopter. The time from injury to treatment or hospitalization dropped dramatically--the median time between wounding and treatment fell to 1.5 hours, and 55% were hospitalized the same day as they were wounded.<sup>12</sup> The entire medical air transportation field has continually developed since that time due to the success of the helicopter in providing casualty evacuation care in Vietnam. Beginning in the late 1960s, the civilian sector has adapted this body of information to use the helicopter in both tactical and non-tactical contexts.

## **THE PHYSICAL ENVIRONMENT**

Apart from differences in humidity and temperature, the mixture of gases within the atmosphere is very constant within the troposphere, the lowest layer of the atmosphere, which reaches to an altitude of between 26,000 and 53,000 feet (8,000 to 16,000 meters). The available oxygen (partial pressure) can be estimated at any altitude by multiplying the

atmospheric pressure by 20.9% (0.209). Other than in a mountainous environment, the majority of aeromedical evacuations from the scene will be conducted at low altitudes, where the absolute atmospheric pressure and the resultant reduction of available oxygen are not an issue (see Figure 1). Secondary transport reaches higher altitudes, but it is done in pressurized aircraft.

Despite the low final altitude, the fact that the pressure will be changing during ascent and descent is important. The relationship between pressure and volume is illustrated by Boyle's Law, which states that, at a given temperature, the product of the initial volume of a gas ( $V_1$ ) times the initial pressure of that gas ( $P_1$ ) is equal to the product of the final volume ( $V_2$ ) times the final pressure ( $P_2$ ):  $P_1V_1 = P_2V_2$ . When a given quantity of gas is subject to less pressure (for instance when a balloon ascends to a higher altitude) the volume of the gas will increase, if it is able to expand. A practical example is that the 5 mL of air in an endotracheal tube cuff becomes 7.5 mL when you go from sea level to 10,000 feet, and for this reason, water may be used in endotracheal cuffs and Foley bulbs. Even changes smaller than that would be sufficient to cause excessive pressure on the tracheal mucosa.

changes are very small due to the relatively small variations in temperature that are encountered at low altitudes.<sup>13</sup> As altitude increases, temperature decreases and this leads to an increase in the density of a quantity of gas, but this change is more than offset by the increase in volume brought about by the lower atmospheric pressure—i.e., pressure/volume-wise temperature is not an issue. What is important to consider is that the temperature *does* drop with increases in altitude, and this temperature drop should be anticipated and planned for in terms of keeping both the patient and the aircrew warm. The standard temperature drop is approximately three degrees Fahrenheit (1.7 degrees centigrade) for each thousand feet of altitude gained.<sup>9</sup> On a cool day, the 15-degree temperature drop that accompanies a 5,000 foot ascent may be enough to lead to sub-freezing temperatures.

#### PHYSIOLOGICAL CONSIDERATIONS

There is probably no issue more important in aeromedical evacuation than proper maintenance of the respiratory status of the patient.<sup>14</sup> The process of respiration can be divided into phases:

- a. Ventilation is the process of bringing air into the alveoli via the trachea/bronchi and exhaling a comparable volume by the same route. Ventilation

Altitude Feet	Altitude Meters	Atmospheric Pressure	Alveolar Partial Pressure	Blood SaO <sub>2</sub>	Example
0	0	760 mm Hg	149 mm Hg	97%	Sea Level
5,400	1,647	630	122	92	Denver, CO
10,150	3,096	523	100	85	Leadville, CO
14,495	4,422	412	76	75	Mt. Whitney, CA
20,320	6,198	349	63	65	Mt. McKinley, AK
26,500	8,080	265	48	50	Annapurna
29,028	8,848	253	43	48	Mt. Everest

Figure 1<sup>2</sup>

**Note:** The alveolar partial pressure is obtained by atmospheric pressure – 47 mmHg water vapor pressure X 0.209

Gas volume and/or pressure will also change in response to changes in temperature, but these

can be affected by mechanical obstructions to the pulmonary passageways—either by foreign objects or secretions, a decrease in the diameter of the passageways due to inflammation or edema, a decrease in barometric pressure, fatigue, injuries to the chest wall, or neurologic impairment of breathing. During inhalation, the contraction of the diaphragm causes

an increase in the vertical dimension of the thoracic cavity, and the contraction of the intercostal muscles elevates the ribcage and increases the front-to-back dimension of the thorax. The lungs are open to atmosphere and tightly adherent to the interior thoracic wall due to negative pressure. As the lung capacity increases with inspiration, air rushes in until the pressure in the lungs is equal to that of the atmosphere. When there are rib fractures or other thoracic wall injuries, mechanical impairment or pain may decrease the ability to expand the chest. If there is a pneumothorax, the negative pressure between the interior of the chest wall and the lung is no longer present. In that case, an increase in thoracic volume does not transmit a pressure change to the lung on the affected side, and no pressure gradient is developed within the lung to cause atmospheric air to enter. The mechanical act of breathing is then ineffective, and either a thoracostomy tube connected to suction via a water seal, or positive pressure ventilation via a cuffed endotracheal tube, or both, must be supplied in order to restore effective breathing. Exhalation during normal quiet breathing is a passive activity caused by the recoil of the elastic tissue of the thoracic wall.

b. The next phase of respiration is pulmonary diffusion, during which the oxygen and carbon dioxide pass through the alveolar membrane and capillary walls into the blood stream. Pulmonary edema can impair this process.

c. The transportation of the gases by blood from the alveoli to the tissues is the third phase of respiration. Transportation of oxygen is dependent upon functional hemoglobin in adequate quantities, an adequate circulating volume, and a heart that is capable of meeting the circulatory demands.<sup>15</sup> Examples of conditions that affect the transportation of oxygen to the tissues, in addition to hemorrhage or anemia, include drugs (nitrites) and chemicals (cyanide, carbon monoxide), both of which may be found in smoke inhalation victims.

d. The final stage is diffusion of the gases between blood and tissues. A reduced blood flow to tissue can cause a “stagnant hypoxia,” resulting from shock, hyperventilation, cold, and heart failure.<sup>6</sup> At the tissues, the process that occurs in the lungs is reversed: carbon dioxide diffuses into the plasma and to the red blood cells where it is converted into bicarbonate and hydrogen ions (carbonic acid), and it also displaces oxygen from the hemoglobin, thus forming carbaminohemoglobin. The low pH and low oxygen content of the tissues help promote this process.

Upon exposure to altitude, the minute volume (respiratory rate x tidal volume) of respiration gradually increases through a combination of respiratory rate and tidal volume until it is nearly doubled at 22,000 feet (6,700 meters). This compares to the increases in rate and tidal volume seen when test subjects are exposed to decreasing concentrations of oxygen.<sup>6</sup> The central pH sensors and the peripheral oxygen sensors respond to the acidotic and hypoxic stimuli by increasing the respiratory rate and tidal volume. This increase in minute volume also causes the body to exhale more carbon dioxide, leading to a respiratory alkalosis. The key issue for aeromedical evacuation, versus slow ascent, is that the respiratory alkalosis will be uncompensated, given a flight of a few minutes to hours. The kidneys will not have time to retain hydrogen ion to balance the off-gassing of CO<sub>2</sub>.

This explanation of the process is simplified, but contains the principles necessary to come to the following conclusion: tissues need oxygen; the higher you go, the less oxygen there is and the harder the body has to work to get it. The problem is avoided by supplying supplemental oxygen to all patients who are transported by air.

#### **OTHER MEDICAL MANAGEMENT**

The US Naval Flight Surgeon’s Manual states that there are no absolute medical contraindications to aeromedical evacuation.<sup>9</sup> I argue that this is not true. A patient who is going to die with or without aeromedical evacuation should not be put on the aircraft unless the aircraft has to make the flight anyway for other operational reasons. The decision regarding those who are expected to have a good chance of survival is more difficult. It must be based upon a number of factors. Trauma triage for patients transported by helicopter is useful, though physiologic criteria alone will only identify half of the trauma patients with serious injuries, and situational triage tends to over-triage.<sup>16</sup> Large studies have shown a survival advantage to “scoop-and-run” vs. stabilization in the field for certain categories of injuries (penetrating cardiac wounds, for instance).<sup>17</sup> In studies where there *was* an improved patient outcome in the groups transported by air, the difference in outcome was felt to be due to advanced care by the flight crew (in areas with a BLS EMS system/lack of local ALS capability),<sup>2,18</sup> rural trauma with long (ground) transport distances or times,<sup>2,19</sup> or the ability to avoid unnecessary stops at “referring hospitals” en route to

trauma centers.<sup>4</sup>

Our standard approach to patient management gives priority to the ABCs, and during aeromedical evacuation, attention to these before and during the flight will promote a successful outcome. Before the introduction of transcutaneous pulse oximetry, the inability to adequately monitor a patient en route placed an increased demand on securing an airway *before* takeoff. The issues of rapid sequence intubation and specialized airway interventions in the field have been resolved to some extent by the use of pulse oximetry en route. Smith et al., have observed that pulse oximetry leads to an increased number of interventions, but a decreased number of complications.<sup>19</sup> Our ability to adequately assess the patient's state of oxygenation on a moment-by-moment basis has largely removed undetected airway problems from the list of preventable causes of mortality. The success rate for intubating en route in the air compares favorably to on the ground,<sup>20,21</sup> and the time on the ground that would be spent to prepare and "stabilize" the patient is now better spent in transit to a trauma center.<sup>19,22</sup>

#### GENERAL PRINCIPLES

a. Airway. The importance of a secure airway cannot be over-emphasized. The airway should be appropriately secured *before* flight whenever: 1) there are appropriately trained and equipped personnel on-scene prior to the arrival of the aircraft, and 2) it can be anticipated that the state of the airway could worsen. Some examples of patients with this potential include patients with decreased level of consciousness, facial injuries with obstruction of or bleeding into the airway, and smoke inhalation or airway burns. The airway should be secured with a cuffed endotracheal tube connected to a ventilator (if available). The cuff should be filled with sterile water or saline to avoid the problems associated with pressure changes en route. If the airway is established with a nasal endotracheal tube, the ostia to the sinuses may be occluded, predisposing the patient to barosinusitis.<sup>7</sup> Numerous studies attest to the variability of intubation success and time to intubate between different aircraft types,<sup>22</sup> and this should be taken into account during the decision making process.

b. Breathing. When the patient's airway is secure and the oxygenation status is continuously monitored, a trend toward hypoxia may indicate hypoventilation. When continuous end-tidal carbon

dioxide monitoring is available, a trend toward hypercarbia may also signal a patient who is hypoventilated. The list of reasons for this is quite long and includes head injury, pain medication, spinal cord injury, chest trauma, pneumothorax, and thoracic burns with eschar formation. The response to such a situation depends upon the particular case. It may be impractical to reverse analgesia, and sedation with mechanical ventilation may be preferred. Suspected cases of pneumothorax should be treated with tube thoracostomy connected to a Heimlich valve or suction via a water seal. In one study, clinically diagnosed cases of tension pneumothorax were treated with intercostal cannula decompression in flight.<sup>23</sup> Upon arrival, 15 of 18 patients had pneumothoraces that needed tube thoracotomies, but none had a tension pneumothorax, and there were no complications from the procedures. In one patient, a pneumothorax went undetected and the patient expired. The "take-home lesson" is that suspected cases of pneumothorax should be decompressed; fear of complications from the procedure is unfounded. In the case of hemothorax, the situation is more difficult—the chest tube may release the tamponade effect and exacerbate the rate of hemorrhage. Escharotomy should be performed when the patient's ability to expand their chest is affected, or it may become so en route.

c. Circulation. In civilian trauma centers, time from injury to transport and the actual transport times are generally short. In tactical EMS, that is not always the case, and the system most affected by this factor is circulation. During the Vietnam War, hemorrhage from extremities was a significant source of mortality.<sup>24</sup> In many of these cases, the tactical situation prevented access to a sufficient level of care in a timely fashion. Similar parallels can be seen in contemporary military (e.g., Mogadishu) and civilian (e.g., Columbine) operations where the tactical situation caused long waits for transport, with significant physiologic compromise due to the delays. The data cited below are taken from civilian studies and should be interpreted cautiously when applied to tactical medical operations.<sup>25</sup>

In the setting of acute blood loss, Habler, et al., noted that a normovolemic (dilutional—patient receives crystalloid) anemia is better tolerated than is a hypovolemic anemia (patient receives no fluid) with regard to tolerating the reduction in oxygen content and delivery.<sup>26</sup> The exception to this principle is penetrating injuries to the torso where the source of bleeding has not been controlled, though even these

studies suggest that limited administration of fluids is beneficial to patients with extremely low blood pressures.<sup>18,27</sup> One of the physiologic responses to hypoxemia is a dramatic increase in pulmonary artery pressure.<sup>28</sup> In the face of this pressure increase, without sufficient preload (volume returning to the right ventricle), the hypoxic condition may worsen. Given the debate over whether or not to give fluids at all, the debate over blood versus crystalloid seems of secondary importance. Despite the fact that blood, not crystalloid, has the capability to carry oxygen (along with numerous other physiological advantages), a recent study showed that patients who received blood during lengthy aeromedical evacuations presented to the trauma center more acidotic than patients receiving only crystalloid.<sup>29</sup> However, this study is flawed in many respects and there is clearly a lot more research before solid conclusions are drawn.

Until then, the best available guidelines for the present are: 1) Do not waste precious time, on scene, “stabilizing” patients with penetrating injuries before brief aeromedical flights to trauma centers.

2) Do not over-resuscitate the patient with penetrating trauma to the torso, as this may exacerbate internal bleeding. A systolic blood pressure of 70 mm Hg is fine; if below 50 mm Hg, resuscitate with small (e.g., 250 mL bolus) quantities of fluid.<sup>29</sup> 3) Do establish IV access if possible as it may be useful for the administration of medication (analgesics, antiemetics, paralytics, etc.) 4) Be prepared to monitor the blood pressure while en route. The standard of monitoring should approach that expected in the hospital setting.<sup>10</sup> 5) If measurement of the hemoglobin concentration is available, keep it above 7.5 g/dL if tools are available.<sup>7</sup>

As a practical consideration, label all bags and lines; coil, tape, and secure all IV lines to avoid accidentally dislodging or entangling.

#### **SPECIFIC MEDICAL PROBLEMS**

a. Penetrating Injuries. Apart from chest wounds, pneumothorax, and circulation, a few more points need to be made. Sucking chest wounds should be covered with a three-sided/one-way valve type of bandage. Keep in mind that this may become a completely occlusive dressing en route and will need to be checked if there is any worsening of respiratory status. The tendency to convert an open pneumothorax to a tension pneumothorax will be exaggerated at altitude.

b. Eye Injuries. If there is a penetrating

injury to the eye, there may be air trapped within the globe that will expand upon ascent. Most authorities do not consider this to be a major factor; though when coupled with vibration and acceleration, increased quantities of vitreous may be extruded.<sup>7</sup>

c. Head Injury. Penetrating injuries to the head may be accompanied by air in the cranial vault. If this gas expands at altitude, and is not vented to atmosphere, a rise in intracranial pressure may result. A more common problem with closed-head injuries is nausea. This should be anticipated and treated prophylactically pre-flight, realizing that the antiemetics will affect the mental status of the patient and may make tracking the GCS difficult. If a CSF leak is present (e.g., from a basilar skull fracture), the rate of fluid leakage will increase with altitude.

d. Facial Injuries. Any patient with external fixation occluding or limiting movement over the mouth must have a quick-release device, or have wire cutters attached to the patient. Thus, the fixation wires can be cut in the event of vomiting.<sup>30</sup> Providing an anti-emetic and a nasogastric tube (if not contraindicated by facial injuries) pre-flight is important in these cases. Blood leaking into the sinuses may prevent adequate ventilation of the sinuses and predispose the patient to barosinusitis.

e. Spinal Injuries. Spinal cord injuries may cause significant alterations in the patient’s physiology, depending on the level of injury. A complete neurological assessment is critical. If the patient has neurogenic shock, the combination of venous pooling and bradycardia may cause a significant hypotension. Atropine should be given before any procedure (e.g., intubation, nasogastric tube placement, or painful procedure) to avoid worsening the bradycardia from further vagal stimulation. The spine board should be padded, and plans for turning the patient to relieve local pressure must be made if the flight will last more than four hours.<sup>32</sup>

f. Extremity Injuries. If casts are in place, they should be replaced by splints if it is feasible to do so. At a minimum, they should be bivalved all the way to the level of the skin (the cast padding is not particularly elastic). Dressings should be applied in such a way as to allow the medical attendant to assess the neuro-vascular status of the limb distal to the injury. Pneumatic anti-shock garments (PASG) or military anti-shock trousers (MAST) may be useful for stabilizing pelvic or femur fractures. However, if they are in place, it is important to realize that the pressure inside them will increase with

altitude and must be monitored to avoid impeding the circulation to the distal extremities.

### MEDICAL EQUIPMENT

Without discussing the specifics of brands and models, certain generalities still hold: All medical equipment for aeromedical evacuation should be compatible with both flight and ground environments, and each piece of equipment should have sufficient battery reserve to operate for at least 1.5 times the anticipated flight time.<sup>30</sup> The flight environment includes not only the physical aspects of pressure changes, temperature changes, and vibration, but also the specific electrical system of the aircraft.<sup>31</sup> Oxygen utilization should be calculated before the flight, and whether the aircraft uses a liquid or compressed oxygen system, the oxygen on board should exceed the amount required by at least 1.5 times.<sup>32</sup> If liquid is not used in the endotracheal cuff, a “cufflator” should be available to measure the pressures en route. Back-up equipment should not work on the same power system as the primary equipment—back up electrical equipment with manual, etc.

Most hospital-based and EMS-based equipment uses auditory warnings for critical levels (heart rate, oxygen saturation, etc.) that cannot be heard on small aircraft and helicopters. Equipment should be chosen that has both auditory and visual warning devices. Scanning instruments continuously for visual warnings is very fatiguing, particularly while attending to the other needs of the patient. Heart and breath sounds often are not obtainable by auscultation, and other modalities must be used to obtain this data (blood pressure, continuous end-tidal capnography, and pulse-oximetry devices).

### CONCLUSION

If the operational circumstances require aeromedical evacuation, patients are selected appropriately, and they are accompanied by properly trained and equipped medical personnel, then aeromedical evacuation can be an important adjunct to decreasing the morbidity and mortality associated with tactical operations.

**Editorial Note:** Dr Wayne’s article is reflective of the current attitude toward rapid and responsive casualty evacuation during contingency operations. In the past decade (since 1990), air evacuation has undergone significant changes and improvements that have manifested itself into what I have witnessed as a flexible resource for patient movement that is now in many planning circles considered

to be an essential part of the patient care chain, as opposed to an earlier view of being an adjunct to the health care system. While Dr Wayne’s article does not discuss historically the various improvements in equipment, training, and the development of Critical Care Air Transport Teams, which has significantly redefined “stable for transport,” he does a remarkable job on highlighting the physical environment which has remained a significant factor in patient movement by aircraft. While operational and medical plans continue to put greater reliance on rapid air evacuation to reduce battlefield casualties, he argues that the patients survivability and a number of other medical considerations must be brought into account to avoid what he terms a “scoop and run” mentality. This is not without debate of course, but it does remind the reader of the essentials of triage, ABC management (with emphasis on airway), and focuses on addressing those concerns first and foremost.

