ISSN 1553-9768 Fall 2005 Volume 5, Edition 4

Journal of Special Operations Medicine

A Peer Reviewed Journal for SOF Medical Professionals

Dedicated to the Indomitable Spirit & Sacrifices of the SOF Medic

Report Documentation Page

Form Approved
OMB No. 0704-0188

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

1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED
2005		**00-00-2005 to 00-00-2005**

4. TITLE AND SUBTITLE	5a. CONTRACT NUMBER
Journal of Special Operations Medicine, Volume 5, Edition 4	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	5d. PROJECT NUMBER
	5e. TASK NUMBER
	5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **Joint Special Operations University,357 Tully Street,Alison Building,Hurlburt Field,FL,32544**	8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S)
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution unlimited

13. SUPPLEMENTARY NOTES

14. ABSTRACT

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			
unclassified	**unclassified**	**unclassified**	**Same as Report (SAR)**	**112**	

COVER

ISSN 1553-9768

View of Mount Everest.

Frequent MEDVAC flights landed during training of RNA medical personnel at Army Hospital.

From the Editor

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

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

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The JSOM is serial indexed (ISSN) with the Library of Congress and all scientific articles are peer-reviewed prior to publication. The Journal of Special Operations Medicine reserves the right to edit all material. No payments can be made for manuscripts submitted for publication.

Official Distribution: This publication is targeted to SOF medical personnel. There are several ways for you to obtain the Journal of Special Operations Medicine (JSOM): 1) USSOCOM-SG distributes the JSOM to all our SOF units and our active editorial consultants. 2) SOMA members receive the JSOM as part of membership. Please note, if you are a SOMA member and are not receiving the subscription, you can contact SOMA through www.somaonline.org or contact MSG Russell Justice at justicer@soc.mil. SOMA provides a very valuable means of obtaining SOF related CME, as well as an annual gathering of SOF medical folks to share current issues.
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Don't forget to do your CMEs!!!! Please let us know how you like the crossword puzzles. Remember, our continuing education is for all SF medics, PJs, and SEAL corpsmen. In coordination with the Uniformed Services University of Health Sciences (USUHS), we offer CME/CNE to physicians, PAs, and nurses.

The JSOM remains the tool that spans all the SOF services and shares medical information and experiences unique to this community. The JSOM continues to survive because of the generous and time-consuming contributions sent in by physicians and SOF medics, both current and retired, as well as researchers. We need your help! Get published in a peer-review journal NOW! See General Rules of Submission in the back of this journal. We are always looking for SOF-related articles from current and/or former SOF medical veterans. We need you to submit articles that deal with trauma, orthopedic injuries, infectious disease processes, and/or environment and wilderness medicine. More than anything, we need you to write CME articles. Help keep each other current in your re-licensure requirements. Don't forget to send photos to accompany the articles or alone to be included in the photo gallery associated with medical guys and/or training. If you have contributions great or small… send them our way. Our e-mail is: JSOM@socom.mil.

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

Maj Michelle DuGuay

From the Surgeon

Frank Butler, MD
CAPT, USN
HQ USSOCOM Command Surgeon

It's been a good summer in Tampa this year (read "no major hurricane action"). The Louisiana and Mississippi gulf coasts were not so lucky, however, with the left-right combination thrown by hurricanes Katrina and Rita. The hurricane victims in these stricken areas were fortunate to have the skills and courage of the Air Force Pararescue community to call on when they were sitting on the roofs of their flooded homes by the hundreds, waiting for somebody to come and rescue them. In many cases, that "somebody" was the Air Force Special Operations Command. One of the enduring memories from the Hurricane Katrina aftermath was scene after scene of AFSOC aircraft with PJs working at the end of a line to evacuate storm victims to safety. Over 6800 people were saved through the courageous actions of AFSOC personnel. The heroic accomplishments of the AFSOC pilots and PJs during the days of this rescue effort have added another chapter in the SOF record of being there when our country needed us.

Farewell

MSgt Bob McCumsey has left the USSOCOM Surgeon's office and moved on to more lucrative employment in the civilian sector. Those of you who have been in SOF medicine for a while will know about the recurring discussions that occur regarding SOF combat medical training. The basis for the different points of view is that SOF medicine has two powerful competing forces at work. The first is Commander, USSOCOM's statutory responsibility to maintain an interoperable standard for all SOF equipment and training, including things medical. The second is the strong traditions of the individual combat medic communities throughout SOF (18Ds, PJs, SEAL Corpsmen, Ranger medics, SOAR medics, AFSOC Independent Duty Medical Technicians, etc). All of these communities have a rich tradition of mission success and a fiercely proud belief in their own brand of combat medic training. Devising a SOF medical training program that respects both positions has been a challenge, and Bob McCumsey has been working to meet this challenge for the past eleven years. It's absolutely true to say that Special Operations Medicine would not be what it is today without Bob McCumsey. More than anybody else, he is responsible for the SOF EMS State that provides the framework for all of Special Operations medicine to work together to achieve an interoperable standard of medical training.

On a personal note, Bob has been one of everybody's favorite people in the Surgeon's office for a long time. It's great to see him with a new job developing combat trauma simulator training for the Army that will make excellent use of his talents and experience. Fair winds and following seas, Bob.

Welcome

SSgt Tiffany Bigwood has arrived in the Surgeon's office to assist with the compilation of the SOF health surveillance data. SSgt Bigwood is from New Hampshire originally and worked at SOCOM in the Knowledge and Futures (SOKF) and Commander's offices before coming to our shop. Her AFSC is 1T171 (Air Crew Life Support). Her contact information is 828-6031 and tiffany.bigwood@socom.mil.

TSgt Natalee Fox comes to us from the U.S. Central Command and will be working in our training department assuming MSgt McCumsey's duties. She is from Alexandria, VA and her AFSC is 3AO (Admin Support Specialist). Her contact information is 828-5043 and natalee.fox@socom.mil.

KUDOS

CPT Steve Briggs in our training department has been working for months on compiling a database with the recertification status of every SOF medic and corpsman in the force. Now that his list of SOF combat medics is complete (with 2700 entries), he will be able to follow the recertification status of the medic force by comparing the list of medics with the list of recent graduates from the SOCMSSC course. What he needs from the components now is a scrub on which medics have separated from the service, so that those individuals can be moved to the inactive roster rather than being counted as out of certification. This achievement represents a major step forward in SOF's ability to document the combat readiness of our force, and CPT Briggs accomplished this through many nights and weekends of working on the database.

The Tactical Combat Casualty Care Transition Initiative sponsored by USSOCOM and executed by the Army Institute of Surgical Research has been doing a superb job of ensuring that new TCCC training and equipment has been flowing to the operators in our deploying SOF units. The best endorsement for this program was from one of our SOF combat medics who remarked after the training "They've been telling us for years that we were going to get this equipment. Today we finally got it all." General Brown's letter to the Army Surgeon General about this project stated "The TCCC Transition Initiative developed and executed by the U.S. Army Institute of Surgical Research (ISR) to meet this challenge has been one of the most successful biomedical research efforts in the history of this command and has produced remarkable advances in our force's readiness to successfully manage battlefield trauma...Reports from SOF forces in theater documenting lives being saved with these techniques are now routine occurrences. This project has been an example of medical support for our combat forces at its very finest." The TCCC TI is funded at $1.3 million dollars per year level starting in FY07 and continuing into out-years, but was under-funded for FY06. Through the hard work of Maj Tim Dykens and Mr. Bob Clayton in our office and Mr. Dave Saren of SOAL, an unfunded requirement was generated and briefed to the USSOCOM Acquisition Executive, Dr. Dale Uhler. He concurred with going forward with the UFR and, so far, an additional $667K of a proposed $1.1 million has been identified. This great work will help us to ensure that out combat medics have all the training and gear that they need to continue to provide world-class battlefield trauma care to our wounded SOF warriors.

Stay strong and keep up the great work!

ENLISTED CORNER

Senior Enlisted Medical Advisor (SEMA)
HMCM Gary Welt

HMCM Welt is deployed in support of SOF forces engaged in the GWOT.

Meet Your JSOM Staff

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

MANAGING EDITOR
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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 where she is in charge of management, production and publication of the JSOM. 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

Summer is over and permanent change of station (PCS) season seems to be over for most Soldiers. Most units have either moved back from the wars or forward to the wars. All the new, bright and shiny, Army Medical Department (AMEDD) officer personnel have arrived at units to learn to be part of Army Special Operations. Even though we had the smallest turnover rate among medical officers that I can remember, we ran a USASOC/ARSOF Special Operational Medical Officers Indoctrination Course (SOMIC) for more than twenty new officers: docs, PAs, PTs, dentists, vets, and reserve components as well as active component. We have widened the SOMIC to include an opportunity for all AMEDD newbies to attend. If you fit the description and did not go on the way into the community, ask my medical training office about attending the following September. Major Josh Miller ran a great course and Lieutenant Colonel Deanna Brown ran an outstanding veterinary breakout curriculum. Thanks from me to both of them. Now with all board certified medical officers who stay longer rather than depart after two short years to pursue their residencies we have greater continuity. Since the PCS rate was small in summer 2005, the turnover rate in summer 2006 may well be quite large. We'll see.

There is some relief in sight on the squeeze in sustainment training seats for 18Ds and SOCM W1s. Seats were cut by USSOCOM (not the surgeon) because we did not fill all the seats they were paying for. MSG Sammy Rodriguez and others worked out a plan to get the number of training seats INCREASED. For now, get a "hard" ATRRS seat as soon as you can and do NOT wait until you are nearly expired to go to SOFMSSP, or whatever it is now called. The argument that everyone was busy at the war and could not attend did not work; an empty seat is an empty seat. The only way to get more seats is to keep them filled and overfilled. The school is trying to keep the content current and changing as does the medical track of ANCOC.

Several new Soldiers have arrived in my office over this summer. Lieutenant Colonel Paul Dakin, my command veterinarian and long-suffering medical S-1 assignment officer has departed for a command in the pacific and been ably replaced by Lieutenant Colonel Deanna Brown. Major Jason Wieman, Chief, USASOC Preventive Medicine, departed for the 1st Cavalry Division at Fort Hood, Texas to become their division surgeon and has been replaced by MAJ Tony Littrell who was in the 96th Civil Affairs Battalion before he departed us for Command and General Staff School a while back. SFC(P) Brian Allen seems to have not yet flunked out of medical school and was replaced by SFC Mike Watson. Lieutenant Colonel Scott Tanner has taken over medical training from Major Muller who has shifted to medical operations.

If you get this issue before the annual SOMA meeting, your plan for how to get a TDY funded to attend the weekend USASOC Surgeon's Conference (10-11 December 2005) and perhaps the followon Special Operations Medical Association conference should be done by now. See details on the SOMA continuing medical education opportunity NOT at www.specialoperationsmedicalassociation.org but at www.somaonline.org

My standing offer of funding the TDY, for anyone who writes a paper to present that is accepted and that I consider worthy still stands.

On page 88 of this issue, under the SOF Related Booklist is my unconventional warfare and unconventional warfare medicine book list. Some may remember that we in the USASOC Command Surgeon's Office did an entire day of guerrilla warfare medicine at the SOMA conference in 2001. Guerrilla/unconventional warfare is happily back and we all need to study it more. I always have, even during the years that it nearly vanished from the doctrine, TTPs, and field manuals. I am happy to claim membership in the only Special Forces unit to have, as its core mission, urban guerilla warfare--Detachment "A", Berlin Brigade. I am happy to answer questions posed by the booklist (farrwa@soc.mil). I plan to write an article sooner or later for the journal also. The booklist is step one. Happy to have co-conspirators in this endeavor.

See you in Tampa. Go kill some bad guys.

NAVSPECWARCOM

Edward Woods, MD
CAPT, USN
Command Surgeon

Setting realistic goals has become the focus of my job over the last two years at WARCOM. As dynamic as Naval Special Warfare and all of "SOFdom" are, defining our medical goals is still paramount for my office. I have in the past talked about defining requirements as an essential process that should originate from the operators in order to be valid. The goals that we set are an outgrowth of the requirements. The dilemma that we face as medical providers is to assure that our goals are realistic and address the requirements. Developing commonsense goals is not always possible if all the parties involved don't want to accept them. Additionally because we all rotate out of our job every three to four years the requirements and goals change with the agenda we bring to our positions. Navy Special Warfare personnel and SOF are, more than any community I have worked for, visceral. When trying to develop a consensus and an understanding of the goals within SOF it often helps if you are thought of as a "good guy." That does not necessarily translate into being medically competent or pertinent. Making promises and setting goals that can't be kept always looks good up front. It can obfuscate more important and pressing issues that require actual work. I have witnessed individuals set goals that are not achievable or are leveraged on the backs of those who they direct while basking in the limelight. Sometimes the end result is for the individual to be found out and marginalized. To have a positive impact we must make sure that we set goals that are achievable and realistic. Medicine is a field that should normally force us into convention. We are held to nationally recognized standards of care and even have clinical practice guidelines that to help us along the way. Some feel these standards to be stodgy and limited. Unfortunately, and even as medicine is better than it has ever been, the growing trend is for commercialization of alternative approaches which are nothing more than thoughts generated in the head of brilliant salesmen and marketed for those who are looking for the better performance or the fountain of youth. Surprisingly these market schemes are not questioned enough and in order to compete, some physicians have chosen to follow this practice and to market themselves and their credentials and walk away with the loot.

This approach can infiltrate the practice of medicine within the SOF community if we let it and result in goals and promises not kept. Some of those we are charged with serving see right through this behavior. I have been reminded by a senior SEAL officer of the days when physicians did not advertise. My fear is that this change in our behavior may be paralleled by the loss of honor and commitment that physicians and providers have always held up as an obligation. As medical staff, my measure for setting goals is to ask myself the question "If this were my brother when faced with all the alternatives, would this be the direction that I would move in to support him?" Sometimes before answering that question I have to decide if I have enough information to reach a decision. In any event asking that question allows me to then set aside any bias I may have and look for the right medical goals to shoot for. It also reminds me to focus on what is really important--the young corpsman and medic charged with saving the lives of his fellow operators.

COMPONENT SURGEON

AFSOC

Dan Wyman, MD
Col, USAF
Command Surgeon

I had the privilege of touring the CENTCOM AOR in August. I started with multiple headquarter sites in Qatar then visited operational units in Iraq and Kuwait. I had the pleasure of talking with operators and medics within SOF and CSAR AFSOC units as well as some Army SF medics. As always, our personnel are well engaged and making goods things happen throughout the AOR. As I write this I am traveling home from a trip to Hawaii which included a Combat Air Force/Mobility Air Force (CAF/MAF) SG conference as well as meeting with SOCPAC and PACOM. It was again great to hear about the fantastic things AFSOC medics are accomplishing in this AOR. AFSOC medical operations…worldwide…any place, any time!!

You may have heard rumors about changes at AFSOC HQ….namely the stand up of the War Fighting Headquarters (WFHQ); final name yet to be determined. There is truth to most of those rumors. Like all other AF MAJCOMs, HQ AFSOC is in the process of standing up a WFHQ which will be separate and distinct from the AFSOC Management HQ. While the final version of these HQs is pending formal approval from the new Chief of Staff of the Air Force, Gen Moseley, the basic philosophy will be for the WFHQ to conduct contingency planning as well as current operations (via Joint Special Operations Air Component, Special Operations Liaison Element, and Air Operations Center) while the Management HQ will hold down the Title 10 responsibilities (organize, train, and equip). Each HQ will have an SG within the special staff and we obviously will work hard to coordinate efforts between the two staffs. Currently, I will continue as HQ AFSOC SG (Management HQ) and Lt Col Tim Robinette is the AFSOC WFHQ SG. Stay tuned for more information.

A "job well done" to our operators and medics for the fantastic work they performed in support of Joint Task Force Katrina and Rita. Our CSAR/SOF PJs were credited with over 6,500 saves/assists and our Flight Surgeons, IDMTs, and Public Health and Bioenvironmental Engineering techs were engaged in all phases of operational support (missions, medical oversight, base operating support sickcall, preventive medicine, and public health). Additionally one of our AFSOC Special Ops Critical Care Evacuation Teams was the first AF critical care team on scene at New Orleans International Airport. They were called Wednesday afternoon, arrived in New Orleans early Wednesday night, and flew out several critical patients (patients on ventilators with multiple medical problems) later that evening. Our training and expertise continue to pay off…at home as well as in distant lands.

Please take care of yourself, your family, and your fellow Airmen, Soldiers, and Sailors and may God bless you and keep you safe!

DEPARTMENTS

Education & Training

In the Fall '03 Edition, I compared the future path of the SOF medic to that of the Beatles song "The Long and Winding Road." I mentioned that there would be times where many obstacles and uncharted roads lie ahead... what an understatement! I'll expound on that thought here in a minute, but for now let me tell you about some of the changes that have occurred since the last issue of the JSOM.

As we usher out last year and roll into FY06 I would like to say goodbye to MSgt Robert McCumsey and welcome in his replacement, TSgt Natalee Fox. When the Command directed us away from the National Registry of Emergency Medical Technician (NREMT) standards, Bob was the individual with the vision of starting our own statehood and certification program. From his first vision to present there have been many changes. Likewise, many more changes lie ahead. Whatever the future holds I think Bob, as all of us, will be pleased, as our SOF medical warriors evolve into versatile and highly capable tactical medical practitioners able to face the challenges in multiple environments and on the developing battlefield. TSgt Fox will be tracking and administering the new Advanced Tactical Practitioner (ATP) Cards. Again, I want to thank Bob for all his hard work and welcome TSgt Natalee Fox.

ATP Certification update: The last two refresher classes have been issued the new ATP Cards and Certifications. The Commander, USSOCOM, has directed that the new USSOCOM ATP critical task list and Tactical Medical Emergency Protocols be incorporated into the training, both at the Joint Special Operations Medical Training Center (JSOMTC) and at the Pararescue school, in Kirtland. Except for a couple of minor topics, all have been integrated into the curriculum. Full (official) implementation is expected between January and July of FY06. Beta testing of the ATP/SOF paramedic examination is to begin shortly.

Now, let's go back to "the long, narrow, winding and often obscured road" of SOF certification. For years there has been a battle over Special Forces medical training. Prior to USSOCOM's existence, the Army SOF community battled with the Army Medical Department (AMEDD) over what subjects should, or should not, be taught to Special Forces (SF) medics. AMEDD has been the proponent for medical training for the Army. It was the United States John F. Kennedy Institute for Military Assistance's (the predecessor to the Special Warfare Center and the United States Army Special Operations Forces) position that the medics belong to them and they had a better grasp of what medical subject should be taught in SOF environments.

In 1980, there was a little joint operation in the desert that didn't exactly go as planned. From this operation a congressional inquiry concluded that there needed to be a command that could organize, train, equip, and carry out joint operations. In 1987 this command, USSOCOM, was formed to oversee joint operations. Later, in 1996, the JSOMTC was established at Fort Bragg, NC, in 1996, to unify all SOF medical training. The JSOMTC's charter is to train all SOF medics/medicine to a joint medical standard. The

JSOMTC's primary mission as an Army training facility is to produce the Special Forces medics. The Special Forces Medical Sergeant's course has been the "gold-standard" for enlisted medical training. Many of the critical task taught at this course go beyond what is needed for all SOF enlisted medics. Thus, the Special Operations Combat Medic Course was developed from the first half of the Army's SF Medical Sergeant's Course, to produce a joint-interoperable SOF combat medic.

USSOCOM's responsibility to provide its personnel with joint special operations education is derived from U.S. Code Title 10, Section 167, which states that the USSOCOM Commander is charged with preparing Special Operations Forces to carry out assigned missions. In addition to organizing, training, and equipping, education is fundamental to fulfilling this law. USSOCOM's education responsibilities are derived further from the following Title 10 mandates:

(1) Develop strategy, doctrine, and tactics.
(2) Conduct specialized courses of instruction for commissioned and non-commissioned officers.
(3) Monitor the professional military medical education of officers and enlisted personnel.

In USSOCOM Directive 40-2, dated Jan 04, the CDR USSOCOM, advised by the Command Surgeon, will advocate for assigned medical forces, overview specialized courses of instruction, and establish medical qualifications and credential standards for all SOF medics and sustainment requirements of critical medical skills. The USSOCOM Command Surgeon, as the proponent for Special Operations medical training, is responsible for the development of the Critical Task List for the SOCM designation. The CDR USASOC is the executive agent for administration and facility management of the JSOMTC and SOCMSSC. In order to carry out these directives we solicited input from SOF medics/corpsmen and medical officers to identify what critical tasks to include. We also solicited input from SOF and civilian medical providers and educators to determine what supporting tasks are warranted in order to achieve adequate coverage of each critical task.

The sensitivity of this process is that all the services essentially have two command structures: the SOF community as well as their respective services. There are different collateral missions, philosophies, and personalities that play a part in the development of what a SOCM medic should be. There is great concern from the JSOMTC because any major changes of the SOCM course will understandably have an impact on the SF Medical Sergeant's course. So, as you can see, there are multiple SOF and component factors that influence the making of the SOCM mold.

The bottom line is that we owe all our SOF warriors the best care possible in any environment. We owe the mothers, fathers, siblings, spouses, and offspring the assurance that the highest medical standard of care for all has been set and is being met. Our SOCM training often parallels NREMT-Paramedic and civilian standards, however, we also train them in advanced techniques that are often reserved for higher medical authority. Those medics that eventually leave the service do not aspire to be NREMT-Paramedics; they aim to be nurses, physician assistants and doctors. Our focus is and should remain on a more advanced combative trained, joint-interoperable standard/medic. The ATP certification is USSOCOM's method of assuring that this standard is being met. There are many within our rank and file who do not wish this to succeed. Many out of naïvete state that we do not have the authority or that it can't be done. The same sentiments were stated in 1972 when the National Registry announced that they too were setting a standard!

CE/CME ARTICLE

Dengue Fever

Shawn Taylor, MD, MC, FS, HMO

Abstract

Dengue fever is responsible for several million cases and several deaths worldwide each year. A high endemic level of dengue fever and its hemorrhagic form correlates with an extensive presence by *Aedes aegypti* mosquitoes. Recently, Dengue Fever has shown an expansion of affected areas and an increasing occurrence of its hemorrhagic form. Efforts based solely on chemical vector control have been insufficient. In addition, educational measures do not permanently modify habits. As long as a vaccine is not available, we will need to be prepared to recognize and treat dengue fever.

Objectives

1. Recognize dengue fever.
2. Describe signs, symptoms, and warnings of dengue hemmorhagic fever and dengue shock syndrome.
3. Understand how to prevent transmission of dengue fever.

Financial Disclosure

The author 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 his topic subject matter.

Introduction

Dengue fever (DF) is caused by dengue virus serotypes 1 through 4. It is an emerging public health problem in many tropical countries due to population growth, urbanization, and increased travel.[1-3] Dengue hemorrhagic fever (DHF) and dengue shock syndrome (DSS) are the severe manifestations of infection. DHF and DSS were first recognized in the 1950s in Southeast Asia and currently account for a significant amount of childhood illness and death in many tropical countries. More recently, DHF and DSS have emerged in Central America, South America, and the Pacific region.[3,4]

DF is an important disease in some travelers and historically has adversely affected many military forces during deployment to tropical or sub-tropical locations.[6-13] While multiple vaccines have been studied and developed, none are yet fielded despite bench research that began in the 1940s and the first field efficacy trial in the 1960s.[14-25] Currently researchers are evaluating five monovalent components, and two tetravalent vaccinations are being evaluated in clinical trials.[15]

Globally, cases of DF have increased, as have DHF and DSS.[26-28] Several other entities also produce similar symptoms and may be confused for DF.[29-32] DF is transmitted from human to human through the bite of the mosquito vector *Aedes aegypti*. Clinically, the infection is typically an acute, self-limited disease characterized by abrupt onset, a biphasic febrile course, anorexia, weakness, prostration, severe arthralgias, severe myalgias, rash, leukopenia, lymphadenopathy, and, in a small proportion of cases, minor hemorrhagic manifestations (petechiae, epistaxis).[33,34] Persons previously infected by one dengue virus serotype may be at higher risk of developing DHF or DSS if they are subsequently infected by a different serotype. Such risks should be taken into account when planning international operations or travel. The risk of DHF among previously dengue-infected personnel should be evaluated.[35-38]

While DF and DSS are fairly easy to define, the exact clinical definition of DHF has historically varied (Table 1).[39] For example, some define a pos-

itive tourniquet test as DHF, while others define DF as the presence of a positive tourniquet test and petechiae because of the absence of clinical bleeding. Others would cite the clinical symptoms of DF, with the lab values of DHF, but an absence of bleeding "classic DF, with hemorrhagic features." The World Health Organization developed standardized diagnostic criteria in response to this.[27] Based on these criteria, WHO based the diagnosis of dengue hemorrhagic fever on both clinical and laboratory findings (Table 2), and graded disease severity from 1 to 4. Grade 3 is defined as circulatory failure manifested by hypotension or a rapid and weak pulse with narrowing of the pulse pressure (20mm Hg or less), with the presence of cold clammy skin and restlessness. Grade 4 is defined as profound shock with undetectable blood pressure and pulse. Dengue hemorrhagic fever grades 3 and 4 are termed DSS.

Due to the lack of a vaccination or specific treatment for DF, prevention is imperative and accomplished by mosquito repellent, protective screens, protective clothing, storing water in containers with lids, and isolating affected patients from further mosquito exposure. Public health measures such as community spraying and decreased vector reservoirs are critically important as well because the disease spreads readily.[40]

Table 1. World Health Organization Case Definition of Dengue Fever

Probable: An acute febrile illness with two or more of the below symptoms:
-headache
-retro-orbital pain
-myalgias
-arthralgias
-hemorrhagic manifestations
-leukopenia
Confirmed: A case confirmed by laboratory criteria

Table 2. World Health Organization Diagnostic Criteria for Dengue Hemorrhagic Fever

Clinical Findings: Fever lasting 2 to 7 days and hemorrhagic manifestations ranging from a positive tourniquet test through clinically obvious bleeding.

Laboratory Findings: Platelet count <100 x 109 cells/L and hemeconcentration, with a 20% rise in hematocrit (or a 20% fall after rehydration)

Discussion

Except for a perfect, textbook clinical presentation, dengue fever can be difficult to distinguish clinically from other febrile illnesses clinically (e.g., malaria, yellow fever, influenza) or arboviral diseases with dengue-like courses (e.g., Colorado tick fever, Rift Valley fever, Ross River fever, Mayaro fever, etc).[29,30] Other symptoms and history can also present a clinical diagnostic challenge. Special Operations Forces medical personnel evaluate large numbers of host nation children during MEDRETEs; SOF medics receive excellent training and being able to recognize DF should be part of their medical care skills.[41]

Concurrent bacteremia may occur in dengue fever and is more common in older patients.[42] Serologic diagnosis is made on the basis of a fourfold or more increase in antibody titer in paired sera by hemagglutination inhibition, complement fixation, enzyme immunoassay, or neutralization test. Typically, paired samples from patients use IgM captured ELISA and indirect IgG ELISA. Detection of dengue virus specific IgA serum antibodies by indirect immunofluorescence assay is diagnostic of DF. Viral RNA can be detected by specific complementary DNA probes or amplified by PCR (polymerase chain reaction).[43-45] While SOF medics will not have these labs available in the field, they can learn to perform a tourniquet test. If the patient already has a petechial rash, you will not need to do a tourniquet test.

