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A Peer Reviewed Journal for SOF Medical Professionals

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Dedicated to the Indomitable Spirit & Sacrifices of the SOF Medic

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From the Surgeon

Again, greetings from HQ USSOCOM. Another quarter is gone and our medical folks continue to amaze everyone with their skillful, compassionate care of the "national treasures" we are privileged to have serve in the SOF community. We have followed the medical care delivered to our operators throughout Operation Enduring Freedom and now Operation Iraqi Freedom and we here are continually in awe of our operators demonstrated competence and heroism under terrible conditions. We come to work each day hoping to find some new capability or process in response to your requests that will make your life easier, your rucksack lighter, or your patients a little easier to care for.

AS AN UPDATE:

1. The Fibrin Dressings are in full production. MSG Brochu and a team went forward to CENTCOM and delivered training and approximately 1200 dressings to the hands of our Medics/Corpsmen/PJs. This is under an Investigational New Drug (IND) protocol which we know is cumbersome, but is critical to the FDA allowing us to get this out there.
2. Chitosan Dressings are also coming to the field. Dr Holcomb and the MRMC folks have shown them as efficacious, and they are approved by the FDA. As they become available, we want every operator to have one in their personal medical gear and trained in their use as overseen by their Medic/Corpsmen/PJ, just as with the tourniquet.
3. The panel of medical experts we funded has finished their work and with the blessing of the American College of Surgeons, the Surgeon General of the United States (Dr Carmona, trauma surgeon and former 18D), and the PHTLS, the Journal of Pre-Hospital Trauma Life Support, is in printing now with a rewrite to the Military Medicine chapter reflecting how trauma needs to be treated in the future. SOF is leading the way in trauma management in difficult threats and places, just as it should.
4. We are working right now with Dr Holcomb and MRMC to get hemoglobin based oxygen carriers (HBOCs) in the field soonest. This technology has languished in the past but our interest has peaked interest in the scientific community and I believe we will have a product under an IND within a year.
5. Health surveillance is becoming more and more critical by the day. We are moving another 600 PDAs forward for our people to use and document exposures, diagnoses, and treatment at the source of that treatment. The goal is to make this tool work in a way that completes your Pre/Post Deployment forms, a SF600 entry for every medical encounter at the site of the encounter (as opposed to a level-3 hospital), and an exposure history document that will assure we will be able to find folks throughout their career and beyond in the event of some unknown exposures they have experienced. At the same time it has medical reference data you need easily at hand.

So, "keep on keeping on," let us know your needs and wants, take care of yourselves too, and push us to make your life better.

GBY/GBA
dhammer

ENLISTED CORNER

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

From the ROAD DOG in the BIG HOUSE

Another day, another quarter, and this one has flown by like the others so let me try and update you on where we stand at the publishing of this edition of the journal.

During this quarter it has been my privilege to be a member of the Fibrin Bandage Team (FBT).

Pictured from left to right are SMSgt Patrick O'Neal, LTC Mark Krause, LTC Harold Modrow, LTC Louis Smith, COL John Holcomb, and MSG Michael Brochu

The mission (Operation Enduring Fibrin) of the FBT was three-fold. One, provide Informed Consent training to all soldiers assigned to SOF within the CENTCOM AOR on whom this bandage may be used in a combat setting. Secondly, and of great importance, was to contact all medical treatment facilities within the theater to inform them of the Hemostatic Dressing (HD) and the Investigational New Drug (IND) Protocol. The FBT then solicited their support in providing follow-up data on the efficacy of this bandage and reporting any adverse events or reasons that this protocol should be terminated. Third, we had to provide the SOF health care providers the information needed for utilization and accountability.

The Fibrin HD is a new method to provide immediate control of potentially life threatening hemorrhage on the battlefield which cannot be stopped by conventional means such as pressure dressings and/or tourniquets. This dressing is the culmination of years of research funded by the American Red Cross, US Army Medical Department, and the US Special Operations Command. The Food and Drug Administration has approved this bandage as an IND since it is made from components of human whole blood. The dressing itself is made by placing predetermined amounts of fibrinogen and thrombin on a bio-absorbable mesh made from

Dexon. These dressings are individually made by hand at the cost of approximately $1000 per unit. Multiple animal research studies have shown that dramatic and immediate hemostasis can be achieved when this dressing is applied to wounds that otherwise would be fatal.