Recent operations in Afghanistan and Iraq have demonstrated the continued emphasis toward very rapid evacuation by the utilization of opportune aircraft, the forward employment of aeromedical assets, and the distribution of air assets to operational and tactical field commanders. This has led to a new consideration for medical personnel, and that is the ability for operational commanders to launch “CASEVAC” platforms without necessarily clinical consultation. While no one would consider the evacuation “out of bounds” or without authority, it does present the opportunity for aircraft to be launched with inappropriate equipment or personnel on-board. This scenario is reflective of Dr Wayne’s analysis of the need for proper medical evaluation and care prior to evacuation, and as stated in his conclusion “If the operational circumstances require aeromedical evacuation, patients are selected appropriately, and they are accompanied by properly trained and equipped medical personnel, then aeromedical evacuation can be an important adjunct to decreasing the morbidity and mortality associated with tactical operations.”

Lt Col Kevin Riley, USAF, MSC, CEM



Commander Wayne entered the Navy Medical Corps in 1990 and served in a variety of operational and clinical settings. A 1983 graduate, Dr Wayne initially trained in Family Practice. Following six years of clinical experience in Emergency Medicine, Dr Wayne accepted a commission in the US Navy.

Trained as a Flight Surgeon, Dr Wayne completed a tour with the Air Test and Evaluation Squadron FOUR as an Operational Test Director. After completing a residency in Emergency Medicine, Dr Wayne was the director of the Emergency Department of Naval Hospital Sigonella, Italy, from 1997 to 2000. Now a member of the



faculty of the Uniformed Services University of the Health Sciences, he is the Assistant Professor and Director, Education Division, Department of Military and Emergency Medicine.

Dr Wayne is a US Naval Flight Surgeon, a designated naval parachutist, and a hyperbaric medical officer. He has written and lectured on these and other related military medicine topics at numerous national and international symposia and training courses. He is trained as an EMT-Tactical and has provided direct medical support to numerous federal law enforcement operations.

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- Charles' Law is  $V_1/V_2 = T_1/T_2$ , where the temperature is expressed in terms of absolute temperature (Kelvin). For example, a change from 50 degrees Fahrenheit to 32 degrees Fahrenheit does not create a change in volume to 1.56 times smaller than the original volume (50/32), but only a change in volume of 1.04 times smaller than the original volume, because the ratio of absolute temperatures is 283/273.
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- The amount of oxygen being delivered to the tissues ( $DO_2$ ) is equal to the product of the Cardiac Output (Q) and the Arterial Oxygen Content ( $CaO_2$ ):  $DO_2 = Q \times CaO_2$ . Cardiac Output (Q) is the product of Heart Rate and Stroke Volume, and the Arterial Oxygen Content is equal to 1.3 x hemoglobin x Saturation ( $SaO_2$ ):  $CaO_2 = 1.3 \text{ Hb} \times SaO_2$ . The factors that can be directly influenced are the stroke volume, which is proportional to the circulating blood volume under normal circumstances, the hemoglobin, and the saturation. Tissues do not extract all of the oxygen that is present —the normal range of extraction is 22 – 32%. To a certain extent, tissues can adjust to decreases in blood flow by increasing the extraction of oxygen. The exceptions to this principle are the heart and the diaphragm which extract the maximum amount of oxygen under normal circumstances. When the tissues reach the point of maximum oxygen extraction any further decreases in blood flow will cause the amount of oxygen being extracted to be insufficient to meet the needs of the tissue, and a state of shock exists (from Marino, Paul L., *The ICU Book*, Philadelphia: Lea & Febiger, 1991; pp 14-19).
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- Most small aircraft and helicopters used 28 volts direct current (VDC). Many pieces of equipment designed for land EMS vehicles are designed for 12 VDC or 110 volts alternating current (VAC). If your field equipment is configured for 12 VDC/110 VAC, it is imperative to know if the helicopter has an inverter to produce 110 VAC.
- The predicted change in oxygen tension with a change in altitude can be calculated with the following formula:  $PaO_2$  (at altitude) =  $22.8 - 2.74(X) + 0.68(Y)$ , where X is the anticipated altitude--in thousands of feet above sea level--and Y is the patients sea level  $PaO_2$ . This calculation will enable you to anticipate a  $PaO_2$  drop en route that will require supplemental oxygen. The oxygen quantity is then calculated based on the patient's minute volume times a  $FIO_2$  of 1.0 (100% oxygen) times 1.5 the predicted flight time.

# Tactical Medicine Training for SEAL Mission Commanders

Frank K. Butler, Jr, MD

## ABSTRACT

The Tactical Combat Casualty Care (TCCC) project initiated by Naval Special Warfare and continued by the US Special Operations Command has developed a new set of combat trauma care guidelines that seek to combine good medical care with good small-unit tactics. The principles of care recommended in TCCC have gained increasing acceptance throughout the Department of Defense in the four years since their publication and increasing numbers of combat medical personnel and military physicians have been trained in this concept. Since casualty scenarios in small-unit operations typically present tactical as well as medical problems, however, it has become apparent that a customized version of this course suitable for small-unit mission commanders is a necessary addition to the program. This paper describes the development of a course in Tactical Medicine for SEAL Mission Commanders and its transition into use in the Naval Special Warfare community.

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**Disclaimer:** The opinions and assertions expressed by the author are his alone and do not necessarily reflect the views of the Departments of the Navy or Defense.

## INTRODUCTION

In the past, combat trauma training for Special Operations corpsmen, medics, and pararescuemen (PJs) was based on the principles taught in the Advanced Trauma Life Support (ATLS) Course.<sup>1</sup> In 1993, the Naval Special Warfare Command established a formal requirement to review the management of combat trauma in the tactical Special Warfare environment and make recommendations for changes as appropriate. The research approach used was to do a preliminary literature review and establish an initial set of recommendations. The recommendations were then reviewed over a six-month period in meetings with Special Operations corpsmen, medics, and physicians, and consensus opinions were developed. Draft copies of the paper were then sent out to approximately 30 subject matter experts in the fields of emergency medicine, general and trauma surgery, critical care medicine, anesthesiology, and cardiothoracic surgery. The paper was

again revised to incorporate changes recommended by these reviewers and subsequently published as a Supplement to *Military Medicine*.<sup>2</sup> The approach used was intended to ensure that the TCCC guidelines had as much input as possible from combat corpsmen and medics.

## TCCC TRANSITION

Preliminary concept approval was first obtained from the Commander of the Naval Special Warfare Command. The next step in the process was to take it to the Bureau of Medicine and Surgery (BUMED). Initial BUMED contact was with CAPT Bob Hufstader, then Deputy Chief of the Medical Corps, who proposed that the best way to approach BUMED evaluation was to determine specifically which courses TCCC should be taught in and to seek out the individuals responsible for teaching that course. This was accomplished and, in March 1996,

TCCC training was incorporated into the Undersea Medical Officer (UMO) training course in Groton, Connecticut, which is responsible for training the UMOs who support SEAL units. After this action had been taken, final approval of this concept was approved from the Commander of the Naval Special Warfare Command. In his letter of 9 April 1997,<sup>3</sup> RADM Tom Richards directed that the TCCC guidelines as outlined in reference two be used as the standard of care for the tactical management of combat trauma in Naval Special Warfare.

A six-hour TCCC course for SEAL corpsmen was developed, approved by BUMED, and taught to all SEAL corpsmen beginning in April of 1997. This course was designed to supplement the extensive trauma training received by SEAL corpsmen at the Joint Special Operations Medical Training Center (JSOMTC). The JSOMTC has now added the TCCC course to its curriculum. The principles of TCCC as taught in this course have also been adopted at least in part by the USAF,<sup>4</sup> the US Army (personal communication, COL Richard Shipley, Commander of the US Army Academy of Health Sciences), the Israeli Defense Force,<sup>5</sup> the US Army Special Forces,<sup>6</sup> and the US Marine Corps. The TCCC course was taught at the Field Medical Service School at Camp Pendleton for the first time in February 2000.

One of the most important milestones in the transition process was the inclusion of the TCCC guidelines in the Prehospital Trauma Life Support Manual.<sup>7</sup> The fourth edition of this manual, published in 1999, contains for the first time a chapter on military medicine. Preparation of this chapter was coordinated by CAPT Greg Adkisson and COL Steve Yevich of the Defense Medical Readiness Training Institute in San Antonio, Texas. The recommendations contained in the PHTLS Manual carry the endorsement of the American College of Surgeons Committee on Trauma and the National Association of EMTs. ***The TCCC guidelines are the only set of battlefield trauma guidelines ever to have received this dual endorsement***

Although the TCCC protocol is gaining increasing acceptance throughout the US Department of Defense and allied military forces, this protocol by itself is not adequate training for the management of combat trauma in the tactical environment. Since casualty scenarios in small-unit operations entail tactical problems as well as medical ones, the appropriate management plan for a particular casualty must be developed with an appreciation for the entire tactical

situation at hand.<sup>2</sup> This approach has been developed through a series of workshops carried out by SOF medical personnel in association with appropriate medical specialty groups such as the Undersea and Hyperbaric Medical Society, the Wilderness Medical Society, and the Special Operations Medical Association.<sup>8-10</sup>

The most recent of these workshops, which addressed the Tactical Management of Urban Warfare Casualties in Special Operations, noted that several of the casualty scenarios studied from the Mogadishu action in 1993 had very important tactical implications for the mission commanders.<sup>10,11</sup> The unconscious fast-rope fall victim in the first scenario resulted in a decision by the mission commander to split the forces in his ground convoy, detaching three of the twelve vehicles to take the casualty back to base immediately, leaving the remaining nine to extract the rest of the troops. The helicopter crash described in Scenario 2 resulted in the pilot's body being trapped in the wreck. As several discrete elements from the target building moved towards the crash site to assist, as described in Scenarios 5 and 6, they suffered multiple casualties. The casualties eventually outnumbered those who were able to maneuver, forcing the elements to remain stationary and preventing them from consolidating their forces. When a rescue convoy finally reached the embattled troops at the crash site, there was a delay of approximately three hours while the force worked feverishly to free the trapped body. Several hundred troops and over 25 vehicles were vulnerable to counterattack during this period. These scenarios made it obvious to members of the workshop panel that training only combat medics in tactical medicine is not enough. If tactical medicine involves complex decisions about both tactics and medicine, then we must train the tactical decision-makers--the mission commanders--as well as combat medical personnel in this area.<sup>10</sup> This paper is a description of how that has been accomplished in the Naval Special Warfare community.

#### **THE TACTICAL MEDICINE FOR SEAL MISSION COMMANDERS COURSE**

The concept of medical training for Special Operations combat operators is not new, but in the past, this training has usually focused on skills rather than strategies. The operators were trained to start IVs, apply field dressings, and so forth. This training is important, but needs to be supplemented by a strategies approach to combat medicine. A Tactical

Medicine for SEAL Mission Commanders Course was developed to meet this need. The course is currently comprised of 5 main sections:

- a) A background of the Tactical Combat Casualty Care initiative;
- b) An explanation of the need to train mission commanders in this area;
- c) A description of how people die in ground combat;
- d) The TCCC guidelines for Care Under Fire and Tactical Field Care;
- e) An introduction to scenario-based training and planning.

The background of the TCCC concept is presented as described above. The remaining aspects of the course are outlined below.

### WHY TRAIN MISSION COMMANDERS IN TACTICAL MEDICINE?

The Tactical Medicine course as taught in Naval Special Warfare provides a rationale for why mission commanders need training in this area. While it is true that a corpsman usually takes care of the casualty, the mission commander runs the mission and *what is best for the casualty and what is best for the mission may be in direct conflict*. The question is often not just whether or not the mission can be completed successfully without the wounded individual(s); the issue may well be that continuing the mission may adversely affect the outcome for the casualty. If the mission is to be successfully accomplished, the mission commander may have to make some very difficult decisions about the care and movement of casualties. Additional reasons to train SEAL mission commanders in tactical medicine include: 1) the importance of having the commander know that the care provided in TCCC may be substantially different than the care provided for the same injury in a non-combat setting; 2) the unit may be employed in such a way that there is no corpsman, medic, or PJ immediately available to the injured individual; and 3) the corpsman, medic, or PJ may be the first team member shot.

### HOW PEOPLE DIE IN GROUND COMBAT

This portion of the course was adopted from a presentation given by COL Ron Bellamy to the Joint Health Services Support Vision 2010 working group.<sup>12</sup> It is critically important that mission commanders be aware that the individuals with the most severe wounds are not necessarily the ones who

should be treated first. An understanding of which deaths are avoidable is enhanced by emphasizing COL Bellamy's important concept of focusing on the causes of **preventable** death on the battlefield. These are summarized in Figure 3. Air warfare, combat swimmer missions, shipboard warfare, and other types of combat would, of course, be expected to have different injury patterns.

### BASIC COMBAT TRAUMA MANAGEMENT PLAN

The three phases of care proposed in the TCCC paper<sup>2</sup> are shown in Figure 4. "Care Under Fire" is defined as the care rendered by the medic or corpsman at the scene of the injury, while he and the casualty are still under effective hostile fire. The available medical equipment is limited to that carried by the individual operator or by the corpsman, PJ, or medic in his medical pack. "Tactical Field Care" is the care rendered by the corpsman, PJ, or medic once the unit is no longer under effective hostile fire. This term also applies to situations in which an injury has occurred on a mission, but there has been no hostile fire. The available medical equipment is still limited to that carried into the field by mission personnel. Time prior to evacuation to an MTF is very variable. "Combat Casualty Evacuation Care" or "CASEVAC" care is the care rendered once the casualty (and usually the rest of the mission personnel) have been picked up by an aircraft, vehicle, or boat. Personnel and medical equipment that may have been previously staged in these assets will now be available.

### CARE UNDER FIRE

Once these terms have been reviewed, the protocol outlined for the Care Under Fire phase as shown in Figure 5 is presented and discussed. The care in this phase is the same as outlined in reference two except for the important added recommendation that the casualty continue to return fire if able to do so effectively. This change from the original protocol was proposed by then-CDR Pat Toohey, Commanding Officer of SEAL Team Four. It is very much in keeping with the philosophy noted in the original paper that *the best medicine on the battlefield is fire superiority*. The fact that control of hemorrhage is the top priority is emphasized by pointing out that exsanguination from extremity wounds is the number one cause of preventable death on the battlefield. Hemorrhage from extremity wounds was the cause of death in more than 2500 casualties in Vietnam who had no other injuries.<sup>13</sup>

The need for immediate access to a tourniquet in such situations makes it clear that *all SOF operators on combat missions should have a suitable tourniquet readily available at a standard location on their battle gear and be trained in its use.*<sup>2,3</sup> Mission commanders are reminded that since this is an equipment item for every man in the unit, it is the mission commander's responsibility to ensure that a tourniquet is part of the routine pre-mission equipment check. As a final point of emphasis, the story of the death of General Albert Sidney Johnston at Shiloh on 7 April 1862 is presented.<sup>14</sup> General Johnston was one of the senior commanders in General Robert E. Lee's army. His command surgeon, Dr. David Yandell, had directed that tourniquets be issued to the troops prior to the battle. During the battle, General Johnston sustained a fatal hemorrhage from a popliteal artery injury that presumably could have been controlled by a tourniquet. The General forgot that he had one available and bled to death with his tourniquet in his pocket.

Since some of the mission commanders may have had some basic medical training, a few other major points of departure from civilian care are emphasized. Does the cervical spine not need to be immobilized before moving a trauma patient with a head or neck injury? The findings of Arishita et al.,<sup>15</sup> answer this question convincingly. They reviewed the issue of cervical spine immobilization (CSI) in penetrating neck injuries in Vietnam and found that in only 1.4% of patients with penetrating neck injuries would CSI have been of possible benefit. Time to accomplish CSI was found to be 5.5 minutes, even with experienced EMTs. Their conclusion was that potential hazards to both patient and provider in a combat environment outweighed the potential benefit of CSI for penetrating neck injuries. The distinction between penetrating trauma and blunt trauma is reviewed, since parachuting injuries, fast-roping injuries, falls, and other types of trauma resulting in neck pain or unconsciousness should be treated with CSI unless the danger of hostile fire constitutes a greater risk in the judgement of the treating corpsman, PJ, or medic.

#### TACTICAL FIELD CARE

The outline of Tactical Field Care as shown in Figure 6 is presented. The Mission Commanders course omits much of the medical literature discussion contained in the longer (6-hour) BUMED-approved course taught to SEAL corpsmen.

The second major change from the protocol presented in reference two deals with the fluid resuscitation of patients with penetrating trauma of the chest or abdomen who are losing consciousness. Several such casualties were discussed at the workshop on urban warfare casualties workshop.<sup>10</sup> There was a clear consensus in the expert panel that should a casualty with uncontrolled hemorrhage have mental status changes or become unconscious (blood pressure of 50 systolic or below), he should be given either an empiric bolus of 1000cc of Hespan or enough fluid to resuscitate him to an end point of improved mentation (systolic blood pressure of 70 or above.)

A Tactical Field Care battlefield triage plan has been proposed for mission commanders and is shown in Figure 7.

#### CASEVAC CARE

The term "CASEVAC" is used to describe this phase instead of the commonly used term "MEDEVAC" because the evacuation may require that the aircraft or other evacuating asset enter an area where the danger of hostile fire is imminent. Some aircraft will do this and some won't. The need for the mission commander to be sure that the evacuating asset will enter a hostile fire zone is illustrated dramatically by Moore and Galloway in their book "We Were Soldiers Once and Young."<sup>16</sup> During the battle of the Ia Drang Valley, the first large US ground action in Vietnam, the 11<sup>th</sup> Air Assault Division made contact and had taken numerous casualties. The request for helicopter evacuation was made to the designated MEDEVAC unit, but upon learning that there was a firefight in progress, this unit declined to perform the evacuation. The casualties were not evacuated until the 229<sup>th</sup> Assault Helicopter Battalion, a combat air cavalry helicopter unit, was contacted, resulting in a significant delay to definitive care.

#### INTRODUCTION TO SCENARIO-BASED PLANNING

Despite the large amount of Special Operations time and effort that has gone into developing a combat-appropriate trauma management plan, the bottom line remains that no single plan is optimal for all situations. This realization led to the concept of scenario-based management plans.<sup>2</sup>

Some representative scenarios are presented in Figures 8 to 15. The medical and tactical issues to be addressed in most of these scenarios have been

addressed previously.<sup>8-10</sup> Figures 8 and 9 are from the Battle of Mogadishu on 3 October 1993. This engagement resulted in the most US casualties in a single firefight since Vietnam (18 dead, 73 wounded). In addition, there was a delay of 15 hours before the first wounded were evacuated to a Combat Support Hospital. Starting with scenarios that have already occurred helps to raise the level of interest in the discussions that ensue.