Petechial rash in Dengue patient

The tourniquet test (also known as the capillary fragility test, hess' test, or the Rumpel-Leede test), used to assess if capillaries can withstand increased pressure, is frequently positive. This is important to assess because the vasculopathy that leads to DSS and DHF can be first visualized in the form of petechiae. Medics can perform this test by inflating a brachial blood pressure cuff above venous pressure (70mm Hg) for five minutes, relieving the

pressure, and then inspecting the extremity for petechiae. If greater than 20 petechiae appear, the test is positive. This test is not highly specific due to potential interfering factors that include women who are premenstrual, postmenstrual without hormone replacement therapy, or any person with badly sun-damaged skin. Any condition associated with increased capillary fragility can result in a positive tourniquet test. Large petechiae generally correlate with thrombocytopenia.[46,47]

In uncomplicated DF, pancythemia can occur, typically after three to four days of illness, and is characterized by leukopenia of less than 2.0 x K/UL, mild acidosis, and hypoproteinemia. Platelets rarely fall below 100,000. Prothrombin time (PT) and partial thromboplastin time (PTT) stay within normal limits. ECG changes may include bradycardia, ventricular ecotopy, flattened T waves, and prolongation of the P-R interval.[48] In DHF or DSS other common hematological features include hemoconcentrations of greater than 20% in hematocrit, thrombocytopenia, prolonged bleeding time, and decreased PT (seldom less than 40% of the control). Chest radiographs may reveal pleural effusions (left > right). Elevated hepatic transaminase levels have been reported in over 80% of dengue cases with no relationship to concurrent hepatitis B or C infections.[43,46,48,49]

Treatment of uncomplicated dengue is primarily supportive. Treatment includes analgesia, bed rest, hydration, and gradual convalescence. Acetaminophen or narcotic analgesia rather than aspirin or non-steroidal anti-inflammatory medications should be used for antipyresis and analgesia. Physicians should treat DHF and DSS patients in a hospital setting and monitor them for shock, especially during the first 48 hours. The patient may develop DHF or DSS after three to five days of symptoms. During this time, typical biphasic fever will often resolve. At this point many may believe that the patient is recovering. In reality however, this time is the most dangerous period and requires high suspicion and vigilance. Warning signs and symptoms include severe pain in the abdomen, persistent vomiting, and bleeding from any site (skin, nose, gums, hematochezia, melena, etc.) If not already in a hospital environment when severe pain in the abdomen and persistent vomiting are detected, medical personnel must get the patient to a hospital immediately. Once bleeding occurs, it is typically too late to decrease mortality. The major clinical feature of dengue hemorrhagic fever is intravascular fluid loss. Vascular permeability allows fluid to leave the intravascular space. You will often note edema in your patient. Expert management of DHF with aggressive IV fluids can reduce the mortality rate to less than 1%.[50] This compares with mortality rates of up to 30% in some series.[51]

Patients with respiratory difficulties should receive oxygen. Electrolytes should be replaced intravenously as needed, based on lab results. Reassess the patient often to avoid fluid overload and congestive heart failure. Initial resuscitation and replacement of fluids is typically with boluses of normal saline or lactated ringers. Maintenance fluids are typically half strength normal saline with 5% dextrose. In severe cases of circulatory failure, volume expanders or blood products may be needed. Transfusions are based on the clinical course and changes in hematocrit values. Packed red blood cells are ideal and should be transfused if there is a rapid drop in hematocrit or blood pressure. Packed platelets may also be needed and are typically given in dosages of 0.2-0.4 U/kg of body weight. DHF and DSS are medical emergencies and should be treated in intensive care settings if possible. DHF patients who go into shock and develop DSS have a mortality rate of up to 40-50%. With expert management in the intensive setting the death rate drops to 2%. Children under 15 years old are the most vulnerable.[46,52-54]

Conclusion

While portable CT scanners, comprehensive laboratories, and other advanced equipment are available to the military in general, small deployments of Special Operations Forces do not have such assets available.[55] In operations other than war, Special Forces medics, physician's assistants, and physicians typically have the ability and resources to manage most patients, but at times need additional assistance and resources.[56,57] Host nation medical facilities or military assistance from external units may be required. Host nation emergency medical services in underdeveloped countries, whether military or civilian, typically demonstrate longer response times and fewer resources than

those in the United States.[58] It is sometimes necessary to consider several options and improvise. Other countries often require payment prior to initiation of treatment, which should be planned for when practicing outside of the United States. Many of the symptoms of dengue fever can occur in other diseases. This will give you a broad differential diagnosis. Keep in mind influenza, measles, rubella, malaria, typhoid fever, leptospirosis, meningococcemia, rickettsial infections, bacterial sepsis, other febrile arthropathies, and other viral hemorrhagic fevers.

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CE/CME ARTICLE

Guide to Prevention of Infectious Diseases during Military Deployments

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Abstract

Infectious diseases can radically affect military forces, resulting in the loss, suspension, or cancellation of military operations. History is replete with examples of this influence.[1-3] A Norwalk-like virus resulted in 29 cases of serious gastrointestinal illnesses among British soldiers, and U.S. Army Rangers acquired malaria while deployed in Afghanistan [Operation Enduring Freedom (OEF)].[4,5] During OEF and Operation Iraqi Freedom (OIF) (current conflict in Iraq) over 800 U. S. military personnel have acquired cutaneous leishmaniasis. Numerous infectious diseases with diverse means of transmission can affect military units (Table 1).

The combination of social, physical, psychological, and environmental factors such as the mental and physical stress, trauma, and nutritional deprivation in association with the deleterious consequences of sudden exposure to numerous disease agents during military mobilizations can strain the immune defenses of immunologically naive soldiers. Manipulation of these factors through personal protective measures (Table 1), vaccines (Table 2), and chemoprophylaxis (Tables 3, 4, and 6) can decrease morbidity and mortality. These manipulations have proven successful: the ratio of deaths from disease to deaths from battle has decreased from 10:1 during the Spanish-American War, to 1:1 in World War I, to 0.14:1 in the Vietnam War, and to less than 0.01:1 in the Persian Gulf War.[1]

Modern militaries now engage in both major ground combat operations and humanitarian assistance missions overseas. These activities can lead not only to severe trauma complicated by wound infections, but may also permit extensive interaction with the local populace and environment, greatly enhancing the danger of acquiring and spreading infectious diseases. In this review, we will provide a guide to preventing militarily relevant infectious diseases.

Objectives

1. Upon completing the review of this subject, the reader should be able to summarize the major infectious diseases impacting deployed military personnel.
2. The reader should be able to identify interventions designed to modify the risk of getting the disease or pre vent significant morbidity/mortality by early treatment.
3. The reader should be able to identify sources to access, to adequately manage infectious diseases encountered while deployed.

Financial Disclosure

The authors have indicated that, within the past two years, they have had no significant financial relationship with a commercial entity whose products/services are related to their topic subject matter.

Food-borne and Water-borne Infections

The most common disabling infection during military deployment is diarrhea. Diarrheal disease affecting deployed personnel most closely resembles travelers' diarrhea with regard to presentation, pathogens, and prevention.[6-10] Travelers' diarrhea, occurring in those traveling usually to foreign countries, is commonly defined as the appearance of four or more stools in a 24-hour period or three or more stools in an eight-hour period. The syndrome includes at least one of the following symptoms or signs of enteric disease: nausea, vomiting, cramps, fever, fecal urgency, abdominal pain, and bloody or mucoid stools. The risk of developing diarrhea continues for four or more weeks after arrival into a new region.

Pathogens are typically bacterial including *Escherichia coli* (enterotoxigenic, enteroadhesive and enteroinvasive), campylobacter (including drug resistant), salmonella, shigella, and aeromonas species. Protozoans such as *Giardia lamblia* and *Entamoeba histolytica* and viruses such as Norwalk-like viruses and rotavirus also cause diarrhea in troops, but are less frequently encountered.[4,8,11]

The risk of developing diarrhea is linked to deployment location and extent of interaction with the local economy. Regions of low risk (<10% 2-week incidence rate) include Northern Europe, Australia, New Zealand, the United States, Canada, and Singapore. Moderate risk (10 to 20% 2-week incidence rate) is associated with the Caribbean Islands, South Africa, and countries bordering the Mediterranean Sea, including Israel. High risk areas (>30% 2-week incidence rate) include Asia, Africa (outside of South Africa), South and Central America, and Mexico.[12]

The prevention of diarrhea involves careful food and drink selection, water purification, and chemoprophylaxis (administration of medications before exposure to prevent illness). The key to preventing the development of diarrhea is avoidance of high-risk exposures with good hand hygiene practices.[12] Freezing may not kill the organisms that cause diarrheal diseases; therefore, drinks with ice are not safe unless the ice is made from purified water. Water and ice are not sterilized by mixing with alcohol. Commercially-produced carbonated beverages are typically safe. Hot tea or coffee that is boiled is typically safe as are most brands of bottled water. In general, raw fruits and vegetables that do not need to be peeled to be eaten (e.g., strawberries, raspberries, etc.) are typical examples of unsafe food. Fruits that are peeled just prior to eating (e.g., bananas, citrus fruits, etc.) are normally safe. Deployed service members should avoid eggs, ice cream, and unpasteurized dairy products. Table condiments including Mexican hot sauces, guacamole, and pico de gallo are not always safe.[13] Filth flies may be responsible for the transmission of pathogens on food and controlling fly populations may be beneficial.[14]

Mission requirements may dictate use of local water with purification. The boiling of water for five to fifteen minutes kills bacteria, parasites, and viruses. The addition of two drops of five percent bleach (sodium hypochlorite) or five drops of iodine to a one-quart (0.95 liter) canteen of water will kill most bacteria in 30 minutes but may not kill some viruses or parasites. Compact water filters impregnated with iodine are available that will remove parasitic pathogens and kill viral and bacterial pathogens.

Antimicrobial agents are effective for treating diarrhea. They are generally not used for chemoprophylaxis due to their costs, associated adverse effects including sun sensitivity and allergic reactions, ability to alter gastrointestinal flora leading to colonization by resistant bacteria and yeast, and the uncommon complication of *Clostridium difficile* colitis. Chemoprophylaxis is generally reserved for short, critical missions where food and water precautions are difficult to maintain or enforce. Fluoroquinolones with 80-100% efficacy are currently recommended for such chemoprophylaxis (table 3).[15-17] Emerging campylobacter resistance to fluoroquinolones, especially in Southeast Asia, raises concerns about the continued utility of these agents. Bismuth subsalicylate (BSS) has approximately 65% protective efficacy as well as some antiviral activity, but compliance with multiple daily dosing is not easy.[18] Azithromycin has currently been evaluated in the treatment of traveler's diarrhea but it may also eventually prove useful for chemoprophylaxis, given the growing incidence of fluoroquinolone-resistant campylobacter.[19,20] Probiotics such as *Lactobacillus GG* and *Saccharomyces boulardii* have shown limited efficacy for prophylaxis while non-absorbable agents have only been evaluated in treatment trials, such as aztreonam and rifaximin.[15,21]

Management of diarrhea is typically directed at maintaining adequate volume status and modifying the signs, symptoms, and duration of illness. These can typically be shortened from three days to one day with the use of antibiotics.[17] For mild diarrhea (one to two stools / 24 hours) without, or with only mild, additional symptoms (nausea, vomiting, cramps, fever, fecal urgency, abdominal pain, and bloody or

mucoid stools), the use of BSS or no therapy at all should be considered. Mild to moderate diarrhea (>three stools / 24 hours) with no distressing symptoms can be treated with loperamide or BSS; if the mission is critical, the addition of a single dose of antibiotic (e.g., levofloxacin 500mg, ciprofloxacin 500mg, or azithromycin 500mg) may be considered. If diarrhea occurs with distressing frequency or symptoms, therapy should include loperamide plus single dose fluoroquinolone or azithromycin and reevaluation in 24 hours. Severe diarrhea or diarrhea with fever or passage of bloody stools should be managed with three days of antibiotics with or without the use of loperamide. Judgment should be exercised about the occasional need for hospital admission in cases of severe dehydration.

Although parasitic infections may lead to prolonged or chronic diarrhea during deployments or upon redeployment, this is unusual. Prevention, using effective food and drink discipline, is crucial in avoiding these infections. There is no indication for empiric prophylaxis during or upon return from deployment using any antiparasitic agent, even for high risk exposures. The urge to empirically treat a presumed parasitic infection in cases of chronic, post-deployment diarrhea should be resisted, as a specific laboratory diagnosis of such an infection should be made before committing such patients to treatment.

Vaccines are available for the prevention of enterically-spread infections (Table 2). The hepatitis A vaccine has excellent protective efficacy (>95%), while all of the typhoid vaccines possess fair (~70%) efficacy. The licensed parenteral cholera vaccine is not recommended due to limited effectiveness. A new oral cholera vaccine CVD 103-HgR (Swiss Serum and Vaccine Institute) has shown excellent efficacy but it is not yet available in the United States.[22]

Vector-borne Infections

Overview

The impact of vector-borne disease on the U.S. military has been observed during major ground combat operations and operations other than war for centuries. Recent examples include dengue in Haiti, malaria during Operation Restore Hope in Somalia and Operation Enduring Freedom in Afghanistan, and visceral and cutaneous leishmaniasis in Operation Enduring Freedom and Operation Iraqi Freedom.[1,5,23-28] Common vectors responsible for disease are shown in Table 1. The primary means of preventing vector-borne diseases are the use of personal protective measures (PPM) and environmental controls (e.g., area spraying of insecticides). Vaccines and chemoprophylaxis are available for certain diseases.

Personal Protective Measures

The goal of PPM use is the avoidance of vector exposure. Direct avoidance is sometimes not possible due to operational tempo and the nature of the threat. Mosquitoes that transmit yellow fever and dengue are typically daytime feeders while those that transmit malaria and Japanese B encephalitis are nocturnal. The U.S. military currently uses a three component PPM: topical application of 33% extended-duration N,N-diethyl-3-methylbenzamide (DEET), treatment of field uniforms and bed nets with permethrin, and proper wear of field uniforms (pant cuffs tucked into the boots, sleeves worn down, and undershirt tucked into the pants).

The most effective insect repellents contain DEET, although not all insects are completely repelled by this compound.[29-31] The duration of protection against mosquito bites varies by concentration and can range from four to eight hours with DEET concentrations of 12.5% to 25%. Increasing DEET concentrations up to 100% does not greatly prolong the duration of protection as a plateau of effectiveness is reached around 50% concentration. Environments alter the duration of protection of the military's extended-duration DEET from six hours in tropical regions, to 10 hours in hot/dry environments, to 12 hours in forested/wet environments. DEET can be absorbed through the skin, potentially (but rarely) resulting in dermatitis, allergic reactions, and neurotoxicity. Therefore, it is used only on exposed skin, at doses generally not exceeding 35%; application to wounds, irritated skin, or eyes should be avoided.

Superior to the use of DEET alone is the combination of DEET with permethrin-treated uniforms and bed nets. In one study comparing the number of ticks on treated versus untreated uniforms, there were 60% fewer ticks on DEET-treated uniforms, 97% fewer on permethrin-impregnated uniforms, and 98% fewer on permethrin-sprayed uniforms.[32] In combination studies, the use of DEET on both skin and clothing resulted in two mosquito bites per nine-hour day, versus 54 bites for permethrin-treated uniforms only, 99 bites for DEET skin use only, and 2287 bites when there was no protection at all.[33] The use of permethrin-treated uniforms has also shown efficacy against leishmaniasis and body lice.[34,35] Overall, the use of permethrin appears safe.[34,36]

Vaccines

Vaccines available for vector-borne diseases include those for Japanese B encephalitis, yellow fever, and tick-borne encephalitis (Table 5). Current work is underway to develop dengue and malaria vaccines.[37,38]

Malaria

An expanded discussion of malaria is included here because of its military relevance and existence of chemoprophylaxis; the reader is referred to other sources for more in-depth discussion.[40,41] The recent experiences of the U.S. military with malaria from Afghanistan and Somalia have merely recapitulated the historical difficulties this disease has presented.[1,5,24,25,39] Four plasmodia species may infect humans; *Plasmodia falciparum* and *P. vivax* cause most disease, with *P. falciparum* responsible for most deaths. Rates of acquisition are region and parasite dependent (Table 5). [40,41] For those persons not taking chemoprophylaxis, Papua New Guinea and Solomon Islands are the areas of the world that pose the highest risk for contracting malaria, with a frequency of greater than 3% per month. The corresponding risk for West Africa is 2.4%, East Africa is 1.2%, India is 0.35%, Southeast Asia is 0.1%, and South America is 0.05%. Besides the region of deployment, other factors affecting the risk of exposure to malaria include the season of the year, nighttime activities (when anopheline mosquitoes most frequently feed), and working at altitudes less than 2000 meters (malaria is rarely transmitted above this elevation).

Chemoprophylactic agents, which when taken correctly during and after exposure can have a >95% efficacy in preventing infection, include several with specific activity against various stages of the malaria life cycle. This cycle can be broken into exoerythrocytic, erythrocytic, and sexual stages. The exoerythrocytic stage includes transmission of sporozoites from the night-feeding female anopheline mosquito into the host's bloodstream. The sporozoites rapidly invade hepatocytes and divide many thousand-fold maturing into schizonts with thousands of daughter merozoites. In *P. vivax* and *P. ovale* infections some of the sporozoites develop into hypnozoites, a dormant stage in the liver, which can cause relapses of disease months after initial infection. Between six and sixteen days after transmission (based upon the species of plasmodium) hepatic schizonts rupture, releasing thousands of merozoites into the bloodstream which invade red blood cells, initiating the erythrocytic stage of infection. The merozoites mature from ring forms to trophozoites to mature schizonts over 48 hours for *P. vivax, P. ovale, and P. falciparum*, and over 72 hours for *P. malaria,* corresponding to the periodicity of fevers that can eventually become established during clinical illness (except for *P. falciparum*, which does not commonly have time to synchronize before diagnosis and treatment). With each cycle new daughter merozoites are released from red blood cells to infect new red blood cells. Some merozoites form gametocytes (sexual stages) which are taken up by anopheline mosquitoes, completing the malaria life cycle.

Antimicrobial prophylaxis of malaria by the U. S. military includes the use of chloroquine, mefloquine, doxycycline, primaquine, or atovaquone/proguanil (Table 4). Chloroquine, mefloquine, and doxycycline are suppressive prophylaxis, treating the erythrocytic stage of malaria. As the parasite must be released into the bloodstream from the liver prior to effective activity of the chemoprophylaxis, these medications are continued after leaving the malarious region for four weeks. Causal prophylaxis, provided by primaquine or, to a lesser extent, atovaquone/proguanil, is active in the exoerythrocytic stage. As such, they can be discontinued five to seven days after leaving malarious regions. Primaquine is also unique in that it is active against the sexual stages of malaria. Primaquine is the only antimalarial agent which can clear the liver of hypnozoites in *P. vivax* and *P. ovale* infections; such use after leaving a malarious area is known as terminal prophylaxis. The need for this terminal prophylaxis is based upon a region's prevalence of *P. vivax* and *P. ovale* and the likelihood of exposure. Primaquine dose-dependent resistance has been reported.[23,42] Causal prophylaxis with primaquine avoids the need for terminal prophylaxis; however, studies suggest that primaquine terminal prophylaxis is still needed following atovaquone/proguanil prophylaxis due to breakthrough *P. vivax* from the hypnozoite stage of infection.

Airborne Infections

Airborne transmission involves person-to-person spread of aerosol or droplets from the nose or mouth. Resultant diseases include both those localized to the respiratory tract as well as subsequent systemic illnesses. Diseases transmitted by airborne means are common during military deployments and

training due to the physical and mental strains of deployment, close living arrangements, and decreased personal hygiene.[6,7,9,43] As upper respiratory viral pathogens persist easily on hands, transmission of "airborne" viruses also occurs commonly by hand-to-hand contact or, possibly, through fomites. Militarily relevant airborne diseases include upper respiratory tract viral infections, influenza, tuberculosis, meningococcal infections, and those secondary to certain biological warfare/bioterrorism agents, including smallpox and pneumonic plague.[44-46] Certain hemorrhagic viruses can be transmitted by aerosolization after disturbing bedding or straw where mice have nested and urinated (Korean hemorrhagic fever). During Operation Iraqi Freedom transmission of varicella, an airborne virus, was seen among civilian dining facility personnel (CKM, personal observation). Diseases due to organisms that are spread in small (one to five micron) particles, such as smallpox and tuberculosis, pose a particularly high threat as these particles can stay suspended in the air for prolonged periods. Other diseases such as measles, varicella, influenza, and meningococcal disease, although easily communicable, require closer contact with the index case because they are spread by much larger particles that fall to the ground within six feet or less from the infected source.

To interrupt transmission, adequate hand hygiene, avoiding hand contact to the face, avoidance of the sharing of drinking or eating utensils, and the use of appropriate control measures (e.g., isolation) when dealing with infected individuals should be employed. Numerous vaccines including those for measles, influenza, varicella, meningococcus, and smallpox have been developed (Table 2). The polysaccharide 23-polyvalent pneumococcal vaccine has been used in military outbreaks of pneumococcal disease.[47] Theoretical studies support more widespread military use and prospective studies are underway.[48,49]

The military has long used chemoprophylaxis to prevent or abort group A streptococcal and meningococcal outbreaks. More recently, azithromycin has been evaluated for prevention of upper respiratory tract infections.[50, 51] The use of weekly azithromycin has resulted in lower seroconversion rates specific to *Streptococcus pyogenes, Streptococcus pneumoniae, Mycoplasma pneumoniae and Chlamydophila pneumoniae (*chlamydia*)*, along with fewer symptoms of acute respiratory tract infection and less difficulty breathing when compared to placebo. Another recent study assessed weekly azithromycin or single dose azithromycin versus no therapy in the prevention of community-acquired pneumonia. Pneumonia developed in 20% of the no therapy group, in 10.3% of the single dose group, and in 8.6% of the weekly group. Of concern was the development of *S. pneumoniae* resistance in 40% of the weekly group and 22.6% of the single dose group.[52] As such, a role for the use of this newer antibiotic for prophylaxis of respiratory disease in military populations is yet to be defined.

During Operation Joint Endeavor members of a deployed field hospital were exposed to a case of active tuberculosis from a local civilian worker.[44] Prevention of exposure entails a strategy that includes the avoidance of high risk individuals, avoiding high risk environments, and screening individuals for presence of disease. If high risk exposure with high risk individuals is likely, such as close interaction with detainees and local-national employees, the use of N95 masks may help to prevent inhalation of the one to five micron infectious particles. Patients with active disease can wear a surgical mask to decrease the risk of transmission to others. Clinical interactions might even be moved outside (sunlight destroys *M. tuberculosis*). Chest x-ray examination of those high risk individuals to evaluate for the presence of active disease may be prudent. The utility of tuberculin skin testing of high-risk individuals in this setting is limited due to difficulty in interpreting the results (both false-positive and false-negative) and logistical difficulties in providing latent tuberculosis infection (LTBI) therapy. For military personnel, a pre-deployment and an approximately twelve week post-deployment tuberculin skin test (which ensures adequate time for the tuberculosis immune response to develop) is recommended to determine if exposure occurred and if LTBI therapy is needed.

Zoonotic Infections

Zoonotic illnesses are those that are acquired from animals, and may be transmitted by bites, contact with contaminated body fluids, hides, or feces, or consumption of food of animal origin (Table 1). Military relevance is exemplified by the development of hantaviral infection in 14 of 3,754 U.S. Marines participating in a joint U.S.-Republic of Korea training exercise during the autumn of 1986. Marines presented with hemorrhagic fever with renal syndrome (HFRS), likely related to exposure to urine from rodents of one of the known reservoirs (*Apodemus agrarius, Rattus rattus,* or *R. norvegicus*).[53] Avoiding

animals and their by-products are the best means of preventing zoonotic infections.

Rabies is an almost universally fatal disease once symptoms develop.[54] The primary means of transmission in developing countries is through exposure to dogs. Transmission is usually through bites from infected animals, but reports also describe bat transmission to humans after only casual exposure. All persons bitten in endemic regions by wild or unimmunized mammals that are not small rodents or lagomorphs (e.g., rabbits) should undergo rapid post-exposure immunization. Rabies immunoglobulin (RIG) is administered to previously unimmunized persons to provide passive antibodies. Twenty IU/kg of RIG is injected in the site of the wound. If no obvious wound site is present (common in bat exposure) or the region bitten cannot tolerate the entire injectable volume (e.g., the finger), then all or the remaining amount of RIG should be given by intramuscular injection in the gluteal region. Vaccination should also be initiated at the time of evaluation (Table 4).

Blood-borne Infections

Many infectious agents can be inadvertently transmitted through the intentional (blood transfusion, intravenous drug use, tattooing, body piercing) or accidental (needle stick), or exposure to an infected source. Diseases potentially transmitted in this manner include hepatitis B, hepatitis C, human immunodeficiency virus (HIV), and hemorrhagic viruses like Ebola or Marburg.[55,56] Of these diseases only hepatitis B can be prevented by vaccination. All other agents must be prevented by avoidance of the risks, by universal precautions on the part of health care workers, and by post-exposure prophylaxis (hepatitis B and HIV). Although acute post-exposure prophylaxis of hepatitis C is not currently recommended, early therapy at the time of seroconversion is being studied.[57,58] No strategies have proven effective for preventing disease from hemorrhagic viruses once exposure to the pathogen has occurred.

Well characterized and effective post-exposure management strategies against HIV infection for healthcare providers exist. [55] Given the high risk of HIV exposure in certain regions of the world such as sub-Saharan Africa, consideration is often given to fielding antiretroviral medications and, more recently, approved HIV rapid diagnostic kits with forward-deployed units.[59] This availability would allow rapid institution of post-exposure prophylaxis in those persons with high risk exposures, as institution of this therapy is time sensitive.[59]

Sexually Transmitted Infections

Militaries continue to encounter sexually transmitted diseases (STDs) in their personnel.[60,61] The list of diseases spread by sexual contact is extensive (Table 6). Vaccines can prevent hepatitis B (and therefore also D). Condoms significantly decrease the risk of STDs including gonorrhea, nongonoccoccal urethritis, genital herpes simplex, and HIV.[62,63] Petroleum-based lubricants may degrade condoms. Spermicides seem not to prevent the spread of disease and may cause vaginal irritation and alter vaginal flora, increasing susceptibility to STDs. The diaphragm, contraceptive sponge, and cervical cap are associated with a decreased risk of gonorrhea, chlamydia, trichomonas, and pelvic inflammatory disease. The efficacy of these methods in preventing the spread of HIV infection is less clear. No measure other than abstinence is 100% effective. Prevention should emphasize education, early diagnosis, and avoidance of further transmission.