Another HD of equal efficacy to the Fibrin HD was to be fielded to Special Operations Forces (SOF) in the CENTCOM AOR. The dressing, Chitosan, manufactured by HEMCON, was found to have serious flaws when it went into full scale production. As a result of these problems, the decision was made to field the Fibrin HD to SOF in the Iraqi Theater of Operations.

The use of an IND protocol requires that any individual on whom this dressing may be used be given a detailed briefing outlining the indications for use, possible adverse events, side effects, and/or contraindications. The service member must then have the opportunity to ask any questions in order to make an informed decision on their participation in this program. Participation is strictly voluntary and without penalty if the SM declines. Detailed forms are required to be completed regardless of whether the SM decides to participate or not.

SMs who volunteered for this program were identified by a green tag worn on their "dog tags" while those that declined were given red tubing to be worn in the same fashion. During our deployment, the FBT provided this brief to just about 3,000 members of SOF and their supporting units. Overall, 96% of the community accepted the protocol and 4% of the community declined for personal, religious, and other reasons. The team hand delivered about 1,185 of new dressings to the forward units for distribution.

USSOCOM State Department of EMS and Public Health: We had hoped to have convened the State Requirements Board by the end of Feb 03 but Operation Iraqi Freedom has taken top priority. We will convene this very important board ASAP. Until then, the JSOMTC will continue to train the best medics in the world with the current Program of Instruction (POI) with the recommended changes by the Joint Medical Enlisted Advisors Committee (JMEAC) and the Board of Regents (BOR).

We have issued the first 57 SOF-P cards to the first SOCM class (05-02) which graduated on 15 April 03. This is a great move forward in our medical training as we now have the power to set the standards that meet our own mission requirements. The top graduates from class 05-02 were:

Distinguished Honor Graduate: PFC Richard W Leon

Honor Graduate: SGT David M Bortoff

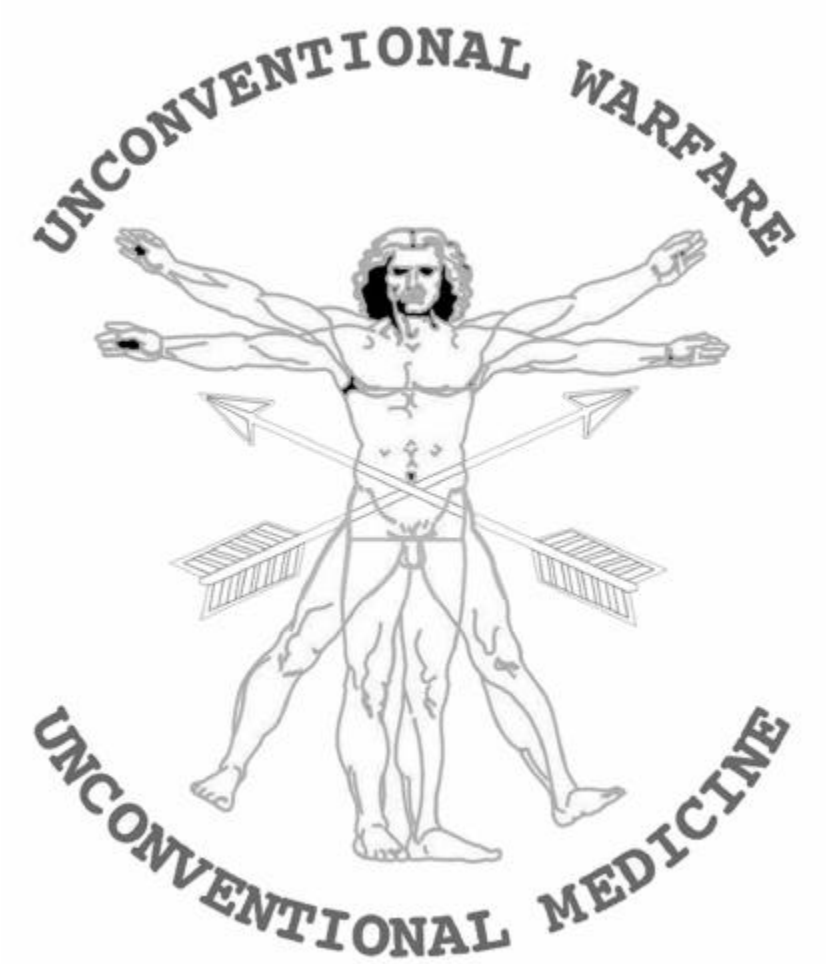
Long range dates for future JMEAC:

The Joint Medical Enlisted Advisory Council (JMEAC) met on 25-26 Feb 03 and was hosted by NSWC. Although only the SEMAs and/or their representatives were present, here are the highlights of this meeting:

1. JSOMTC Issues: COL Keenan has hired a civilian contractor to provide a non-partisan evaluation of the institution's academic and operation practices. With the inclusion of female airmen in the student populace, it has been deemed by the center that USSOCOM will have to assist in additional monetary resources to make adaptations for these students, especially for restroom and locker facilities. There is also a professional opinion that a proposed plan to move Combat Trauma Management (CTM) training to the SOCM could potentially raise current attrition rates. Lastly, the JSOMTC Battalion 1SG is currently acting as the battalion Sergeant Major until the replacement is on station at the later end of June.
2. Tactical Combat Casualty Care Panel: MSG Justice and HMCM Jefferson briefed about the out comes of the panel which convened 18-20 February in San Antonio. Texas. The draft for the military medicine portion (Chapter 15) of the PHTLS textbook is finished. The panel will transition over to the Navy for administration but USSOCOM will still have a chair on it.

Future JMEAC Meetings:
27-28 May 03, AFSOC will host
26-27 Aug 03, USASOC will host

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



COVER

USSOCOM Department of EMS and Public Health Device Symbolism

- The "Star of Life" represents a historical and integral part of the EMS system. The "Star" is made up six points, of which each represent an aspect of the system: Detection, reporting, response, on scene care, care in transit, and transfer to definitive care.
- In heraldry, the color purple or purpure represents royal majesty, sovereignty, justice and truth. This hue is instrumental in presenting a Joint flavor and purpose of the State entity, through the summation of each Service's shade of color.
- The three component crests represent the primary dominions that make up the State's core medical populace and executive body.
- The coiled serpent around the sword symbolizes the God of Medicine or Healing, also known as Aesculapius. It is a personification of health: rejuvenescence through the casting off of skin, wisdom that involved both extensive knowledge and prudent action, and a sense of subtlety.
- The lowered sword indicates a just and generous pursuit of honor and virtue in warlike deeds, and notwithstanding it further depicts a presence of protection, authority, strength, courage, and the penetrating power of intellect.
- The wings symbolizes protection or coverture, swift mobility, freedom, and the release of creative energy.

These symbolic elements are the primary support matrix or foundation of SOF Medicine.

The *Journal of Special Operations Medicine* is an authorized official quarterly publication of the United States Special Operations Command, MacDill Air Force Base, Florida. It is in no way associated with the civilian Special Operations Medical Association (SOMA). Our mission is to promote the professional development of Special Operations medical personnel by providing a forum for the examination of the latest advancements in medicine.

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

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From The Staff

Just a reminder that there are important changes in the distribution of the *Journal of Special Operations Medicine* (JSOM) you need to be aware of. To assure the JSOM continues to be available to all who find value in it, we need to comply with the intent of the current distribution rules governing this publication.

Starting with the last edition, we sent the JSOM to all our SOF units and the active editorial consultants without change. One of the new changes in SOMA membership is that you will now receive the JSOM as part of your membership. If you are a SOMA member and did not receive your journal, you can contact SOMA through www.specialoperationsmedicalassociation.org. The JSOM is also available as a paid subscription from the Superintendent of Documents, U.S. Government Printing Office, for only $30 a year at:http://bookstore.gpo.gov/subscriptions/sub011.html#006. Thank you for understanding our need to change the distribution of the JSOM in order to be in compliance with current distribution rules.

More big news!! As of 15 March, *WE ARE ONLINE*!!! Thanks to the cooperation and efforts of the Joint Special Operations University, the JSOM is now available online to all in DEERS at http://www.hurlburt.af.mil/jsou. There are instructions on their homepage as to how to enter their medical link and access issues of the JSOM. You will also be able to take your CME tests online and a copy will automatically be sent to the JSOM email address for grading. And, if that's not enough... You can even link straight to the Government Printing Office to subscribe to the JSOM.

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

The JSOM is one of the most excellent and righteous tools we have to span all the SOF services and to share medical information and experiences unique to this community. The JSOM survives because of generous but time-consuming contributions sent in by clinicians, researchers, and current and former medics from all the Services who were SOF-qualified and/or who served with SOF units. We need your help! Get published in a peer-review journal NOW! 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, infectious disease processes, and/or environment and wilderness medicine. We also need 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… fire 'em our way. Our E-mail is: JSOM@socom.mil.