Figures 10 to 12 deal with a parachute insertion and subsequent land warfare phase with injuries of several different magnitudes imposed on landing. The medical care of these casualties is relatively straightforward, but they require some difficult tactical decisions by the mission commander which are discussed.

Figures 13 to 15 deal with casualty scenarios that occur during diving operations. This is a very important aspect of the training for SEAL mission commanders because the underwater environment has such a large impact on the management plan and because this area is virtually unaddressed in the civilian medical literature.

As the group discusses the various scenarios, it becomes apparent that the appropriate care for a casualty may vary based on the criticality of the mission, the anticipated time to evacuation, and the environment in which the casualty occurs. Any management plan for a combat casualty discussed in the planning phase should be considered advisory rather than directive in nature, since only infrequently will an actual tactical situation unfold exactly as planned.

These scenarios illustrate that the importance of the role of the mission commander in dealing with casualties is often just as important as that of the corpsman, since the unit's emergency action must address both the medical and the tactical problems at the same time. It is obviously not possible to plan for every casualty scenario that might be encountered, but review of several casualty scenarios most appropriate for an impending operation is a valuable addition to the planning process.

## TRANSITION

The concept for the Tactical Medicine for Mission Commanders course was first presented to the line leadership at the Naval Special Warfare Center, which is responsible for teaching the SEAL Junior Officer Training Course to all officer graduates from Basic Underwater Demolition/SEAL training (BUD/S). The concept was approved, and with the

help of the medical staff at the NSWC, the course has been taught to all officers graduating from BUD/S since April of 1998. It is being taught to SEAL operational units at present. Two recent innovations have been recommended by SEAL line officers and are in the process of being implemented. The Director of Training at the Naval Special Warfare Center stressed the need to provide course attendees with material at the course that they could use to help implement this training at the unit level. A Tactical Medicine for Mission Commanders CD has been approved and is in production at the time that this article is being written.

It is now anticipated that training in Tactical Medicine for Mission Commanders will be added to the SEAL Tactical Training Course taught to all new SEALs after graduation from Basic Underwater Demolition/SEAL training. Although this course has been developed within the SEAL community, it has great applicability to the other components of SOF (Rangers, Special Forces, and Air Force Combat Control Teams) as well as to the Marine Corps and to other conventional forces that conduct small unit operations. Efforts are ongoing to coordinate with other potential users of this course to demonstrate the course to them and make course materials available if desired.

## THE SEAL TACTICAL SIMULATOR

A parallel concept could be used to help develop responses to tactical problems of a non-medical nature in SEAL operations. The aviation community makes extensive use of flight simulators to sharpen pilots' responses to both aircraft emergencies and tactical problems. The SEAL community likewise makes extensive use of the SEAL Delivery Vehicle (SDV) simulator to train new SDV pilots and navigators. There is, however, no simulation tool currently available for non-SDV SEAL operations. The same scenarios used for casualty discussion can be modified to present tactical problems. Figure 16 describes a ship attack in which there is an underwater explosion, but the divers have apparently suffered only middle ear barotrauma and can both continue with the mission. A number of tactical options may be considered by the senior member of the swim pair: 1) ignore the possibility of additional charges and continue with the planned operation; 2) abort the operation and swim away; 3) swim away from the ship and observe for possible periodicity of the charges; 4) surface and shoot the individual dropping

the charges; 5) descend to the bottom of the harbor in an attempt to avoid the effects of subsequent blasts; or 6) swim 180 degrees around to the other side of the target ship to try to gain shielding from the effects of subsequent blasts. Several of these options may be reasonable; others would be dramatically ill-advised.

Use of scenario-based casualty planning has led to a number of medical research projects designed to address unanswered questions or shortcomings in medical technology. The same thing might occur using tactical scenarios. For example, if the prisoner in Figure 17 is released, he might compromise the mission and endanger the lives of mission personnel. If he is restrained at the location of the contact, there would be no way to release him after the mission is complete without returning to that location before extraction. One reasonable option might be to develop a pair of time-release handcuffs that will allow the prisoner to be restrained and left at the contact site but released after a preset time.

Use of real-world events would add a valuable measure of realism to the training obtained with the SEAL Tactical Simulator (STS). Figure 18 describes a real-world Special Operation – the rescue of the Air France Flight 139 hostages at the Entebbe airport by Israeli commandos in 1976.<sup>17</sup> All of the details of the scenario are historically correct up to the final line, which describes the first door entered as being booby-trapped and asks how the leaders of the second and third elements should change their tactics as a result. If they choose to enter through their doors as planned, there is a very reasonable expectation that these doors will be booby-trapped as well, more commandos will be killed, and all the hostages executed. Looking for roof entrances or other similar maneuvers would take too much time. The best choice might be for the second and third elements to enter the terminal through the first door since that booby trap has already been tripped. Another good choice might be a window entry if

there are suitable windows present. The chilling account of the rescue attempt at the town of Ma'alot on 15 May 1974 emphasizes the importance of speed in hostage rescue.<sup>17</sup> Terrorists had taken a school and were holding the children and teachers hostage. When the assault commenced, the terrorists began killing the hostages; 22 children and teachers were killed and another 56 wounded. The point that will be made to the individual studying the scenario is that in this type of operation, the difference between a dramatic success and a disaster may be measured in just a few seconds.

As a research effort, the STS would progress from collection of suitable scenarios to development of tactical responses to determining the relative merits of each option. Advanced development might consist of adding combat video footage and a suitable computer interface. As with medical casualty scenarios, plans developed in this type of an exercise would often need to be modified in the field as a tactical situation unfolds somewhat differently from the ones contained in the STS. Use of the STS to train for tactical problems that emerge during a SOF operation is, however, consistent with the guidance provided by General Peter Schoomaker, Commander-in-Chief of the US Special Operations Command, in his vision statement: “We must also have the intellectual agility to conceptualize creative, useful solutions to ambiguous problems . . . This means training and educating people *how to think, not just what to think.*” This project has been proposed as a candidate for funding through the USSOCOM Small Business Initiative Research Program and is currently competing for funding in FY01.

#### ACKNOWLEDGMENTS

Special thanks to the many Special Operations physicians, corpsmen, PJs, and medics who have assisted with this project. Thanks also to the SEAL line officers who have contributed their time and support to the Tactical Medicine for Mission Commanders project.

## Figure 1

### Tactical Combat Casualty Care Objectives

1. Treat the casualty
2. Prevent additional casualties
3. Complete the mission

## Figure 2

### How People Die in Ground Combat

- KIA: 31% Penetrating Head Trauma
- KIA: 25% Surgically Uncorrectable Torso Trauma
- KIA: 10% Potentially Correctable Surgical Trauma
- KIA: 9% Exsanguination from Extremity Wounds
- KIA: 7% Mutilating Blast Trauma
- KIA: 5% Tension Pneumothorax
- KIA: 1% Airway Problems
- DOW: 12% (Mostly infections and complications of shock)

## Figure 3

### Preventable Causes of Death on the Battlefield

1. Bleeding to death from extremity wounds (60%)
2. Tension pneumothorax (33%)
3. Airway obstruction (maxillofacial trauma) (6%)

## Figure 4

### Phases of Care

- Care Under Fire**
- Tactical Field Care**
- Combat Casualty Evacuation (CASEVAC) Care**

## Figure 5

### Care Under Fire

1. Return fire as directed or appropriate
2. The casualty(s) should also continue to return fire if able.
3. Try to keep yourself from getting shot
4. Try to keep the casualty from sustaining additional wounds
5. Stop any life-threatening hemorrhage with a tourniquet
6. Take the casualty with you when you leave



## Figure 6

### Tactical Field Care

1. CPR should not be attempted on the battlefield for victims of blast or penetrating trauma who have no pulse, respirations, or other signs of life.
2. The nasopharyngeal (tube in the nose) airway is the airway of first choice for unconscious patients until the CASEVAC phase. Patients who are shot in the face may require a surgical airway.
3. Progressive, severe respiratory distress in the setting of unilateral blunt or penetrating chest trauma on the battlefield should result in a presumed diagnosis of tension pneumothorax and that side of the chest should be decompressed with a needle.
4. Casualties who have controlled bleeding without shock do not need emergent IV fluid resuscitation.
5. Casualties who have had bleeding that is now controlled but who are in shock should receive 1000cc of Hespan.
6. Casualties who have uncontrolled hemorrhage from penetrating wounds of the chest or abdomen should receive no IV fluid in the field.
7. An exception to rule number 6 above is that casualties who have uncontrolled hemorrhage from penetrating wounds of the chest or abdomen and develop decreased mental status should either receive 1000cc of Hespan or be fluid resuscitated to an end point of improved mentation.
8. Saline locks (plastic IV catheters without fluids attached) may be used instead of IVs if fluid resuscitation is not required (for IV antibiotics and morphine, if required).
9. Morphine is to be used IV (5 mg) instead of IM.
10. IV antibiotics should be used as soon as possible for patients with penetrating abdominal trauma, grossly contaminated wounds, massive soft tissue trauma, open fractures, or any patient in whom a long delay until definitive treatment is expected.
11. Casualties should not be completely undressed for a secondary survey in the field. Removal of clothing should be limited to that necessary to expose known or suspected wounds.

## Figure 7

### Battlefield Triage

1. Control life-threatening bleeding
2. Disarm casualties as required
3. Establish airways (unconscious or respiratory distress)
4. Treat tension pneumothorax
5. Treat shock
6. Pain control
7. IV antibiotics

## Figure 8

### Urban Warfare Scenario 1 – Fast Rope Casualty

- 16 man Ranger team – security element for building assault
- 70 foot fast rope insertion for building assault
  - One man misses rope and falls
  - Unconscious
  - Bleeding from mouth and ears
  - Taking fire from all directions from hostile crowds
  - Anticipated extraction by ground convoy in 30 minutes

## Figure 9

### Urban Warfare Scenario 7 - Helo Hit by RPG Round

- Hostile and well-armed (AK-47s, RPG) urban environment
- Building assault to capture members of a hostile clan
- In Blackhawk helicopter trying to cover helo crash site
- Flying at 300 foot altitude
- Left door gunner with 6 barrel M-134 minigun (4000 rpm)
- Hit in hand by ground fire
- Another crew member takes over mini-gun
- RPG round impacts under right door gunner
- Windshields all blown out
- Smoke filling aircraft
- Right minigun not functioning
- Left minigun without a gunner and firing uncontrolled
- Pilot
  - Transiently unconscious - now becoming alert
- Co-pilot
  - Unconscious - lying forward on helo's controls
- Crew Member
  - Leg blown off
  - Lying in puddle of his own blood
  - Femoral bleeding

## Figure 10

### Tib/Fib Fracture on Parachute Insertion

- Twelve man SF team
- Interdiction operation for weapons convoy
- Night parachute jump from a C-130
- 4-mile patrol over rocky terrain to the objective
- Planned helicopter extract near target
- One jumper sustains an open fracture of his left tibia and fibula on landing

## Figure 11

### Multiple Trauma from Parachute Collapse

- 16 man SEAL patrol
- Interdiction operation on a weapons convoy
- Night static line jump from C-130
- 4 mile patrol over rocky terrain to objective
- Planned helicopter extraction near target
- One jumper has canopy collapse 40 feet above the drop zone
- Open facial fractures with blood and teeth in the oropharynx
- Bilateral ankle fractures
- Open angulated fracture of the left femur

## **Figure 12**

### **Fatality from Parachute Malfunction**

- 16 man SEAL patrol
- Interdiction operation on a weapons convoy
- Night static line jump from C-130
- 4 mile patrol over rocky terrain to objective
- Planned helicopter extraction near target
- One jumper has streamer
- Obviously dead on DZ

## **Figure 13**

### **Underwater Explosion on Ship Attack**

- Ship attack
- Launch from PC 12 miles out
- One hour transit in two Zodiacs
- Seven swim pairs
- Zodiacs get in to a mile from the harbor
- Turtleback half mile, then purge and go on bag
- Charge dropped in water at target ship
- Swim buddy unconscious

## **Figure 14**

### **CNS Oxygen Toxicity during Ship Attack**

- Ship attack
- Launch from PC 12 miles out
- One hour transit in two Zodiacs
- Seven swim pairs
- Zodiacs get in to a mile from the harbor
- 78 degree water - wet suits
- Turtleback half-mile, then go on bag
- Very clear, still night - transit depth 25 feet
- Diver notes that buddy is disoriented and confused with arm twitching

## **Figure 15**

### **Gunshot Wound prior to SEAL Delivery Vehicle Extraction**

- 2 SEAL Delivery Vehicle operation
- Insertion from Dry Deck Shelter with a two hour transit to beach
- Target is a heavily defended harbor in a bay
- 43 degree water - divers wearing dry suits
- Air temperature 35 degrees
- Boats bottomed for across-the-beach radio beacon placement
- One man shot in chest at the objective
- Hostile forces in pursuit

## Figure 16

### Underwater Explosion on Ship Attack (2)

- Ship attack
- Launch from PC 12 miles out
- One hour transit in two Zodiacs
- Seven swim pairs
- Zodiacs get in to a mile from the harbor
- Turtleback half mile, then purge and go on bag
- Swim pair approaching target ship
- Underwater explosion
- Both swimmers experience ear pain without other symptoms

## Figure 17

### Chance Contact on Parachute Insertion

- Twelve man SF team
- Interdiction operation for weapons convoy
- Night parachute jump from a C-130
- 4-mile patrol over rocky terrain to the objective
- Planned helicopter extract near target
- Chance contact with three hostiles at the drop zone
- Contact results in two KIA and one prisoner
- Prisoner is a 15 year-old boy who was not armed

## Figure 18

### Entebbe Raid – Tactical Problem Scenario

- 27 June 1976
- Air France Flight 139 hijacked by 4 terrorists
- Flown to Entebbe (Uganda)
- 106 hostages held in Old Terminal at airport
- 7 terrorists guarding hostages
- 100 Ugandan troops perimeter security
- Sayeret Matkal rescue 4 July 1986
- Exit from C-130 in Mercedes and 2 Land Rovers
- Assault team dressed as Ugandan soldiers
- Shot Ugandan sentry when challenged
- Planned assaulted terminal through 3 doors
- First door reached booby trapped – multiple casualties
- What should second and third element leaders do?



**CAPT Frank Butler, MC, USN**

CAPT 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 5 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 the Chief Resident in 1989. CAPT Butler was then assigned to the Naval Hospital Pensacola where he was Chief of Ophthalmology from 1990 to 1994. He assumed his current duties as Director of Biomedical Research for the Naval Special Warfare Command in 1990 as well.

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# RATTLESNAKE BITE AND THE ART OF MEDICINE - SORTING OUT THERAPIES

**Warner Anderson, MD**

## **ABSTRACT**

Crotalid envenomation in general, and rattlesnake bite in particular, is a true medical emergency, yet it is surrounded by folklore and ineffectual, or even harmful, practices. Antivenin is the only effective treatment, but has its own attendant risks, including death. Cultural values and events surrounding the bite can heavily influence care. The special operations health care provider must be aware of the subtleties in the decision tree of snakebite care. A new antivenin made from sheep offers less allergic risk.

### ***Report of a Case***

An eighteen year-old male is delivered to the ambulance entrance of the emergency department by family in a pick-up truck. He complains of rattlesnake bite on his index finger, over the middle phalanx. He states the bite occurred about thirty minutes prior to presentation, when he tried to catch a rattlesnake he found near his home in a rural desert area. Upon direct questioning, he admitted to having had a "couple" beers--when informed that "a couple" is not a number, he admitted to having drunk five sixteen-ounce cans prior to the bite. The patient has no chronic problems, takes no medications, and when asked about allergies, states he is allergic to "furry animals" including horses. No specific symptomatology of horse allergy can be determined, but cultural circumstances virtually guarantee exposure to horses at an early age.

Examination reveals a cooperative anxious male in no obvious distress. The affected hand is swollen from the tip of the index finger to about the middle of the second metacarpal, and extends to the web space between the index finger and the thumb. Two fang marks over the middle phalanx of the index finger are actively bleeding, although the actual

punctures are tiny.

An indelible laboratory marker is used to outline the area of swelling, and the time "2110" is written on the line. Baseline complete blood count (CBC), comprehensive metabolic panel (CMP), prothrombin time (PT), and partial thromboplastin time (PTT) are drawn, along with a blood alcohol concentration (BAC) and urinalysis (UA). An intravenous line is started in the dorsum of the non-affected hand by nursing, and a bolus of saline begun at five hundred milliliters per hour.

A horse serum allergy test is injected intradermally on the affected side, and a control (comparison) dose of normal saline is placed in the identical location on the other forearm. Within ten minutes, the patient develops a wheal and flare reaction greater than one centimeter diameter, indicating sensitivity. The control site is non-reactive.

Ten vials of equine crotalid antivenin are retrieved from pharmacy and the mixing begins--suspension of the antivenin in saline is a slow process, and requires about thirty minutes per vial. Thus, security, all available nursing personnel, and the emergency physician are all occupied in swirling

the ten vials to suspend the antivenin.

Twenty minutes after arrival, the swelling is re-checked and has extended from the fingertip to the mid-forearm, in a circumferential manner, with the hand swelling now tensing the skin. Another marker is placed on the arm and informed consent is obtained for antivenin administration. Baseline PT is 12.8.

The patient is given seventy-five milligrams of diphenhydramine (1 mg/kg), one hundred milligrams of ranitidine, and two hundred-fifty milligrams of methylprednisolone (Solu-Medrol®), all intravenously. A milligram of epinephrine is drawn into a ten-milliliter syringe and diluted with nine milliliters of saline, then the needle is capped and the syringe kept in the physician's shirt pocket for quick access.

When the antivenin is ready, it is placed in a fresh liter of normal saline (100 ml of saline is removed prior to adding the 100 ml antivenin volume). A new IV site is established in the antecubital fossa (for large vein access) of the non-affected arm, and a slow test infusion of ten milliliters of the liter dilution antivenin is well-tolerated. The remaining antivenin is given as a one-liter mixture over thirty minutes.

While the antivenin is running, the patient is given a dose of tetanus toxoid. Toward the end of the infusion, the patient develops a mild dry cough consistent with bronchospasm, but no rhonchi or distress.

When the antivenin is finished and the IV line available, the patient receives a dose of Timentin®, a broad-spectrum antibiotic with gram-positive, gram-negative, and anaerobic coverage.

The patient is moved from the emergency department to the intensive care unit, and two hours later the PT is 17.3. The patient requires another ten vials of antivenin for recurring symptoms and rising PT.