Infections Associated with Water Exposure

Transmission of infections, including leptospirosis and schistosomiasis, may occur with wading, bathing, boating, swimming, or rafting resulting in exposure of mucous membranes, damaged, or even intact skin to water. Leptospirosis is a zoonotic infection with protean manifestations that is worldwide in distribution, although it is most commonly found in tropical regions.[64] Infection results from exposure to environmental sources such as animal urine, contaminated water or soil, or infected animal tissue. Portals of entry include cuts or abraded skin, mucous membranes, or conjunctivae. Preventive measures include avoiding potentially infectious sources including stagnant water or water contaminated with runoff from farms with animals, control of rodent populations, and protection of food and water from animals. A placebo-controlled chemoprophylaxis study with weekly doxycycline during and at the end of exposure among 940 U.S. soldiers in Panama demonstrated that doxycycline prevented cases of leptospirosis.[65]

Schistosomiasis is contracted from freshwater exposure along the margins of lakes, slow moving streams, and irrigation ditches in Africa, South America, and Southeast Asia.[66] Disease ranges from an acute illness (Katayama fever) with fever, malaise, and eosinophilia, to a chronic illness with development of hepatosplenomegaly, portal and pulmonary hypertension, bowel polyps, and urinary tract complications. Transmission occurs when the tiny, free-swimming cercariae penetrate human skin during

immersion, requiring from 30 seconds to 10 minutes for insertion. They subsequently migrate to veins of the intestine or bladder. No vaccine or antimicrobial agent has been shown to prevent disease. DEET has minimal efficacy, but liposomal DEET products (not yet available) have shown some activity in preventing penetration of cercariae.[67] The most effective means of prevention is avoidance of contaminated water exposure.

Other Infections or Infestations

Various diseases are associated with skin exposure to soil, to other people and their clothing, or with unusual means of transmission. Hookworms (*Ancylostoma duodenale, Necator americanus*), the agents of cutaneous larva migrans, and strongyloides gain entry into the human host by penetrating intact skin. Scabies or lice can be transmitted by close contact with infected individuals or their clothing. Myiasis is a subcutaneous fly larvae infestation at the site of inoculation or skin contact. Mosquitoes in Latin America can carry the human botfly larvae on their body, and in Africa tumbu flies deposit their larvae onto drying clothes. People contract these diseases by being bitten by the mosquito or putting on the infested clothes. Tungiasis in Africa, and Latin America results from female fleas depositing their eggs under the skin, usually of the feet and toes. Preventive measures should focus on general personal hygiene, avoiding contact with insects, ensuring clothes are not infested, and avoiding exposure of bare skin to soil.

Available Intelligence

The prevention of infectious diseases during deployment is a challenge, one in which the nature of the continuous and widely varied infectious threats that troops will face overseas must be understood in order to prepare well before deployment.[68] Numerous governmental and civilian web-based information systems are available to assess risk.[69] The United States Department of Defense Global Emerging Infections System (GEIS) performs militarily relevant research around the world with results applicable to deployment (www.geis.fhp.osd.mil). The United States Defense Intelligence Agency Armed Forces Medical Intelligence Center has a restricted internet site with pertinent medical deployment information (https://mic.afmic.detrick.army.mil). Military experts in infectious diseases stay abreast of the pertinent outbreaks and risks to deployments and are available for remote consultation through a link on a secure web site (Army Knowledge On-Line) available to military physicians.

Table 1 Militarily relevant infectious diseases with associated mechanisms of transmission, specific disease entities, and activities to prevent infection.

Disease category	Means of transmission	Examples of specific diseases	Personal measures to prevent disease
Food-borne and water-borne	Ingestion of contaminated food, dairy products, and water	Traveler's diarrhea, hepatitis A, typhoid fever, cholera	• Avoid undercooked food, non-bottled beverages, and non-pasteurized dairy products • Avoid consuming street vendor food • Use bottled water for drinking, making ice cubes, and brushing teeth • Carbonated beverages are safe • Peel fruit • Avoid salads, uncooked seafood • Wash hands with soap and water or alcohol hand sanitizers before each meal
Vector-borne	• Mosquitoes • Sandflies • Ticks • Flies(Black, tsetse) • Fleas • Mites • Reduviid bug • Lice	• Malaria, dengue, yellow fever, viral encephalitis, lymphatic filariasis • Leishmaniasis, sandfly fever, bartonellosis • Crimean-Congo hemorrhagic fever, encephalitis, relapsing fever, babesiosis, rickettsial infections • Onchocerciasis, African sleeping sickness • Plague, murine typhus • Scrub typhus • Chagas' disease • Trench fever, relapsing fever, epidemic typhus	• Wear the uniform with the pants tucked into the boots, sleeves worn down, and under-shirt tucked into the pants • Use 35% extended-duration DEET • Impregnate uniform with permethrin • Minimize outdoor exposure during periods of insect activity • Use insect netting sprayed with permethrin • Check for ticks regularly • Use malaria chemoprophylaxis if indicated
Airborne	Person to person by aerosol and droplets from the nose and mouth	Tuberculosis, upper respiratory tract viral infections, influenza, meningococcus, winter vomiting disease	• Avoid hand contact to the face • Do not share drinking or eating utensils • Wash hands regularly • Pre- and post-deployment tuberculin skin testing • Use appropriate control measures when dealing with infected or potentially infected individuals
Zoonotic	• Animal bites • Contact with or aerosolization of rodent urine • Ingestion of animal feces • Ingestion of unpasteurized dairy products • Ingestion of under-cooked meats • Exposure to animal birthing products • Exposure to animal hides	• Rabies • Lassa fever, hantavirus, leptospirosis • Echinococcus • Brucellosis • Trichinosis • Q-fever • Anthrax	• Do not pet or feed animals (especially dogs) • Avoid direct contact with animals or animal products
Blood-borne	Direct contact with blood or other body fluids through contaminated needles, cosmetic procedures such as piercing and tattooing, or blood transfusions	Hepatitis B and C, HIV/AIDS, hemorrhagic viruses	• Avoid skin-perforating medical or dental procedures outside of U.S. medical system (acupuncture, piercing, tattooing, venipuncture) and sharing of razors • Avoid contact with body fluids, blood, or blood products
Sexually transmitted	Oral, anal, or genital sexual contact	Hepatitis B, HIV, syphilis, gonorrhea, chlamydia	• Abstinence • Use condoms during oral, anal, or genital sex • Avoid relations with commercial sex workers

Table 1 continued

Disease category	Means of transmission	Examples of specific diseases	Personal measures to prevent disease
Water exposure	Wading, bathing, boating, swimming, or rafting with exposure of mucous membranes, or intact or damaged skin to infested freshwater	Leptospirosis, schistosomiasis	• Avoid swimming or wading fresh water especially if stagnant or slowly flowing
Soil	Contact with or ingestion of contaminated soil	Anthrax, ascariasis, trichuriasis, hookworm, strongyloides, cutaneous larval migrans	• Wear toe covered foot-wear • Avoid sitting in sandy areas with uncovered skin • Avoid ingesting soil • Tetanus immunization
Trauma	Injuries caused by high- or low-velocity weapons, mortars, mines, improvised explosive devices (IED)	Tetanus, bacterial infection	• Tetanus prophylaxis • Wound debridement • Antimicrobial prophylaxis

Table 2 Routine, worldwide, regional, and military specific vaccines to prevent infectious diseases.

	Risk	Initial schedule	Booster	Comments	Adverse events□
Routine					
Diphtheria/tetanus/pertussis (DTP)	• Worldwide • Diphtheria present especially in eastern European countries, Russia	Childhood series	Tetanus and diphtheria every 10 years	• If dirty wound, reimmunize if > 5 and <10 years since last tetanus immunization • Tetanus immune globulin (TIG) is indicated in dirty wounds without a history of 3 or more doses of tetanus toxoids	• Frequent: minor local reactions (pain, swelling, redness), fever • Rare: hypotonic-hyporesponsive episode, anaphylaxis • Tetanus component brachial neuritis, anaphy laxis
Influenza	• Worldwide • Seasonal (year round in the tropics)	1 dose	Re-immunize every year	Do not give if unable to eat eggs due to possible anaphylactic reaction	• Frequency not defined: fever, malaise, angioede ma, urticaria, myalgia • Injection site tenderness, redness, or induration • Allergic or anaphylactoid reactions
Measles/mumps/a rubella (MMR)	Worldwide	Childhood series	Booster at age 18 or older if have not received 2nd dose		• Frequent: minor local reactions (pain, swelling, redness), fever, irritability, malaise, and non-specific symptoms • Rare: measles component: febrile seizure, thrombocy topenic purpura, anaphylaxis, encephalitis • Mumps component (strain-dependent)- aseptic meningitis

Table 2 continued

	Risk	Initial schedule	Booster	Comments	Adverse events□
Routine					
Polio Oral (live attenuated) Enhanced-potency inactivated poliovirus vaccine (E-IPV)	Eastern hemisphere only	Childhood series	Single booster age 18 or older	Oral form not routinely given in the U.S. anymore	Rare: vaccine-associated paralytic poliomyelitis (oral only)
Varicella	Worldwide	2 doses given 4 weeks apart	Unknown	• Routine vaccine being given to children and the military • Post-exposure varicella vaccine efficacy estimated to be 86% against all forms of disease and 100% against moderate to severe disease • VZIG prevents disseminated and progressive varicella when administered up to 96 hour after exposure (reserved for pregnant women or immunosup-pressed individuals)	• Frequent: fever, minor injection site reactions, generalized varicelliform rash • Rare: chills, fatigue, headache, irritability, malaise, nervous ness, pruritus, abdominal pain
Worldwide Hepatitis A	Worldwide	0, then between 6 and 12 months	None	• Standard U.S. military immunization. • Protection begins 2-4 weeks after 1st immunization	• Frequent: minor local reactions (pain,swelling, redness)
Hepatitis B Recombinant hepatitis B surface antigen vaccine	Worldwide	Usually- 0,1,6 months Rapid- 0,1,2,12 months	None	• Start series 6 months prior to deployment	• Frequent: local reaction (pain, swelling, redness), fever • Rare: anaphylaxis, Guillain-Barré syndrome
Typhoid Parenteral heat and phenol inactivated vaccine Oral live attenuated Salmonella typhim strain Ty21a vaccine Parenteral Typhim Vi capsular polysaccharide vaccine	Worldwide	 2 doses 4 weeks apart 4 oral doses every other day. One dose	 3 years 5 years 2 years	 Inexpensive, but most days lost to adverse events Expensive but well tolerated Expensive but well tolerated	Injection: • Frequent: local tenderness, pain, and induration at injection site (especially heat inactivated vaccine) • Rare: hypotension, allergic reactions Oral: • Occasional: headache, fever, rash, abdominal discomfort, diarrhea, nausea, vomiting • Rare: anaphylactic reaction

Table 2 continued

	Risk	Initial schedule	Booster	Comments	Adverse events□
Routine					
Rabies- Cell-culture-derived vaccines: Human diploid cell vaccine (HDCV) Rabies vaccine absorbed (RVA) Purified chick-embryo cell culture vaccine (PCEC)	Worldwide (rabies-free regions British Isles, New Zealand, Japan, Taiwan, many of the Caribbean islands, Sweden, Norway, Spain, and Hawaii)	Preexposure doses at 0, 7 and 21 or 28 days. Alternatively, five dose series post-exposure.	Ongoing risk and serologic status will dictate need for booster	Rabies immunoglobulin (RIG) given within 7 days of initiating vaccine series if rabies exposure has occurred	• Frequent: local and/or general reaction depending on type of vaccine
Regional Japanese encephalitis Inactivated mouse-brain-derived vaccine	• Most of East Asia from India east to Korea and Japan during the late summer and early fall • Sporadic throughout the year in tropical areas of SE Asia	0, 7, 14 or 30 days	24 months or later	Risk with exposure >1 month in certain environments	• Frequent: local reaction, low-grade fever, myalgia, gastrointestinal upset • Rare: mouse-brain only – neurological reactions, hypersensitivity
Meningococcal disease- Meningococcal quadrivalent (A/C/Y/W135) polysaccharide vaccine	• Sub-Saharan Africa from Guinea to Ethiopia, December to June. • Sporadic worldwide	1 dose	Unclear; protection appears to last at least 3 years	Legally required for pilgrims who make the Hajj to Mecca, Saudi Arabia	• Frequent: mild local reaction
Yellow fever Live attenuated 17 D viral strain vaccine	Central Africa and South America	1 dose	10 years	History of anaphylactic reactions following egg ingestion	• Frequent: headache, influenza-like symptoms, local reaction (pain, swelling, redness) • Rare: encephalitis, allergy/anaphylaxis, hepatic failure
Military Specific					
Anthrax	Worldwide	0, 2, 4 weeks, 6, 12, 18 months	Yearly		• Frequent: local tenderness, erythema, subcutaneous nodules, induration, warmth, local pruritus, headache, fever, malaise, anorexia, vomiting, nausea, edema, myalgia • Rare: cellulitis, chills, body aches, delayed hypersensitivity reaction, peripheral swelling

Table 2 continued

	Risk	Initial schedule	Booster	Comments	Adverse events□
Routine					
Smallpox	Not currently present	• Primary vaccination: single drop of vaccine suspension and 2 or 3 needle punctures. • Revaccination: single drop of vaccine suspension and 15 needle punctures	Unclear	Adverse reactions requiring evaluation or possible treatment: Inadvertent inoculation, generalized vaccinia, eczema vaccinatum, progressive vaccinia, postvaccinial CNS disease, fetal vaccinia	Frequency not established for all reactions. • Frequent: headache, fatigue, chills, rash, secondary pyogenic infections, pain at injection site, satellite lesions, inflammation, myalgia, lymphadenopathy • Rare: encephalitis, encephalomyelitis, encephalopathy

□Frequent > 10%, Occasional 1-10%, rare <1%
Abbreviations used: HCWs, Health care workers
Notes:
1. Live vaccines include measles, mumps, rubella, oral polio, oral typhoid, BCG, varicella, and yellow fever.
2. Vaccines can be given simultaneously at separate sites at least 2 cm apart.
3. Inactivated vaccines do not generally interfere with the immune response of other inactivated or live vaccines.
4. If live vaccines are not administered at the same time, the interval between vaccinations should be delayed by 4-8 weeks.
5. Once a vaccine series has been initiated do not restart; resume where series left off. Shortening interval between vaccinations may abate vaccine protective efficacy but lengthening does not.
6. Combination vaccines - DTP, MMR, hepatitis A + B, IPV + DTP, IPV + DTP + Hib, IPV + DTP + HepB + Hib.
7. Vaccines not available in the U.S. or not routinely given in the U.S. military - Haemophilus influenzae type b (Hib); Tuberculosis - Bacille Calmette-Guerin vaccine; cholera; pneumococcal polysaccharide 23-valent formulation, conjugate vaccine; Lyme disease (Borrelia burgdorferi OspA) vaccine; plague; tick borne encephalitis-inactivated whole virus vaccine; hepatitis A + typhoid combination.

Table 3 Antimicrobial agents for diarrhea chemoprophylaxis.

Drug	Protective efficacy	Adverse events□	Comments
Fluoroquinolones*	80-100%	Frequent: dizziness, fever, headache, insomnia, nausea, vomiting, diarrhea, constipation	*Campylobacter* resistance in Southeast Asia
Bismuth subsalicylate**	40-65%	Frequent: discoloration of the tongue (black), grayish-black stools	May have some antiviral activity Frequent dosing a liability
Probiotics- *Lactobacillus GG, Saccharomyces boulardi*i	0-50%	Well tolerated	Not recommended
Azithromycin***	Unknown	Occasional: diarrhea, nausea, abdominal pain, cramping, vomiting	May be beneficial in fluoroquinolone-resistant areas

□Frequent > 10%, Occasional 1-10%
*Examples: levofloxacin 500mg orally per day, ciprofloxacin 500mg orally per day, gatifloxacin 400mg orally per day
** 2 tablets with each meal and prior to bedtime (8 tablets per day)
*** azithromycin 500mg orally per day

Table 4 Malaria prophylaxis

Drug	Active against	Dosing	Adverse events□	Advantages	Disadvantages
Chloroquine	• Chloroquine susceptible *P. falciparum** • Chloroquine susceptible *P. vivax*** • All *P. malariae* and *P. ovale*	500mg (or 300mg base) orally every week starting 1-2 weeks prior to travel, during travel, and for 4 weeks upon leaving malarious region	• Frequent: pruritus in African-American individuals, nausea, headache • Occasional: skin eruptions, reversible corneal opacity, partial alopecia • Rare: nail and mucous membrane discoloration, deafness, photophobia, myopathy, retinopathy with daily use, blood dyscrasias, psychosis,	• Weekly dosing • Minimal adverse events	• Resistant regions • Concurrent use with intradermal human diploid rabies vaccine can reduce antibody response
Mefloquine	Mefloquine susceptible *P. falciparum*†, *P. vivax, P. malariae, P. ovale*	250mg orally every week starting 1 to 2 weeks prior to travel, during travel, and for 4 weeks upon leaving malarious region	• Frequent: transient dizziness, diarrhea, nausea, vivid dreams, nightmares, irritability, mood alterations, headache, insomnia • Rare: seizures, psychosis, prolonged dizziness	• Weekly dosing	• Contraindicated in persons with active depression or a previous history of depression, generalized anxiety disorder, psychosis, schizophrenia, other major psychiatric disorders, or seizures • Not recommended for persons with cardiac conduction abnormalities
Doxycycline	*P. falciparum, P. vivax, P. malaria, P. ovale*	100mg orally daily starting 1-2 days prior to travel, during travel, and for 4 weeks upon leaving malarious region	• Frequent: gastrointestinal upset, vaginal candidiasis, photosensitivity • Rare: allergic reactions, blood dyscrasias, azotemia, esophageal ulceration	• Good for those needing fine motor skills and high con centration • Approved for pilots	• Dosing • Adverse events
Atovaquone + proguanil (Malarone®)	*P. falciparum*^, *P. vivax, P. malaria, P. ovale*	250mg atovaquone + 100mg proguanil combination tablet orally daily starting 1-2 days prior to travel, during travel, and for 5-7 days upon leaving malarious region	• Frequent: nausea, vomiting, abdominal pain, diarrhea, increased transaminases • Rare: seizures, rash	• Dosing	Not adequate for terminal prophylaxis of hypnozoite stages of *P. vivax* or *P. ovale*
Primaquine	*P. falciparum, P. vivax, P. malaria, P. ovale*	30mg base orally daily starting 1 to 2 days prior to travel, during travel, and for 5 to 7 days upon leaving malarious region	Occasional: gastrointestinal upset, hemolysis in G6PD deficiency, methemoglobinemia	• Dosing • No terminal hypnozoite prophylaxis needed	Not given to G6PD deficient personnel

Table 4 continued

Drug	Active against	Dosing	Adverse events□	Advantages	Disadvantages
Terminal Prophylaxis Primaquine#	*P. vivax, P. ovale* hypnozoite stage	15mg‡ or 30mg base orally daily upon departing malarious region for 2 weeks	Occasional: gastrointestinal upset, hemolysis in G6PD deficiency, methemoglobinemia	Only drug available for terminal prophylaxis	Not given to G6PD deficient personnel

□Frequent > 10%, Occasional 1-10%, rare <1%

*Chloroquine susceptible *P. falciparum* - Haiti, Dominican Republic, Central America north and west of the Panama Canal, northern Argentina, parts of the Middle East (Saudi Arabia, Yemen, Oman, and Iran have reported resistance).

***P. vivax* resistance reported in Irian Jaya (Indonesia), Papua New Guinea, and in small case series in Brazil, Guatemala, Guyana, India, and Myanmar.

†Mefloquine susceptible *P. falciparum* - worldwide except Thailand bordering Myanmar and Cambodia.

!Can load 250mg orally once a day for 3 days and then 250mg orally once a week[70]

^ Resistance in Africa noted[71]

‡CDC now recommends 30mg base for all travelers needing terminal prophylaxis

#Primaquine resistant P. vivax reported in Oceania, Southeast Asia, and Somalia

All U.S. military services currently recommend routine testing of glucose-6-phosphate dehydrogenase (G6PD) levels. Approximately 11% of African-Americans in one analysis of veterans are G6A-PD deficient.[72] Although G6A-PD patients do not typically hemolize red blood cells, this is not predictable. If personnel are G6PD deficient, seek expert consultation prior to utilizing primaquine.

Table 5 Rate of acquisition of infection with malaria.

Region	*P. falciparum*	*P. vivax*	*P. malariae*	*P. ovale*
Africa	High	Rare	Low	Moderate
South Pacific	High	High to moderate	Low	Low
Southeast Asia	Moderate to low	High to moderate	Low	Low
India, South Asia	Moderate to low	Moderate	Rare	None
South America	Low to none	Moderate to low	Rare	None
Central America	Low	Moderate to low	Rare	None
Caribbean	Low	Low to none	Rare	None
Middle East	Rare	Low	Rare	None

Table 6 Types of sexually transmitted diseases with typical presentation and incubation period.

Organism	Location	Incubation period	Condition/Disease
Chlamydia trachomatis Serotypes D-K	Worldwide	5-21 days	Genital chlamydia infection: urethritis/cervicitis, endometritis, salpingitis, periappendicitis, perihepatitis, conjunctivitis, epididymitis, Reiter's syndrome
Serotypes L1-L3	East and West Africa, India, parts of southeast Asia and the Caribbean	0.5-4 weeks	Lymphogranuloma venereum: bubo, fistula, lymphedema
Neisseria gonorrhea	Worldwide	3-10 days	Gonorrhea: urethritis/cervicitis, endometritis, salpingitis, epididymitis, perihepatitis, septicemia, arthritis, pustules, conjunctivitis
Haemophilus ducreyi	Developing countries	4-14 day	Chancroid: genital ulcer, inguinal lymph nodes (buboes), fistulas (seen in 50% of cases)

Table 6 continued

Organism	Location	Incubation period	Condition/Disease
Calymmatobacterium inguinale	Developing countries	6 weeks to 1 year	Donovanosis, granuloma inguinale: subcutaneous nodules followed by granulating ulcer, extragenital spread may occur
Treponema pallidum	Worldwide	1.5 to 10 weeks	Syphilis: painless genital ulcer (primary stage), rash (2nd stage), late in course (3rd stage) involves numerous organs
Herpes simplex virus, type 2 > 1	Worldwide	4 to 10 days	Painful ulcer, keratitis, encephalitis, meningitis
Hepatitis B	Worldwide	3 to 6 months	Acute hepatitis
HIV 1	Worldwide	2 weeks to 10 years	AIDS
HIV 2	Africa	2 weeks to 10 years	AIDS
Trichomonas vaginalis	Worldwide	0.5 to 3 weeks	Trichomoniasis: vaginal and urethral discharge, acute pain, irritation
Shigella, Entamoeba histolytica	Worldwide - High rates of *E. histolytica* in India, Africa, Mexico and parts of Central and South America. Both reported associated with oral-anal sexual contact.	Days to weeks	Gastroenteritis: diarrhea, septicemia, abscess formation, melena, weight loss
Sarcoptes scabiei	Worldwide	2 to 7 weeks	Scabies: itching, excoriations
Phthirus pubis	Worldwide	1 to 2 weeks	Pubic lice: itching

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CE/CME ARTICLE

The Ten Commandments of Nutrition: 2005

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Abstract

The topics of nutrition, dietary supplements, and enhancement of SOF mission performance are of critical importance to the Special Operations community. This article provides state-of- the-art information in these areas for SOF operators.

OBJECTIVES:

1. Recognize that most dietary supplements are not necessary for good health or optimized performance.
2. Identify the basic requirements for adequate hydration.
3. Recognize that long-term weight modifications must be made through long-term changes in eating and exercise behavior

Financial Disclosure

The authors have indicated that, within the past two years, they have had no significant financial relationship with a commercial entity whose products/services are related to their topic subject matter.

Nutrition is a topic of critical importance to everyone. Athletes want something to promote an increase in lean muscle mass, improve strength, or shave minutes off their run, bike, or swim times. Warriors want this too, but they also want ways to enhance their performance during physically and mentally demanding missions. Our country is fortunate enough to enjoy a well-fed culture, leading many Americans to want a quick fix to their weight problem – a pill or a diet to help them shed unwanted pounds. Since over 50% of Americans are either overweight or obese, this is not surprising. Another group of Americans can be considered supplement junkies. These people invest in expensive vitamin, mineral, and herbal preparations that promise to help them achieve whatever advertised life-enhancing result that they desire. Finally there is a group that is health conscious; they maintain a regular exercise program and strive to select the right types of foods to ward off cardiovascular disease, cancer, osteoporosis, and other diseases in an effort to increase their longevity and general health. Most of us fit into several of these categories at one time or another.

Most Special Operations (SOF) warriors are interested in sports and performance nutrition. They need information regarding optimum nutrition as they prepare for strenuous missions that may take them to the limits of their physical and mental endurance. The U.S. Special Operations Command (USSOCOM) Biomedical Research and Development Program has focused on this need over the years, and developed several nutrition information products for the SOF community, such as the "Compendium on Ergogenics for Special Operations" authored by the Uniformed Services University of the Health Sciences Human Performance Laboratory several years ago. This information is available on their web site at http://www.usuhs.mil/mim/ahbf.htm. New information continues to come forward on this topic, however, and the SOF community needs to keep pace with these emerging concepts.

This article is an update to the Ten Commandments of Nutrition that were first published in the SEAL professional journal "Full Mission Profile" in January of 1992. As before, the Ten Commandments are presented in an informal style, but are based on well-documented information. The revised Ten Commandments of Nutrition are presented in Figure 1.

Beware of Supplement Buccaneers.

The **first commandment** deals with the topic of "supplement buccaneers." Are all claims made by supplement products true? Hardly! For decades, the Food and Drug Administration (FDA) regulated most dietary supplements as foods under the Food Drug and Cosmetic Act of October 25, 1994, when President Clinton signed the Dietary Supplements Health and Education Act (DSHEA), a regulation acknowledging that consumers firmly believe that dietary supplements are safe and may confer health benefits. Through DSHEA, Congress expanded the meaning of dietary supplements to include substances such as ginseng, garlic, fish oils, psyllium, enzymes, glandulars, and other such mixtures. Unfortunately, DSHEA, in effect, increased the amount of misinformation that can be disseminated to prospective customers and expanded the types of products that could be sold. Since its passage, hormones such as DHEA and melatonin are now considered dietary supplements. Also as a result of DSHEA, ingredients in dietary supplements are not subject to pre-market safety evaluations and manufacturers are not required to demonstrate the safety or effectiveness of their products prior to marketing. The FDA does not evaluate any of the commercially available products unless there are complaints, so consumers should be aware that these supplements may not produce the advertised results (Imagine that!) and may, in fact, be harmful. As an example, numerous deaths were caused by ephedra compounds before they were removed from the market.