DON'T FORGET TO DO YOUR CMES!!!! The JSOM offers CMEs to our SF medics, PJs, and SEAL corpsmen as well as physicians, PAs, and nurses, in coordination with the Uniformed Services University of Health Sciences (USUHS). In this edition, you will find 1.0 CME or 1.2 CNE/CEH offered on INTRAOSSEOUS VASCULAR ACCESS IN ADULTS: CURRENT STATUS AND MILITARY APPLICATION. Also in this edition of the JSOM, we honor our fallen brother, Jerry "Buck" O'Real Pope II.

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

Major DuGuay

Journal of Special Operations Medicine

Meet Your JSOM Staff

EXECUTIVE EDITOR
David L. Hammer, MD
Hammerd@socom.mil

Colonel Hammer's military and medical career began in 1958 when he served as a US Navy Combat Medical Corpsman attached to US Marine Corps infantry, artillery, and communication/reconnaissance units. Following discharge, he completed his BS and MD degrees at the University of Michigan in 1967 and 1970, respectively. Following nine years of civilian medical practice in a multi-specialty group in Grand Rapids, Michigan, he reentered military service as a Flight Surgeon at Beale AFB, CA. In 1984, he completed the Air Force Residency in Aerospace Medicine at Brooks AFB, Texas, during which period he earned a Masters in Public Health Degree from Harvard University. Colonel Hammer has spent the majority of his career in aerospace medicine and direct line support assignments, has commanded three medical groups, and has been assigned to the ARRS/SG, the AFSOC/SG and the USAFA/SG. He is a chief flight surgeon and a master parachutist.

MANAGING EDITOR
Michelle D. DuGuay, RN
Duguaym@socom.mil

Maj DuGuay joined the Army Reserve in 1987 and served as a nurse in a Combat Support Hospital unit for three years before switching services in 1990 to become an Air Force C-130 Flight Nurse. She is currently an IMA reservist attached to the SOCOM/SG office. Maj DuGuay has a Bachelors in Nursing and a MBA/Management. Her career includes being a flight nurse in both the military and private sector, 17 years of critical care and emergency room nursing experience, 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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GENERAL RULES FOR SUBMISSIONS

1. Use the active voice when possible.

2. Secure permission before including names of personnel mentioned in your piece. Do not violate copyright laws. If the work has been published before, include that information with your submission.

3. Articles should be double-spaced, twelve point font, aligned on the left and justified on the right.

4. Important: Include an abstract, biography, and photo of yourself as part of the article.

5. Use of acronyms should be held to a minimum and when used they must be spelled out the first time.

6. Remember that your audience is inter-service, civilian, and international.

7. Every article has a point to make, which is traditionally stated in the introductory paragraph and restated in the closing or summary. Subtlety is not usually a virtue in a medical publication.

8. All references MUST be cited in the text and in numerical order. The references MUST be arranged in the order of appearance in the text. Give the full name of the journal. Use the following style of citation: author names, title of article: journal name, year, volume number, inclusive page numbers. If unsure, please contact us at JSOM@socom.mil.

9. Photographs with your article are highly encouraged. Photos must be sent separately from the document so they can be converted into a publishing format. Where possible, traditional ("hard copy") photos should be sent, however, scanned and digitized copies can be used but please make as large as possible, even if you have to send them one at a time. Every attempt to return your original pictures will be made, but the JSOM will not be held accountable for lost or damaged items.

10. Send submissions by e-mail, diskette, CD, or plain paper to the Editor. E-mail: JSOM@socom.mil or by mail to: USSOCOM Surgeon's Office. Submissions may also be sent to the physical address at: United States Special Operations Command ATTN: SOCS-SG/ JSOM 7701 Tampa Point Blvd MacDill AFB, FL 33621-5323.
Retain a copy for yourself.

11. We reserve the right to edit all material for content and style. We will not change the author's original point or contention, but may edit clichés, abbreviations, vernacular etc. Whenever possible, we will give the author a chance to respond to and approve such changes.

12. Again, the JSOM is your journal. It is a unique chance for you to pass your legacy to the SOF medical community.

Take advantage of the opportunity.

USASOC

Rocky Farr, MD
COL, USA
Command Surgeon

I am beginning to write this on my way back from Hurlburt Field, Florida where the USSOCOM Biomedical Initiatives Steering Committee (BISC) just met. The BISC is the organization that helped develop the fibrin bandage that the Army Research and Material Command is making and we are fielding as an investigational new drug (IND) to our Special Operations Forces soldiers in the war. Even I have my green tag on my dog tags saying I have agreed to be treated with this IND. The BISC is also looking at and/or funding many other items and ideas to get us better things in better ways. If you have any great medical research ideas please send them to my medical research and development officer, Mr. Marak (marakj@soc.mil). Also remember medical, or other kinds of research, has to be cleared by this MACOM. In the case of medical research, it must be cleared through this office.