Two days after admission the patient is discharged home in much-improved condition. However, on the seventh day he returns to the ED for a swollen finger (the bite site), which is inflexible. Subsequently, the patient is lost to follow-up.

### ***Clinical Presentation of Crotalid Envenomation***

Most SOF medics are quite familiar with the types of crotalids found in North America, since this information is presented in the Special Operations Combat Medic core curriculum. This family of ven-

omous snakes is characterized by heat-sensing pits on their faces, vertical pupils, and fangs located in the front of their mouths. They produce complex venom consisting of a number of proteins, metals and enzymes, using this judiciously as a defensive or offensive weapon, or withholding it in a warning bite.

The North American crotalids range in size from the Eastern diamondback rattlesnake at over two meters long, to the half-meter pygmy rattler. Although the Eastern diamondback is the most venomous due to its size, and thus the amount of venom at its disposal, the much smaller Mojave rattlesnake



Eastern diamondback rattlesnake



Pygmy rattlesnake

produces very potent venom with both hemotoxic and neurotoxic effects. The copperhead, on the other hand, has much milder venom.

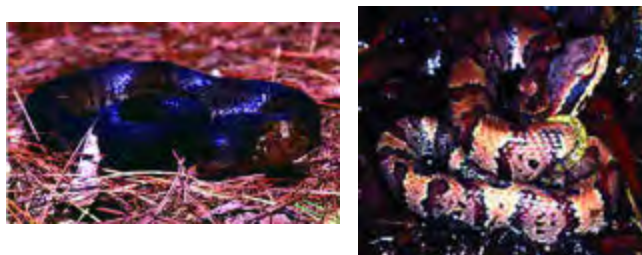
While most crotalids are shy and retreating, the water moccasin is territorial and may attack with-





out known provocation (and is the only crotalid ever to have attacked the author).

Victims of crotalid bites also range widely in their characteristics, but with two very common fea-



Water moccasin adult (left) and juvenile (right)

tures--male gender and alcohol intoxication. Not only does alcohol use seem to invite envenomation, it complicates treatment and informed consent.

#### **Illustrative Case**

A sixty-two year old male presented with a single puncture to the left hand, said to be due to a rattlesnake bite. The puncture was unremarkable in appearance except that it oozed a tiny trickle of blood and was surrounded by a small ecchymosis. During physical examination, the area began to swell, and lines were drawn at intervals to track the velocity of spreading edema. Antivenin was prepared but the patient was too intoxicated to provide informed consent. Therefore, concurrence of another physician was obtained regarding the necessity of antivenin. The skin test for horse serum allergy was negative. The patient was carefully coached to immediately report any itching or need to cough.

As the infusion was completing, the patient, whose BAC had returned at 380 mg/Dl, was noted to be rubbing his eyes. Close inspection revealed evol-

ing marked chemosis and conjunctival redness. The patient promptly developed a slight dry cough. Epinephrine 0.3 mg subcutaneously and diphenhydramine fifty milligrams intravenously resolved the signs of anaphylaxis.

The patient was admitted to the intensive care unit where he later had an alcohol withdrawal seizure and delirium tremens.

The package insert for crotalid polyvalent antivenin describes four classes of envenomation--none, mild, moderate, and severe. Since up to twenty-five percent of bites may be "dry" (due to the snake's assessment that the incident does not warrant wasting precious venom, or because the snake has just eaten and expended his venom on the prey), a careful appraisal of the bite's progression is central to the decision of whether, or how much, antivenin to give.

The effects of equine-derived antivenin on an allergic patient have been described, but the practitioner must also bear in mind the long-term immunological effects on non-allergic patients.

#### **Illustrative Case**

A thirty-five year old male presented to the emergency department complaining of rattlesnake bite to the hand. Two small puncture wounds were apparent to the examining physician, but there was no swelling. The patient demanded immediate antivenin. While laboratory tests and observation were underway, the patient became angry at the perceived delay and signed out against medical advice. The PT and PTT returned at normal values. However, the patient went to another nearby hospital, where he demanded and received antivenin. He wrote a letter of complaint to the emergency medicine chief at the first institution, who validated the first physician's decision. However, the patient presented to the first institution a few weeks later with back pain, joint pain, proteinuria, and hematuria. The emergency physician diagnosed serum sickness resulting from antivenin administration. The patient recovered after several weeks' illness.

Cultural values may profoundly affect not only the expectations of the care (as in the preceding case), but also the history of the bite. Where rattlesnakes are *tabu* as harbingers of doom, the patient may be reluctant to talk forthrightly about the circumstances of the injury. In Navajo culture, as in ancient Hebrew culture, profound spiritual circum-



stances are associated with the viper.

### ***Illustrative Case***

A sixteen year-old mentally retarded male complains to his custodial grandparents that he was bitten hours earlier by a neighbor dog. He and his grandparents speak only Navajo. They take him to the hospital nearest their home, where the on-duty physician becomes alarmed at the marked swelling of the affected arm. In light of several recent deaths caused by virulent streptococcal infection (“flesh-eating bacteria”), the patient is immediately referred to an orthopedic surgeon seventy miles distant. The patient arrives in the emergency department, where the emergency nurse starts an IV while awaiting the orthopedist. When the orthopedist arrives, she notes to him that the bite marks appear more consistent with snakebite. The orthopedist, through a Navajo interpreter, confirms that it was a dog that inflicted the wound. The patient is taken to the operating room for fasciotomy for compartment syndrome, and the surgeon notes coagulation necrosis of the extremity. He converts the fasciotomy to an emergency amputation. A few hours later, the grandparents find a dead rattlesnake outside their home where the boy was playing.

The presentation of crotalid envenomation may be milder than feared (as in the serum sickness case) or cryptogenic (as in the last case), but it may also be worse than it appears.

### ***Illustrative Case***

A fifty-three year old field health nurse is bitten on the lateral margin of her foot by a rattlesnake while she was gardening. She has some immediate pain and bruising from the single fang mark, but little or no swelling and the pain is very mild. The emergency physician thinks this a contradictory set of signs and symptoms, making grading the severity difficult. He calls a telephone consultation, and it is suggested that the bite may have been at last partially intravenous. The emergency physician begins mixing antivenin and checks a second PT--which had risen to twenty-two seconds! The patient receives antivenin, is admitted to the ICU, and later is discharged without incident.

An intravenous dose of venom is just as dangerous as an intravenous dose of any other serious poison, and the difference between a zero--or mild--envenomation bite and an intravenous bite may be

difficult to determine early in the course. Indeed, death may rapidly follow an intravenous bite.

### ***Field Treatment of Crotalid Envenomation***

The old joke refers to two hunters who are hunting in the woods of Alabama. One unzips to relieve himself and is bitten by a rattlesnake on his genitals. The other hunter tells him to lie down and take it easy, and he'll go call the doctor on the cell phone. The doctor instructs him to make two incisions on the bite marks and carefully suck out the poison. The second hunter goes back to the bitten one and says, “Well, I talked to the doctor.”

The second hunter asks, in a panic, “What did he say? What did he say?”

The first hunter replies, “The doctor said you're gonna die.”

This apocryphal story points out a basic fact of life in crotalid envenomation--there is little the medic can do in the field to ameliorate the effects of a rattlesnake bite except give antivenin. Most other treatments are folklore with no proven benefits: constricting band, electric shock, cooling the part, cut and suck, elevate, lie still, and so on. The best field treatment is immediate evacuation of any crotalid bite victim to a source of antivenin.

Most references still recommend a constricting band, but remark that the potential to worsen the process with too-tight a band is great. The Sawyer® kit is recommended as a possibility, but the Coughlin kit is generally condemned as dangerous.

Fortunately, the mortality from crotalid envenomation is low. Very few Americans die from rattlesnake or other crotalid bite. Much of this is due to the site bitten--usually the lower leg or the distal forearm or hand. The area closest to the startled or threatened snake is the part the snake bites. However, some anatomic areas of snakebite offer more danger to the patient than others.

### ***Illustrative Case***

A Florida man in his late twenties was partying and drinking alcoholic beverages with his friends. While driving on a back road they saw a large Eastern diamondback on the shoulder of the pavement. The patient-to-be stopped and picked up the snake, which in turn bit him on the arm. The young man decided turnabout is fair, and bit the snake back. The rattlesnake took the opportunity to bite his assailant on the tongue. The patient went to a local hospital where

he was boisterous and difficult to interview. He was immediately transferred to a university medical center. The patient's evolving edema spread to his lower airway, and in spite of tracheotomy, the patient died of asphyxiation within a few hours.

In some parts of the country, a baseball cap worn backward may be an additional risk factor for rattlesnake bite.

OCONUS, the medic may find equine preparations to be the only available antivenin. These are the old standby, but are no longer manufactured or marketed in the United States. Although equine polyvalent crotalid antivenin has had a long and distinguished career, it has been retired in favor of a more high-tech, racier, and ten times more expensive product.

### ***Ovine Polyvalent Immune Fab (CroFab): A New Tool***

A new weapon in the envenomation armamentarium, CroFab® is a highly purified protein antibody derived from sheep serum. While the equine-derived antivenin is essentially a crude extract with a great deal of other horse proteins (thus, antigens), CroFab is composed of antibodies which have been cleaved with papain to leave the active component only, while removing all other foreign proteins.

Additionally, it is thought, or implied, that fewer people are allergic to sheep than to horse proteins. In theory, it makes sense. So much sense, in fact, that a skin test is not recommended and is not included with the CroFab®. However, in a study referenced in the package insert, twenty-five of forty-two patients receiving CroFab® experienced some sort of adverse reaction. Of these reactions, seven experienced urticaria. One of these had an "allergic reaction" consisting of wheezing, dyspnea, and urticaria--which sounds a lot like anaphylaxis.

CroFab® is approved by the FDA for use in mild and moderate envenomation. It is not approved in severe snakebite. One assumes the reason is that during clinical trials, equine antivenin was available as an alternative, so the legal implications of giving an experimental treatment when an efficacious one already exists were unsurmountable. CroFab® should work for severe in addition to mild and moderate bites.

The dosing schedule for CroFab® is complex. Four to six vials of CroFab® are mixed in 250 milliliters of saline, and a test infusion of about eight

milliliters over ten minutes. If the patient has no untoward reaction, the remainder is given over one hour, with close attendance.

The patient should be observed for worsening of symptoms over the next hour. If swelling continues or other signs worsen, the patient should receive a second four-to-six vial dose. The patient is then monitored for at least twenty-four hours. Every six hours, an additional two-vial dose may be given until progression is arrested, up to eighteen hours.

The product must be stored at four to eight-degrees centigrade, but not frozen. When reconstituted, it must be used within four hours. Currently, CroFab® costs (federal price) several hundred dollars per vial.

### ***Envenomation: The Gift that Keeps on Giving***

Recovery from crotalid envenomation, even with antivenin administration, is unpredictable. Two major problems surface after treatment: delayed coagulopathy and serum sickness. Both can be extremely serious.

Delayed coagulopathy can occur anytime in the first week after the antivenin treatment, and is thought to represent a continuation of the original bite. Essentially, the thinking is that venom is still present in depot form and continues to leak from the bite site. Thus, after all the circulating venom, or venom-antivenin complexes are cleared, the patient receives more venom in a delayed-release form. These patients can spontaneously begin bleeding from the gingival and elsewhere. Treatment is supportive until the bleeding stops.

Approximately one week after administration many, if not most, patients who receive equine antivenin will complain of aching in several joints, lymphadenopathy, rash, and headache. This is serum sickness. The condition is caused by deposits of immune complexes on endothelium, such as the lining of blood vessels. Treatment is relief of pain. Considering the risks of delayed coagulopathy, use of platelet-inhibiting drugs such as ibuprofen or naproxen is probably not a good idea. Acetaminophen, with or without codeine, may be better.

### ***Ovine Crotalid Antivenin: A Little Better for a Lot More Money***

Since mid-2001, equine antivenin has become less common as it has been supplanted by the newer ovine (sheep) derived preparation. Although equine preparations for other pit vipers will still be

encountered OCONUS, by this printing equine antivenin will have disappeared from the United States.

Ovine antivenin is not dosed or administered in the same way as equine, and requires establishing a new protocol. Indications remain the same, and so does crotalid snakebite care in general. However, ovine antivenin generally requires less total antivenin and is somewhat less allergenic. It is made by purifying the Fab portion (fragment) of the antibody, which actually does the work, from the Fc fragment, which is just along for the ride but causes some of the allergic reactions.

Although marketed as less allergenic, ovine crotalid antivenom has shown itself to be another of those risk: benefit issues. A recent article in *Annals of Emergency Medicine* pointed out that in actual use it may have more reactions than originally claimed, and emphasized the need for post-marketing surveillance to determine the real consequences.<sup>1</sup>

**REFERENCE**

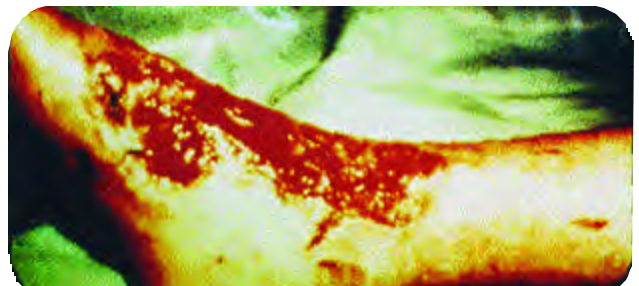
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Moderate rattlesnake envenomation in a toddler after treatment with antivenom.



Mild rattlesnake bite of the foot



Same foot some hours later

# CONTINUING MEDICAL EDUCATION TEST

## Improved Communications and Hearing Protection in Helmet Systems: The Communications Earplug

**JSOM**



1. The Army continues to have a significant number of claims to disability regarding hearing loss.  
T / F
2. Existing noise levels in many of the Army's combat systems are well below the standards set by Mil-Standards Noise Limits.  
T / F
3. The first helmet designed to provide sound attenuation was the ANR.  
T / F
4. A primary problem with reducing sound levels in the military systems through the use of double hearing protection, is the profound degradation of communications.  
T / F
5. ANR is very effective at higher frequencies but actually increases noise levels at the lower end of the spectrum.  
T / F
6. The ear cup in the existing helmet system provides for both comfort and stability when worn, as well as allowing the use of the CEP to enhance noise attenuation.  
T / F
7. Head shape and helmet fit are significant issues when measuring sound attenuation with the HGU-56/P and ANR alone but have little or no effect when using the CEP alone.  
T / F
8. The CEP does require an extra step for use and is subject to wear and tear but was found to be comparable to the standard helmet and an improvement in communications capabilities after a break-in period.  
T / F
9. The CEP system is a more expensive adjunct than the ANR in present configuration.  
T / F
10. It only makes sense to explore the use of the CEP in other combat systems to enhance communication capabilities.  
T / F

# CONTINUING MEDICAL EDUCATION TEST

## Medical Aspects of Air Evacuation from a Tactical Environment

**JSOM**



1. A patient is intubated and loaded into a helicopter for transport. The helicopter will ascend from sea level to about 2,000 meters ASL during the transport, then land at sea level on the other side of the ridge. During this time, the air volume in the endotracheal tube cuff will:
  - a. freeze from cold temperatures aloft.
  - b. decrease in pressure relative to the surrounding atmosphere aloft.
  - c. increase in pressure relative to the surrounding atmosphere aloft.
  - d. evaporate.
  
2. A patient has sustained significant unilateral blunt injury to his chest requiring needle decompression. The patient is alert, cooperative, exchanging air, and in pain. He will be transported in an unpressurized aircraft. If within his capabilities, the provider on the ground should:
  - a. Place a chest tube on the affected side.
  - b. Withhold narcotics for analgesia.
  - c. Place a Combi-Tube®.
  - d. Paralyze the patient.
  
3. Vital signs in a flying helicopter are reliable if taken the traditional way.

True  
False
  
4. In a helicopter, breath sounds should be evaluated by auscultation to determine chest excursion and air exchange.

True  
False
  
5. A patient taken to significant altitude in an unpressurized aircraft will rapidly develop:
  - a. Respiratory alkalosis.
  - b. Respiratory acidosis.
  - c. Respiratory alkalosis with metabolic compensation.
  - d. Respiratory acidosis with metabolic compensation.

6. A patient triaged as “expectant” warrants immediate aeromedical evacuation.
- True  
False
7. The decision to move a patient by air depends upon the patient’s condition, regardless of the tactical situation and operational issues.
- True  
False
8. The temperature at your site is 52 degrees F. Your patient will be sent by helicopter with open doors to 4,000 feet AGL, where he will fly approximately 45 minutes to the combat support hospital. During the flight, he will be subjected to a temperature of about \_\_\_\_\_ degrees. Ignore wind chill.
- a. 65  
b. 55  
c. 45  
d. 40
9. Prior to moving a patient by air who has a circumferential cast on his leg:
- 1) Bivalve the cast to prevent build-up of pressure.  
2) Remove the cast and apply PASG (MAST) trousers.  
3) Replace the cast with a splint.  
4) Place the casted extremity in a dependent position.
- a. 1 and 2  
b. 2 and 4  
c. 1, 2, and 3  
d. 4  
e. All of the above
10. A patient with burns to the face and trunk is prepared for aeromedical evacuation. The eyebrows are singed, the nasal vibrissae are gone, and the awake, cooperative patient has dysphonia. If the provider has the capability, he should:
- a. Intubate the patient while awaiting the arrival of the aircraft.  
b. Place a Combi-Tube®.  
c. Avoid analgesic medications.  
d. Withhold intravenous fluids.

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**Journal of Special Operations Medicine, Volume 4, Edition 1 / Winter 04**

**Date of original release:** 20 Mar 04

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**POST-TEST – Answer Sheet**

**Article 1--Page 22--Improved Communications and Hearing Protection in Helmet Systems: The Communications Earplug** by COL John Powell, MC – Kent A. Kimball, PhD – Ben T. Mozo – Barbara A. Murphy.

**Please circle the letter that corresponds to the correct answer:**

- |          |           |
|----------|-----------|
| 1. T / F | 6. T / F  |
| 2. T / F | 7. T / F  |
| 3. T / F | 8. T / F  |
| 4. T / F | 9. T / F  |
| 5. T / F | 10. T / F |

Article 2--Page 32--Medical Aspects of Air Evacuation from a Tactical Environment by CDR Barry A. Wayne, MC.

Please circle the letter that corresponds to the correct answer:

- 1. a b c d
- 2. a b c d
- 3. T / F
- 4. T / F
- 5. a b c d
- 6. T / F
- 7. T / F
- 8. a b c d
- 9. a b c d e
- 10. a b c d

**Continuing Education Evaluation Form**  
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**Article 1**

Page No. 22

Strongly Agree    Strongly Disagree

**Article 2**

Page No. 32

Strongly Agree    Strongly Disagree

**Educational Value:**

I learned something new that is important.

5 4 3 2 1

- - - - -

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.