Although not all product claims are totally false, the buyer must be informed, resourceful, and skeptical of exaggerated claims made regarding expensive nutritional products. The main benefit of most dietary supplements is to enhance the financial standing of the manufacturer, as most nutritional needs are easily met at a more reasonable price from the foods in a balanced diet.

Read the "Nutrition Facts" label

The **second commandment** is straightforward and simply states that one should read the labels on all packaged foods and supplements prior to purchase. For food products, the information present will vary, but all labels contain serving size, calories, and information on some key nutrients that affect health. Close attention should be paid to serving size; specifically how many servings are in the package. The number of calories listed refers to only one serving, so if the package provides two or three servings rather than just one, it is easy to underestimate the calories consumed. The number of calories from fat is also shown, so one can determine the percent of calories from fat. The nutrient label also shows the amount of saturated and trans fat: trans fats have been associated with cardiovascular and coronary heart disease as well as other health problems.

Food labels also provide information on other important nutrients, including carbohydrate (CHO), protein, sodium, dietary fiber, vitamin A, vitamin C, calcium, and iron. Each nutrient is given a percent of Daily Values (DVs), which are the recommended levels of intake based on a 2,000 or 2,500-calorie diet. Energy-providing nutrients are protein, CHO, and fat. Proteins are building blocks for skeletal muscles, whereas CHO provide the energy we need to fuel our daily activities. Fats provide more than twice as many calories per gram compared to CHO or protein. Although fat is good in some operational settings, if consumed in large quantities in your everyday diet, it will show up quickly in the form of extra pounds. Fats also have the undesirable effect of elevating serum lipid levels (fats carried in the blood), which is associated with an increased risk of heart attack and strokes. If a food product is a good source of vitamins and minerals, that will also be listed on the label. Vitamins and minerals are not sources of energy, but are needed in small amounts to facilitate certain chemical reactions in the body.

Although dietary supplement labels have a less rigid format than foods, certain information is required:

- Statement of identity (e.g., "choline citrate").
- Net quantity of contents (e.g., "60 capsules").
- Structure-function claim (i.e., what system in the body is affected and how this effect is accomplished).
- The statement "This statement has not been evaluated by the Food and Drug Administration. This product is not intended to diagnose, treat, cure, or prevent any disease."
- Directions for use (e.g., "Take one capsule daily").
- Supplement Facts panel (i.e., Lists serving size, amount, and active ingredient).
- Other ingredients in descending order of predominance and by common name or

proprietary blend.

- Name and place of business of manufacturer, packer, or distributor.

Being aware of the nature and amount of nutrients contained in foods and supplements will help you adhere to the additional recommendations provided below, although one final caveat is that some supplements have been found to not contain what is printed on their label and others may be cross contaminated with unlisted compounds, including potentially banned substances.

Real food is better and cheaper than supplements

The **third commandment** relates to the use of vitamins and other supplement products. Dietary supplement products include vitamins, minerals, botanicals, sports nutrition supplements, weight management products, and specialty supplements. The many commercially available products are designed as supplements, not as replacements, for a well-balanced diet and a healthy lifestyle. The premise is that when such products are used properly, they help promote overall good health and prevent disease. In 1986 the dietary supplement industry in the U.S. was only a $3 billion dollar industry. Yet, sales were in excess of $20 billion in 2004. According to the FDA, over 29,000 dietary supplement products are on the market and more than 150 million Americans take dietary supplements annually. This is big business.

Megadose quantities of vitamin and mineral supplements deplete your bank account and serve mostly to increase the nutrient content of your body's waste products.

Dietary supplements are often divided into three main categories:

- Substances with established nutritional functions, such as vitamins, minerals, amino acids, and fatty acids.
- Substances that serve other specific functions in the body (e.g., pyruvate, chondroitin sul fate, and steroid hormone precursors). For example, chondroitin sulfate and glucosamine are claimed to enhance the structure and function of joint cartilage and thereby reduce joint pain.
- Herbs or botanical products and their concentrates and extracts.

Vitamin deficiency states are rare in healthy, non-vegetarian, non-alcoholic, non-pregnant, and non-breast-feeding adult Americans. Unless you fall into one of these categories, it is unlikely that you need extra vitamins and minerals. While large doses of expensive, brightly colored, and aggressively marketed vitamin and mineral supplements are rarely beneficial, taking a standard multivitamin-mineral supplement can be a reasonable choice. A small independent survey reported by the Office of Dietary Supplements (ODS) revealed that about 60% of the military personnel surveyed used a multivitamin supplement and many individuals also used various other types of supplements. The numbers of military high-dose vitamin takers are higher than seen in non-military populations and this is of concern given that each year many adverse events are reported in association with high-dose vitamin intake particularly with the fat-soluble vitamins (A, D, E, and K). Adverse effects may include headaches, central nervous system damage, liver failure, kidney stones, rhabdomyolysis, seizures, peptic ulcers, and even death. High doses of Vitamin E have recently been associated with increased risk of heart attack. Note that there are some disease conditions for which high doses of vitamins or minerals may be beneficial. If you think you may have one of these diseases, consult with your physician before starting to take vitamins as a treatment.

If you feel compelled to take some form of dietary supplement, a low dose "One-a-Day" multivitamin-mineral supplement won't hurt and provides assurance that your vitamin intake is adequate. Note that supplemental iron is rarely indicated for men and may cause harm. Do not purchase multivitamin-mineral supplements that contain iron unless recommended by your physician.

You don't need to eat those nasty-tasting protein powders to bulk up.

The **fourth commandment** deals with a topic near and dear to weight lifters and bodybuilders everywhere. The quest for hugeness has resulted in many athletes and warriors ingesting massive quantities of protein and amino acid supplements over the years. At present there is no evidence to suggest that protein supplements are required for optimal muscle growth or strength gain. Protein intakes between 0.5

and 0.8 grams per pound (90 to 140 grams for a 175 lb man) will meet the needs of all SOF operators. In fact, virtually all studies have shown that protein intakes of 0.8 grams per pound of body weight are more than adequate for even the most serious weight lifter or bodybuilder, as long as the diet provides sufficient energy. No study has ever shown a need for more than that amount of protein, but we do know that a negative energy balance will compromise the maintenance and building of muscle mass. Taking in adequate calories/energy is critical for maintaining maximum strength.

0.8 gram of protein per pound body weight per day is the maximum recommended protein intake, even for the most serious weight lifter or bodybuilder.

The best method for ensuring that you are maintaining an adequate caloric intake is to monitor your body weight. Weighing should be done at the same time every day, preferably first thing in the morning. A slow, steady decline from your normal weight indicates a negative energy balance, impairment in protein synthesis, and/or reduction of body fat stores. A rapid change in weight is more likely to reflect changes in hydration status. Be aware of fatigue, poor performance, and an increase in your resting heart rate first thing in the morning, as they may be other warning signs that you are in negative energy balance.

Based on the scientific data, we suggest that an intake of more than 0.8 gram of protein per pound per day can be unwise. Remember that excess protein will be stored as unwanted body fat, just like all extra calories. Potential hazards of excess protein or amino acid intake include dehydration, kidney problems, and calcium depletion. Although most people normally take in more protein than necessary, good sources of high quality supplemental protein include chicken and fish. A list of protein content found in common foods is provided in Figure 2.

Limit your fat intake to less than 30% of total calories

The fifth commandment refers to the intake of dietary fat. Limiting dietary fat to less than 30% of total calories is an important factor in reducing the risk of heart disease, stroke, and some types of cancer. Minimizing fat intake is also very important in weight control because fats are high in energy at 9 kcal/gram. Reading the label on food products allows you to find the total calories in the item and calculate the percentage of calories from fat - just take total fat calories, divide by the total number of calories, and multiply by 100. The number obtained should be no more than 30%.

It is not necessary to eliminate all food items that fail the fat test (e.g., potato chips, peanuts, anything french-fried, ice cream), but an effort should be made to limit high fat foods and balance your diet with low-fat foods.

Read the nutrition labels of foods and avoid those that contain “trans fats” (otherwise known as hydrogenated fats). These fats do not occur in nature and are man-made – added or created during food processing. Trans fats are associated with a significantly greater risk of heart disease. An easy way to tell if an oil you are using is high in trans fats is if it is a solid at room temperature, it probably is a trans fat (e.g. butter, shortening).

Dehydration is a common cause of poor athletic performance.

The **sixth commandment** deals with the importance of hydration. Water is the most abundant compound in the body, comprising approximately 60% of our body weight. Proper hydration is critical since dehydration, or loss of body fluids, will compromise performance. Dehydration amounting to only 2% of body weight can cause decrements in athletic performance as well as increase the risk of heat injuries. Adequate hydration and sweating are crucial to your body’s ability to dissipate excess heat. Since intense exercise can produce sweating rates of up to one to two liters per hour, a 170-pound individual could lose 2% of his weight in less than an hour. A 4% loss of body weight can decrease performance by 25%. Athletes who exercise for extended periods of time, especially in hot and humid weather, are at high risk for dehydration. Individuals training or competing more than once a day have an increased risk of dehydration. Warriors in deployed operational settings may also be at significant risk from chronic dehydration as fluid intake is reduced due to op-tempo, weight carriage restrictions, and a desire to avoid nighttime trips to the latrine.

The fluid lost during exercise should be

replaced during the period of exercise if this period is more than about 30 minutes. If this is not possible, the fluid should be replaced within a very short time after exercise. The appropriate amount of fluids to be replaced can be estimated from body weight losses or the length of the exercise period. When possible, body weight should be measured before and after exercise to estimate fluid loss. The amount of weight lost represents a good estimate of the amount of fluid needed to replace sweat losses and promote adequate rehydration. Other good indicators of adequate hydration are normal urinary frequency and urine that is pale in color instead of the deep yellow seen with dehydrated states.

Water, juice, and sports drinks are good choices for replacing fluid. Both water and sports beverages are important, but several issues should be considered when selecting the best beverage. The usual beverage of choice for maintaining hydration status during exercise is water because it is both readily absorbed and inexpensive. A general rule is that water is preferred for routine consumption and when the duration of the exercise is 60 minutes or less. Taking in excessive quantities of plain water may lead to life-threatening hyponatremia (low blood sodium), so more is not always better. For acute fluid loss due to exercise of long duration (greater than 1 hour), fluids containing CHO and electrolytes are important to sustain performance and replace sodium and chloride lost through sweat.

The optimum CHO content for a sports drink is between 4% and 8% (9 to 19 g of CHO per 8-oz. serving). The taste and flavor of the beverage should be appealing so adequate amounts will be ingested. Also, the beverage should be cool (between 59° and 72°F), rather than warm if possible: cool fluids are absorbed more rapidly than warm ones.

In general, 16 ounces of water or sports drink should be ingested two hours before exercise to assure adequate hydration at the onset of exercise. During exercise, fluids should be ingested at regular intervals, so they are absorbed at a rate sufficient to replace fluids lost through sweating. Alternating between water and a CHO-electrolyte drink may help speed absorption of the fluid. At least four to eight ounces should be ingested every 15-20 minutes during heavy exercise. No more than one liter (approximately one quart) should be consumed each hour, unless exercising in warm or hot conditions, in which case, up to 1.5 liters/hour may be consumed.

Take in CHO and protein immediately after prolonged, intense exercise.

The **seventh commandment** is based on scientific evidence that nutrition is important for maintaining performance and accelerating recovery after training. Optimal physical and mental performance requires CHO as a fuel. CHO is stored in muscles and liver as glycogen and one hour of high intensity exercise can reduce glycogen levels by 55%. Two to three hours of strenuous exercise can deplete glycogen stores. A diet low in CHO can rapidly deplete glycogen stores and negatively affect both short-term intense and prolonged exercise performance. Moreover, mood is better when a high CHO, as compared to a low or moderate CHO, diet is consumed. A high CHO intake may also prevent or reduce symptoms associated with overtraining.

Persons who ingest low CHO diets (20 to 100 grams per day) typically have reduced exercise tolerance and are unable to improve their performance through training. The mass marketing of low CHO foods should be of concern to members of USSOCOM. Information provided to the ODS indicated that 34% of a military sample were limiting their CHO intakes. This eating pattern could adversely affect both athletic and mission performance. Daily CHO intake is directly related to an operator's ability to sustain performance, whether the activity is aerobic or anaerobic in nature.

A low-carb diet will not provide enough energy for optimal performance. "Just say no" to the Atkins Diet.

Given that dietary CHO is essential for maintaining and replenishing glycogen stores to support continued high levels of activity, all SOF personnel should be careful to consume sufficient amounts to meet their training needs. When undergoing regular training sessions, between two and five grams of CHO/pound body weight should be consumed daily. Stated differently, approximately 55 to 70% of the total daily energy should come from CHO.

After a vigorous training session or a prolonged and strenuous mission, recovery can be accelerated by

Athletes should go for the CARBS!

good nutrition. Rapid replenishment of muscle and liver glycogen and providing amino acids to the muscles for repair are part of the recovery process. Both endurance and resistance exercise alike can deplete glycogen stores, and exercise stimulates the breakdown of muscle proteins. Thus, what and when foods are eaten following physical exertion becomes very important for optimal recovery.

Consuming a healthy meal or snack containing CHO and some protein is the best way to accelerate recovery after training or missions. Protein ingestion along with fluids and carbohydrates has also been shown to be beneficial in cyclists who want to exhaustive exercise.

Within 30 minutes after completing prolonged endurance activities, 50 to 100 grams of CHO along with 10 to 20 grams of protein should be consumed.

Strength and power athletes should consume a mixture of CHO (0.2 to 0.5 gram CHO/pound body weight) with some protein (up to 0.1 gram/pound body weight) 20 minutes of completing exercise, but certainly no more than 30 minutes after a workout.

Taking in some protein with CHO should accelerate glycogen repletion and enhance protein synthesis. The amount of protein depends on the amount of CHO, but a good rule is that no more than one gram of protein should be eaten for every four grams of CHO. The timing is critical: providing nutrients to the muscles within 30 minutes after a workout will speed up recovery for the next one. Repeating this pattern of intake (CHO and protein) several hours later may be beneficial if the exercise or mission has been extremely strenuous. This dietary practice may also help to reduce injuries.

Eat fresh fruits, vegetables, and whole grain products every day.

Commandment eight states that you should eat fresh fruits and vegetables, whole grain products, and high fiber products every day. A large body of evidence supports this recommendation both for performance and long-term health. As previously mentioned, diets high in total fat, saturated fat, and cholesterol are associated with an increased risk of obesity, cancer, and coronary heart/cardiovascular disease. In contrast, diets high in fiber, fruits, vegetables, and grain products, and low in fat are linked to a reduced risk.

The source of protein in the diet may also be important, as protein derived from soybeans, as compared to other proteins, may reduce the risk of cardiovascular disease. Other important foods include dairy products, olive oil, and foods that provide selenium (Brazil nuts, cashew nuts, cheese, chicken, eggs, garlic, green vegetables, whole wheat bread, and others). What is important to remember is that **the key to performance and health is selecting whole foods.** Although we do not always know what role a particular nutrient in a food serves to protect against diseases, it is clear that whole foods and not supplements are most important. As such, you should make a conscious effort to increase your intake of fresh and whole foods, both of which are often lacking in American fast and frozen food diets.

Beware of ALL short-term diets.

The proliferation of fad diets is one of the least distinguished chapters in our national health and nutrition history. The **ninth commandment** relates to the problem of diets and dieting. So many weight-loss diet books and plans are available that the general consumer doesn't know what direction to take or who to believe. Some of the many are the South Beach Diet, Atkins Diet, Scarsdale Diet, Russian Air Force Diet, and grapefruit diet, to name only a few. Many authors of diet books have limited medical and/or nutrition training and base their diets on case studies, anecdotal reports, or vivid imaginations. Some of these poorly conceived diets have resulted in fatalities.

For most of the population, maintaining body weight is governed by a single basic principle: ***energy in = energy out***. If you take in more calories/energy than you expend, then the extra energy will be stored as fat. In contrast, if you expend more calories than you take in, the body will find the needed energy by reducing its own fat, protein, and/or CHO stores. *The only reasonable approaches to weight loss are* to (a) expend more energy through an increase in physical activity, (b) take in fewer calories that you expend, or (c) a combination of (a) and (b). Diets and diet plans that actually work recognize that individual behaviors must change, to include long-

term changes in activities and/or caloric consumption. Short-term fad diets that promote rapid weight loss are generally useless and occasionally harmful.

Effectively, one should not diet but rather develop more beneficial eating and exercise behaviors. A well-planned and effective diet will result in the loss of only about one pound each week. (About 3500 excess calories must be expended or not ingested to lose one pound.) The very rapid weight losses claimed by some diets are produced by temporary depletion of body water, which may cause dehydration, electrolyte imbalances, and/or life-threatening irregular heartbeats. Overall, weight loss is best accomplished by moderate changes in dietary behaviors and exercise patterns that can be sustained over the long term.

The #1 nutrition-related disease in the U.S. is obesity.

The **tenth and last commandment** is one of great importance for overall health. Obesity is the number one nutrition-related disease in the United States today. According to the National Institutes of Health, obesity and "overweight" together are the second leading cause of preventable death in the United States, close behind tobacco use. Our affluence as a nation, the marketing and availability of fast food restaurants, the large portion sizes, the many choices available at mealtimes, and our increased dependence on television, computers, and video games for entertainment have all contributed to the crisis of "globesity." However, it is also a reflection of our eating behaviors. Many American children are told by parents or other adults to "clean your plate." This bad habit may require us to eat to the point of discomfort, as a penalty for overestimating our appetite. If you find yourself doing this, make a conscious effort to stop.

Eating in the absence of hunger, such as during social gatherings, is a habit to break. Decreasing your food portion size may help to decrease caloric intake without requiring food restriction. One exception to this rule is when preparing for a *mission or an endurance athletic event*. A little extra CHO may be critical in this setting.

In summary, you should learn to read the labels on your food products and select your meals so that each day you take in about 0.5 to 0.8 gram (90 to 140 grams for a 175 lb operator) of protein per pound of body weight. Balance your energy needs with CHO and fats, but be careful that fats contribute less than 30% of your total calories. Fresh fruits, vegetables, rice, and high fiber cereal products should be regulars. Getting your carbs and fluids right is one of the most important thing you can do to optimize your mission readiness and performance. Lastly, when it comes to nutrition, less is often better, or, as Thomas Jefferson observed

"We seldom regret having eaten too little."
Thomas Jefferson

Suggested Reading

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Fig 1

U.S. Special Operations Command

TEN COMMANDMENTS OF NUTRITION: 2005

1. DON'T BELIEVE ANYTHING YOU READ ABOUT NUTRITION OR DIETARY SUPPLEMENTS WRITTEN BY SOMEONE TRYING TO SELL YOU SOMETHING.

2. READ THE LABELS ON ALL FOOD PRODUCTS TO DETERMINE ENERGY, NUTRIENT TYPE, AND VITAMIN CONTENT.

3. MOST AMERICANS DO NOT NEED VITAMINS OR OTHER DIETARY SUPPLEMENTS, BUT A "ONE-A-DAY" TYPE VITAMIN-MINERAL PRODUCT WON'T HURT IF YOU WANT TO ENSURE THAT YOUR INTAKE OF THESE ITEMS IS ADEQUATE.

4. SKIP THE PROTEIN AND AMINO ACID SUPPLEMENTS. 0.8 GRAMS OF PROTEIN PER POUND OF BODY WEIGHT PER DAY IS THE MAXIMUM RECOMMENDED PROTEIN INTAKE.

5. LIMIT FAT CALORIES TO LESS THAN 30% OF TOTAL CALORIES.

6. DURING PERIODS OF PROLONGED, INTENSE EXERCISE, REPLACE SWEAT LOSSES BY DRINKING ONE TO TWO LITERS OF A CARBOHYDRATE/ELECTROLYE FLUID EVERY HOUR.

7. A CARBOHYDRATE/PROTEIN "RECOVERY SNACK" SHOULD BE CONSUMED WITHIN 60 MINUTES AFTER PROLONGED, INTENSE AEROBIC OR RESISTANCE TRAINING.

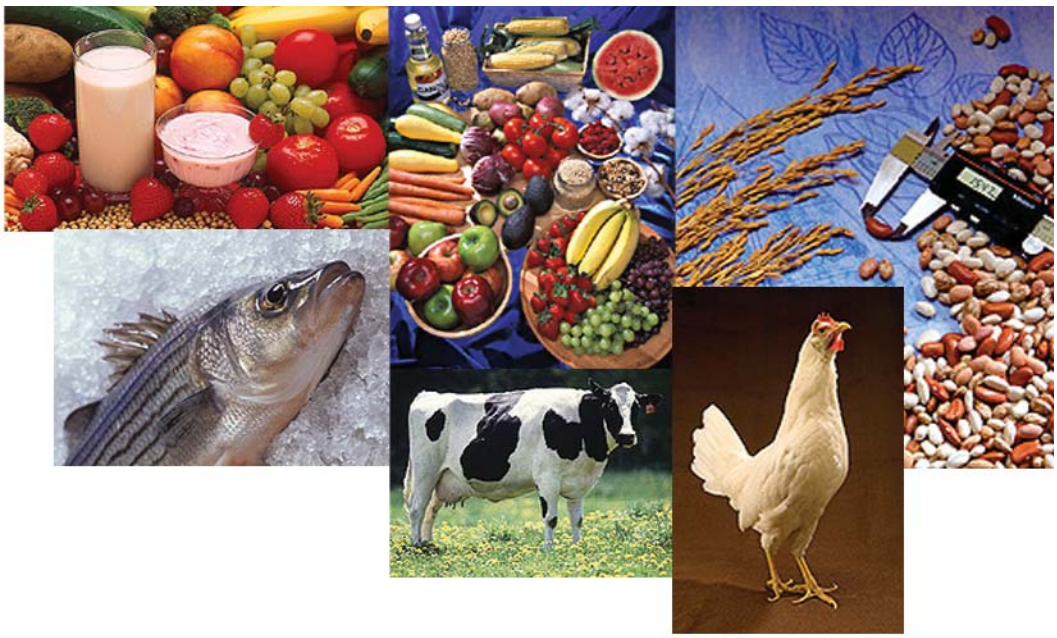
8. EAT FRESH FRUITS, FRESH VEGETABLES, AND HIGH-FIBER FOOD PRODUCTS DAILY.

9. SHORT-TERM WEIGHT REDUCTION DIETS ARE GENERALLY USELESS AND OCCASIONALLY DANGEROUS. LONG-TERM CHANGES IN EATING AND EXERCISE HABITS ARE THE ONLY WAY TO ACHIEVE LASTING WEIGHT MODIFICATIONS.

10. THE MOST COMMON NUTRITION PROBLEM IN THIS COUNTRY IS TOO MUCH NUTRITION. DON'T EAT WHEN YOU'RE NOT HUNGRY AND STOP EATING AS SOON AS YOU'VE HAD ENOUGH, NOT WHEN YOUR PLATE IS EMPTY.

Figure 2
Table of Protein Content

Food	Protein (g)
Tuna (6 oz)	40.5
Porterhouse Steak (6 oz)	38.0
6” Subway Chicken & Bacon Ranch Sub	36.0
1 Taco Bell Stuffed Chicken Burrito	35.0
Salmon (6oz)	34.0
Chicken Breast (1 each)	33.4
Cottage Cheese (1 cup)	28.0
6” Subway Chicken Breast Sub	24.0
Pepperoni Pizza (2 slices)	24.0
Hamburger (4 oz)	22.6
Dry Roasted Peanuts (3 oz)	20.0
Cheese (3 oz)	19.9
Cashews (3 oz)	15.5
Eggs (2)	12.6



CE/CME ARTICLE

Issues Related to the Use of Tourniquets on the Battlefield

Thomas J. Walters, PhD*; Robert L. Mabry, MD

Abstract

On the battlefield, a properly applied tourniquet can be an effective means of controlling severe extremity wound hemorrhage. However, a great deal of confusion exists among Soldiers, medics, and military medical officers on a number of tourniquet-related issues. What is an appropriate combat tourniquet? When is it appropriate to use a tourniquet? When and by whom should a tourniquet be removed? Under what conditions a tourniquet should not be released or removed? What are the most effective ways to increase limb salvage while using a tourniquet? A panel of experts met on these and additional issues at the 2003 Advanced Technology Applications for Combat Casualty Care Conference on August 21 and 23, 2005, at St. Petersburg Beach, FL. This article reviews those issues and presents a summary of the panel's recommendations.

Objectives

1. Describe what circumstances dictate the use of a tourniquet.
2. Explain the characteristics of an effective tourniquet.
3. List the steps for removing a tourniquet.

Financial Disclosure

The authors have indicated that, within the past two years, they have had no significant financial relationship with a commercial entity whose products/services are related to their topic subject matter.

Introduction

A properly applied tourniquet can be an extremely effective means of controlling extremity wound hemorrhage and could prevent 7 out of 100 combat deaths.[1,2] However, tourniquet use remains controversial and is the source of a good deal of confusion.[3] In civilian emergency medicine, the fear of tourniquet-related complications has all but eliminated their use,[3] yet, the Israeli Defense Forces (IDF) advocate the liberal use of tourniquets,[4] as do members of the Special Operations Forces (SOF) community.[5,6] These divergent views cause considerable confusion on the part of Soldiers, combat life savers (CLS), medics, and other military medical personnel.

A panel of physicians, medics, scientists, and biomedical engineers convened as part of the 2003 Advanced Technology Applications for Combat Casualty Care Conference on August 21 and 23, 2005, in St. Petersburg Beach, FL, to address some of the major issues regarding tourniquets in combat. This panel included individuals possessing combat, clinical, and/or scientific experience and knowledge of tourniquet use. This article presents a brief review of each issue followed by a distillation of the panel's discussion and major recommendations, which appear in Table 1.

Major Issues

What Is an Appropriate Combat Tourniquet?

Panel participants emphasized that first, and foremost, an adequate tourniquet must stop arterial bleeding; anything short of this is unacceptable. A tourniquet tight enough to occlude venous return but not arterial flow can exacerbate bleeding. An inadequate tourniquet can also cause significant bleeding if extensive laceration of the soft tissues is present distal to the device. This is a critical point, as many Soldiers, including CLSs and medics, erroneously believe that partial arterial occlusion actually is preferred and will prevent limb loss from ischemia. A properly functioning tourniquet should be tightened until blood flow stops. Some oozing will continue to occur following a sufficiently tightened tourniquet due to medullary (bone) blood flow.