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(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)? \_\_\_\_\_  
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 How do you rate the layout of this journal? \_\_\_\_\_  
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 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

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Dedication		

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

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There I was	Correspondence	Editorials
SOMA Update	Photo Gallery	Med Quiz
Dedication		

What improvements would you make to the JSOM?

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

FOLD ALONG THIS LINE

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FOLD ALONG THIS LINE



## Use of H<sub>2</sub> Blockers in the Treatment of Allergic Reactions and Anaphylaxis

By Bob Hesse, RN, NREMT-P, I/C

The goal of this short article is to provide the SOF medic with an overview on the use of H<sub>2</sub> histamine blockers for the treatment of allergic and anaphylactic reactions, both in the field and clinic area. H<sub>2</sub> blocker use should be considered as an adjunctive treatment in the setting of anaphylactic-type reactions. Epinephrine administration remains the mainstay of first-line therapy of patients experiencing acute anaphylactic signs or symptoms.

In the field, the Special Operational Forces (SOF) medic must be fully prepared to treat a variety of acute medical problems. As a consequence of the global operational environment, the SOF soldier may be exposed to many substances that could potentially cause an allergic or anaphylactic reaction at almost any time. Regardless, patient signs, symptoms, and speed with which the onset occurs are all characteristics used to discern the potential severity of the reaction. The quicker the reaction onset and progression, the more severe the reaction is. The presence of any airway involvement or hypotension is always cause for great concern and rapid treatment.

For a majority of patients being evaluated and treated for allergic reactions, their symptoms are not severe and may present with only mild cutaneous symptoms. Presenting signs are localized and may include itching, angioedema, or urticaria. These symptoms are caused when mast cells and basophils degranulate, releasing substances such as histamines, leukotrienes, and prostaglandins among others. This causes vasodilation and vascular permeability, which lead to tissue swelling and edema. Anaphylaxis is a much more severe, systemic reaction involving antigen-immunoglobulin E (IgE) interaction. Patients usually present with respiratory and cardiovascular compromise and should be handled as a life-threatening emergency. Regardless of the severity of the reaction, the evaluation and treatment of the patient must be rapid with ongoing assessment for further problems and effectiveness of treatment.

Histamine release plays an important role in

allergic and anaphylactic reactions. Diphenhydramine, the first reported antihistamine utilized, is still the accepted histamine blocker of choice.<sup>2</sup> Diphenhydramine [Benadryl®], an H<sub>1</sub> histamine blocker, is administered either IV or IM injection, and indicated for both minor cutaneous reactions and anaphylaxis.

Identification of H<sub>2</sub> receptors has brought about a new class of drugs, called H<sub>2</sub> blockers. There are four commercially available H<sub>2</sub> blockers. They are cimetidine [Tagamet®], ranitidine [Zantac®], famotidine [Pepcid®], and nizatidine [Axid®]. Only the first three are available in an injectable form. Safe and effective, they are often utilized to treat conditions such as gastric hyperacidity, gastroesophageal reflux disease, and/or peptic ulcer disease. The action of H<sub>2</sub> receptor sites, when occupied/stimulated by histamine, activates the proton pump of the parietal cells to secrete hydrogen ions. Hydrogen ions are directly responsible for the pH of the stomach. The higher the hydrogen ion concentration, the lower the gastric pH, and the more acid in the stomach. The ability to effectively block these receptor sites limits and decreases gastric acid secretion.<sup>2</sup>

It was initially felt H<sub>2</sub> receptors did not play a role in anaphylaxis or minor allergic-type reactions such as urticaria.<sup>2</sup> It was further believed that a negative feedback reaction was associated with the administration of H<sub>2</sub> blockers in the setting of allergic-type cutaneous reactions. The action of histamine on H<sub>2</sub> receptors on the mast cell would inhibit further histamine from being released by occupying the receptor site. The hypothesis was the action of H<sub>2</sub> blockers would disinhibit the release of further histamine, causing more histamine release and further problems.<sup>2</sup>

It's been shown H<sub>2</sub> blockers do aid in the treatment of patients experiencing allergic reactions, specifically cutaneous reactions such as urticaria. The vast majority of the literature reports are with cimetidine and ranitidine. There are very few (if any) liter-

ature reports of the use of famotidine or nizatidine in treating acute allergic reactions. One early study showed the use of cimetidine alone, vs. diphenhydramine (alone?), was more effective at controlling urticaria and itching with less sedation.<sup>2</sup> Later studies showed that combining diphenhydramine with an H<sub>2</sub> blocker is more effective at controlling cutaneous reactions than each medication used alone.<sup>3,4</sup>

To date, there have been no large studies evaluating the use of H<sub>2</sub> blockers and their role in the treatment of anaphylaxis. Despite this, adjunctive H<sub>2</sub> blocker use is advocated for treatment of anaphylaxis.<sup>1, 3-5</sup> Besides treating the cutaneous effects of histamine, it is hypothesized that H<sub>2</sub> receptor blockade may have some effects on myocardial and peripheral vascular tissue.<sup>5</sup> This would also explain the use of H<sub>2</sub> blockers in the setting of shock refractory to epinephrine, and fluids.<sup>1</sup> One author did correctly caution providers about the use of cimetidine in the treatment of anaphylaxis and allergic reactions.<sup>4</sup> Cimetidine inhibits the cytochrome P450 enzyme system in the liver, responsible for the metabolism of many drugs. Cimetidine can prolong the metabolism of β blockers and other drugs, which may interfere with treatment of epinephrine and prolong the half-life of the offending allergen.

In closing, H<sub>2</sub> blocker use for the treatment of allergic and anaphylactic-type reactions should be considered. Their safety and efficacy in treating cutaneous symptoms have been well documented.<sup>1-5</sup> These medications can add another tool to the SOF medic's treatment kit.

Bob Hesse has been involved with EMS since 1987. He enlisted in the Army in 1987 as a medic and went on to become a flight medic. Bob has been teaching since 1989 when he was tasked to teach at USMA during cadet basic training for two summers. He currently teaches numerous courses in EMS and critical care medicine at the local, regional and state level. He is a Nurse, Paramedic, and EMS Instructor Coordinator. Bob flies full-time for West Michigan Air Care and sits on a number of terrorism and disaster preparedness committees in the SW Michigan region and at the state level. He currently sits on the Curriculum and Examination Board for SOCOM as the Civilian Curriculum Developer.

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# Lessons Learned

## Pararescuemen Validate New Skills During UN Headquarters Bombing Incident

Wayne Fisk

The bombing of the UN Headquarters in Baghdad, Iraq, on 19 August 2004, spotlighted a relatively little-known mission capability of USAF pararescuemen: Confined-space rescue operations. The attack on the UN facility provided theater commanders a combat validation of that capability.

At 1228 hours on that day, a homicide/suicide terrorist maneuvered an explosive-laden concrete truck to within feet of the UN's hotel and detonated some 700-1000 pounds of high-explosives. The attack completely destroyed the two-story lobby and heavily damaged the connecting three-story northwest wing. The massive blast ultimately resulted in the death of more than twenty people, with more than one hundred injured and entrapped inside. US military units and government assets immediate-

VAC flights from an improvised casualty collection point (CCP) to the nearby US military medical facilities.

Also nearby--but apparently unknown by Army command resources--were three teams of elite Air Force Reserve Pararescuemen (PJs), DoD's premier asset for search and rescue operations. While combat search and rescue (CSAR) operations are the forte of these highly specialized men, other specifically unique skills--such as confined-space rescue operations--render them invaluable during such crisis.

Unfortunately, it was not until nearly two hours after the explosion that their capabilities were acknowledged and approved for on-scene operations. Two teams of three PJs each boarded two HH-60D "Pave Hawk" helicopters, call signs *Jolly Green 21*

and *22*, and raced to the scene. (The *Jolly Green* call sign evolved from the Vietnam-era when the famed *Jolly Green Giant* rescue helicopters saved more than 2,000 aircrew and combatant lives.) Even then they were forced into a 25-minute holding pattern until final approval was received for air-land insertion. First to arrive was the PJ security team of CD, KA, and AN, followed immediately by



Damaged area of UN HQ facility in Baghdad.

ly moved to secure the site and commence rescue and recovery operations. While groups of ad hoc rescuers moved amid the highly unstable collapsed structure, aviation resources began staging CASE-

the PJ medical team of LZ, SS, and NT. Satellite communication between the teams and the *Jolly Greens* was established, and the two teams moved forward. Simultaneously, a third three-man PJ team with RP, SE, and SY was launched and en route to the

disaster scene aboard *Jolly Green 23*.

By the time the teams entered the remains of the building, Army personnel untrained in such forms of rescue had accomplished a great deal, and won the praise and admiration of the PJs. Still, due to structural instability, obstacle impairments, and casualty locations, a number of victims had not been recovered or removed. Dangling electrical wiring, rivulets of water from broken water mains, and weakened floors and walls made travel and movement inside the building dangerous and precarious.



PJ security team member KA (left) and Army personnel configure victim retrieval systems.

Army personnel guided the PJs to one entrapped man located on the destroyed remains of the third floor. He had been partially crushed between a portion of the buckled roof and the collapsed floor below. Adding to the difficulty of the situation, he was suspended by his crushed legs in mid-air, backwards, and upside-down in a 15-foot “V” formed by the debris. Extrication was difficult but effective through the versatility of a Sked stretcher and a rope retrieval system. The man was extracted through a very narrow, unstable tunnel formed by portions of the collapsed debris.

Upon transfer through the “tunnel,” general supportive care measures were applied by the PJ security team medic, AN. The injuries were numerous: severe lacerations to the face with upper and lower lip and tongue injuries that created varying airway obstructions; crushing and de-gloving injuries to the right hand resulting in multiple fractures; mangle blast injuries to both lower extremities; massive

blood loss resulting in severe shock.

The PJ security team and Army personnel moved the patient from the Sked stretcher to a pole litter for transport to the CCP. The PJ Medical Team accompanied him aboard *Jolly 22* to the Expeditionary Medical Support (EMEDS) at Camp Sather, Baghdad International Airport. En route, the patient received airway management, O<sub>2</sub>, IV therapy, fracture and wound management, and EKG and O<sub>2</sub> saturation monitoring.



Multitude of injuries sustained by patient #1 located on third floor of UN northwest.  
Bombing injury to the face--above  
Bombing injury to the arm--below





Bombing injury to the legs

The receiving trauma surgeon at the AF EMEDS credited the PJs with saving the man's life through their rapid extrication procedures and expert medical skills.

With the first patient safely aboard *Jolly 22*, the PJs returned to the rubble of the third floor where another victim was thought to still be trapped; however, Army firefighters and sweep teams reported no further victims could be located. The PJ security team returned to the CCP to provide medical coverage to a woman with severe head and facial lacerations, as well as numerous minor smaller lacerations. Medical treatment consisted of wound reassessment, ABCs, and supportive care. She and her husband were transported to the EMEDS via *Jolly 21* in the company of the PJ security team members AN and KA. Upon off-load, the team returned to the bombing site to provide further medical and rescue assistance.

And that assistance was desperately required as yet another victim was discovered within the confines of the destroyed structure. Utilizing their specialized skills, the PJs directed the assistance of Army personnel to the successful extraction of another patient, a man suffering multiple blast injuries throughout his body, facial lacerations, and right leg paralysis of unknown origin. C-spine precautions were applied, as well as IV, O<sub>2</sub>, EKG, and general supportive care. Transport to the EMEDS was aboard *Jolly 23*.

## LESSONS LEARNED

1. In the short time that the PJs were involved with the rescue and recovery operation at the UN building, they were able to combat-validate their skills in confined-space rescue operations. Due to delays in the implementation of the PJs, various man-portable extrication tools (Jaws of Life, portable saws, lift bags, and ropes and pulleys) were not utilized.
2. The Sked stretcher proved ideally suited for the environment in which it was applied. Its characteristics of fully enveloping and containing a patient, plus its smooth-sided and rugged light-weight construction, directly aided in the safe and swift removal of patient #1.



## ANATOMY OF A MEDRETE

Brian Campbell, DO  
Don Shipman, PA-C

Medical Readiness Training Exercises (MEDRETEs) were the highlight of every annual training schedule for the docs and medics in 5th Special Forces Group. We picked up a lot of pinecones and pulled a lot of drop zone coverage waiting for the chance to travel to the Area of Operations and do some real-world medicine. Of course, not all the lessons learned were medical. The following tale is an anthology of actual experiences from operations conducted by the authors between 1986 and 1991, combined into one Ultimate MEDRETE.

### HONEYMOON WITH THE BOYS

The Group Dentist had finally married his true love. The nuptials had been scheduled for sometime prior to his assignment to Group just a few months before the Glorious Event. What Dan didn't know was that the Glorious Event was actually the upcoming MEDRETE to East Africa. So, the day after his wedding at the 5th Group Chapel we were all sitting on the loading ramp of a C-141 wondering where Dan was and how things would turn out when he missed movement. The engines were turning, and as the ramp began to rise a silver Corvette raced onto the tarmac at Green Ramp and screeched to a halt just short of the plane. Out jumped Dan with his A-bag,



and he scrambled into the aircraft almost literally at the last possible second. His bride waved goodbye from the abandoned vehicle, and he commented upon what a close thing that had been—he almost missed his honeymoon in Africa.

### WELCOME TO AFRICA

We suffered innumerable delays en route for broken airplanes complicated by crew rest (all spent with our team locked in a hanger at one or another airfield in Europe). Our flight surgeon was pretty successful at predicting where and when these breakdowns would occur. He attributed that success to hanging out in the cockpit with the front-end crew, listening closely to determine where the pilots had girlfriends stationed. We eventually arrived in country after about 20 hours of flight time. The C-141 loadmaster approached us as we unloaded our gear and offered up a case of orange juice. He was certain



that we would need the extra nourishment, and he didn't want to have it in the back of his plane anyway. This delighted our dental technician, and he drank about half the supply of hot, canned juice. In retrospect, this may have been an error in judgment as acidic beverages can leach heavy metals from the solder used in the metal cans and produce acute GI toxicity. In any event, he proceeded to vomit all over several members of the team during the infil flight later that afternoon; whether from airsickness or orange juice or some combination thereof, we never



knew. Nor did the recipients of his personal attentions seem to care. A lynch mob quickly formed, but 25 milligrams of IV phenergan can solve a lot of problems.

### **THORNED IN THE HEAD, PART 1**

Acacia is a lovely tree that is almost synonymous with East Africa. The problem with it is that it is absolutely covered with long, vicious thorns that are coated with oxalate crystals and produce an



intense burning pain whenever some hapless fool bumps into one. One of the medics discovered this truth when he suffered a scalp wound at the hands of an acacia branch as we set up our team tent. Naturally, the thorn broke off in the wound. Upon closer examination, it was lodged in the bone of his parietal skull. Tent assembly ceased while we established a detail to locate, break out, clean, and use our surgical instruments. The bleeding stopped eventually, and copious irrigation helped prevent



osteomyelitis. The solution to pollution is dilution.

### **“SNIPER!”**

The first night in the field was quiet and provided a much-needed rest for our exhausted team. OK, that’s a lie. Freakish laughter punctuated by the braying of mules erupted from somewhere in the wee, pitch black hours of morning. This hellishly frightening noise seemed to come from within the tent. Suddenly, Al began screaming, “Sniper, sniper!” and everyone bailed out of their mosquito-netted cots, grabbed weapons, and set up a hasty perimeter. The yelling stopped. The braying stopped. The laughing stopped. After a long period of silence, someone turned on a flashlight. Al was peacefully asleep in his cot, dreaming. The rest of us were nervous wrecks. In the morning, twelve sleep deprived team members and Al left the tent to discover the remains of a zebra lying a short distance outside the canvas. The mystery was solved: Hyenas had feasted on a kill during the night.



### **SNAKES, PART 1**

One of the medics came to breakfast with a dead snake held securely by the head with a heavy Kelly clamp. “Hey, Doc, is this snake poisonous?” “I don’t know, Todd. Why, did it bite you?” “Uh, no, not exactly . . .” Further questioning revealed that someone had found the snake in their tent and asked the medic if it was poisonous. In an effort to determine this critical information, Todd had pried open the live snake’s mouth to see if it had fangs. Yes, it did. A rapid literature search revealed that the snake was a mole viper, only rarely fatal to humans. IV access was established, and airway and ventilatory

management tools were made ready, just in case. There was no antivenin, and evacuation was not within the realm of possibility. Todd vehemently protested that he had not “really” been bitten and was well enough to accompany the team to the first village, but we left him behind anyway. Another medic was also left in camp to care for him should the need arise. The team left on the two-hour drive cross-country to the first site. Thirty minutes later Todd developed neurologic symptoms without respiratory distress and kept his attendant busy most of the morning. He seemed fine when the team returned that night, although it was a little hard to assess the mental status of someone who deliberately stuck his finger into the mouth of a snake he thought might be poisonous.

### **ROACHES, AND BATS, AND ANTS, OH MY!**

One of the villages visited was quite distant from the base camp. We used a helicopter to transport the team to the site, but it did not return at the end of the day to take us back. Radio contact indicated that the bird would not return until the next day, so we set up a spike camp in the village that night. A building was graciously offered for our use, but the preventive medicine NCO wanted to spray the place down for bugs before we settled in. The roaches appeared shortly after the spraying ended. Not a few roaches—hundreds of roaches, nay, thousands of roaches! They were everywhere. And they were mad. Most of the men abandoned the structure, but a few intrepid individuals remained “safe” within their mosquito-netted cots. Their screams of horror made it difficult for the rest of us to eat our MREs.

Darkness fell, and the roaches had all either died or moved on. Before we could settle down for the night, however, a new nemesis appeared. Bats. More bats than anyone had ever seen, and they were flitting through the unglazed windows of our building feasting on the insects drawn in uncounted millions to the light we had set up to keep the roaches away. A rather lengthy game of bat-baseball ensued, and this proved too much for the two physicians on the team. One of them produced a high-speed, low-drag, lightweight, two-man tent from his rucksack, and they moved their sleeping bags out of the building. They slept safely in the completely enclosed, bug-proof tent.

They awoke the next morning cold and stiff, their air mattresses mysteriously deflated. They swore vociferously at the hardness of the ground, and the flight surgeon lectured on the effects of Charles’ Law of gas thermodynamics. Obviously, the mat-

tresses had lost pressure because of the dramatic drop in temperature overnight. They pulled their limp bedding from the tent, and carpenter ants erupted from beneath them. They had inadvertently pitched their tent on top of an anthill in the darkness, and the ants had eaten through the floor of the tent and their air mattresses, letting the air out of both the mattresses and the flight surgeon with the bug-proof tent.