Tourniquet tightness must increase considerably as limb size increases. This is due to the inverse relationship between the tourniquet pressure required to occlude arterial flow and the circumference of the limb.[7-10] Additionally, there is also an inverse relationship between tourniquet width and the pressure required to occlude arterial flow (Figure 1).[8-10] Given that the range of limb circumferences for male Soldiers are 11.5 to 15.0 inches (29 to 38 centimeters) and 20.3 to 26.7 inches (51 to 68 centimeters) for the arm and leg, respectively,[11] two key concepts become clear. First, complete occlusion of the leg is extremely difficult, if not impossible, with a one-inch (2.5 centimeters) tourniquet, especially without mechanical augmentation (windlass, ratchet, cams, or elastic components). This is exemplified by the inability of the strap and buckle tourniquet (MSN NSN 6515-00-383-0565) and one-handed tourniquet (OHT) (NSN 6515-01-504-0827), both one inch (2.5 centimeters) wide, to effectively occlude arterial flow in the leg.[12] The second concept is that small changes in width have a large impact on reducing occlusion pressure. Thus, wider tourniquets are much more effective. However, simply increasing the width of the tourniquet strap does not eliminate the need for mechanical augmentation because, as width increases, so does the amount of tissue that must be compressed, greatly increasing the effort required to produce tension. Additionally, as the width of a strap increases it tends to bow, thus transmitting relatively more pressure to the center than to the edges, and effectively reducing the functional width.[13]

Caulkins et al., field-tested eight potential battlefield tourniquets.[14] Of these, only three were capable of reliably occluding arterial flow in the lower limbs, and none of these favored one-handed operations. These included two strap/ratchet and one pneumatic design. These three systems were the only tourniquets tested that could augment the user's ability to tighten them by mechanical means. All others tested depended on elastic components or some form of a strap and buckle design. This critical observation emphasizes the fact that simple strap and buckle type tourniquet systems cannot reliably occlude arterial flow in the lower limbs.

In contrast to straps, which compress limb tissue via circumferential tension, pneumatic tourniquets use inflation pressure which is controlled more easily and more evenly applied around the circumference of the limb. Compared with the strap tourniquet the contoured pressure profile of a pneumatic tourniquet also reduces high shear stresses at the tourniquet edge that can result in nerve damage.[15,16] The greater width of the pneumatic tourniquet, combined with the greater effectiveness of tissue compression, also allows it to be much more effective at lower pressures, thereby reducing the likelihood of tissue damage.[15,17] These desirable properties have nearly eliminated tourniquet-related complications following orthopedic surgery where pneumatic tourniquets have become the standard.[18] The potential advantages of a pneumatic tourniquet on the battlefield were recognized before WWII.[19,20] However, concerns about size and weight, leaking, and ruggedness have kept them off the battlefield. These technical concerns have been largely overcome by at least one commercially available pneumatic trauma tourniquet (Delfi EMT tourniquet). The panel recognized that equipping all Soldiers with pneumatic battlefield tourniquets may not be practical, but recommended that it be considered for medics and issued to all casualty evacuation vehicles.

The panel recognized the potential for the all-but-forgotten rubber-tubing tourniquet, a very popular tourniquet used during WWII and first used in the 1870s. A six-foot (183 centimeter) piece of ½ inch (12 centimeter) outer diameter latex tubing can achieve very reliable and effective occlusion of arterial bleeding (Figure 2).[20] This tourniquet has many advantages, including the ability for one-handed application to the upper arm, low size and weight, and very low cost. The disadvantage is that pressure

is difficult to regulate, often resulting in excessive pressure and pain. Regardless, the panel recommended that the rubber-tubing tourniquet be considered in any future down-selection process.

Until a new effective battlefield tourniquet can be identified, fielded, and issued to each Soldier, the improvised tourniquet or Spanish windlass remains the principal option. The Spanish windlass tourniquet (used on the battlefield since 1674), while low tech and simple, is a reliable technique with proper instruction and practice (see Training and Education). However, because this tourniquet requires the Soldier to locate a windlass resulting in the loss of valuable time, the panel recommended that Soldiers be issued a six inch (15.3 centimeter) long stick or a plastic tube as part of the hemorrhage control kit.

The panel agreed that the current strap and buckle type tourniquet (NSN 6515-00-383-0565) needs to be removed from the inventory. This narrow tourniquet rarely controls bleeding completely and cuts into underlying skin. Although following WWII it was recommended strongly that the tourniquet be discarded,[20] it continues to be issued today.

The Army urgently needs an effective tourniquet system that can be carried by every Soldier and is easily and rapidly self-applied,[6,14] however, the panel voiced general concern that an emphasis on one-handed operation has overshadowed critical attention to adequate control of arterial bleeding in the lower extremities. The vast majority of injuries requiring a tourniquet occur in the lower extremities (68%)[4] where one-handed application is not necessary. This fact needs to be emphasized in the design of current and future battlefield tourniquets.

When Should A Tourniquet Be Applied?

Care under fire

If a Soldier is wounded under fire, a tourniquet should be used for any severely bleeding extremity wound. While under fire, the use of direct pressure, pressure dressings, pressure points, and elevation may place the casualty and medic at additional risk of injury. Current Army doctrine supports a much more conservative approach to tourniquet use only after all other measures have failed. However, the liberal use of the tactical tourniquet has gained popular support among the Special Operations community, primarily as a result of lessons learned from such Special Operations missions as the Battle of the Black Sea in Somalia[2] and the subsequent studies in tactical medicine.[5,6,21]

Other circumstances

Tourniquet use when not under fire is dictated by the inability to control bleeding by other means. The panel reiterated current policy (FM 21-11; FM 8-230; STP 21-1-SMCT) and emphasized the need to better educate all Soldiers. Additional recommendations are discussed below.

When Should a Tourniquet Be Removed?

During the early part of WWII, medical personnel would briefly loosen tourniquets every 30 minutes to allow reperfusion via intact collateral circulation. As a result, death sometimes occurred from the cumulative effects of the bleeding. This led to a policy reversal in the latter part of the war, giving rise to the current belief that a tourniquet should not be loosened or removed except by a medical officer.[20] Clearly, if a more liberal application of tourniquets is advocated, we must also adopt new guidelines for removal to avoid unnecessary loss of limbs or even life. Regardless of the conditions under which a tourniquet is applied, the most effective method of limb salvage is the early, successful conversion of a tourniquet to a less damaging means of hemorrhage control. The panel recommended that combat medics adhere to the algorithm described in Table 2.

Under What Conditions Should a Tourniquet Not Be Removed?

Despite the panel's advocacy of a more liberal policy of tourniquet use and removal, there are clearly conditions that preclude tourniquet removal (Table 3).

Limb Salvage

Soldiers and military medical personnel commonly perceive that tourniquet use inevitably will result in permanent injury or loss of limb due to ischemia. Based on studies in orthopedic surgery, a two-hour time period generally is accepted as the safe limit before some level of functional loss occurs.[3,18,22] Tourniquet application beyond two hours results in progressive neuromuscular injury. However, we do not know at what point limb loss becomes inevitable. Wolff et al.,[20] reported a number of tourniquet applications of 4 to 6 hours without any apparent deleterious effects. Lastein et al.,[4]

reported over 90 cases of tourniquet application in the Israeli Defense Force and found complications only after 150 minutes, none of which resulted in limb loss. Regardless, it is critical to limit tourniquet duration if at all possible. This means either recognizing when a tourniquet is not necessary or converting to a less damaging means of hemorrhage control as soon as possible.

Surgeons commonly employ periodic reperfusion when using tourniquets during elective procedure for bloodless extremity surgery. This practice significantly increases the length of safe tourniquet duration, and formed the basis of a good deal of scientific investigation.[18,20,22-24] However, this strategy is incompatible with tourniquet use on the battlefield. As discussed above, Wolff et al.,[20] found that an unacceptable number of Soldiers died of incremental exsanguinations from repeatedly loosening the tourniquet and the practice justifiably was abandoned.

Finally, cooling ischemic muscle profoundly reduces muscle injury.[20,25-27] Even a two to three degree Celsius reduction in muscle temperature can significantly increase the return of muscle function following extended tourniquet application.[26,28] The practice of exposing the limb, thereby exploiting cool environmental temperatures, was credited for successful limb salvages following tourniquet applications for up to eight hours during WWII.[20] Therefore, the panel recommended that this practice be encouraged as part of Soldier training. In addition, this practice reduces the chance of overlooking an injured Soldier with a tourniquet once he is transferred to a higher echelon of care.

Training and Education

Improvements in hemorrhage control will not occur without changes in current Soldier education and training at all levels.

Soldier Training: A non-medic comrade in arms initially renders most battlefield first-aid, either through Buddy Aid or through Combat Lifesavers. The panel agreed that current training in hemorrhage control techniques, including tourniquet use, is extremely deficient. Hemorrhage control techniques and the use of tourniquets already are Common Tasks taught to all Soldiers upon initial entry training. However, a recent study of approximately 40 Advanced Individual Training students who completed Initial Entry (Basic) Training showed that less than half could recognize and treat a life-threatening hemorrhage of the thigh in a simulated patient (personal communication, Mabry). In addition to greater emphasis on the control of life-threatening extremity hemorrhage during Basic and Advanced Individual Training, Soldiers also need sustainment training with additional emphasis on this skill during common task training and other training opportunities where field skills are emphasized, such as the Ranger Course, Primary Leadership Development Course, and the Advanced and Basic Non-Commissioned Officer Courses. This skill also should be added to the tasks tested for the Expert Field Medical Badge and Expert Infantry Badge. Innovative training aids such as the hemorrhage simulators and interactive patient manikins should be evaluated as adjuncts to improve training across the Armed Forces.

Combat Lifesavers (CLS): The panel agreed that additional training in hemorrhage control techniques, including tourniquet use is warranted. Training should be extensive enough for the CLS to be able to evaluate the need for a tourniquet, or the suitability of a wound for another form of (less damaging) hemorrhage control. The panel believed this additional training could occur within the current time constraints of CLS training if the training time for establishing intravenous access was reduced or eliminated. Current tactical combat casualty care guidelines question the utility of early intravenous fluid therapy in the field. Rapid control and arrest of life-threatening hemorrhage is more beneficial and takes less time and skill than establishing intravenous access and giving fluids for resuscitation. Further, it is unlikely that the small amount of intravenous fluids available to the CLS are of much benefit and may even be detrimental to the casualty with significant hemorrhage.

Medics: In addition to knowing how to apply tourniquets, medics should be taught under what circumstances tourniquets should and can be removed. Simple guidelines should be taught, taking into account evacuation time, the tactical situation, and the presence or absence of shock. The recommendations made by this panel would allow medics to judge when to remove unnecessary tourniquets to prevent further injury, while safely managing those casualties who need them.

Testing and down-selection of Battlefield Tourniquet Systems

The panel advocated that a systematic testing process be developed and adopted by which any and all potential battlefield tourniquet systems are tested

prior to their inclusion in the inventory. This process is critical in order to avoid fielding an ineffective battlefield tourniquet, as occurred in the case of the OHT. The process developed by the panel is similar to that of Caulkins et al.[14] While time did not allow the panel to develop the details of the testing process they made and agreed upon several general recommendations. Scores will be assigned to objective measures determined at each phase. Each score will be entered into a matrix, ultimately leading to selection of the final selection.

Phase 1: Adherence to sound principles of tourniquet design

Initial consideration of any tourniquet will be based on established scientific facts and principles of tourniquet engineering, e.g., less than or equal to one inch (2.5 centimeter) in width, no mechanical augmentation, etc. This will allow quick rejection of tourniquets outright without further testing.

Phase 2: Laboratory testing in human volunteers

A. Lower Limb: Once a tourniquet has passed Phase 1, it will be tested on the extremities in human volunteers. Three endpoints will be determined:

- Elimination of Doppler pulse in the posterior tibial artery
- Elimination of palpable peripheral pulse
- Loss of pulse oximeter waveform

Based on a recent study by Wenke et al.,[12] these determinations can be made in less than 30 seconds. Confirmation of complete occlusion must be demonstrated before further consideration.

B. Upper Limb: Candidates that occlude leg blood flow will then be tested on the upper limb. This is to ensure that the device(s) does not possess physical constraints that preclude effective use on small limbs.

Phase 3: Field testing

Tourniquets that meet Phase 2 requirements will be field tested by medics under environmental conditions similar to those encountered on the battlefield. Time did not permit the development of the details for field testing yet. The panel recommended that the details of this phase could be developed by the Army Medical Department Board and should involve Soldiers, Marines, and SOF in various tactically relevant environments.

Phase 4: Safety testing

In Phase 4 the effective circumferential force will be determined in limb surrogates, i.e., the relationship between circumferential force and occlusion pressure. This phase is designed to ensure that the potential for tourniquet injury is factored into the selection matrix, i.e., the lower the effective circumferential force, the better the score.

Phase 5: "Practical Consideration"

All tourniquets that reach requirements to this point will be judged on such additional considerations such as size, weight, shelf-life, ruggedness, ease of application, and cost.

Panelists

Thomas J. Walters, MS, PhD

Dr. Thomas Walters, currently at the United States Army Institute of Surgical Research (USAISR) as a member of the Combat Casualty Care Research Program, is a research scientist with a background in muscle physiology. Dr. Walters received his MS in exercise physiology and Ph.D. in muscle physiology from the University of Texas at Austin. From 1990 to 2000 he performed research at Brooks Air Force Base, TX in thermal stress and its role on limiting physical performance. His current research focuses on issues related to extremity trauma, including tourniquet-related injury.

CPT Robert Mabry, MC, USA

Captain Robert Mabry, MD, is currently Battalion Surgeon for the 1st Special Forces Group, Ft. Lewis, WA. He is a former Special Forces 18D medic. He received his medical degree from the Uniformed Services University of the Health Sciences at Bethesda, MD, in 1999 and completed his residency at Brooke Army Medical Center as an emergency room physician in 2003.

COL Clifford C. Cloonan, MC, USA

COL Clifford Cloonan, MD, is currently an associate professor and the Interim Chairman of the Department of Military and Emergency Medicine at the Uniformed Services University of the Health Sciences in Bethesda, Maryland. He is a former Special Forces 18D medic. COL Cloonan is a former dean of the Joint Special Operations Medical Training Center and is the Department of Defense representative to the National Registry for Emergency Medicine Technicians.

COL John Holcomb, MC, USA

COL John Holcomb, MD, is currently

Commander, USAISR, and Chief, Trauma Division, Brooke Army Medical Center, San Antonio, TX. He is the trauma advisor to the U.S. Army Surgeon General and for the USSOCOM Biomedical Initiatives Steering Committee. COL Holcomb's numerous medical assignments include staff surgeon at Womack Army Medical Center, Ft Bragg, NC, and the Joint Special Operations Command; Chief of Trauma at WBAMC; Chief of the Military Trauma Research Branch at the USAISR; and Director of the Joint Trauma Training Center at Ben Taub General Hospital, Houston, TX. His research interests include novel methods of hemorrhage control, optimal resuscitation techniques, and medical informatics.

COL (Ret) Robert H. Mosebar, MD, MC, USA

Dr. Robert Mosebar is a medical consultant for the Directorate of Combat and Doctrine Development, U.S. Army Medical Department Center and School, Ft Sam Houston, TX. His military career spans over 50 years and ranges from a combat medical aidman and litter bearer during WWII to numerous medical commands until his retirement in 1996. Dr. Mosebar introduced the concept of the Combat Lifesaver for the battlefield to the Army.

Robert Pedowitz, PhD, MD

Dr. Robert Pedowitz is an associate professor in the Department of Orthopaedics at the University of California, San Diego. He is the Chief of Sports Medicine and the Program Director for the UCSD Orthopaedic Surgery Residency Training Program. Dr. Pedowitz completed medical school and residency at the University of California, San Diego, and completed a sports medicine fellowship at Duke University. He received a PhD from the University of Gothenburg, Sweden, for a thesis titled "Tourniquet-Induced Neuromuscular Injury" and his publications include 16 scientific articles on tourniquet-related injury.

Kevin Inkpen, MASc

Kevin Inkpen received the Bachelor of Engineering degree from Lakehead University in Thunder Bay, Ontario, in 1997 and the Master of Applied Science degree from the University of British Columbia in 1999, both in Mechanical Engineering. He currently works as a development engineer in Vancouver, BC, Canada for Delfi Medical Innovations Inc., which develops and manufactures surgical and specialty tourniquet products.

Albert T. McManus, PhD

Dr. McManus is the Senior Research Scientist at the USAISR. He formerly headed the Hard and Soft Tissue Trauma Research Program at the USAISR. Dr. McManus served on numerous international committees and received three U.S. and international patents.

SFC (Ret) Robert Miller, BSHS

Robert Miller is currently the CEO of Innovative Casualty Response and the Program Director for North American Rescue Products. He serves on the Committee on Tactical Combat Casualty Care and is an editorial consultant for the Journal of Special Operations Medicine. Mr. Miller holds a Bachelor's in Health Sciences degree and recently retired from the Ranger Regiment with 20 years experience as a Special Operations Combat Medic. He was the primary developer of "Ranger First Responder," a war-fighter combat trauma-training course that replaced the U.S. Army's Combat Lifesaver Course in several units within the Special Operations Command.

SFC David Funk

SFC David Funk is a Special Forces 18D medic assigned to United States Special Operations Command. He is a founding member of the 3rd Ranger Battalion. Prior to his current assignment, he spent 10 years assigned to the 7th Special Forces Group. He received his medic training in 1995. SFC Funk is also a dive medical technician and hyperbaric chamber operator.

Acknowledgements

We acknowledge the valuable participation of the following non-panelists:
SFC Dominique Greydanus – USAISR
Joseph Wenke, PhD – USAISR
LCdr Dennis Filips, MD – Canadian Forces
Joseph J. Marak – USASOC
Kathy L. Ryan, PhD - USAISR

The authors thank Ms. Amy Newland for her invaluable help in the preparation of this manuscript.

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Table 1

Major Recommendations

- Replace strap and improvised tourniquets.
  - Remove the current strap and buckle tourniquet* from inventory.
  - Candidates for replacement must undergo a systematic down-selection process prior to consideration for inclusion in the inventory.
- Issue suitable windlass (6-8" x ¾" dowel or plastic tube) to all Soldiers as part of hemorrhage control kit.
- Train and permit medics to loosen or remove tourniquets.
- Train Combat Life Savers to confidently loosen or remove tourniquets.
- Exercise care under fire - use a tourniquet for any severely bleeding extremity wound.
  - Assess the need for tourniquet as soon as the tactical situation allows.
  - Attempt conversion to another means of hemorrhage control.
- Do not remove tourniquet if:
  - casualty is in shock.
  - conversion of casualty cannot be monitored regularly for re-bleeding.
  - tourniquet has been in place for > 6 hours.
- Note time of tourniquet application on casualty's forehead.
- In Soldier training require greater emphasis on tourniquet use and hemorrhage control in general, to include the use of bleeding manikins and sustainment training.
- Issue a tourniquet to all Soldiers and train them to use it.
- Add a pneumatic trauma tourniquet to the inventory and carry in all evacuation vehicles.

* NSN 6515-00-383-0565

Table 2

Care Under Fire Tourniquet Removal Algorithm

- Apply hemostatic or pressure dressing to the wound site.
- Resuscitate if needed.
- If the casualty shows no signs of shock and no active bleeding, THEN loosen tourniquet and inspect wound for re-bleeding.
- Leave loosened tourniquet in place and monitor wound frequently.
- If rebleeding occurs, retighten tourniquet.
- Only a medical officer prepared to control bleeding surgically can remove a retightened tourniquet.
- If frequent monitoring is not possible, continue the use of the tourniquet rather than risk the failure to notice rebleeding.
- NEVER intermittently loosen and retighten a tourniquet.

Table 3

Under what conditions should a tourniquet not be removed?

- Shock - Removal only by a senior medical provider
- Amputation
- Uncontrollable bleeding - Wounds involving arterial injury are too great to be controlled by any means.
- Extended periods of tourniquet application - A tourniquet applied to the leg for six or more hours without successful conversion should not be removed until the casualty reaches the Forward Surgical Team or higher level of definitive surgical care.
- Inability to observe casualty - Do not risk failure to notice re-bleeding; leave tourniquet in place.

Figure 1. Occlusion pressure versus the ratio of tourniquet width to limb circumference.[8] At the ratios encompassing the range of thigh circumferences representative of male Soldiers, it is not possible to obtain complete occlusion with the common one inch (2.5 centimeter) tourniquet. Increasing tourniquet width has a dramatic impact of occlusion pressure. (Reproduced with permission from Lippincott, Williams, and Wilkins)

Fig 1

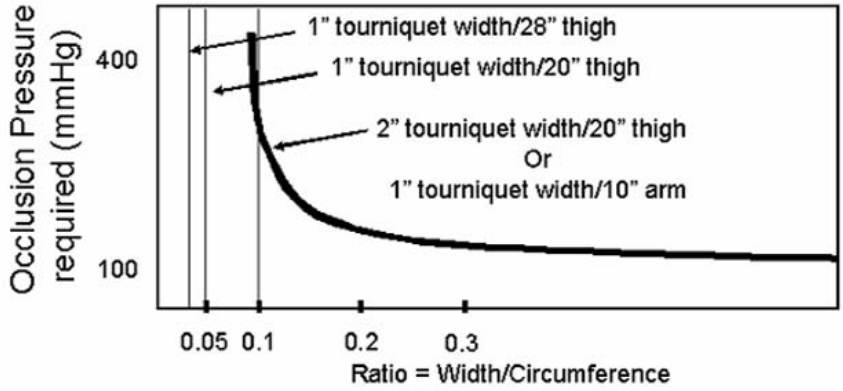

Fig 2

Figure 2. The surgical tubing tourniquet was strongly advocated during WWII.[20] (C and D) A six-foot (183 centimeter) long piece of ½ inch (15 millimeter) diameter latex surgical tubing can provide an effective tourniquet by making at least four parallel turns of the tubing around the leg. Starting two inches (five centimeters) from the injury and working away, (A) overlap the end first and anchor it by the second turn (B) the last turn is anchored by the next to last turn. Insert the end through the loop to guard against accidental release during transport. This tourniquet requires only moderate tension during winding, as too much tension can damage underlying tissues, as well as be very painful.

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Please make sure if you are a physician, PA, or nurse, you send in the Uniformed Services University of the Health Sciences (USUHS) Evaluation Form on pages 63-68 with your puzzle or test. If you are a Corpsmen, Medic, or PJ, please send in the SOCOM Evaluation Form on page 69 with your puzzle.

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CONTINUING MEDICAL EDUCATION TEST

JSOM

Crossword Puzzle for Dengue Fever on page 12

Please be sure to return the completed puzzle as well as the appropriate Continuing Education Evaluation Forms

USUHS designates **Dengue Fever** and **Issues Related to the Use of Tourniquets on the Battlefield *(combined)*** for a maximum of **1.25** category 1 credit toward the American Medical Association Physician's Recognition Award.

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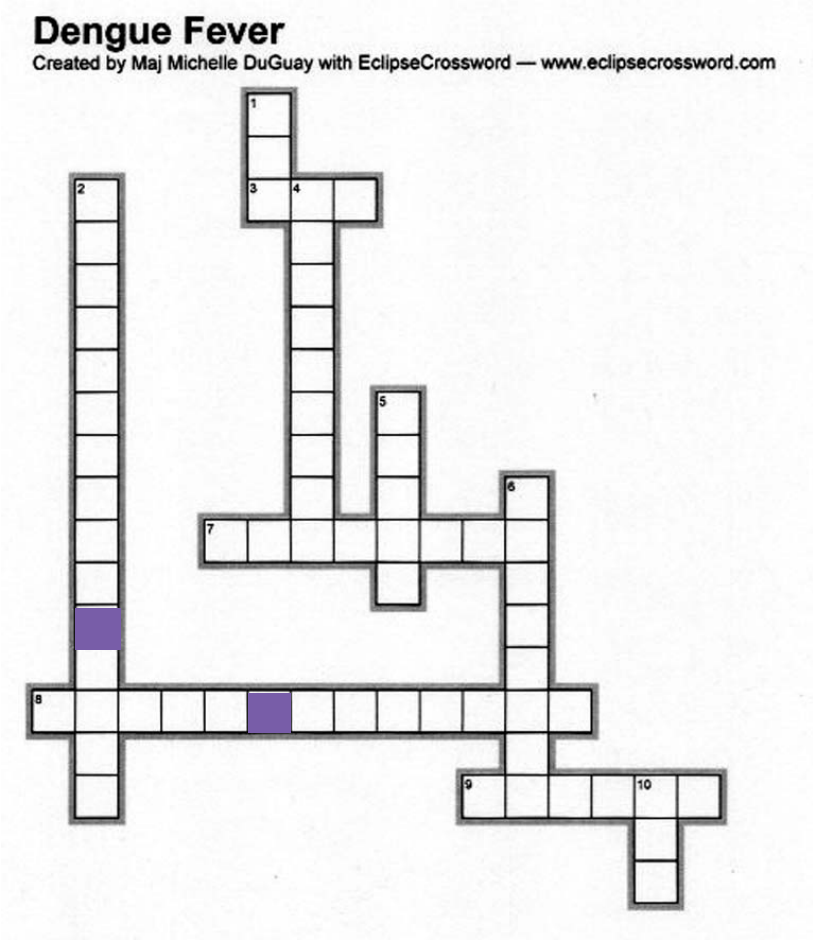

Dengue Fever

Across

3. The most dangerous presentation of dengue fever is_____.

7. You can catch dengue fever from the bite of a _____.

8. The species of insect is _____ _____. (Two words)

9. A patient with DHF or DSS requires IV_____.

Down

1. Pain treatment with Ibuprofen, aspirin, and/or ketoraiac in a patient with DF is a _____ idea.

2. A test to evaluate a patient with dengue fever using your blood pressure cuff is called a _____ _____. (Two words)

4. There are four _____ of the dengue fever virus.

CONTINUING MEDICAL EDUCATION TEST

JSOM

Crossword Puzzle for Guide to Prevention of Infectious Diseases during Military Deployments on page 17

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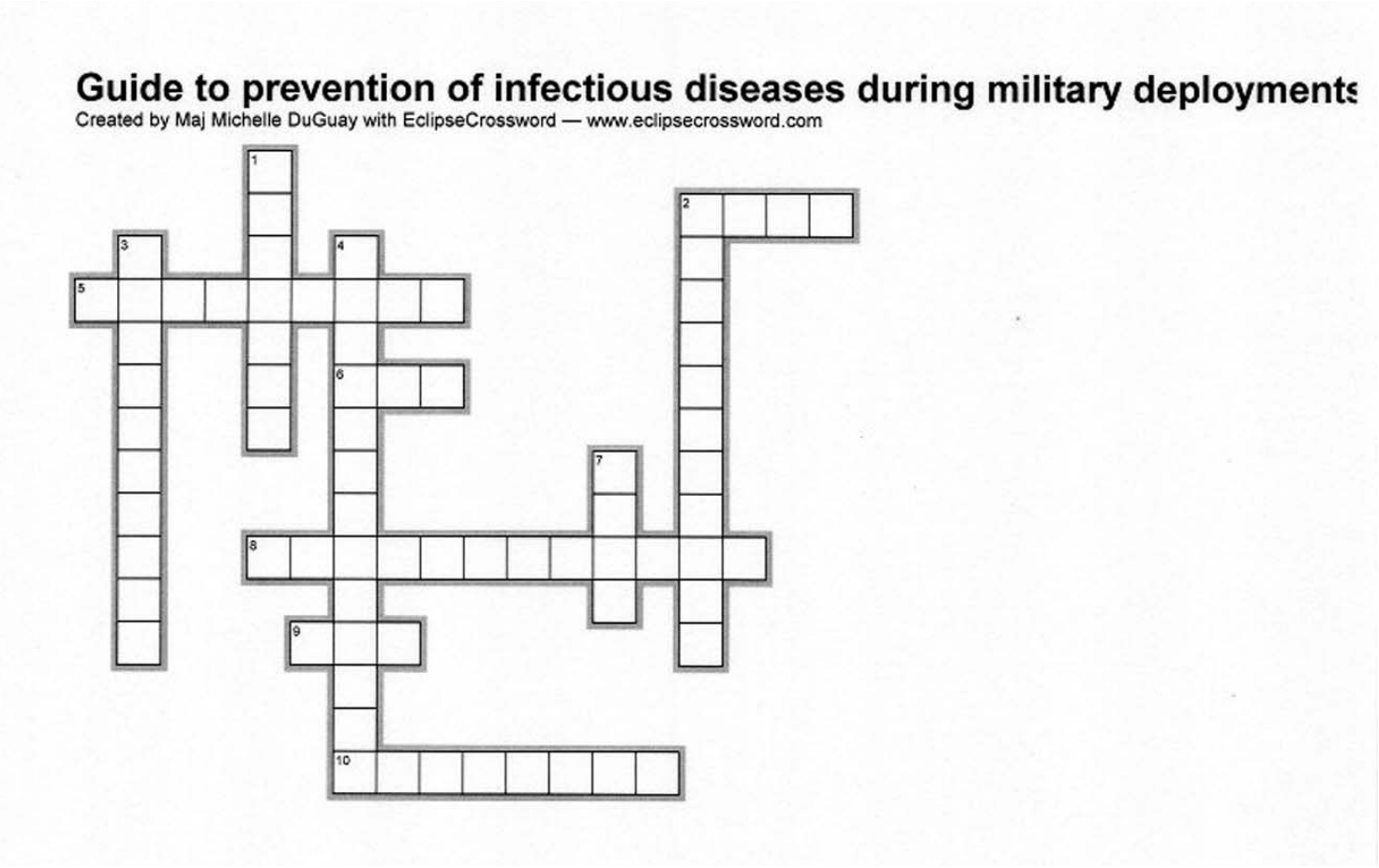

Guide to prevention of infectious diseases during military deployments

Across

2. The three components of personal protective measures in prevention of vector borne diseases are _____, permethrin treated uniforms, and proper wear of the uniform.