### **SPOOGE BOMB**

Things were settling into a routine in the main camp. Spirits were soaring and rapport was building. Team cohesion was remarkable with the exception of one medic who had his own plan. Don had moved his cot, bedding, and other personal gear out of the tent and next to the campfire where the team spent each evening sitting with our counterparts. Jokes, pranks, songs, and tall tales filled our nights around the fire. A favorite prank involved “spooge” or hexachlorophene foam hand cleaner, which has a high alcohol content and burns quite readily. A pile of spooge was squirted next to or beneath the chair of an unsuspecting victim, then a trail of foam leading from the pile to the fire acted as a fuse to produce the desired effect. Bonus points were scored for creative or overly circuitous fuse laying. Eventually, someone discovered that the empty spooge cans made a pleasing “pop” when thrown into the fire, and it was only a matter of time before someone threw a new, full can into the flames. The explosion was quite spectacular. Aluminum shrapnel and flaming globs of foam flew everywhere. No one was injured, but Don’s gear went up in flames. The report of survey later indicated that burns were not “fair wear and tear.”

### **WHEN IN ROME . . .**

The team veterinarian was addicted to tobacco. His specific vice was Copenhagen, and he was always trying to quit. The latest plan for quitting was to bring only one can with him to the field. He would have to quit when that was gone, and he would have the withdrawal symptoms licked by the time he returned to CONUS. Everything worked according to plan until about four days into the withdrawal. We stopped at the African bush version of the Piggly Wiggly one afternoon, and Jack was desperate for a dip. He did his best to question the proprietor, a frail lady of little less than 130 years, but alas she did not speak English; nor did he speak any of her native tongue. To make matters worse, she did not speak Swahili or Arabic and so could not even communi-



cate with our counterparts. Undaunted, Jack resorted to international hand and arm signals for a dip of Copenhagen, with a suitable accompaniment of guttural noises and the odd “Copenhagen!” thrown in for good measure. At last an understanding was reached and the nice little old lady produced a crumpled brown leaf wrapped around finely ground snuff. Jack threw a large wad of local currency at her and delightedly dumped the contents of the leaf into his licked-clean Copenhagen can. As he moved to place the first dip between his lip and gum, the nice lady grabbed his hand and shook her head. With infinite patience, she demonstrated the proper technique for sniffing snuff, and Jack smiled, “When in Rome, do as the Romans do.” A snort of powder went up each nostril, and we started on the short walk back to the truck. Jack collapsed half way there. Blood and snot spewed from his nostrils in very dramatic fashion while his face became dark red and swollen. It was perhaps the best imitation of how an acute infectious sinusitis looks that any of us had ever seen. Fortunately, he was surrounded by healers, and we all sought to help him by yelling from the bed of the truck that he’d be left behind if he didn’t hurry up and climb in. Eventually, with Herculean effort, Jack crawled unassisted into the truck, and we left with him prostrate in his own secretions. When he could finally talk, he said he felt like a baseball bat had struck him between the eyes. We told him he should be ashamed endangering the old lady like that—she had almost died laughing.

### **THORNED IN THE HEAD, PART 2**

One of the physicians introduced a new sport on the ride back. It was called urban surfing and involved standing on the tailgate of the truck while holding onto the support rib of the canvas truck cover and listening to rock music played very loud on a



Walkman stereo. The competition mainly involved seeing how long one could ride thus without being swept from the truck by a passing acacia limb. The other physician made no secret of the fact that he felt anyone participating in such activity at roughly 45 miles per hour over broken terrain needed psychiatric evaluation of his suicidal tendencies. Things went swimmingly for perhaps a mile, with Tom narrowly escaping death by deftly ducking each passing branch. Then two branches came in tandem, and Tom rose from his crouch beneath the canvas to meet the second one square in the face. Inexplicably, he landed inside the truck. He lay bleeding and stunned, a large thorn protruding from his forehead. The medics jumped to his aid, but the flight surgeon only remarked, “I told him that would happen. There’s only two kinds of people playing games like that: the quick and the dead—.”

### **THORNED IN THE HEAD, THE SEQUEL**

An acacia branch whipped into the back of the truck before the words left the doctor’s mouth, and thorns impaled him. Now both physicians lay bleeding on the floor of the bed with medics cleaning wounds, bandaging, and doing neurologic exams as the African savanna raced by at 45 mph.

### **THORNED IN THE HEAD MEETS MOTHRA**

It was decided upon return to the camp that Tom needed a primary closure of his forehead laceration. The problem was that the flight surgeon had only one hand with which to work because his left arm was in a sling. It was also completely dark. The dentist cleaned the wound and provided local anesthesia while medics attempted to erect barriers to

keep insects from swarming around the light. The wound was irrigated and inspected for foreign material. All was ready for the closure when a small moth appeared, circling the light. "Would somebody please get that out of here before it—" The moth struck the lamp's bulb and spiraled into the open wound in Tom's head. It lay on the gleaming periotum and suffered its death throws, scattering the powder from its wings uniformly throughout the wound. Tom, blindfolded to protect against splashing irrigation fluids, asked, "What's going on?" "Oh, we're just demonstrating the difference between sterile and clean procedures." The moth was plucked from the hole. The doctor placed sutures and a medic tied them.

### SWEATY EGGS

Rapport between US and host nation (HN) medics was incredibly high. One of the HN medics confided in his counterpart and asked his expert medical opinion on a delicate personal matter. "My American friend, you must help me." "What is wrong?" "My eggs, they are sweaty." "What?" "My eggs, they are very sweaty. You must do something." "Your...?" "My eggs, my eggs! You must do something for them." Oh, THOSE eggs. GI foot powder cures more than just athlete's foot.

### KILLER BEES

Not every encounter was pleasant, however. At one village, a would-be thief hit upon a foolproof plan to steal the team's supplies. After a few unsuccessful snatch and run attempts, he threw a beehive through the window of the pharmacy, no doubt believing it would be a simple matter to take whatever he desired once the bees had run off the team. The bees would swarm upon a victim by the dozens and all sting at once, seemingly on signal. The effect was impressive to say the least, but the bees had trouble discriminating between healthcare providers and burglars. We escaped only with our weapons and radio. The aspiring burglar escaped empty handed. The bees cleared everyone out for a radius of about a quarter mile and jealously guarded the shack that had been the pharmacy. The village elders built small fires in tin cans and created enough smoke to allow a few of us at a time to re-enter the building and recover our supplies. All things considered, the situation worked out fine. We treated a few stings, thanked God no one suffered anaphylaxis, and called off work a little early that day.

### SNAKES, PART 2

We returned to camp only to find the vet had patients waiting for him in our tent. A small snake



was happily inspecting the gear he left under his cot. A quick consultation was requested, and it was decided that the snake should not be killed but rather relocated. "I wonder what kind of snake it is," the flight surgeon said as he sought to out-manuever the reptile. The cobra responded by rising up and spreading its hood in the classic pose. Incredibly, moments later the flight surgeon held the snake firmly by the head and said, "I wonder what kind of cobra it is." The red spitting cobra responded by spraying a perfectly aimed stream of venom into the doctor's face. A life-long affliction of myopia saved both the doctor and the young serpent, which took up residence in a termite mound a mile or so from camp. Upon hearing the tale, the battalion commander awarded the flight surgeon a "Letter of Reprimand with Bronze V."

### FOND FAREWELLS

Our HN counterparts planned a regular down-home picnic to farewell the team. A red hartebeest was sacrificed for the barbeque and proved quite delicious—definitely an improvement over boiled goat meat—and the *piece-de-resistance* was the local version of haggis. A large fire was built and burned to coals. Next, the late hartebeest's stomach was opened and the contents dumped unceremoniously on the ground (no attempt was made to wash residue from the now defunct organ). The remaining viscera were cubed and the pieces placed in the stomach, and the mix was then topped off with blood until the stomach was once again full. It was sewn shut with string, and the whole affair was dropped into the coals and buried. Through some magic intuition, the

cook was later able to dig up the delicacy (which was now more or less the same consistency and shape of a loaf of homemade bread) just before it was completely incinerated. The ashes and dirt were brushed off and slices were carved from the treasure and offered to the guests of honor.

The team vet had watched the entire proceeding with a jaundiced eye and was kept from interfering only by the commander's insistence that we were being honored and that anything less than enthusiastic participation in the feast would offend our hosts. Eager to please, the vet accepted the first slice of heaven offered and wolfed it down amid some rather impressive histrionics and gagging. Everyone else proved to be much more reserved and finicky in their dining habits. As a consequence, there was only one American with a clean plate when the last piece of "haggis" was brought around, and the vet got to eat that one, too. This occurrence would have been met

with universal approval and glee, save for a single dissenting vote.

Gifts were exchanged by all, as is customary. The Americans presented the obligatory plaques and coins, but our counterparts gave us unique, culturally significant items such as woodcarvings, local textiles, and traditional clothing items. The high point of the exchange was when the African commander presented our commander with a large hand-carved ebony elephant. In his remarks, he dubbed our commander "Ndomo" and proclaimed to all that only an elephant was big enough to symbolize the impression he had made. Our leader, a physically imposing man, flexed his biceps and smiled, believing that "ndomo" meant "elephant." The rest of the team also smiled because we knew that the word for "elephant" was "ndovu" and that "ndomo" translated as "mouth," thus proving that Americans are not the only soldiers with a sense of humor.



COL Brian Campbell, DO, MPH, has served with 5th SFG(A) as the Group Surgeon and 2nd BN Surgeon. He also served as the Regimental Surgeon of 160th SOAR(A) and as the Chief of Clinical Services and Operational Medicine at USSO-COM. He participated in Operation Prime Chance and in Operation Desert Shield/Storm. Dr Campbell is board certified as a Preventive Medicine Specialist in the fields of Aerospace Medicine and Occupational/Environmental Medicine.

CPT Don Shipman, PA-C was assigned to 5th Special Forces Group as a Special Forces Medical Sergeant. While in Special Forces, CPT Shipman conducted humanitarian assistance, demining, and foreign internal defense missions in Central America, Africa, and Asia. During the Persian Gulf War, he was the Team Sergeant of ODA-542. Prior to physician assistant training, he spent a year as the Group Medical Operations Sergeant. Since becoming a PA, CPT Shipman has served in the Arctic light infantry, airborne infantry, the Joint Special Operations Command, and HQ United States Special Operations Command. CPT Shipman received his Master's Degree in Family Medicine from the University of Nebraska in 1997 and is currently in a three-year residency in pursuit of a doctoral degree.



The Joint Special Operations University, United States Special Operations Command, announces the Joint Special Operations Medical Officer Orientation Course 04A (JSOMOOC) 19-30 Apr 04, Hurlburt Field, Florida

**Course Description:** The JSOMOOC is a SECRET level interactive course designed to orient medical officers, senior non-commissioned officers, and governmental civilians newly assigned to or in direct support of SOF operations. The course will familiarize attendees with the USSOCOM mission, roles, and capabilities with focus on medical operations in the joint SOF setting. Area of emphasis will include operations/plans, lessons learned, intelligence, medical force protection, operational risk assessment, occupational and environmental health surveillance, and SOF pertinent clinical subjects.

**Continuing Medical Education (CME):** CME credit has been applied for through the Uniformed Services University for the Health Sciences.

**Selection:** Class size is limited. Individuals will be selected through a nominative process. Priority will be given to applicants assigned or forecasted to directly support SOF operations. To request attendance, apply online at <https://www.hurlburt.af.mil/milonly/tenantunits/jsou/index.php>.

For additional information, contact Lt Col John McAtee, DSN 579-4754, Comm (850) 884-4754, or Maj Cheryl Magnuson, DSN 579-5847, Comm (850) 884-5847. DSN FAX 579-4409, Comm (850) 884-5847.

Unclassified E-mail [john.mcatee@hurlburt.af.mil](mailto:john.mcatee@hurlburt.af.mil)

Classified E-mail [john.mcatee@hurlburt.af.smil.mil](mailto:john.mcatee@hurlburt.af.smil.mil)

Unclassified E-mail [cheryl.magnuson@hurlburt.af.mil](mailto:cheryl.magnuson@hurlburt.af.mil)

Classified E-mail [cheryl.magnuson@hurlburt.af.smil.mil](mailto:cheryl.magnuson@hurlburt.af.smil.mil)

# SOMA Review



## SOMA Sabers

Dr. Steve Yevich, COL (Ret)  
Ex-President, SOMA

The tradition of presenting SOMA sabers (a US Cavalry sword) began several years ago by LTC(R) Dale Hamilton as a means to recognize retiring SOMA Presidents. Recipients include COL (Dr) Jim Coy (1994-1995); COL (Dr) Craig Llewellyn (1996-1998); COL Robert Leitch (1999-2001); COL (Dr) Steve Yevich (2002-2003).

In 2002, the SOMA President saw that the SOMA saber was a significant method of bestowing recognition on other key personnel, even those from outside SOF, who contributed to SOF medicine throughout their careers, especially from the higher leadership and strategic levels. SOF of the past were not regarded as a fully acceptable entity by the conventional military, and SOMA saw that these individuals risked their careers by their endorsement of SOF medicine. Awardees falling into this category include GEN PK Carlton, GEN Patrick Sculley, and GEN Darrell Porr. LTC(R) Dale Hamilton was also finally recognized for his decade of unpretentious, behind-the-scenes, total support, and production of the SOMA event, without whom the SOMA would have floundered and expired years ago.

In 2003, expansion of the award of the saber was completed by encompassing SOF medics from each of the services who were selected by their brethren for recognition of a career of dedication to Special Operations medicine. In addition, retrospective recognition was awarded to key individuals from the early Special Operations years, from both medical and non-medical backgrounds, who had provided strong support, and/or had made significant impacts on the inception of Special Operations medicine. SOMA saw that without the now-legendary uphill

battles that these latter individuals fought against conventional military and medical authorities to establish the training and credibility of the SOF medic, the recent and speedy advances that SOF medicine has recently made would have been impossible to achieve.

Sixteen SOMA sabers were presented at the 2003 SOMA Conference banquet to retiring and retired personnel, medical and non-medical, SOF and non-SOF, but all strongly confirmed supporters and innovators in SOF medicine. These included the following:



RADM (Dr) Richard Carmona (left)  
Dr Steve Yevich, COL (Ret) (right)

**RADM (Dr) Richard Carmona**, Surgeon General of the United States, and former Special Forces medic (Vietnam). **HON Rudi Gresham**, Senior Adviser to the Secretary for Veterans Affairs; Aide to

GEN Yarborough during the formative years of Special Forces, when President Kennedy acknowledged the Green Beret and the advanced mission and subsequent medical training were formalized. **COL (R) Ola Lee Mize**, Medal of Honor recipient, enlisted and officer SF, with multiple combat tours in Korea and Vietnam; a strong SF medic supporter, both as a “user” of SF Medic skills (war wounds) and as director of training at JFK Special Warfare Center. **COL (R) D. Tsoulos**, SF tabbed surgeon, Vietnam; JFKSWCS Command Surgeon; strong supporter of SF and SF missions throughout his career, and mentor to numerous medic-physicians in the 1980s and 1990s. **COL (R) Harry Heinitsh**, aka “Dirty Harry”, SF tabbed physician; previous IMA as Command Surgeon JFKSWCS; the man who was an early mentor for many SF medics and docs from the late 1970s to present.



**COL Cliff Cloonan**, prior 18D, physician, and Dean of JSOMTC, who, with highest integrity and self-sacrifice, fought for and instituted the most ideal standards of SOF medical training at the JSOMTC. **LTC (R) Doug Phelps**, prior USSOCOM Medical Operations Officer; credited with pushing numerous SOF medical operational innovations and initiatives during the earlier years of SOCOM. **CMSgt (R) Stan McGill**, former Senior Enlisted Advisor for AFSOC; seen by his superiors, peers, and subordinates as a role model for enlisted medics as well as officers; always reliable, always patient, always delivered. **SFC (R) Phil Melcher**, nominated by his peers/superiors as a role model representative of the all-around hard-working SF medic. **SFC (R) Robert Miller**, Ranger battalion and regimental medic extraordinaire; one of the single-most greatest influences

in Ranger medical training and innovation in Ranger history, with far reaching influences on every unit across SOF. **SFC (R) Arden Gage**, 18D from 1st and 7th SFGA, and JSOMTC Instructor; credited by his peers as being one of the best instructors/operators in SF. **HM1(SEAL) (R) Gary Kibbee**, SEAL medic extraordinaire and of legend; Vietnam era SEAL; continually activated over the decades to deploy in essential missions (ODS/DS, OAF, OIF); renown in the SEAL and civilian communities as an understated superhero SOF medic.

Four sabers were also presented in absentia, but in person by a SOMA representative to the following:

**GEN William P. Yarborough**, the Special Forces commander who had the vision to identify the role and direct the implementation of independent medic training that made the Special Forces medic into the legendary figure recognized today. **COL Richard L. Coppedge** (see below). **MSG (R) Tony Vozza**, 5th SFGA Group medic; nominated by his peers and subordinates for a career of dedication and self-sacrifice to SOF. **SFC (R) Scott Shepard**, 18D, NCOIC of the SOFMSSC; credited by his peers for the success of the sustainment course.

A note about Dr Richard Coppedge:

Herein brings me to an important point. Most SOF medical personnel know nothing of their heritage, beyond a few anecdotal stories, variably and inconsistently relayed. (This information has yet to be compiled in a volume specifically devoted to the SOF medic.) It was through the HON Rudi Gresham (former aide to GEN Yarborough and witness to President John F. Kennedy’s 1962 recognition of the Green Beret), that I discovered an important part of the conception of the SF medic. General Yarborough is recognized as the first SF commander who identified the need for the SF medic to receive formal expanded medical training in order to operate independent of a physician, in denied and geographically isolated areas of the world. The JFK Special Warfare Center Command Surgeon at that time (1962) was COL



Richard Coppedge. Doctor Coppedge had previously worked with establishing training for Special Forces medics in the 1950s as commander of the AMEDD Center and School, so he was somewhat familiar with the highly unconventional nature of the Special Forces mission. Upon arriving at JFKSWCS, Coppedge sought out and extensively interviewed experienced SF medics to best define the training needs for the medic. He traveled extensively around the world with GEN Yarborough [Europe, Africa, Iran, South East Asia (including Vietnam), and the Far East], as Yarborough checked on deployed US Special Forces while also investigating training and tactics of Special Operations forces from other nations. Special Forces medical training became tailored to meet the scope of the expanded medical mission, encompassing combat trauma, routine sick call and minor surgical procedures, veterinary care, and care oriented to the support of indigenous families. The “Winning the Hearts and Minds” concept was adopted by GEN Yarborough from the British SAS in Malaysia, and the Special Forces medic was recognized as (and trained to be) the most essential factor in establishing the legendary and unique rapport that SF has with the nations that they have supported.

After Dr Coppedge’s retirement from the Army in the 1970s, he was recruited by WHO to go back to Vietnam as a civilian, and he witnessed the fall of the Republic of Vietnam. He continued deploying with WHO to other troubled areas of the world, to include Nicaragua before and during the revolution in the late 70s.