5. Bismuth subsalicylate is 40-65% effective in preventing _____ diarrhea.

6. The interval between yellow fever immunizations is every _____ years.

8. What antimicrobial agent is used to treat travelers' diarrhea due to fluoroquinolone resistant campylobacter while deployed to Southeast Asia.

10. _____is an airborne infection which is similar ti tuberculosis in that it is spread by small 1-5 micron particles.

Down

1. Typhoid vaccines are approximately _____% effective in preventing disease.

2. What chemoprophylaxis is used to prevent the development of leptospirosis after high-risk water exposure?

3. What antimicrobial agent is used to clear the liver of the hypnozoite stage of *Plasmodium vivax* and *Plasmodium ovale*?

4. Doxycycline is an antimicrobial agent that is effective in preventing infections with _____.

7. The incubation period for gonorrhea is 3-10 _____.

CONTINUING MEDICAL EDUCATION TEST

JSOM

The Ten Commandments of Nutrition: 2005
on page 34

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Corpsmen, Medics, and PJs: The education activity **The Ten Commandments of Nutrition** and **Guide to Prevention of Infectious Disease During Military Deployment *(combined)***, for **1.7** contact hours, are provided by the USSOCOM.

1. Dietary supplement advertisements are very reliable.

   True/False

2. What information is contained on food product labels?

   A. Energy content

   B. Nutrient type

   C. Vitamin content

   D. All of the above

3. The best way to ensure that your vitamin intake is adequate is:

   A. Eat 6 bananas every day

   B. Take 2000mg of vitamin C daily

   C. Take a "one-a-day" type vitamin

   D. None of the above

4. The maximum recommended protein intake is

   A. 0.8 grams of protein per pound of body weight per day

   B. 1.6 grams of protein per pound of body weight per day

   C. 2.4 grams of protein per pound of body weight per day

   D. 3.2 grams of protein per pound of body weight per day

5. Fat calories should be no more than ___ of total calories.

   A. 10%

   B. 20%

   C. 30%

   D. 75%

6. During periods of prolonged, intense exercise, replace sweat losses by drinking _____ of a carbohydrate/electrolyte fluid every hour.

   A. 0.5 liters

   B. 1-2 liters

   C. 3-4 liters

   D. None of the above

7. A carbohydrate/protein "recovery snack" should be consumed within _____ after prolonged, intense aerobic, or resistance training.

   A. 60 seconds

   B. 60 minutes

   C. 8 hours

8. Which of the following is not an important food item that should be consumed every day?

   A. Fresh fruits

   B. Fresh vegetables

   C. M&Ms

   D. High-fiber food products

9. Short-term weight reduction diets are generally useless and occasionally dangerous. Long-term changes in eating and exercise habits are the only way to achieve lasting weight modifications.

   True/False

10. The most common nutrition problem in this country:

   A. Too much nutrition

   B. Sushi

   C. Flavored popcorn

   D. None of the above

CONTINUING MEDICAL EDUCATION TEST

JSOM

Crossword Puzzle Issues Related to the Use of Tourniquets on the Battlefield
on page 43

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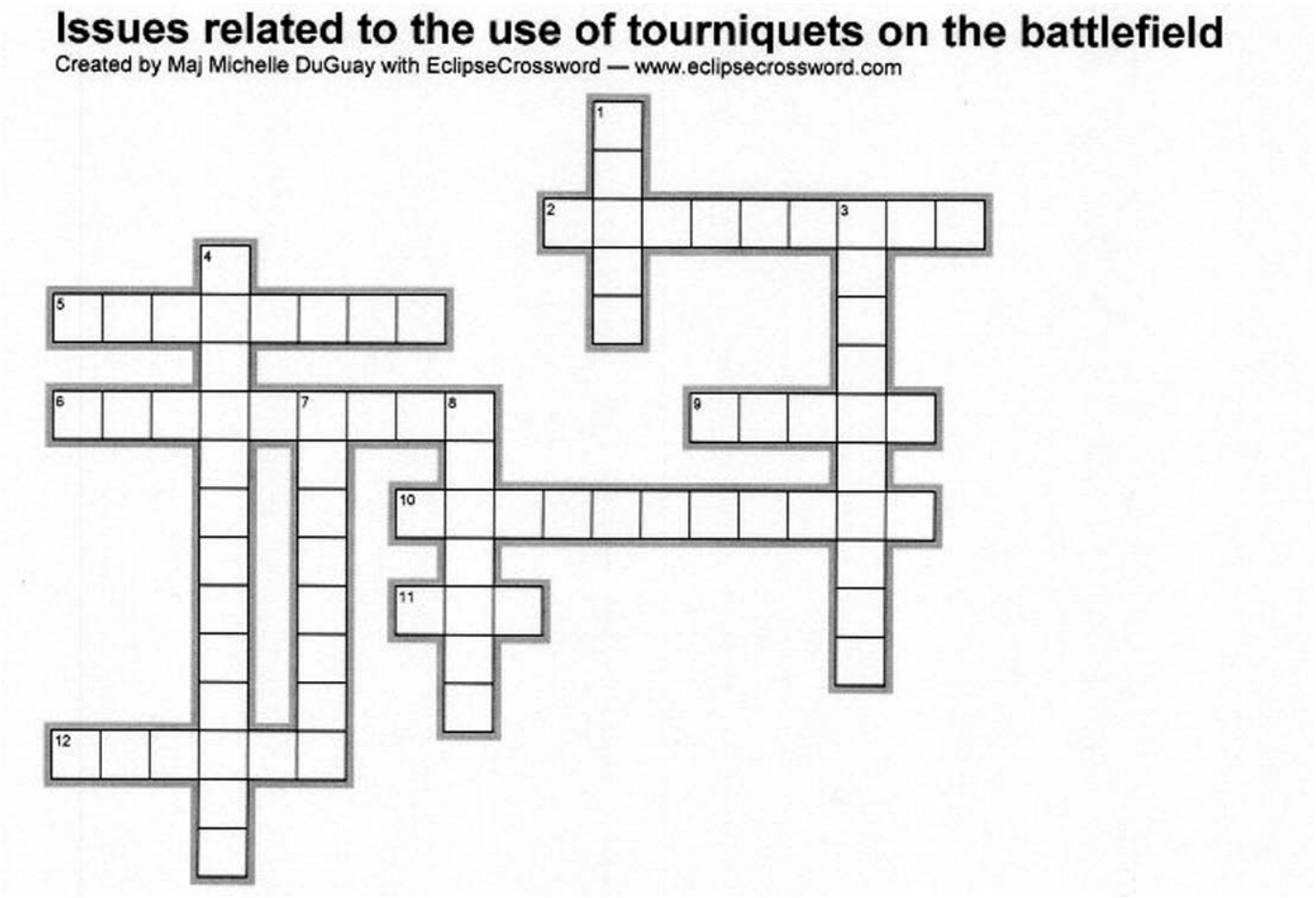

Issues Related to the Use of Tourniquets on the Battlefield

Across

2. Oozing will occur with a sufficiently tightened tourniquet because of _____ blood flow.

5. Note time of tourniquet application on casualty's _____.

6. _____ tourniquets use inflation pressure.

9. As _____ increases the requisite pressure to occlude blood flow decreases.

10. Hemorrhage controltechniques and the use of _____ already are common tasks taught to all Soldiers upon initial entry training.

11. A tourniquet should not be removed if it has been in place for ____or more hours.

12. One of the two endpoints when testing tourniquets was the elimination of pulse in the posterior _____ artery as determined by Doppler auscultation.

Down

1. Strap tourniquets produce higher _____ stresses at the tourniquet edge than the pneu matic tourniquet, which can lead to nerve damage.

3. Conditions where a tourniquet should not be removed include shock, _____,and uncontrollable bleeding.

4. If _____ is required, it should be done prior to tourniquet removal.

7. An adequate tourniquet must be able to stop _____ bleeding.

8. Muscle injury can be profoundly reduced by _____ ischemic muscle, as little as 2° C to 3°C.

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POST-TEST – See Puzzle located on page 54
Article 1 Dengue Fever page 12

POST-TEST – See Puzzle located on page 60
Article 2 Issues Related to the Use of Tourniquets on the Battlefield page 43
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Articles
1. *Dengue Fever page 12*
2. *Issues Related to the Use of Tourniquets on the Battlefield page 43*

	3- Agree 1- Disagree	
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POST-TEST – See Puzzle located on page 56
Article 3. Guide to Prevention of Infectious Diseases during Military Deployments page 17

POST-TEST – Answer Sheet--See test located on page 58
Article 4. The Ten Commandments of Nutrition: 2005 page 34
Please circle the letter that corresponds to the correct answer:

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

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USUHS Continuing Education Evaluation Form
Journal of Special Operations Medicine
Volume 5, Edition 4 / Fall 05
Date of Original Release 1 Dec 05

Articles

3. *Guide to Prevention of Infectious Diseases during Military Deployments page 17*
4. *The Ten Commandments of Nutrition: 2005 page 34*

	3- Agree 1- Disagree	
	Article 3	**Article 4**
Educational Value:	3 2 1	3 2 1
I learned something new that is important.	_ _ _	_ _ _
I verified some important information.	_ _ _	_ _ _
I plan to discuss this information with colleagues.	_ _ _	_ _ _
I plan to seek more information on this topic.	_ _ _	_ _ _
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.	_ _ _	_ _ _
Were the educational objectives of the article(s) met?	YES___NO___	YES___NO___

If no, please explain:_____

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

Comments:

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How long did it take to complete **Articles 3** ____ minutes **Articles 4** ____ minutes

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

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Journal of Special Operations Medicine
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POST-TEST – See Puzzle located on page 54
Article 1 Dengue Fever page 12

POST-TEST – See Puzzle located on page 60
Article 2 Issues Related to the Use of Tourniquets on the Battlefield page 43
Please return with completed crossword puzzles.

POST-TEST – See Puzzle located on page 56
Article 3. Guide to Prevention of Infectious Diseases during Military Deployments page 17

POST-TEST – Answer Sheet--See test located on page 58
Article 4. The Ten Commandments of Nutrition: 2005 page 34
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8. a. b. c. d.
9. True False
10. a. b. c. d.

	3- Agree 1- Disagree	
Educational Value:	3 2 1	3 2 1
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Abstracts from Current Literature

Cadaver Testing to Validate Design Criteria of an Adult Intraosseous Infusion System

RN Susak, Lark FRCPC; MD Macnab, J. Andrew MASc*; PEng, Findlay, Judy PhD*; Johnson, L.

Mil Med. 2005 Mar;170(3):251-7.

Introduction: The FAST 1 intraosseous (IO) infusion system was designed to deliver fluids and medications into the adult sternum in the prehospital and battlefield environments. **Objective:** To test the prototype in 106 cadavers and excised sterna and compare it with other IO devices. **Results:** The insertion force was similar to that of other IO devices (mean, 8.5 kg; range, 2.3-19.6 kg). In 39 of 39 trials, the depth-control mechanism inserted the portal within 1.0 mm of a predetermined distance below the anterior surface of the cortical bone. If misplaced, under-penetration was more likely than over-penetration (mean displacement, -0.3 mm; SD, 0.5 mm). After release, the portal could not be advanced further into the manubrium. Marrow was accessed in 75 of 77 trials. Mean flow rates were 109 mL/min for normal saline solution and 102 mL/min for hypertonic saline/dextran, similar to the Cook Sur-Fast device. **Conclusion:** The cadaver and bench tests demonstrated the reliability and safety of the FAST 1 system at the design/prototype stage.

Simple Aspiration as Initial Treatment for Primary Spontaneous Pneumothorax: Results of 91 Consecutive Cases

Stewart S.W. Chan MBBS*, FRCSEd, FHKAM and Peggo K.W. Lam MPhil†
*Accident & Emergency Medicine Academic Unit, Prince of Wales Hospital, The Chinese University of Hong Kong, Hong Kong, China
†Centre for Clinical Trials and Epidemiological Research, School of Public Health, Faculty of Medicine, The Chinese University of Hong Kong, Hong Kong, China

Received 19 November 2003; accepted 16 September 2004. Available online 8 February 2005.

Abstract

Varying opinions exist regarding the choice of initial treatment for primary spontaneous pneumothorax (PSP). This study aims to determine the success rate of simple aspiration of PSP, identify factors associated with failure, and identify associated complications. A retrospective analysis was performed on 91 consecutive patients receiving simple aspiration for PSP at the Emergency Department of a university teaching hospital in Hong Kong, China. The overall success rate was 50.5%. Failed cases had significantly larger sizes of pneumothorax, and significantly larger volumes of air aspirated. Pneumothorax size ≥ 40% was significantly associated with failure. In a multivariate analysis, pneumothorax size ≥ 40%, compared to size 21–39%, independently predicted failure, with an odds ratio of 8.88 (95% CI, 2.49 to 31.63). Complications were rarely encountered. It is concluded that the success rate may be significantly improved by excluding patients with pneumothorax size 40% or larger from this modality of treatment.

Blunt Cardiac Trauma Caused by Fatal Falls From Height: An Autopsy-Based Assessment of the Injury Pattern.

Turk, E. MD; Tsokos, M. MD

Journal of Trauma-Injury Infection & Critical Care. 57(2):301-304, August 2004.

Abstract

Background: Falls from height are contributing widely to population morbidity and mortality, especially in urban settings. The presence of blunt cardiac injuries can increase morbidity among these patients, leading even to death. Some clinical studies and case reports have been published on the subject, but a systematic autopsy-based approach to the subject is missing in the literature of recent decades. **Methods:** This study reviewed 61 cases of fatal fallS from height that were subjected to a full autopsy at the Institute of Legal Medicine, Hamburg, Germany, from 1998 to 2002. The autopsy protocols and available clinical information were evaluated for assessment of the cardiac injury pattern. **Results:** Cardiac injuries were found in 33 cases (54%), all of which involved falls from heights exceeding 6 m. In 16 cases, the cardiac injuries were the cause of death or contributed to the fatal outcome. In five of these cases, the individuals possibly could have recovered from their trauma if their heart injury had been sufficiently diagnosed and adequately treated in time. The most frequent finding was pericardial tearing (45%). Tears caused by stretching of the epicardium in the area wherein the inferior vena cava leads into the right atrium and epicardial hematoma were present in 11 cases (33%). Endocardial tears of the atria were found in six cases (18%), and did not occur during falls from heights lower than 11 m. Transmural tears to the right atrium were present in 10 cases (39%), and to the left atrium in 6 cases (18%). These tears occurred with increasing frequency in relation to greater heights. When the heights were lower than 15 m, these tears were smaller than 1 cm in diameter, but when the heights exceeded 15 m, extensive irregular tears were observed. Sternal fractures were seen in 76% of all cases involving heart injuries. In 16% of these cases, the fractures were multiple. Only 18% of the cases without cardiac injuries had sternal fractures, and none of these was multiple. Thus, the presence of severe sternal fractures can be used as an indicator of possible cardiac trauma. **Conclusions:** A thorough cardiologic diagnosis should always be performed for patients who survive a fall from height. These patients should be transported to a unit capable of performing cardiopulmonary bypass, and explorative thoracotomy should be considered.

J Trauma. 2004;57:301-304

Caffeine Maintains Vigilance and Improves Run Times During Night Operations for Special Forces

McLellan, Tom M.; Kamimori, Gary H.; Voss, David M.; Bell, Douglas G.; Cole, Karl G.; Johnson, Dagny

Source: Aviation, Space, and Environmental Medicine, Volume 76, Number 7, July 2005, pp. 647-654(8)

Publisher: Aerospace Medical Association

Abstract

Purpose: This study examined the effects of caffeine (CAF) on vigilance, marksmanship, and run performance during 27 h of sustained wakefulness in Special Forces personnel. **Methods:** There were 31 Soldiers (29.8 ± 5.4 yr, 86.4 ± 8.6 kg) who were divided into placebo (PLAC, n = 15) and CAF (n = 16) groups. A 6.3-km control run was completed on the morning of Day 1. In the evening of Day 2, Soldiers performed a control observation and reconnaissance vigilance task (ORVT) in the field. This 90-min task was repeated twice more between 02:00 and 06:00 on Day 3 during an overnight period of sleep deprivation. Marksmanship was assessed before and after the ORVT. PLAC or 200 mg of CAF gum was administered at 01:45, 03:45, and approximately 06:30 on Day 3. A final 6.3-km run commenced within 30 min of receiving the final dose. **Results:** ORVT was maintained in CAF at control levels of 77 ± 13% during the overnight testing. However, values decreased significantly for PLAC from 77 ± 15% to 54 ± 29% and 51 ± 31% during the first and second overnight testing periods, respectively. CAF had no effect on marksmanship but improved 6.3-km run times by 1.2 ± 1.8 min. Run times slowed for PLAC by 0.9 ± 0.8 min from approximately 35 min during the control run; the changes in performance were significant between groups. **Conclusions:** It was concluded that CAF maintained vigilance and improved running performance during an overnight field operation for Special Forces personnel.

Aerobic Exercise 2 Hours Before a Dive to 30 msw Decreases Bubble Formation After Decompression

Authors: Blatteau, Jean-Éric; Gempp, Emmanuel; Galland, François-Michel; Pontier, Jean-Michel; Sainty, Jean-Marie; Robinet, Claude

Source: Aviation, Space, and Environmental Medicine, Volume 76, Number 7, July 2005, pp. 666-669(4)
Publisher: Aerospace Medical Association

Abstract

Background: A single bout of aerobic exercise 24 h before a dive significantly reduces the formation of circulating venous gas emboli (VGE) on decompression. The purpose of this investigation was to determine the effect of aerobic exercise 2 h before a dive. **Methods:** There were 16 trained military divers who were compressed to 30 msw (400 kPa) for 30 min breathing air in a dry hyperbaric chamber at rest, then decompressed at a rate of 10 m • min-1 with a 9-min stop at 3 msw. Each diver performed two dives 3 d apart, one with and one without exercise that consisted of running for 45 min at 60–80% of maximum heart rate (estimated as 220 - age). VGE were graded according to the Spencer scale using a pulsed Doppler detector on the precordium at 30 min (T30) and 60 min (T60) after surfacing. **Results:** Mean bubble grades at T60 were 1.25 for control dives and 0.44 for dives preceded by exercise, the difference being highly significant. None of the divers showed an increase in venous bubble grade after exercise. **Conclusion:** Like exercise 24 h ahead, 45 min of running 2 h before a dive decreases bubble formation after diving, suggesting a protective effect of aerobic exercise against DCS. The threshold of exercise intensity and duration necessary to change venous circulating bubbles is unknown. Mechanisms underlying the protective effect of exercise remain unclear. Rather than altering the nitrogen elimination rate, exercise may affect the population of gaseous nuclei from which bubbles form.

There I Was

The Anatomy and Pictorial View of a VETRETE

Michael E. McCown, DVM

Abstract

During two deployments to South America in 2004 and 2005, the 7th SFG(A) veterinarian, ODA team medics, 96th CAB, and partner nation personnel conducted three Veterinary Readiness Training Exercises (VETRETEs). These VETRETEs were conducted near military posts located in remote areas of the country. This informational article describes the purpose, execution, results, and future impact of these three VETRETEs, and of VETRETEs in general.

Introduction

The 7th Special Forces Group (Airborne) is committed to work with and to provide assets to the 96th Civil Affairs Battalion (CAB) and partner nation personnel in order to conduct humanitarian and civil assistance (HCA) missions. Two examples of HCA missions are Veterinary Readiness Training Exercises (VETRETEs) and Medical Readiness Training Exercises (MEDRETEs). Both MEDRETEs and VETRETEs are short-term exercises designed to practice medical and veterinary skills by providing these services to underserved partner nation civilians and their livestock and domestic animals.

DoD Directive 2205.3[1] describes the implementing procedures for the HCA program. This directive specifically defines the purpose, funding sources, and budget use for HCA projects like VETRETEs. The policy states, "HCA activities shall promote the foreign policy and national security interests of the United States and the specific operational readiness skills of the U.S. Armed Forces who participate in the activities."[2] The HCA mission's primary focus or purpose as per this directive and DoD Directive 2205.2, "Humanitarian and Civic Assistance (HCA) Provided in Conjunction with Military Operations,"[3] must be to train U.S. forces, participate in readiness exercises, or support military operations.

VETRETEs usually begin with a partner nation request. The 96th CAB personnel then start to plan, coordinate, and develop a supply/medication purchase order. The initial coordination and planning occurs between 96th CAB and SF personnel on the ground with partner nation personnel. The 7th SFG(A) then deploys the group veterinarian and plans to utilize Operational Detachment A (ODA) team medics already in country as force multipliers.

Mission Execution

Mission: The 7th SFG(A) Veterinarian deployed to South America in the spring of 2004 and 2005 to assist 96th CAB and 7th SFG(A) personnel to conduct three VETRETEs in order to increase the effectiveness of the VETRETEs with the underlying goal of increasing the credibility of the military, police, and civilian governmental organizations with the local population while providing critical training opportunities for U.S. Armed Forces and partner nation personnel.

The first VETRETE took place in the spring of 2004 and lasted four days. Outstanding prior planning and coordination by the 96th CAB liaison and partner nation personnel made for a successful exer-

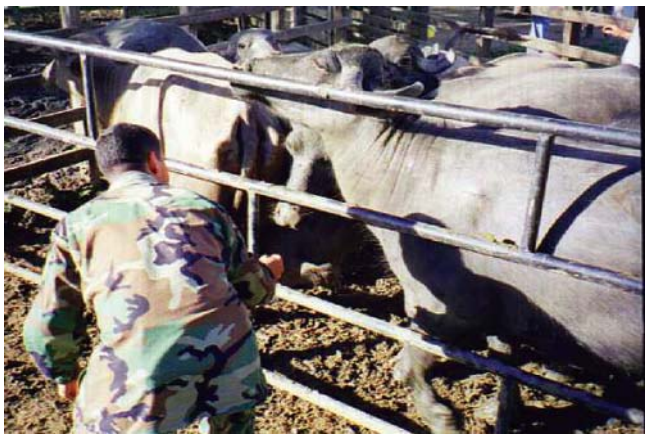
A small hand-built housing structure commonly encountered on a local farm during the mobile VETETE to the smaller farms in the host nation.

cise. The host nation's military provided Soldier support for security factors, and the local Ministry of Agriculture provided two veterinarians and six veterinary technicians. Coordination with local farmers ensured their livestock and animals were ready for a veterinary team on a specific day during the four-day event. This VETRETE, therefore, had "mobile" veterinary teams ready to travel to each farm and perform specific veterinary needs for that farm. The smaller farms consisted of 10-15 head of cattle while the larger farms maintained well over 100 head. The larger farms had chutes to confine the cattle in order to be treated, making our job much easier. At the smaller farms, the team had to rope the cattle. Once roped, the team secured the cattle to trees or posts. The teams subcutaneously (SQ) vaccinated cattle for rabies and foot and mouth disease, dewormed them with Ivermectin SQ, and gave them an intramuscular (IM) injection of vitamin B complex. To prevent fly infestations, the teams applied ear tags with insect repellent. The teams vaccinated pigs and dogs for swine fever and dewormed with Ivermectin SQ. While the teams vaccinated horses for rabies SQ, they dewormed horses with oral Ivermectin paste. To treat chickens for coccidiosis, the team gave farmers the anticoccidial medication, Amprolium, to add to the water. Illustrating the versatility of SOF 18Ds, one of them rode a buffalo after repeated attempts by partner nation personnel failed (see photo). Overall, the teams treated 1,572 animals during the first VETRETE.

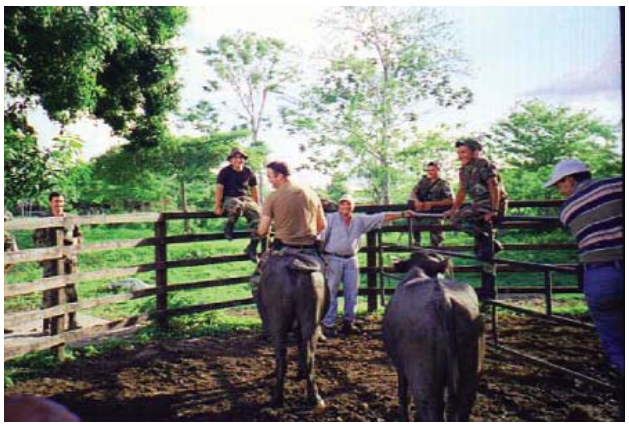
Another of the host nation's small hand-built housing structures commonly encountered on local farms during the mobile VETETE.

Local host nation veterinarian and soldiers assist as group vet vaccinates and deworms a small pig.

Instead of utilizing mobile teams to travel to various remote farms, the second VETRETE occurred at agricultural fairground in a larger but more remote South American farming town in the spring of 2005 to which the local populace brought their animals. The site was large and had adequately spaced livestock holding pens. As before, the host nation's military provided Soldier support from the nearby military post. Five local veterinarians and local middle school stu-



Group veterinarian administering vaccinations to cattle in chutes.



18D riding buffalo as host nation soldiers and local veterinary personnel look on.

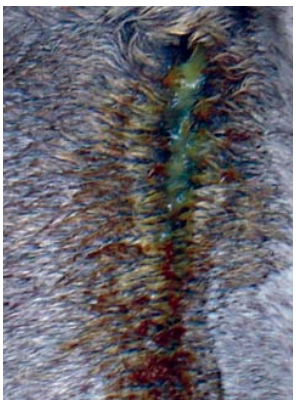
Local students and soldiers prepare for VETRETE at local agricultural fairground site.

dents volunteered their time to assist with this event. After conducting a site survey of the animals present and with more due to come, the personnel immediately formed three teams: one to care for horses, one for cattle and other livestock, and one for small animals. The teams treated the livestock and animals with the same vaccinations and medications as in the first VETRETE. The 96th CAB liaison moved around to the different teams to ensure they had adequate supplies, while the author became part of the three-person veterinary team caring for cattle and other livestock. Two highlights of this VETRETE were the field-expedient surgery by a local veterinarian to remove a tumor from a large bull and the author's surgical exploration and ultimate removal of a half-dollar-sized, calcified mass from a chronic weeping lesion in the side of a horse. The

Field surgical procedure to remove a tumor from a bull during the VETRETE.

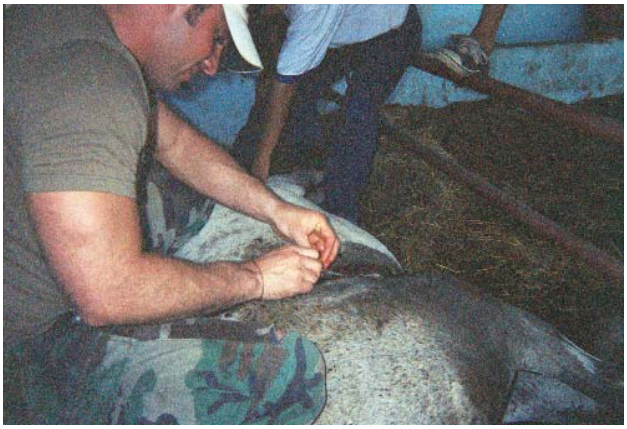
lesion presented over one year ago and had remained unhealed. Local veterinarians and farmers had tried oral and topical antibiotics with no significant improvement. The lesion oozed a green/yellow discharge and had a slight odor. After initial assessment, the presumptive diagnosis of a retained foreign body inciting a chronic, non-healing lesion was made. So, the two-year-old horse was anesthetized for surgical exploration of the lesion. Eventually the hard mass was discovered

Group veterinarian assessing wound on flank of horse as horse begins to assess the group vet



Close-up of horse's non-healing, leaking wound.

six to eight inches deep into the horse's flank musculature and was removed. The deep, open lesion was vigorously flushed with dilute betadine solution. The lesion was kept open and allowed to heal by second intention. The horse was doing fine and the lesion had begun to close at one week post-op. The foreign body was believed to be a stick or piece of wooden fencing



CPT McCown performing a field surgical removal of a foreign body embedded deep into horse's flank.

broken off and into the side of the young horse one year ago. The horse's body then began the process of "walling-off" the foreign body forming the calcified mass. The horse's body was unable to close the lesion due to the size of the calcified mass. Only the mass' removal would allow for closure and resolution of the open lesion. Overall, the teams treated 1,517 animals. To conclude the VETRETE, the local partner nation's townspeople and military treated the teams to a cook-out feast of a freshly slaughtered cow, drinks, and

dancing to a live band.

The third VETRETE occurred a week later in a poor, riverside area of the partner nation. This event once again employed a mobile veterinary team to visit farms along the river. This VETRETE focused on farms and people with less than ten head of cattle or small numbers of livestock. The team again treated the livestock and animals with the same vaccinations and medications as in the first VETRETE. While this event benefited only 327 animals, the team served less fortunate farmers who would benefit more from veterinary assistance.

Spring 2004 VETRETE

Farms	Cattle	Horses	Pigs	Chickens	Dogs	Buffalo
49	1173	60	162	122	34	21

Spring 2005 VETRETE #1
(Agricultural Fairground Site)

Farms	Cattle	Horses	Pigs	Chickens	Dogs	Cats
1	85	178	5	10	920	325

Note: Four field-expedient surgeries conducted onsite

Spring 2005 VETRETE #2

Farms	Cattle	Horses	Pigs	Chickens	Dogs	Cats
60	210	14	10	20	11	2

Results

Discussion

These three VETRETEs, that occurred with no injuries to participating personnel, effectively accomplished the mission and achieved the underlying goals of training U.S. military personnel while supporting the partner nation's efforts to increase the credibility of the military, police, and civilian governmental organizations with the local population. The team increased the VETRETEs' effectiveness through the integration of partner nation personnel, the Group veterinarian, and ODA team medics to act as force multipliers. Additionally, these VETRETEs provided invaluable training to U.S. Armed Forces and partner nation personnel. While increasing the credibility of the military, police, and civilian governmental organizations with the local population is a hard goal to measure, the 96th CAB personnel continually gain insight into this through interactions with partner nation personnel and the local population. These relations and credibility should improve over time as HCA missions like VETRETEs and MEDRETEs are utilized to demonstrate how the partner nation government performs civic actions to improve the overall quality of life of its citizens.

Conclusion

The impact of HCA missions on the local population is immense if they are planned and performed correctly, efficiently, and with the underlying goal of increasing the partner nation government's legitimacy in mind. With this said, 7th SFG(A) remains committed to its work with 96th CAB and the partner nation by providing its available assets such as personnel, supplies, and operational assistance to ensure the future accomplishment of HCA missions and goals in the South American area of operations.

References

1. DoD Directive 2205.3, Implementing Procedures for the Humanitarian and Civil Assistance (HCA) Program, January 27, 1995
2. DoD Directive 2205.2, Humanitarian and Civil Assistance (HCA) Provided n Conjunction with Military Operations, October 6, 1994
3. DoD Directive 2205.3, Implementing Procedures for the Humanitarian and Civil Assistance (HCA) Program, January 27, 1995: 1

The author gives special thanks to all of the 7th SFG(A) medics and personnel, 96th CAB personnel, and partner nation personnel that participated in these VETRETEs.

CPT McCown is a graduate of the University of Florida College of Veterinary Medicine. He enlisted in the U.S. Army in 1993 and obtained a commission in 2001. He is currently assigned as the Group Veterinary Surgeon, 7th SFG(A), Fort Bragg, NC. CPT McCown is also the 7th SFG(A) Group Med Training Officer-in-Charge (OIC) responsible for the group medical training, with 18D sustainment training as its primary focus. He was the Combined Joint Special Operations Task Force (CJSOTF) Veterinary Surgeon while deployed to Afghanistan in support of Operation Enduring Freedom (OEF).

Current Events

USSOCOM Care Coalition takes care of the SOF warrior for life

"Our SOF warriors have seen first hand, the enormous price of freedom … it is essential to protect our heroes and their families."

Gen. Doug Brown, USSOCOM Commander

Julie Scott, MA
USSOCOM Family Care Coalition

On August 1, the U.S. Special Operations Command started a new program to help Special Operations Forces and their families during some of the most critical times of their lives.

The USSOCOM Care Coalition's mission is to provide needed support to SOF warriors and their families who have led the fight on the Global War on Terror by establishing the model care program in DoD. Its focus is to coordinate with the Department of Defense and other government agencies to ensure services our SOF families are entitled are provided. Additionally, when timely support from government programs is unavailable, the USSOCOM Care Coalition will seek support from civilian agencies to create a standardized level of care for all SOF.

To achieve this mission, the Care Coalition is focused on three areas:

1. Families: To unite USSOCOM's family support/family readiness programs from U.S. Army Special Operations Command, Air Force Special Operations Command, Naval Special Warfare Command, and Joint Special Operations Command. Fortunately, USSOCOM components already have outstanding family programs in place to address local needs at the unit level. In terms of family readiness, the Care Coalition is here to lend our support to component's family readiness/support organizations in addressing issues that are common or unique to SOF, ensuring continuity of care regardless of location.

2. Casualties: To contact every USSOCOM Global War On Terrorism, Operation Enduring Freedom or Iraqi Freedom, casualty (regardless of severity) and family – active, Guard, Reserve, separated, or retired – and let them know that we are here to provide advocacy and support to them for life. When a road block is met and personal efforts have been exhausted, the USSOCOM Care Coalition will be there to engage and take action on the immediate issue, then examine the issue from a policy perspective and administratively work to correct the gap in support.

3. Non-Government (NGO) Support: To establish a relationship with civilian organizations that can provide the means for meeting our SOF fam-

GEN Doug Brown, commander, U.S. Special Operations Command, presents a Purple Heart to SPEC Matt Drake, 9th Psychological Operations Battalion, during an award ceremony April 18 at the James Haley Veterans Affairs Hospital in Tampa. Drake received injuries in Iraq from an improvised explosive device Oct 2004. (Photo by Tech. Sgt. Jim Moser)

Staff Sergeant. David Glenn, 3rd Special Forces Group medic, completes upper body stretches with the help of Bunnie Wyckoff, Walter Reed Medical Center physical therapist. The U.S. Special Operations Command Care Coalition was formed to establish a model care system for Soldiers, Sailors and Airmen and their families. (Photo by Capt Joseph Coslett)

ily needs when government assistance is not available. In this role, the USSOCOM Care Coalition will serve as a conduit between the SOF warrior and the reputable, responsive, trustworthy civilian organization committed to supporting SOF. We'll always maintain the security of personal information by obtaining permission from the SOF warrior before contacting an NGO.

SOF Truth #3: "Humans are more important than hardware"

"Our greatest challenge today is contacting the casualties and their families. For the SOF warrior and their family we'll provide advocacy and support not only today, but through transition, and separation or retirement," said Mr. Jim Lorraine, the Director of the USSOCOM Care Coalition.

"Our greatest challenge today is contacting the casualties and their families. For the SOF warrior and their family we'll provide advocacy and support not only today, but through transition, and separation or retirement."

Mr. Jim Lorraine, USSOCOM Care Coalition

An integral aspect of the program are the USASOC liaison non-commissioned officers at Walter Reed Army Medical Center. Not only do they provide an excellent example of getting the word out, they are the model to emulate in taking care of our SOF casualties. Master Sergeant Dan Thompson and Sergeant 1st Class Marty Thompson, both 20th Special Forces Group Soldiers, have expertly seen to the needs of hundreds of SOF wounded warriors as they transition through Walter Reed. They not only advocate for care, assist with medical appointments, and help navigate the board processes, but they also seek lodging and child care resources for family members assisting in their loved one's rehabilitation.

"These guys have their finger on the pulse of SOF servicemember and family issues," Lorraine said. "They are the most valuable asset we have out there providing support to these troops who have given so much."

The program is new and opportunities for future expansion have been identified. On hand to launch the Care Coalition efforts are: Major Julie Scott, USSOCOM's Family Readiness Officer who supports USSOCOM and the component family readiness/support organizations by escalating component issues to the command, Joint Chiefs of Staff, DoD, and other government agencies; and 1LT Dawn Paul, as our wounded warrior advocate carrying out the most essential task of contacting our casualties and their families. Paul will also coordinate with government and non-government agencies to make certain all potential benefits are provided to the families. Additional functions for the program will be to enable civilian industry that have been so supportive of USSOCOM with a venue to help transition the most skilled, tenacious and hard working members of the armed forces into their employment.

"SOF is not a passive career – you have to actively engage and pursue to become a member. Support to our SOF warriors should never be passive; the SOF warrior and their family have provided too much" Lorraine said.

For more information please visit our webpage at www.socom.mil or contact
Mr. Jim Lorraine: lorraij@socom.mil,
Maj Julie Scott: julie.scott@socom.mil, or
1LT Dawn Paul: pauld@socom.mil.

The USSOCOM Surgeon's Office does not endorse any of the below listed private contractors who provide medical training nor does the USSOCOM Surgeon's Office vouch for the competence of the instructors providing the training. This listing of education opportunities is simply to help our readers in the event some would like to further their continuing medical education.

Special Operations Medical Associations Conference 2005

12-15 December 2005

Marriott Waterside Hotel - Tampa, FL

www.somaonline.org or www.tacticalmedic.org

The Special Operations Medical Association's annual conference is meeting in Tampa, FL 12-15 December 2005. Please note that this year's conference is meeting at the Marriott Waterside Hotel and will focus on challenges and solutions of the Special Operations "first responder" and "first receiver." There will be many more NCOs presenting and more presentations on Combat Lessons Learned. We are still finalizing some additional optional break out sessions.

SOMA has a new web site with two Internet addresses: **www.somaonline.org** or **www.tacticalmedic.org** and are actively making more improvements to it. To log in, if you are a member, use the first letter of your first name and your last name. For example, Alan Moloff would log on as amoloff. The password for everyone is password1. Both the log on and password are in lower-case. Please check the website for all conference information, registration, and agenda.

If you are a SOMA member and have not received the last issue of JSOM (Summer 2005) or have moved since last December 2004, PLEASE send an email with your current address to: Russ Justice at justicer@earthlink.net and April Porter at HELLzPrwln@aol.com. Please note that SOMA is a private, tax-exempt organization and is not affiliated with the United States Special Operations Command.

Tactical Element Courses

For additional information on the following courses offered by Tactical Element, please visit online at www.tacticalelement.cc. Course announcements and course regsitration forms may be obtained by e-mailing info@tacticalelement.cc.

2005 Training Courses, Dates, and Locations

Tactical Emergency Medical Operator

5-9 DEC 05 / TEMO-05-05 Starke, Florida
Camp BlandingJoint Training Site
Starke, Florida

08-13 MAY 06 / TEMO-06-02
North Carolina Justice Academy - East Campus
Salemburg, North Carolina

Tactical Emergency Medical Operator (TEMO) is a five day program of instruction preparing law enforcement officers, security specialist, firefighters, and emergency medical services personnel assigned to and/or supporting law enforcement and/or military special operations in a multitude of urban, rural, austere, and remote environments. TEMO targets operators and support personnel of tactical operations or special operations teams, delivered in 48 hours of day and night operations comprised of classroom lecture and practicum, followed by field training exercises. TEMO continues forward regardless the weather. How you train is how you perform!

Course topics include but are not limited to:

· Advanced Airway Techniques
· Anti-Personnel Devices (including Improvised Explosive Devices)
· Aspects of Wound Ballistics
· Tactical Operations (TACOPS)
· Command and Control (C2)
· Tactical Operations
· Urban Combat Skills
· Rural Combat Skills
· Medical Force Protection
· Role and Responsibilities of the Tactical Emergency Medical Operator
· Load-out and Equipment Considerations
· Mission Development
· Pre-Mission Medical Threat Assessment
· Remote Assessment / Remote Mentoring
· Tactical Combat Casualty Care

Tactical Search and Rescue (TACSAR)

12-16 DEC 05
Minnesota Army National Guard Maneuver Training Center
Camp Ripley
Little Falls, Minnesota

Tactical Search and Rescue (TACSAR) provides the knowledge, skills, responsibilities, and the equipment required for operators who are assigned to field operations during a tactical search and rescue mission. The TACSAR program of instruction also provides students with field training exercises and missions where the students are required to posses the prescribed equipment during daylight and nighttime field operations. Four major areas of instruction include: survival, search and rescue, self-aid, and casualty care. Casualty care and self-aid focus on the rural austere tactical environments.

Furthermore, TACSAR provides training for new operators and allows them to accumulate the required clothing and equipment needed for tactical search and rescue operations. The program also gives the student practical experience during simulated search and rescue operations. In many cases TACSAR provides as an excellent refresher course for the more experienced operator including leadership.

TACSAR is a five day, full dress, full load-out program of instruction and targets medical operators and non-medical operators, delivered in forty-five (45) hours of day and night operations comprised of field lecture and practicum. In addition to receiving the Tactical Element Certificate of Training, students also earn the American Safety & Health Institute two year Wilderness First Aid certification. The outdoors is the classroom regardless the weather. How you train is how you perform!

Course topics include but are not limited to:
· Patrolling (mounted or dismounted)
· Anti-Personnel Device (APD) Recognition
· Camouflage, Cover, & Concealment
· Load-out and Equipment Considerations
· Rural Tactical Environmental & Preventative Medicine
· Land Navigation (LANDNAV)
· Basic Survival Skills
· Rural Combat Skills
· Mission Development / Preparedness
· Pre-Mission Medical Threat Assessment
· Tactical Search and Rescue
· Tactical Combat Casualty Care
· Casualty Extraction
· Casualty Evacuation (CASEVAC)
TACSAR is offered in two specific presentations:
Dismounted (ground special/tactical operations teams)
Mounted (posse or equine unit)

Special Operations Casualty Management

6-8 DEC 05
Camp Blanding Training Site
Starke, Florida

13-15 DEC 05
Minnesota Army National Guard Maneuver Training Center
Camp Ripley
Little Falls, Minnesota

Special Operations Casualty Management (SOCM) is an intense three day program of instruction providing the tactical operator possessing limited or no prior medical training the necessary concepts and skills to deliver casualty care during special operations. With the potential for effective hostile fire/threat, the Special Operations Casualty Management course enables the non-medical personnel to apply practical lifesaving techniques and basic level medical knowledge, skills, and equipment familiarity required to mitigate casualty care until the arrival of advanced medical care or until the casualty can be safely extracted to a receiving medical treatment facility.

Personnel may be required to respond immediately to any casualty situation during tactical operations. This training is particularly applicable to personnel deployed to remote sites or operating in denied environments including small unit tactical operations. This training provides instruction and practical application of casualty assessment, identi fication, and treatment of common traumatic injuries, and management of common operational medical considerations.

Training consists of twenty-four (24) hours of instruction. Skill labs follow lectures to reinforce the modular instruction. Training also includes essential skills utilization in scenarios frequently encountered during the individual's performance of duty, as well as practical skills applications during performance labs.

S.E.R.T. Group International
Specialized Emergency Response Team

Scott Sheldon - President
P.O. Box 371231
Reseda, CA 91337-1231
Ph: 866/500-5465

SPECIAL OPERATIONS MEDICAL COURSES

Tactical Operations Medical Specialist

This high-speed, low-drag course covers the skills necessary to provide emergency medical care in the austere environment . Consisting of classroom, skills stations, and very realistic scenarios this course will provide a new Tactical Medical operator with the training necessary to support a SPECOPS team during operations and training. Course length is 5 days.

Curriculum Includes:
-Tactical Combat Casualty Care
-Role/Responsibility of TEMS provider
-Medical Threat Assessment
-Ballistics
-Team Health
-Buddy Care
-Clan Labs
-Dental Care
-Pediatric Trauma
-Entry / Room Clearing Techniques
-Rescue Techniques
-Field Training Exercise

Special Operations Medical Provider

The course covers basic elements of providing operational emergency medical care in the austere environment. This offers the medical operator options for treating casualties in the tactical or combat environments. Course length is 3 days.

Curriculum Includes:
-Tactical Combat Casualty Care
-Medical Threat Assessment
-Ballistics
-Team Health
-Buddy Care
-Rescue Techniques

Pediatric Trauma in Tactical Operations

Prerequisite: Assignment or intent to provide medical care in tactical operations.

This course addresses the unique medical needs of the pediatric trauma victim. As noted in Operation Iraqi Freedom, kids pose a unique challenge to medical providers. Following the axiom that "kids are not small adults," this course will present assessment and treatment options for those children injured during tactical or combat operations.

Curriculum Includes:
-Kids and Combat Operations - A Primer
-The PALS paradigm
-Patterns of injury
-Treatment Options

The following is a list of information resourses for contining education.

Casualty Care Research Center
Department of Military and Emergency Medicine
Uniformed Services University
4301 Jones Bridge Road
Bethesda, Maryland, United States 20814-4799
Office: (301) 295-6263
Fax: (301) 295-6718
Web Site: www.casualtycareresearchcenter.org

CERTAC
P.O. Box 354
Drake, Colorado, United States 80515
Office: (970) 214-9355
Fax: None
Web Site: www.certac.com

Counter Force Training
3160 School Drive
Savanna, Illinois, United States 61074
Office: (888) 660-3442
Fax: (815) 273-3247
Web Site: www.counterforcetraining.org

Cypress Creek Advanced Tactical Team
c/o Cypress Creek EMS
16650 Sugar Pine Lane
Houston, Texas, United States 77090
Office: (281) 440-9650 Extension 156
Fax: (281) 440-7677
Web Site: www.ccatt.org

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

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

Heckler & Koch, Inc.
International Training Division
21480 Pacific Boulevard
Sterling, Virginia, United States 20166-8903
Office: (703) 450-1900 Extension 293
Fax: (703) 406-2361
Web Site: http://www.tacticalmedicine.com/

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

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

Lion Claw Tactical
5900 East Virginia Beach Boulevard
Suite 408
Norfolk, Virginia, United States 23502
Office: (757) 321-2059
Fax: (757) 498-0059
Web Site: www.lionclawtactical.com

"Medic Up" Tactical Medic Training Course
3300 Via Giovanni
Corona, California, United States 92881
Office: (909) 340-9201
Fax: (909) 340-9201
Web Site: www.medicup.com

National Academy of Tactical Medical Response
3075 Shattuck Road
Suite 813
Saginaw, Michigan, United States 48603-3258
Office: (989) 585-4001
Fax: (989) 585-4001
Web Site: www.tacticalmedical.com

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

NWTC, Inc.
1844 North Nob Hill Road
Suite 406
Plantation, Florida, United States 33322
Office: (866) 328-2918
Fax: (866) 328-2918
Web Site: www.nwtcinc.org

Omega Tactical Consultants
7915 Trail Run Loop
New Port Richey, Florida, United States 34653
Office: (727) 243-6891
Fax: (727) 375-1577
Web Site: www.omegatacticalconsultants.com

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

Spartan Group International
Applied Training and Consulting Division
P.O. Box 671
Mamers, North Carolina, United States 27552
Office: (877) 977-2782
Fax: None
Web Site: http://www.spartangroup.com

SERT Group International
P.O. Box 371231
Reseda, California, United States, 91337-1231
Office: (866) 500-5465
Fax: (818) 344-8099
Web Site: http://thesertgroup.homestead.com

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

Special Operations Tactical Training International
P.O. Box 830
Dover, Tennessee, United States 37058-2716
Office: (931) 232-6593
Fax: (931) 232-6542
Web Site: www.sottint.com

STS Consulting
PMB Box 176
1981 Memorial Drive
Chicopee, Massachusetts, United States 01020
Office: (413) 531-8699
Fax: (413) 532-1697
Web Site: www.tactical-ems.com

Tac1Aid
157 Middle Road
Newbury, Massachusetts, United States 01922
Office: (978) 499-0492
Fax: None
E-mail: Tac1Aid@hotmail.com

Tactical Element, Inc.
380-H Knollwood Street
Suite 140
Winston Salem, North Carolina, United States 27103
Office: (336) 945-2289
Fax: (336) 945-2289
Web Site: www.tacticalelement.cc

Team One Network
620 Richards Ferry Road
Fredericksburg, Virginia, United States 22406
Office: (540) 752-8190
Fax: (540) 752-8192
Web Site: www.teamonenetwork.com

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

X-TEMS
P.O. Box 925
Loveland, Ohio, United States 45140
Office: (513) 583-3001 Extension 500
Fax: (513) 583-3012
Web Site: www.xtems4life.com

VETERINARY MEDICINE

K-911 Emergencies, Inc.
P.O. Box 8652
Jupiter, Florida, United States 33468-8652
Office: (561) 575-2514
Fax: None
Web Site: www.k911emergencies.com

The ResQ Shop
1051 Meadow West Drive
El Paso, Texas, United States 79932
Office: (915) 877-4312
Fax: (915) 877-4242
Web Site: www.theresqshop.com

University of Florida
Department of Small Animal Clinical Sciences
2015 Southwest 16th Avenue
Gainesville, Florida, United States 32610
Office: (352) 392-4700 Extension 5700
Fax: (352) 392-6125
Web Site: www.doce-conferences.ufl.edu/k9

SOF and SOF Medicine Book List

Colonel Rocky Farr

Those of you who know my history of joining the Army at age 18 may realize that I have evidently conned the Army into sending me off for long term civilian schooling for my bachelor's degree, two master's degrees, and my doctor of medicine. Each time, I bought books. So below is my book list of military medical history and Special Operations Forces history books currently in my library. For a detailed list with the publishers and date of publication, please contact the JSOM atd JSOM@socom.mil