I visited Dr Coppedge, his wife Kim (who he met and married in Vietnam), and their daughter, Elizabeth (Lisa), who was several months old when she and Kim fled RVN in 1975 during the final NVA invasion. While I can only convey the gist of Dr Coppedge’s life, he truly had a most adventurous one, and I hope that he will begin to contribute articles to the JSOM about the early years of Special Forces medicine.

The SOMA will continue to root out and recognize these people who influenced the early development of Special Operations medicine. While the ground that they broke was a tremendous achievement, the lessons that they learned are still lessons that we continue to learn today. History repeats, and only fools need to learn by first-hand experience.



Dr Coppedge (SOMA Saber), wife Kim, and Dr Steve Yevich



Dr Coppedge (SOMA Saber), wife Kim and daughter Lisa

*EXCERPTS FROM "WARRIOR/HEALER:  
THE UNTOLD STORY OF  
THE SPECIAL FORCES MEDIC"*

**Editor's Note:** Len Blessing Jr has spent the last three years on a project to write a book that will tell the untold story of "The Special Forces Medic." We have agreed to publish the excerpts of Len's book, not to advertise it, but because we believe strongly in his desire to document and preserve the complete history of Special Forces medical operations. The JSOM plans to provide "Lessons Learned" from all levels of SOF medical providers as well as record SOF medic stories for historical purposes.

mdd

The following excerpts from "Warrior/Healer: The Untold Story of the Special Forces Medic" represent three years of painstaking yet exhilarating experiences encountered during the process of documenting a remarkable story. Initially dubbed, "Project BacSi," the manuscript has evolved much like the SF medic and his training. The original idea was to document the experiences, exploits, and accomplishments of the Vietnam War era SF medic. Just two weeks into the quest it became evident that to restrict the project's scope to that time frame, remarkable as it is, would be an extraordinarily huge error and be an injustice to ALL Special Forces medics, past and present. Each medic from 1952 to this day has contributed to the growth and accomplishments of Special Forces medical operations.

While I want the excerpts to generate excitement and anticipation for the eventual publication of the book, the purpose of having the JSOM print them is not self-serving. The main objective is to spread the word about the project and garner more support and participation to accomplish a greater goal. Currently, over 200 SF medics, doctors, and team members have joined to assist me with this mammoth project. The range of generations represented covers the first class of medics with the original 10th Group to a handful of active duty members. Obviously, it is impossible to cover everyone and everything in just one book, but who said we have to stop at just one?

This leads to the greater goal alluded to earlier. The extended mission of this project, self imposed and assigned, is to collect, categorize, document, and preserve the complete history of Special Forces medical operations. This can only be accomplished with your support and participation. It is my hope that this article and the book will inspire and encourage each of you to climb aboard and contribute in any way you wish to reach this goal.

Please feel free to contact me.

Leonard D Blessing Jr.  
302-762-6022  
lenblessing@comcast.net



## EXCERPTS CHAPTER 4: “DO NO HARM”

Special Forces expended an extraordinary amount of time and funds training men who did not complete the medical training. One medic, Robert Kipfer, noted in reference to the attrition rates versus the investment that “a lot of money was spent and they didn’t get much out of it.” Kipfer concedes that the stringent expectations are an absolute necessity because the medic was “going to be in an isolated situation and you will have to be knowledgeable enough to take care of people without the aid of hospitals or



Bob Kipfer, circa 1965/1966, Republic of South Vietnam.  
*Photo courtesy of Bob Kipfer*

doctors.” Walter R. (Bob) Lewelling, who began medical training in October 1962, underscored the possibility of elimination from the course that the students encountered through to the final day of training: “I remember that there were quite a few who did not finish, including a couple who bombed out on the last day at the ‘Murder Board’.”

The “Murder Board,” an affectionate name the medics had for the final exam each student must pass, was officially called the Oral Boards. This final hurdle of the training process was pass or fail. There was no in-between. The board of examiners was comprised of medical professionals from all medical fields. The full day of oral examinations were administered by doctors, nurses, anesthetists, lab technicians, dentists, and veterinarians. During an interview Lewelling recalled, “The pressure and stress was intense. There was an old medical senior NCO present during the boards – he knew what you would need to know over in Vietnam.” One of his friends had

made it all the way to the Oral Boards and flunked out at that time. Lewelling recalled questioning the wisdom of that decision: “At the time I really questioned that. They put him through all that training and then wouldn’t let him be a medic. In retrospect and knowing now – it was probably a good idea; he possibly couldn’t have stood the pressure and they were afraid he would get people killed.”

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Fort Sam Houston medical officials had repeatedly denied requests that such a surgical lab be designed and made available for use by Special Forces medics. The denials inspired Captain Radcliffe, who took over for Captain Bond, to attempt to provide the best possible training. After failing to receive the necessary approval for the course from AMEDD (Army Medical Department), Captain Radcliffe realized, “We would have to take full responsibility for advanced training ourselves. I set myself to take the task of developing the best program possible, by Special Forces, for Special Forces, right on post at Ft. Bragg.”<sup>1</sup> The course was designed for as much hands on training as possible. The formal Program of Instruction (POI) included: debridement, endotracheal intubation, suturing and amputations, preparation and sterilization of surgical equipment, administering general anesthesia, operating room techniques, post-operative care, and laboratory and pharmacology skills. Lab training was minimal, covering routine CBC, WBC, urinalysis, parasitology, stool specimens, and identifying various types of worms.

By December 1960, the 7th Group became the sole users of the full-fledged program. The training developed and taught at the Research Lab was perhaps the best example of the Special Forces medics’ desire to continually receive the most advanced and updated training possible. The value of training received at the lab was evident in that the proto-type was mimicked in Germany for the 10th Group medical staff. Official documentation has not been uncovered but Josef Frey, while serving with the 10th Group in Lengries, Germany from May 1964 to October 1966 as the Group Chief Medical NCO, attests to operating a school for refreshing surgery procedures. He stressed that the school was strictly used for medics in the 10th Group, not for training new medics.

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Unclear guidelines and procedures created confusion and duplicated training among many of the trainees. An example of this is apparent when Kipfer and Martin Brady's class arrived at Ft. Sam Houston in January 1962. The orders sending them there were typed incorrectly, resulting in the entire class, including several SFCs, to repeat Basic Training. Kipfer recalled, "This didn't go over too well, crawling under barbed wired. . . that was definitely the first and last class that happened to."<sup>2</sup>

This particular incident may have been the last occurrence of repeating Basic Training, but it certainly was not the last incident of the trainees being subjected to the illogical orders of officials at Ft. Sam and the regular army. Thus began a time honored tradition--a phenomenon the author has taken the liberty of naming "Ft. Sam Antics." An entire book could be written detailing the stories of regular Army personnel, military police, and the medical professionals' resistance to the special training needs of the SF medic at Ft. Sam. The trainees' reactions to counter what they perceived as a hindrance to their mission typically resulted in actions with a hilarious flair. Sapper stated, "There wasn't a minute that went by that we weren't f----- with by somebody."

The regular army personnel at Ft. Sam didn't understand why these enlisted men required such a high level of training or they did and decided that they were not going to treat the trainees any differently than they would the other trainees in their command. Obviously, this created some serious problems – usually for the command structure. The SF soldier is a different "beast," one which they had not seen the likes. These men were AIRBORNE! They had already been subjected to the trials and tribulations of the worst training conditions imaginable by the Army and had passed. They were sent to Ft. Sam for one reason – extensive advanced medical training. When some ranking NCO or low-grade officer decided they were going to "break" the wild mavericks, it almost always resulted in some ingenious and shocking responses from the medics. This is not to imply that the trainees were constantly subjected to misuse or pushed to act in a non-traditional manner. Many times, they simply were letting off steam from the pressure of the training. Add to the mixture of behaviors the simple fact that the trainees were 20 year-old kids that had the world by the tail and were a part of the most elite unit in the Armed Services and it's fairly obvious to understand why they were so unique.

After all, that is what SF expected of its ranks--untraditional proactive individuals that never shied away from a challenge.

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In recognition of the skills desired and expected of the medical specialist, many felt they required a commensurate rank and pay grade. COL Donald Blackburn addressed the shortcomings of rank classification of "specialist." He instigated a change to the more appropriate "noncommissioned officer." Blackburn submitted a "Request for Change in the Current Table of Organization and Equipment," dated June 6, 1960. The request cited the unique and complex mission of Special Forces for qualified instructors and leaders who were well versed in the technical aspects of their specialty. COL Blackburn's request clearly demonstrates that the medical personnel were more than just Specialists because many situations would require them to "conduct instruction and supervise operations in the role of demolition supervisors, weapons leaders, and tacticians commensurate with the individuals experience and degree of cross training."<sup>3</sup> Large numbers of indigenous personnel organized and trained under combat conditions which required the medic to be an advisor for large areas and for operating medical installations without benefit of direct command supervision. A noncommissioned officer was also desirable in the event of an absence of a detachment leader, which may require the medic to assume those duties. In the event such a situation should develop, it is best represented by a noncommissioned officer to help exert influence, prestige, and authority. Blackburn emphasized that, "The psychological effect of the detachment medical specialist on indigenous personnel must not be underrated."<sup>4</sup> He also pointed out that noncommissioned officers would be reluctant to volunteer for Special Forces duty in the medical field, knowing that they would forfeit their proficiency pay, thus greatly reducing their source for replacements and consequently, the effectiveness of Special Forces units. The requested changes were subsequently approved and enacted October 31, 1960.

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The selection criterion for soldiers chosen to receive medical training were now greatly enhanced from the early years but still wasn't a cut and dry process. A minimum test score required, called the AGCT (Army General Classification Test), was 115, although a point or two lower was sometimes overlooked. This test score is the military equivalent of the

traditional IQ test. Administered at the induction center, the test was used to determine abilities in multiple subjects covering general knowledge. Carey Drumheller remembers that “a score of 115 or better was needed to attend OCS (Officer Candidate School), pilot school, and medical school. If you could score 130 or 140, you were a genius. If you scored 80, you were going to be leading the ‘charge of the light brigade,’ or in other words, ‘cannon fodder’.” Some classes averaged a score of 130. Martin Brady recalls how he was selected to become a medic: “The way you were picked was by GT score. If it was over 110 you went to the medic program.”<sup>5</sup> Lewelling asked for medical training but doesn’t recall that they had any specific criteria for assigning trainees to any particular MOS, other than several tests and an interview process. Some, like Dale Worley, ended up being a medic by circumstance, “I was sent over to Training Group to be classified for training and was asked what MOS I wanted to be trained in. I have no idea how, but ‘medic’ came out of my mouth.”

Scores didn’t dictate certain success. There were people who failed out of the training who had scored 137. Dr Coppedge explained that the test scores were not the only factor determining who would become a medic and who would not. “Theoretically, what was being measured at that time was not just knowledge, but attitude. It wasn’t important just what the medic did in surgery, in the operating room and the debriding of the wound; it was also the follow up on the ‘patient’.”<sup>6</sup> Punctuating Dr Coppedge’s remarks regarding test scores, an examination of Brady’s class of 120 that started in January only graduated 28 in November. All of the training had a tremendous impact on the medics, but without question, it was the AMTS phase that had the most. The course, built around treatments for battlefield casualties, imparted the severity and the seriousness of the training. It became evident that a shocking sense of immense responsibility rested upon the soon to be medics.

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The training and direction provided at Ft Sam Houston were a vital part of the medic’s education to define his abilities and limitations. The training did not necessarily prepare them to actually perform the skilled procedures but to have the knowledge of what was taking place so that they could make an informed, quick, and correct decision that was in the patient’s best interest. If circumstances

dictated, he was prepared to perform the necessary procedure to extend the patient’s chances for recovery. In hindsight, Dr Juel envisioned what would become today’s physician assistant (PA). The medical professionals during the early 1960s were not prepared to accept this concept and without doctors teaching the procedures, they were not going to exist. The persistent resistance to train enlisted personnel and the possible ramifications of them practicing these highly skilled tasks needed to be addressed and explained to gain physician support. The setting in which Special Forces medics operated required the need for a physician substitute. Dr Juel took a different approach to get the doctors to accept this idea and understand the need for the advanced type training for non-physicians.

“We had to have physicians to train these men. There is no way the skill of a physician can be taught by anyone else. So we used the approach of the missionary. I talked to doctors all over the country, telling them that many of them had participated in the training of Christian Missionaries who were not doctors, but were going into the field and had to be somewhat knowledgeable, and I had to assume they did not object to training these people. So, why did they object to training this man, who had to go into the same situation and be the best qualified, not necessarily a doctor?”<sup>7</sup>

This tactical presentation broke the ice with most physicians. But, there were still some exceptions to participation in training the Special Forces medic.

The emphasis of the course outline at Ft Sam Houston became diagnostic skills. This was based on the premise that in order to treat, you first had to know what you were treating. With this additional training emphasis in mind, Dr Juel, working with Dr Coppedge, developed the course instruction, which was finalized with additional training time authorized, bringing the total time spent at Ft Sam to eighteen weeks.

Each phase of the training was tested through the use of a mannequin. Knowledge of anatomy, physiology, pharmacology, nursing, evacuation, and treatment methods were observed through this method. Medics obtained the patient’s medical history, diagnosed the problem, prescribed treatment, and performed the necessary medical or surgical procedure. Weak areas were observed and complimented or critiqued immediately to effectively reinforce the

teaching received in the classroom.

Medics were introduced to subjects and procedures to provide them familiarity with the procedures they were sure to encounter in an operational setting. The ramifications of performing such advanced and specialized procedures were addressed in the classroom. For example, OB instruction is a very difficult area to train a non-physician, yet it was a distinct possibility the medic would face such a situation. Therefore it had to be covered in generalized terms. The societies and cultures in which the men would be operating had been witnessing birth for many centuries without the benefit of modern medical technology. Woman can give birth with virtually no help. The older females of a village often act as midwives in this setting and did a fairly good job of it given the circumstances. The likelihood they would seek outside assistance was slim, and if they did, it usually meant there were complications with the delivery, such as a breech birth. Dr Juel stated, "We tell them NEVER to do that and if they are called upon, to volunteer to help but never take over the case."<sup>8</sup> The rationale and theory behind this practice was that a medic could destroy a team's credibility in a village if their actions caused harm, thus having a negative impact on their mission. This theory makes perfectly good sense, both tactically and technically. But, when an individual is placed in a guerrilla warfare setting, his goal and mission is to win the support of the people, and to do that, he becomes quite intimate with the people with whom he works. The American soldier is known worldwide for his compassion and when asked for help, will do so with very little hesitancy.

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By the end of 1962, Special Forces was a mere ten years old. They withstood the growing pains through patient perseverance and professional dedication to the belief in what they were doing and the newfound support of their Commander-in-Chief. The medical program had grown at a fast pace. The creation of the Surgeon's Office at the Special Warfare Center and strong support of the Surgeon General of the U.S. Army led to the subsequent changes of the training cycles for medics. There was now a defined

and centralized medical command, complemented by the newly introduced TO&E addition of a Preventive Medicine Officer.

The first training class of medics numbered twenty-eight. Now 800 plus were in the various phases of the training process. The medical NCO role was better defined with a medical mission that included the socioeconomic conditions affecting the medical care of people in the region. Culture considerations such as taboos, religions, and social structures were all considered when determining the medical activities conducted by the medics. Environmental conditions such as local diets, edible plants, clean water supplies, and animals affected the health of all team members. The medic has to be familiar with these to provide optimum care for his team.

Sewage and garbage disposal practices were perhaps the crux of the medical mission in Southeast Asia. Counterinsurgency operations dictated a complete program addressing the health concerns of the people. Designing and implementing plans to improve the unsanitary conditions in the villages vastly improved the health conditions in a very short period of time. The knowledge of disease prevalence and their specific indications and implications was of paramount importance to provide healthcare for the team and indigenous people. Familiarity with available medical support facilities and evacuation capabilities determined the level of care the medic may be required to perform should problems arise.

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3. 7th SF Group (Airborne) 1st SF; Request for change in TOE; 6 June 1960
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5. Letter from Brady to author
6. Interview with Coppedge by Dorogi; pp 35
7. Interview with COL Roger A Juel, MC by Dorogi, pp 7-8
8. Interview with COL Juel by Dorogi; pp 26

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Leonard D. Blessing Jr.  
Lenblessing@comcast.net

## EXCERPTS CHAPTER 5: “THE QUIET PROFESSIONALS”

“Special Forces Aidmen are trained to be physician-surrogates; their assignments often require them to perform preventive and curative medical functions in primitive, often hostile areas, that are normally the responsibility of Medical Corps officers. Their work with U.S. military and native military and civilians in Southeast Asia has well justified the time, expense, and trust invested in them.”

- Captain Francis G. LaPiana, MC, USA, September 1966<sup>1</sup>

I want to illuminate the immense range of environments and political climates in which the SF medic conducts his work. This chapter will step away from the heavy emphasis on Vietnam and view some missions to other corners of the world. Special Forces teams deploy worldwide. They participate in training exercises in Alaska with native Eskimos. They are in South American host countries training counterpart units the intricacies of counter-insurgent tactics. They deploy to help rebuild areas devastated by natural disasters and to countries with sensitive political climates that require their ability to project a professional manner and act as “field ambassadors.”

The medics have an innate and extraordinary ability to leave a positive impression on all those that they come into contact with. Within weeks of this project’s beginning, a deluge of information about such missions came to light not from the medics, but from former team members and commanding officers. Their personal recollections and insight lend an understanding and appreciation of the team “Doc” and his intrinsic value contributing to the successful completion of assigned missions.

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An example of Special Forces conducting a mission that places them in the role of field ambassadors took place in Iran in 1962. Detachment A-33, 10th Special Forces Group (Airborne) received their task on 1 June 1962.

“The primary purpose of this mission is to recover and evacuate the bodies of LTC Johnson, MAJ Carder and CPT Knotts, presumed dead in the Zagros mountains as a result of the US Army aircraft crash on 27 January 1962. . . Search and recovery operations will be conducted in the simplest and

most expeditious means possible. Undue risk of life for the purpose of recovering bodies or equipment is not justified. If the operation is unsuccessful after fourteen days, you will contact this headquarters for further guidance.”<sup>2</sup>

Initial rescue attempts by other military units resulted in rescuing two survivors. One deceased crewmember had been located and identified but was lost during a snowstorm prior to evacuation. Severe weather conditions in the high elevation, coupled with a lack of proper equipment, necessitated the search for the remaining and presumed dead crewmembers to be suspended. Another search launched on 10 February 1962 succeeded in only recovering a minimal amount of equipment. Unexpected bad weather dropping more than a meter of snow and the inability of a HU-1B helicopter to operate at such high altitudes forced abandonment to await more favorable conditions to retrieve the remaining bodies located at 12,500 feet under 5 meters of snow. Detachment A-33 was given the opportunity to conduct the body and equipment recovery and destroy the aircraft where other elite units from Iran and Germany had failed. The team’s secondary mission was to conduct area familiarization and orientation studies.

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The missions and events presented here are just a microcosm of the almost infinite number of instances in which Special Forces medics have responded to their government’s requests to participate in missions throughout the world, helping the sick, wounded, and malnourished people of a region. The story is still being written through the recent events in Afghanistan, Iraq, Philippines, Colombia, and many others.

In time, when the cloak of secrecy and classification due to mission sensitivity and personal safety concerns is removed, today’s “Team Doc” will be recognized for their efforts and contributions. Then, the nameless beings who treated a fellow team member maimed in a training accident in Afghanistan will be publicly recognized for their skill and dedication making it possible for their brother to live and the one time “Bac Si” leading a Civil Affairs unit in America’s effort to bring stability to the anarchy that existed in Baghdad after the removal of a brutal

regime will receive acknowledgement of his efforts. These and many others are a testament to the dedication to their mission and the endless efforts of SF medics around the world to bring relief to those in need.

Until then, we can all rest well knowing they are carrying the American values and principles to less fortunate people.

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2. Letter of Instructions, Headquarters 10th Special Forces Group (Airborne), 1st Special Forces, APO 108, US FORCES, June 1, 1962

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Leonard D. Blessing Jr.  
Lenblessing@comcast.net



# 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. Three new books have been added since the Fall Edition.

TITLE	AUTHOR
15 Months In SOG	Thom Nicholson
A Concise History of US Army Special Operations Forces, with Lineage and Insignia	Geoffrey T. Barker
A Very Short War (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)	John F. Guilmartin, Jr
Advice and Support: The Early Years Airborne and "Special Forces" (Non-fiction, good quick references, especially for family or civilians)	Ronald H. Spector Hans Halberstadt
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 (Fiction)	Raymond D. Harris
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	SGM Joe R. Garner (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 Year To Freedom	James N. Rowe
From OSS to Green Berets	Col. Aron Bank (Ret)
Ghost Soldiers: The Epic Account of World War II's Greatest Rescue Mission (Ranger operation to free POWs in the Philippines)	Hampton Sides
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	MG Jack Singlaub (Ret)
Ho Chi Minh: A Life	William J Durker
I Served	Don C. and Annette R. Hall
In The Village of the Man	Loyd Little
Inside Delta Force: The story of America's elite counterterrorist unit	Eric L. Haney
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	Donald W. Betts

<b>TITLE</b>	<b>AUTHOR</b>
Operations Desert Shield and Desert Storm	
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	L H. 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. Vandembroucke
Phantom Warriors, Book II	Gary A. Linderer
Phantom Warriors: LRRPs, LRP, 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	H.T. 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 J.R. Wright
Spies And Commandos	Kenneth Conboy
Strategy and Policy Background Umbrella Concept for Low Intensity Conflict	Alex & Hamilton Booz
Street Without Joy (French in Indochina; Good groundwork for SF in Vietnam)	Bernard B. Fall
Talking with Victor Charlie: An Interrogator's Story	Sedgwick D. Tourison, Jr.
Tam Phu	Leigh Wade
The Chindit War (Good section on Merrill's Marauders)	Shelford Bidwell

TITLE	AUTHOR
The Company They Keep	Anna Simons
The Devil's Brigade	Robert H. Adleman
The Dying Place (Fiction)	David A. Maurer
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 (This is the other half of the Bravo Two-Zerostory [a very good read on human endurance and tenacity])	Chris Ryan
The Politics of Heroin in SE Asia (essential reference for understanding the Golden Triangle)	Alfred McCoy
The Protected Will Never Know	Leigh Wade
The Raid	Benjamin F. Schemmer
The Ravens (The classic about our Bird Dog brothers)	Christopher Robbins
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
US Army Special Operations in World War II	David W. Hogan Jr.
US Special Forces	Peter McDonald
US Army Special Forces 1952-84	Gordon L. Rottman
US Army Handbook for North Vietnam Dept. of Army: 550-57	
US Army Handbook for Cambodia Dept. of Army: DA Pam: 550-50	
US Army Handbook for Laos Dept. of Army: DA Pam: 550-58	
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Who's Who From MACV-SOG	Jim Morris
	Stephen Sherman



## Apologies

Hippocrates in Megapolis: Urban Combat and Medical Support, which was published in Vol 3, Ed 3, Summer 03, was previously published in the US Army Medical Department Journal, January-March 2003. Medical Implications of High Altitude Combat was previously published in the April-June 2003 edition of the same journal. Permission to publish in the JSOM was granted but we neglected to give credit. Our sincere apologies.

## Letters

I am a senior Medic of the Royal New Zealand Medical Corp. I am currently serving in Afghanistan where I have read an old Journal of Special Operations Medicine; Vol 2, Ed 4. I am thoroughly impressed by the layout, articles and content of the Journal. I would like to enquire whether the Journal is made available to medical units/individuals outside of the United States Forces? I have liased with some of your SF Medics and our training/knowledge and Esprit De Corp is very similiar. Please advise if I can subscribe to the Journal of Special Operations Medicine. Alternatively I would like to submit an article.

Kindest Regards  
Sergeant Kirk Blumers  
Senior Medic  
Task Group Crib

I just received the lareset issue of the journal and again I found it very interesting. The article on the Thai museum was indeed macabre.  
Thanks again for keeping me on your mailing list.

CAPT Mel Lessing, USPHS (Ret)  
Assistant Editor  
Military Medicine

# **Editorials**

The article by COL Warner Anderson on RATTLESNAKE BITE AND THE ART OF MEDICINE - SORTING OUT THERAPIES prompted this editorial.

## Viperidae Antivenin:

- 1) The presence of fang marks does not always imply envenomation. Vipers may bite without injecting venom into the victim.
- 2) In the event of a snake bite occurrence with envenomation, it will take 10-15 vials of antivenin per individual. Full course of treatment will take several days and requires ICU capabilities.
- 3) Cold chain must be maintained for antivenin to maintain efficacy.
- 4) Manufacturers of antivenin are limited.
- 5) Military supplies are/will be limited and MEDLOG channels may not be able to respond within timelines required for emergencies in remote locations.
- 6) Significant risk of anaphylactic reaction exists if antivenin is used.
- 7) Risk assessment must be conducted prior to purchase of any antivenin supplies.
  - (a) What is the mission? Does the mission really cause greater risk?
  - (b) Is there an increased risk of exposure that cannot be reduced by education/recognition and avoidance? What population is at a greater risk?
  - (c) Will treatment capabilities be in place?

\*\* Would recommend that minimal supplies be on hand to support emergencies. Give one dose and place on air evacuation platform enroute to appropriate medical care facility.

\*\* Increase individual awareness of threat and avoidance procedures. 99% of all snake bites are initiated by the human.

\*\* Do NOT rely on the antivenin to be the savior of stupid actions or unsubstantiated fears.

MAJ William M. Darby  
Command Preventive Medicine Officer  
US Special Operations Command - SG



1. What is the USSOCOM policy on the tactical use of blood products by our Level 1 medical providers?
  - a. Match the blood type to that on the dog tags and proceed with caution.
  - b. Use only O-negative blood that has been maintained at the proper temperature and storage controls under the guidance of the Blood Bank personnel.
  - c. There is no USSOCOM policy.
  - d. Use only fractional blood products (packed cells, platelets, serum) dependent upon the volume requirements and only under the direct supervision of Blood Bank personnel.
  - e. USSOCOM only authorizes the use of HBOC for our tactical scenarios which often don't permit the proper storage and maintenance of blood products.
  
2. A USSOCOM commander is deploying with his forces into a malaria endemic (chloroquine-resistant zone). He is a flag officer and an aviator (not currently on flying status) and requires malaria prophylaxis. His medical record reveals he is G6PD deficient. The drug of choice for this aviator is:
  - a. Doxycycline at a dose of 100mg/day during exposure and daily for 4 weeks after returning from the deployed location.
  - b. Primaquine, 3mg daily while in the endemic area and for 2 weeks once out of the malaria area.
  - c. No drugs are currently allowed for aviators, so he needs strict use of personal protective measures (DEET repellent, sleeves down, nets, treated clothing, etc.).
  - d. Mefloquine (Lariam) is the drug of choice for most travelers with a dose of 250mg/week (1 tablet) for 2 weeks before departure, one tablet/week during travel, and one tablet/week for 4 weeks after departing the malaria area.
  - e. Because he is G6PD deficient, he cannot take anti-malarial drugs because the drug causes significant cardiac complications in G6PD deficient people.
  
3. Contraindications to smallpox vaccine includes which of the following:
  - a. Acute, chronic skin conditions, severe acne, burns in the healing process.
  - b. Recent LASIK eye surgery using steroid drops until 3 days prior.
  - c. History of eczema as a child, but no evidence of recent activity.
  - d. Patient with recent amenorrhea not taking BCPs.
  - e. All of the above.

1. Answer: c.

There is no USSOCOM policy. To date, USSOCOM forces have always been in support of a geographic command (CENTCOM, PACOM, etc.) and as such, the policy is a theater policy overseen and managed by the combatant command surgeon as communicated down through the component SOC commander and his staff and with input by the USSOCOM/SG staff.

2. Answer: d.

Mefloquine is the drug of choice for most travelers into chloroquine resistant regions. Side effects include nausea, DIZZINESS, headaches, and vivid dreams. Aviators are treated cautiously with all drugs, particularly those with CNS type effects (dizziness, etc.) for the spatial disorientation effects of flying can be compounded by these medications. However, because this person is not on flying status and won't be flying, he can take the Mefloquine. The G6PD issue concerns Primaquine sensitivity where this drug can cause intravascular hemolysis in those with G6PD deficiency.

3. Answer: e.

Smallpox vaccination carries significant risk of serious unwanted side effects and vaccinated personnel should be followed for adverse effects. The military experience through June 2003, is notable for 36 cases of generalized vaccinia, 18 cases of autoinoculation, 21 cases of myopericarditis, three cases of ocular vaccinia and one case of postvaccinial encephalitis.

# Photo Gallery

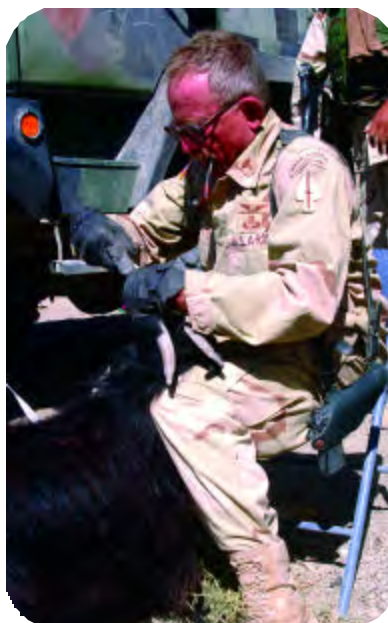


CPL Brian Cobb, 20th Special Forces Group (SFG), prepares a vaccination for a goat during a Medical Civil Action Program (MEDCAP) in the village of Pol-e Charkhi. US, British, and Afghan soldiers conduct the MEDCAP to help local Afghans who cannot afford medical treatment.

*Photo by SPC Kelly Burkhar*

COL Dalton Diamond, a surgeon with Coalition Joint Civil Military Operations Task Force gives dewormer medicine to a goat during CMAX at the village of Gaday, Oct 2003. US and Romanian troops from Kandahar Army Airfield, Afghanistan, conduct a Combined Medical Assistance exercise mission where members of the 486th, 407th and 321st Civil Affairs, 308th Tactical Psychological Operations Company, 10th Mountain Police Company and C MED 10th Mountain Forward Support Battalion set up a clinic at Marouf Valley to provide the nearby villages with medical and veterinary care and distribute food supplies.

*US Army photo by SPC Gul A Alisan (Released)*



During a medical clinic in Aug 03, SFC Michael Perkins, a medical specialist with GSC 3rd Special Force Group, examines a little boy from the local Kuchi tribe for possible worms at a location near the city of Gardez, Afghanistan. The Combined Joint Civil Military Task Force Surgeon Cell deploys in a series of day trips to selected locations and operates an ambulatory clinic which provides vaccinations and acute and preventive medical care to members of the Kuchi tribes as part of Operation Warrior Sweep.

*US Army photo by SFC Larry E. Johns (Released)*



1LT Dan Winschel, a Special Forces physician's assistant with the 404th Civil Affairs Battalion, explains the types of supplies donated to local doctors and nurses at the Azadi hospital in downtown Kirkuk, Iraq, Oct 2003.

Members from the 404th CA BTN collected a variety of medical journals, magazines, books, and CDs donated by US physicians to help local Iraqi doctors who have been without new material for years. *US Air Force photo by SSgt Lee Osberry Jr (Released)*



A 5th SFG medic listens to a Kazakh girl's irregular heartbeat during Operation BALANCE KAYAK, in Kazakhstan in Sep 2000. BALANCE KAYAK was a medical capabilities exercise that provided various facets of medical treatment to 12 local villages by screening patients and providing training to increase Kazakhstan's medical capabilities.

Services offered were obstetrics, gynecology, orthopedics, and general medicine, with a fully equipped mobile pharmacy. All equipment used was provided by the host nation.

*Photo by SSgt Jeremy Lock, USAF*



During Operation BALANCE KAYAK held in Kazakhstan, 18D SSG Brent Oland cuts into a local Kazakh man's foot to remove an embedded foreign object that is a result of mashing concrete.

*Photo by SSgt Jeremy Lock, USAF*

COL Dalton Diamond, a surgeon with HQ USASOC, took time to provide some valuable medical education to PFC Kirk Moir III, a medic with 1st Platoon, A Co, 1/87 Infantry Regiment while in Gardez, Afghanistan, Aug 2003. They examine the foot of a injured man from the local Kuchi tribe while a US army medic and an Afghan army medic look on. *US Army photo by SFC Larry Johns (Released)*



**The Photo Gallery continues with an interesting submission by John Wightman, MD, regarding a humanitarian SOF rescue in Afghanistan**



On 17 July 2003, a 10 year-old boy living near Dae Rawod bit into a landmine after a failed attempt to open the unknown shiny metal can with a stick. The Air Force's 59th Expeditionary Rescue Squadron, based at Kandahar Air Field, was called to rescue the victim at night in poor visibility due to blowing dust. Despite expert intubation and resuscitation by member PJs, the patient arrived at the Army's 948th Forward Surgical Team in hemorrhagic shock.

*Photo by SrA Kevin Bratcher (210th Rescue Squadron, Kulis ANGB, AK).*



Members of the Air Force's 376th Expeditionary Aeromedical Evacuation Squadron, also based at Kandahar Air Field, were called upon to transport the patient aboard a 59 ERQS HC-130N Combat Shadow to a maxillofacial surgeon in Bagram. Inflight care by the CCAT team was complicated by difficulty maintaining position of the ET tube due to facial swelling and instability, and high peak airway pressures during ventilation.

*Photo by Capt Kenny Wilson (74th Medical Operations Squadron, Wright-Patterson AFB OH).*



Following continued resuscitation by the CCAT team in flight and the trauma team at the Army's 452nd Combat Support Hospital in Bagram, the patient was taken to the operating theater for tracheostomy for airway control, jejunostomy for feeding, débridement and closure of extensive soft-tissue injuries, and internal fixation of his multiple maxillary and mandibular fractures

*Photo by MAJ Peter Chase (452nd Combat Support Hospital, Milwaukee, WI).*



Two weeks later, the patient was thriving (as shown in the picture opposite). Over the next four weeks, he underwent additional surgeries to reconstruct his lips. This child survived only because of timely expert care by SOF medics operating in austere conditions. Six weeks after injury, he was returned to the Army's Area Support Medical Company in Kandahar then to his home, where he was able to drink, eat, and speak normally.

*Photo by MAJ Peter Chase (452nd Combat Support Hospital, Milwaukee WI).*

Lt Col Wightman began his career in medicine as an EMT in Colorado and a paramedic for St Louis City EMS. After receiving an MA in physiology and an MD from the University of Missouri in Columbia, he completed residency in emergency medicine at the University of Illinois in Chicago. Lt Col Wightman had risen to Chief of Emergency Services before returning to his roots in field medicine. He has deployed under Operations PROVIDE PROMISE, PACIFIC NIGHTINGALE, RESOLUTE RESPONSE, CRYING EAGLE, and ENDURING FREEDOM, as well as numerous special-operations missions. Most recently, Lt Col Wightman completed a four-year tour as the Director of Education for the Department of Military & Emergency Medicine at the Uniformed Services University under Drs Llewellyn and Cloonan. He is rated as an Army flight surgeon and possesses a private helicopter license. Since 2002 he has been assigned to Wright-Patterson Air Force Base, where he is the Program Director of the Integrated Residency in Emergency Medicine and team leader for a Critical Care Air Transport Team (CCATT).



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**Take advantage of the opportunity.**

# Dedication

## SGT Roy Wood



SGT Roy Alvin Wood, MD, was killed January 10, 2004 in the Hindukush Mountains, Afghanistan serving as a 20<sup>th</sup> Special Forces Group Medical Sergeant assigned to the Combined Joint Special Operations Task Force. His family lost a wonderful husband and loving father; Lee Memorial Hospital lost a dedicated emergency medicine physician; Special Operations lost a big brother; and America lost a true hero.

SGT Wood, 47, whose vivid and honored military career spanned 24 years, was a dedicated US Army Special Forces medic and a popular ER doctor at both Lee Memorial Hospital and Health Park Medical Center. Dr Roy Wood's preparation as an operator placed him in the famed "Triple Canopy" club as Airborne, Ranger, and Special Forces qualified. For the majority of his military career, Dr Wood served as a Special Forces officer with Civil Affairs plus the 5<sup>th</sup> and 11<sup>th</sup> Special Forces Groups. He joined the 20<sup>th</sup> Special Forces Group as a Major promotable to Lieutenant Colonel and served as the 3<sup>rd</sup> Battalion Surgeon until two companies were mobilized for Operation Enduring Freedom. Although not part of this deployment order, Dr Wood immediately resigned his commission and attended the Joint Special Operations Medical Training Center certifying as a Special Forces medic. This enabled Roy to return to an Operational Detachment Alpha Team deploying to Afghanistan. Ultimately, his goal was to revert to a Special Forces warrant officer so that he could remain on a team longer.

Roy left a young family, a comfortable south Florida home, a lucrative medical practice, and the commissioned officer corps to perform a combat tour as a SOF medic. The risks he incurred greatly exceeded all potential and real benefits but he willingly defended our nation, our people, our principles, and our ideals. Dr Wood made the ultimate sacrifice while personifying the Special Forces motto "De Oppresso Liber."

Let us all join together please and remember Roy A. Wood and celebrate his life by rededicating ourselves to follow his high standards as a warrior, SOF medic, and a man. We miss you, Roy. As true for so many before you, your time with us was all too short.

COL Mike Mouri

### Special Forces Aidman's Pledge

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



### Pararescue Creed

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



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

### Navy Poem

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



~ Harry D. Penny, Jr.

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