TITLE	AUTHOR	ISBN
15 Months In SOG: A Warrior's Tour	Thomas L. Nicholson & T. P. Nichols	0804118728
90 Minutes at Entebbe	William Stevenson & Uri Dan	0553104829
200 Years of Military Medicine	Rose C. Engelman	GPO, 1975
A Bugle Calls: The Story of the Witwatersrand Rifles and its Predecessors, 1899-1987	S. Monick	620139846
A Concise History of U.S. Army Special Operations Forces	Geoffrey T. Barker	0922004099
A Concise History of the U.S. Army Airborne Infantry	Geoffrey T. Barker	0922004021
A Concise History of U.S. Army Airborne Infantry	Geoffrey T. Barker	0922004013
A Concise History of U.S. Army Special Operations Forces	Geoffrey T. Barker	1988
A Confederate Nurse: The Diary of Ada W. Bacot	Ada W. Bacot & Jean V. Berlin	0872499707
A Confederate Surgeon's View of Ft. Donaldson: The Diary of John Kennerly Farris	Jim Stanbery	Regimental Studies, 1991
A Historical Perspective of Special Operations Forces as Instruments of Strategy	Gregg D. Jones	CGSC 1991
A History of Medicine in South Carolina. 1825-1900	Joseph I. Waring & Richard H. Shryock	SCMA
A History of Military Medicine	Richard A.Gabriel & Karen S. Metz	031327746X
A History of Special Forces in Somalia 1992-5	Joseph D. Celeski	
A Man Called Intrepid	William Stevenson	0345310233
A Medical Tour Through the Whole Island of Great Britain	Louis Appleby	057117339X
A Prototype of a Confederate Hospital Center in Lynchburg, Virginia	Peter W. Houck	B0006ELBYY
A Saw, Pocket Instruments, and Two Ounces of Whiskey: Frontier Military Medicine in the Great Basin	Anton P Sohn	0870622722
A Soldier with the Arabs	John Bagot Glubb	B0006DI81O
A Soldier's Story. The Double Life of a Confederate Spy	David L. Phillips	1567994253
A Special Breed of Man	Ed Edell	0934588082
A Surgeon's Civil War: The Letters and Diary of Daniel M. Holt, M.D.	James M. Greiner, Janet L. Coryell Daniel M. Holt, & James R. Smither	0873384946
A Study of the Medical Support to the Union & Confederate Armies During the Battle of Chickamauga: Lessons & Implications for Today's U.S. Army Medical Department Leaders	David A. Rubenstein	CGSC, 1990
A Swift, Elusive Sword: What if Sun Tzu and John Boyd Did a National Defense Review?	Chester W. Richards	1932019014
A Systematic Review of "Commando" (Special) Operations 1939-1980	Edward Lutwak, Steven L. Canby, & David L. Thomas	
A Texas Surgeon in the C. S. A.	John Q. Anderson	B0007E4AEG

TITLE	AUTHOR	ISBN
A Vast Sea of Misery: A History and Guide to the Union and Confederate Field Hospitals at Gettysburg, July 1 to November 20, 1863	Gregory A. Coco	0939631091
A Woman Doctor's Civil War: The Diary of Esther Hill Hawks	Gerald Schwartz & Esther Hill Hawks	0872494357
A Woman of Valor: Clara Barton and the Civil War	Stephen B. Oates	0028740122
About Face: Odyssey of an American Warrior	David H. Hackworth & Julie Sherman	0671526928
African Guerrillas	Christopher S. Clapham	025321243X
AFSOF: A Unique Application of Aerospace Power	John A. Hill	Air Univ. Press, 1993
Airborne: A Guided Tour of an Airborne Task Force	Tom Clancy	0425157709
Air Commando!: 1950-1975, Air Force Special Operations Command	Michael E. Haas	B0006PF6DA
America and Guerrilla Warfare	Anthony James Joes	0813121817
An Historical Survey: The U.S. Army Vietnam Individual Training Group (UITG) Program, 1971-73	Kenneth R.Bowra	(Army War College 1991)
An Intimate History of Killing: Face-To-Face Killing in Twentieth-Century Warfare	Joanna Bourke	0465007376
Angels of Mercy	Mary Paulinus Oakes & Ignatius Sumner	1885938128
Any Place, Any Time, Any Where: The 1st Air Commandos in WWII,	R.D. Van Wagner	076430447X
Apollo's Warriors: United States Air Force Special Operations during the Cold War	Michael E. Haas, Ronald R. Fogleman, Hugh Richardson, & Steve Garst	1585660353
April '65: Confederate Covert Action in the American Civil War	William A. Tidwell	0873385152
Army Badges and Insignia Since 1945	Guido Rosignoli	0713706481
Army Medical Department 1775-1818	Mary C. Gillett	1410202380
Army Medical Department, 1818-1865	Mary C. Gillett	0160019540
Army Medical Department, 1865-1917	Mary C. Gillett	9994162853
Army of Mississippi's Medical Department Apr-Jul 1862	Paula Ann Ussery	University of Mississippi Press, 1981
Armed Progressive: A Study of the Military and Public Career of Leonard Wood	Jack C. Lane	0891410090
Art of the Warrior	Ralph D. & Mei-Chun Lee Sawyer & Sun Pin	1570621632
Assault at Mogadishu	Kai Hermann & Peter Koch	0552107743
Asymmetrical Warfare on the Great Plains, A Review of the American Indian Wars - 1865-1891	Lowell StevenYarbrough	Army War College, 2002
At the Hurricane's Eye	Greg Walker	0804109559
Badges and Insignia of the Elite Forces	Leroy Thompson	1854095110
Battle Exhaustion: Soldiers and Psychiatrists in the Canadian Army, 1939-1945	Terry T. Copp & Bill McAndrew	0773507744
Behind Fascist Lines	Anna K. Starinov	0345444574
Behind Japanese Lines: An American Guerrilla in the Philippines	Ray C. Hunt & Bernard Norling	0813109868
Belle Boyd: Siren of the South	Ruth Scarborough	0865545553
Beret Insignia of the U.S. Army	William A. Hudspeath & R.W. Smith	B000714ZSK
Black Hawk Down: A Story of Modern War	Mark Bowden	0871137380
Blank Check	Tim Weiner	0446514527
Bravo Two Zero	Andy McNab	059303421X
Cambodia: Analysis of U.S. Military Assistance to Cambodia, 1970-1975	Kenneth R. Bowra	ACGSC 1983
Casebook on Insurgency and Revolutionary Warfare: 23 Summary Accounts.	Paul A. Jureidini, et al.	Washington, DC: Special Operations Research Office, 1962. (356.9)
Casualties & Consensus: The Historical Role of Casualties in Domestic Support for U.S. Military Operations	Eric V. Larson	0833023705

Title	Author	ISBN
Central Burma: The United States Army Campaigns of World War 2	George L. Macgarrigle	0160481376
Champ Ferguson Confederate Guerilla	Thurman Sensing	0826512127
Chimborazo: The Confederacy's Largest Hospital	Carol Cranmer Green	1572333162
Civil War Medicine	Stewart M. Brooks	B0007DN1N8
Civil War Medicine 1861-1865	C. Keith Wilbur	0791052079
Civil War Medicine: Care & Comfort of the Wounded	Robert E. Denney	0806908793
Civil War Medicine: Challenges and Triumphs	Alfred Jay Bollet	1883620082
Civil War Nurse: The Diary and Letters of Hannah Ropes	Hannah Anderson Ropes and John R. Brumgardt	0870492802
Civil War Pharmacy: A History of Drugs, Drug Supply and Provision, and Therapeutics for the Union and Confederacy	Michael A. Flannery,	0789015021
Civil War Schemes and Plots	Webb B. Garrison	0517162873
Classics of Strategy and Counsel, Volume 1	Thomas F. Cleary	1570627274
Code-Name Bright Light: The Untold Story of U.S. POW Rescue Efforts During the Vietnam War	George J. Veith	0440226503
Code Name Copperhead	Joe R. Garner & Avrum M. Fine	0671864351
Cohesion, the Key to Special Operations Teamwork	Ralph E. McDonald	B00010X2WC
Cold Injury, Ground Type	Tom French Whayne	B00071O36E
Combat Surgeons	John Laffin	0750921730
Combined Operations	Vice Admiral Lord Louis Mountbatten & Hilary St. George Saunders	1417987413
Command and Control	James D. Mitchell	0425117774
Commando Raids: 1946-1983	Bruce Hoffman	B0006EQN60
Commandoes	Douglas C. Waller	0671787179
Commandos and Rangers of World War II	James D. Ladd	0312151675
Commandos from the Sea: Soviet Naval Spetsnaz in World War II	Yuriy F. Strekhnin & James F. Gebhardt	1557508321
Come Retribution: The Confederate Secret Service and the Assassination of Lincoln	William A. Tidwell, et. al.	0878053484
Complete Art of War	Sun Pin, et. al.	0813330858
Conduct of the Partisan War in the Revolutionary War South	Kristin E. Jacobsen,	CGSC 2003
Confederate Agent, a Discovery in History	James D. Horan	B0007EW656
Confederate Commando and Fleet Surgeon	John Worth Lynn, & Daniel Burr Conrad	1572492201
Confederate Courage on Other Fields: Four Lesser Known Accounts of the War Between the States	Mark J. Crawford	0786407204
Confederate Hospitals on the Move: Samuel H. Stout and the Army of Tennessee	Glenna R. Schroeder-Lein	0872499642
Confederate Spy	Louis A. Sigaud & Belle Boyd	B0007EDK7E
Confederate States Medical and Surgical Journal	Samuel P. Moore & William D.Sharpe	0810809729
Confederate Surgeon: Aristides Monteiro	Sylvia Dannett & Rosamond H. Burkart	0396058965
Confederate Surgeon: The Personal Recollections of E.A. Craighill	E. A. Craighill & Peter W. Houck	0930919912
Confederate Operations in Canada and New York	John W. Headley	0809442841
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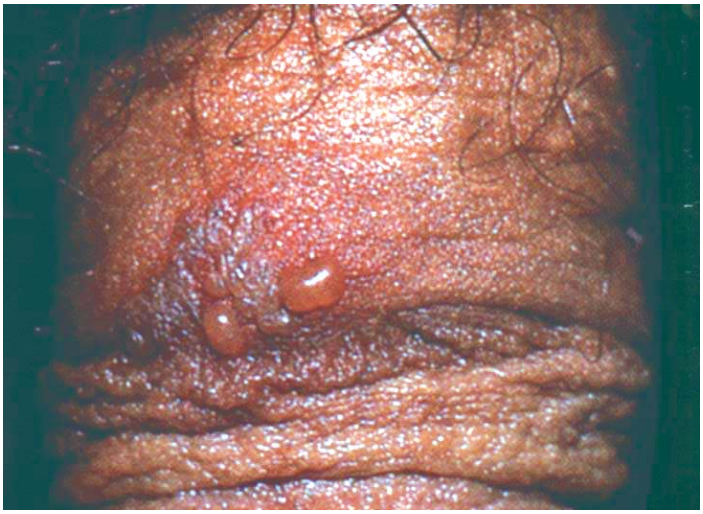
Picture This….

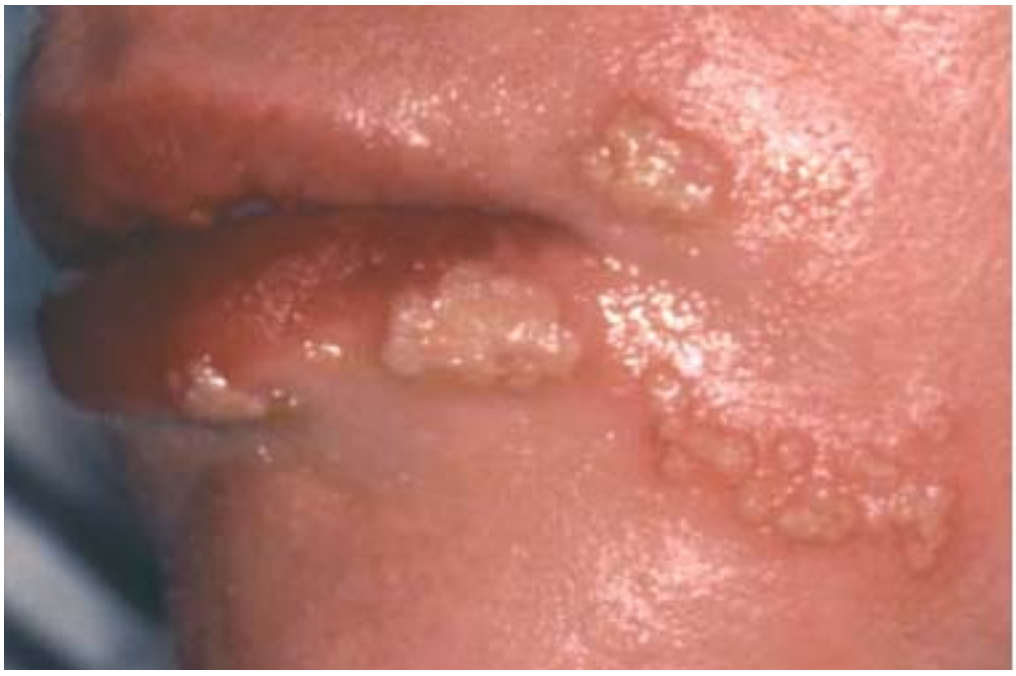
Chad Hendrickson, MD
Daniel Schissel, MD

A 24-year-old Soldier reports to sick call with complaint of fever, malaise, and the lesion pictured below since the day before (photo#1). The patient also reports that the lesion has a distinct "crawling" or "tingling" sensation associated with it. The patient denies ever having similar lesions before.



Question 1:
Using the primary lesion definitions outlined in your SOF medical handbook, how would you describe the morphology of this lesion?

Question 2:
What is your differential diagnosis for this lesion?



ANSWERS:

Question 1:

Morphology: Grouped 1-2mm vesicles on an erythematous base.

Question 2:

Your differential diagnosis for orolabial lesions (photo#2) should include herpangina, apthae, early varicella zoster (shingles) eruption, Stevens-Johnson syndrome, pemphigus vulgaris, or infectious pharyngitis. For similar lesions on the genitals, the differential diagnosis should include trauma, syphilitic chancre, chancroid, granuloma inguinale, and lymphogranuloma venerum. The morphologic description of "grouped" vesicles on an erythematous base is characteristic for early herpes simplex virus infections, and the diagnosis is often made clinically on the grounds of morphology and history alone.

HERPES SIMPLEX VIRUS INFECTIONS

Epidemiology

Herpes simplex virus (HSV) infection is acquired through direct contact with skin, mucous membranes, saliva, or genital secretions from an infected person who is actively shedding virus. HSV are ubiquitous pathogens, with serologic positivity for HSV antibodies estimated at >80% of the population >12 years old in some parts of the world.[1] Genital herpes is the most prevalent sexually transmitted disease in the world and is uncommon before adolescence. Factors associated with increased risk for HSV infection include onset of sexual activity at an early age, increasing number of sexual partners, black or Hispanic race, low income, low level of education, female gender, homosexuals, and HIV positive patients.[2]

Etiology/Pathogenesis

Herpes simplex virus belongs to the herpesvirus family, which also includes varicella zoster virus (Herpes Virus 3), Epstein-Barr virus (Herpes Virus 4), cytomegalovirus (Herpes Virus 5), and human herpesviruses 6, 7, and 8. All members of the herpesvirus family follow a sequence of primary infection, latency, and reactivation. Orolabial herpes simplex virus infection is also known as herpes labialis, cold sore, or fever blister, and patients are often times unaware that their lesions are caused by a viral infection. Two different viruses, HSV-1 and HSV-2, cause HSV infections. The viruses differ in their affinity for orolabial versus genital infections. HSV-1 causes most of the orolabial infections, while HSV-2 is the predominant virus isolated from genital lesions. The virus causes a transient viremia after inoculation of a cutaneous site. The virus then becomes latent for an unspecified period of time, only to reappear in the future when the virus is reactivated. The reactivated virus multiplies and migrates from the nerve ganglion, where it had established latency, causing a new lesion on the orolabial or genital skin and mucosa.

Clinical

Primary infections are most often asymptomatic. Patients are usually unaware that they have had the transient viremia and will often times be perplexed when they have their first clinical outbreak because they cannot associate it with a recent exposure. Patients with a primary infection may present with fever, malaise, anorexia, and lymphadenopathy three to seven days after exposure. The associated lesions usually progress from a prodromal tender or burning erythematous macule to painful grouped vesicles on an erythematous base that later mature into pustules with erosion and crust. Resolution without scarring is expected in 2 to 4 weeks. After the initial infection, the patient may be so fortunate as to never have a recurrent lesion, but is more likely have 1 to 10 recurrences per year.[3,4,5] Recurrences may be accompanied by a prodrome, but both the prodrome and subsequent lesions are usually much less severe than the primary infection. HSV-1 is primarily responsible for orolabial infections. The mouth and lips are most often affected, but the gingiva, buccal mucosa, and pharynx may also exhibit lesions. Primary HSV-2 infections may be accompanied by very painful

balanitis, vulvitis, or vaginitis. Females may also have lesions on the cervix, buttocks, perineum, and experience inguinal lymphadenopathy and dysuria. Patients may also experience urinary retention and aseptic meningitis as a result of HSV infection. It is important for Soldiers to know that they do not need to have an active lesion in order to infect another person. Persons who have been infected will shed virus asymptomatically in the saliva and genital secretions in an unpredictable manner.

It should also be noted that persons, particularly children, with atopic dermatitis (eczema) are susceptible to a generalized cutaneous HSV infection called eczema herpeticum, which in infants is a medical emergency. Herpetic whitlow is an exquisitely painful lesion on the hand caused by HSV, most commonly in children with oropharyngeal HSV or females with genital herpes. Herpes gladiatorum is characterized by herpetic lesions in locations that come into contact during contact sporting events, such as wrestling. Erythema multiforme minor is highly associated with HSV infection. HSV infection of the eye is the second most common cause of blindness in the U.S. Herpes encephalitis is the most common sporadic, fatal encephalitis in the U.S. A discussion of neonatal herpes is beyond the scope of this review, but it is important to know whether the mother is experiencing active genital herpes around the time of delivery.

Diagnosis/Treatment

Although HSV infection is often diagnosed by physical exam and history alone, it is prudent to confirm the diagnosis with laboratory tests when possible, and always in pregnant women and newborns. The Tzanck preparation is a simple office-based test that may be performed by the practitioner on an intact blister or pustule. Typical cytologic changes including multinucleated giant cells are nonspecific, but confirmatory in the right clinical scenario. Better tests include culture, direct fluorescent antibody testing, PCR, and serologic assays. PCR is the test of choice for detecting HSV in the spinal fluid. Type-specific assays may be performed to differentiate between HSV-1 and HSV-2.[6]

Treatment of HSV infections consists of systemic antiviral agents in combination with topical and oral anti-inflammatory and analgesics when necessary.[7] The most commonly prescribed oral and intravenous antivirals include acyclovir, valacyclovir, famciclovir, penciclovir, foscarnet, and cidofovir. Treatment needs to be initiated within the first 48 hours to have any effect on the duration or severity of the outbreak. Suppressive treatment can be highly effective for patients who are experiencing multiple recurrences per year or experience very painful or psychologically disturbing outbreaks. Oral acyclovir and valacyclovir are safe and effective treatments for suppressive therapy in the author's experience. Foscarnet is the only FDA approved treatment for acyclovir resistant HSV infection, although other medications and combination regimens are available. Below is a table of recommended regimens for treatment and suppression of both orolabial and genital HSV infections.

Recommended Oral Dosing for Genital or Orolabial Herpes Simplex Virus Infections

	Acyclovir (Zovirax) 200mg, 400mg, 800mg caplets	**Valacyclovir (Valtrex) 500mg, 1000mg tablets**	**Famciclovir (Famvir) 125mg, 250mg, 500mg tablets**
First occurrence	200mg 5x/d for 7-10 days	1g bid for 7-10 days	250mg tid for 7-10 days
Episodic recurrence	200mg 5x/d for 5 days	2g bid x 1 day or 500mg bid for 3-5 days	125mg bid for 5 days
Chronic suppressive therapy	400mg bid	<10 recurrences/yr 500mg daily >10 recurrences/yr 1gm	250mg bid

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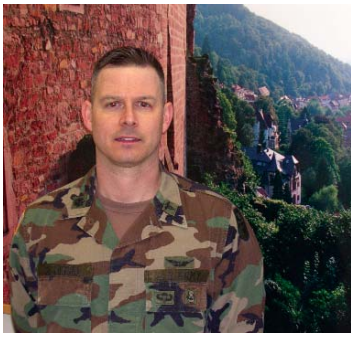
If you're deployed and have a concern about a puzzling skin lesion you can email your clinical photos and with the aid of your SOF manual a concise morphologic description of the difficulty to our Operational Teledermatology site at derm.consult@us.army.mil or to Daniel.Schissel@US.Army.Mil. The lesion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

Capt Chad Hendrickson graduated for Uniformed Services University School of Medicine in 2002 and did his dermatology transitional internship at Brooke Army Medical Center, Fort Sam Houston in 2002-2003.

He got his BS in biology from Gannon University in 1996 and his MS in physiology and biophysics from Georgetown University in 1998. Dr. Hendrickson received a Preintramural Research Training Award, NIH 1996-1997 for research on gene therapy for Fabry's disease.



LTC Daniel Schissel originated "Picture This" for the MED Quiz. He is a 1993 graduate of the Uniformed Service University of the Health Sciences and completed his internship with the family practice department at Fort Bragg in 1994. He then served as the 2/10th Special Forces Group (Airborne) surgeon and followed on as the 10th SFG(A) Group Surgeon. He completed his residency training in dermatology at the Brooke Army Medical Center in 1999. LTC Schissel is presently station in Heidelberg, Germany as a staff physician and the European Regional Medical Command Dermatology Consultant. He has authored the dermatology section of the new SOF manual, serves on the USSOCOM Medical Curriculum and Examinations Board, and is the U.S. Army Aviation Dermatology Consultant.

MEDICAL VIGNETTES FROM AFGHANISTAN

After serving as a dental and PM Officer for the 19th Group for the last 10 years, I had the recent privilege of serving a 5-month contingency temporary tour of active duty (COTTAD) last winter with the 3rd Group in Afghanistan. My main responsibility over that time was to rotate between 10 different SF firebases and provide dental and PM support as needed by the 18Ds. It provided me a near unique opportunity to see how current SF medical clinics (guerilla hospitals) are being run. The following photos give one a feel for the incredible medical challenges faced by the 18Ds as they ran these medical clinics in some of the more remote and inaccessible areas of the world.

LTC Harrington has served as the Dental and PM officer for 19th SFG(A) from 1995 to the present. From 1993 to 1995, he served with the 11th SFG(A) as their ESO Officer.. He received a DMD from Tufts School of Dental Medicine and his MPH from Harvard School of Public Health. He currently serves as the Secretary for SOMA and has a private dental practice in Weston, Mass. Courtesy of LTC Robert D. Harrington and 2/3 and 3/3 18Ds.

Photos are examples of typical trauma cases encountered.

A Qoochee tribal elder is carried for most of the day by primitive litter across the desert and arrives at the outer perimeter of the firebase just before sunset, looking for medical treatment.

The 18D has approximately a half hour to assess, diagnose, and provide definitive treatment before the patient has to leave.

18D prepping local truck, provided by local AMF Commander, as a litter transport, for patients ride back to camp.

Here are two examples of leishmaniasis cases encountered at daily clinic calls.

Delicate hand surgery reconstruction by 18D, secondary to AK 47 round.

One of the most common pediatric injuries are burns from cooking fires.

The smile from the burn patient in the photo to the left which makes the effort all worthwhile.

Hand injury with tendon exposure from spilled, hot cooking oil.

Patient sustained deep knife wound a week before and went to a local medical office where monofilament fishing line was used for tight, primary closure with no antibiotics. Patient presented to SF medical clinic with weeping exudate from primary closure site.

Late night fasciotomy performed when MEDEVAC unavailable.

A small, portable, solar powered high speed drill (about 4 lbs) I brought along allowed the 18Ds to perform over 750 fillings (FUJI IX Composite) during the time I was out in the field. The 18Ds were trained in its use over about a day and a half and at that point, could perform the vast majority of fillings that were requested by local patients.

Dental clinics, one of the most cost effective medical treatments for locals, can be run almost anywhere, from the front bumper of a HUMVEE to the front porch of a local store.

Dedication

SGT 1st Class
Marcus V. Muralles

SGT 1ST CLASS MARCUS V. MURALLES
Killed in action on June 28, 2005 Operation Enduring Freedom

SFC Marcus V. Muralles died June 28, 2005, in eastern Afghanistan when his MH-47D helicopter was shot down by enemy fire during combat operations. He was born October 5, 1971 in Louisiana, and was raised in Shelbyville, IN. Marcus was an instant friend to everyone who crossed his path. He had an optimistic outlook for any and every situation. His soft spoken yet confident demeanor made every aspect of our lives he was involved in, good or bad, get better.

SFC Muralles joined the Army in August 1994 as an infantryman. After completion of Basic Combat Training and Advanced Individual Training he was assigned to 3rd Battalion, 75th Ranger Regiment, Fort Benning, GA. After completing his initial enlistment obligation, he was assigned to the inactive ready reserve. In August 1998 he returned to the active duty and graduated One Station Unit Training at Fort Benning in the summer of 1998. His first duty station was Company B, 3rd Battalion, 75th Ranger Regiment as a medical administrator, platoon medic, and company senior medic. In August of 2003, Muralles was assigned to 3rd Battalion, 160th Special Operations Aviation Regiment (Airborne) as an aerial flight medic. His military schools include: the Emergency Medical Technician's Course, the Airborne Ranger Course, the Primary Leadership Development Course, the Jumpmaster Course, the Basic Non-commissioned Officer Course, and the Advanced Noncommissioned Officer Development Course. Muralles' military awards and decorations include: the Meritorious Service Medal, the Army Commendation Medal, the Army Achievement Medal, the Good Conduct Medal, the National Defense Service Medal, the Armed Forces Expeditionary Medal, the Humanitarian Service Medal, the Iraq Campaign Medal, the Afghanistan Campaign Medal, Global War on Terrorism Expeditionary Medal, and Global War on Terrorism Service Medal. His badges include the Ranger

Tab, the Combat Medical Badge, the Expert Infantry Badge, the Expert Field Medical Badge, the Aviation Badge, and Master Parachutist Badge with two combat jumps. He was posthumously awarded the Bronze Star Medal, the Purple Heart, the Meritorious Service Medal, an Air Medal with Valor device and the Combat Action Badge. He is survived by his wife and two children.

His influence on the SOF community will live on forever. We will not forget how he lived and died like a hero in the Afghan desert.

-Night Stalkers-

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Take advantage of the opportunity

Special Forces Aidman's Pledge

As a Special Forces Aidman of the United States Army, I pledge my honor and my conscience to the service of my country and the art of medicine. I recognize the 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 accept- ed the thought of eternal lonliess ....should I fail. I have seen the face of terror; felt the sting- ing cold of fear, and enjoyed the sweet taste of a moment's love. I have cried, pained and hoped...but most of all, I have lived times others would say best forgotten. Always I will be able to say, that I was proud of what I was: a PJ It is my duty as a Pararescueman to save a life and to aid the injured. I will perform my assigned duties quickly and effi- ciently, placing these duties before personal desires and comforts.

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

A Navy Poem

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

I'm the one called "Doc".

~ Harry D. Penny, Jr. USN Copyright 1975

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