At the time that I'm writing this we are only eight days into the war and I am stuck watching this war on my television news. So it goes. I did however, make the one in Afghanistan, where our guys are **still** being wounded and killed. At least I managed to help get more and improved equipment into the field and into your hands to help save lives. The war is still too new to get any decent feedback on how SOF medicine is performing but I bet it is living up to its usual high standard. Our medical logistics folks, headed by Major Hank Sully, a mobilized reserve officer, have worked magic! Stand by for a lot more fielding of new medical equipment sets (MES).

Although the war is on everybody's mind, nothing else has stopped. We are still in Afghanistan as well as hundreds of other places around the world. By the time you read this, we will be into the summer permanent change of station season, assuming there is not a stop movement freeze. Several of our medical officers were selected for fellowship or residency training. The Army Surgeon General is now deciding if graduate medical education will start on time, (1 July) or not. I have chosen the summer 2003 cohort of medical officers, physician assistants, and, new this year to the Special Forces groups, physical therapy officers. All these newbies will spend the summer in various schools, such as airborne, flight surgeon, diving medical officer, and others, before arriving for assignment. I have gotten a plus up in both the number of professional officers assigned to the 160th SOAR (A) and to the SOSCOM. LTC Dakin (dakinp@soc.mil) handles assignments and the myriad of details that it takes. If you have any AMEDD officers, active or reserve, looking for a job, send them his way.

The new, updated Army Regulation 611-75, Management of Army Divers, has been published. It changes the requirements on diving medical officers

to include what badge to wear and how to be certified as an Army Special Operations Diving Medical Officer. Any doc or PA who is a military diver or DMO should read and send their diplomas, et cetera to my chief of medical training, Major Abner (abnerh@soc.mil).

Smallpox continues to go well. It is the same vaccine we used back in the dark ages when I was an 18D; no biggie. OPPLAN was written by a lawyer, so it is painful. Soldiers can be immunized and depart ASAP. Any questions, contact my chief of preventive medicine, Major Cajigal (Cajigal@soc.mil). Do not forget about anthrax and getting your numbers into MEDPROS, someday.

We should have a USASOC Surgeon's Conference before the Special Operations Medical Association conference (www.specialoperationsmedicalassociation.org) in December. So, start thinking up presentations worthy of a trip to Tampa. I am assuming, but do not know, that the Society of US Army Flight Society/Operational Aeromedical Problems course will meet with us again. We did not have a USASOC Surgeon's Conference last year because SOMA met early and that would have meant meeting Thanksgiving weekend.

Over the last two months I have seen almost all of our reserve civil affairs unit surgeons, veterinarians, other AMEDD officers, and enlisted medics as they mobilized through Fort Bragg on their way east. It was great to finally see all the faces that I have only seen previously in databases. Colonel Diamond, Major Dunn, and 1LT Goins did great work buffing them up for success. I thank them all.

Blood and how far forward to take it has been an issue. SFC Allen (allenbr@soc.mil) from my office attended a blood expert meeting in Washington, DC and we have submitted a draft policy on blood forward and walking donors to USSOCOM. For details: contact SFC Allen. Other issues at these echelons above the reality that I work at include future force structure and equipment. Special Operations aviation will gain several more flight surgeons. MAJ Abner has been working that issue. There has been a new Aeromedical Policy Letter published on performance enhancing drug use in aviators and we still have our command policy letter out on that. Intervals for various physicals, flight, and HALO, have also changed. LTC Newton has been working these issues (newtonf@soc.mil).

Accompanying this article is a photo of the Surgeon's office crew in front of Colonel Bull Simon's statue. I would like to thank them all for their hard work. We bid farewell to LTC Smith (the tall guy) who departs for National War College to become educated.

NAVSPECWARCOM

Larry Garsha, MD
CAPT, USN
Command Surgeon

Train like you fight and you will bleed less in war. Our SEAL and Marine corpsmen are testing this principle as they support their shipmates and platoons in fighting for Operation Iraqi Freedom. We have received reports of success of our training efforts as well as "wish I hads," but through it all everyone has been committed and diligent and they have saved lives. Because missions are still classified, I cannot extol individual performance in this article, but I am very proud of all of the work that NSW medics have performed. Those of you forward know who you are and I want you to take the rest of the day off.

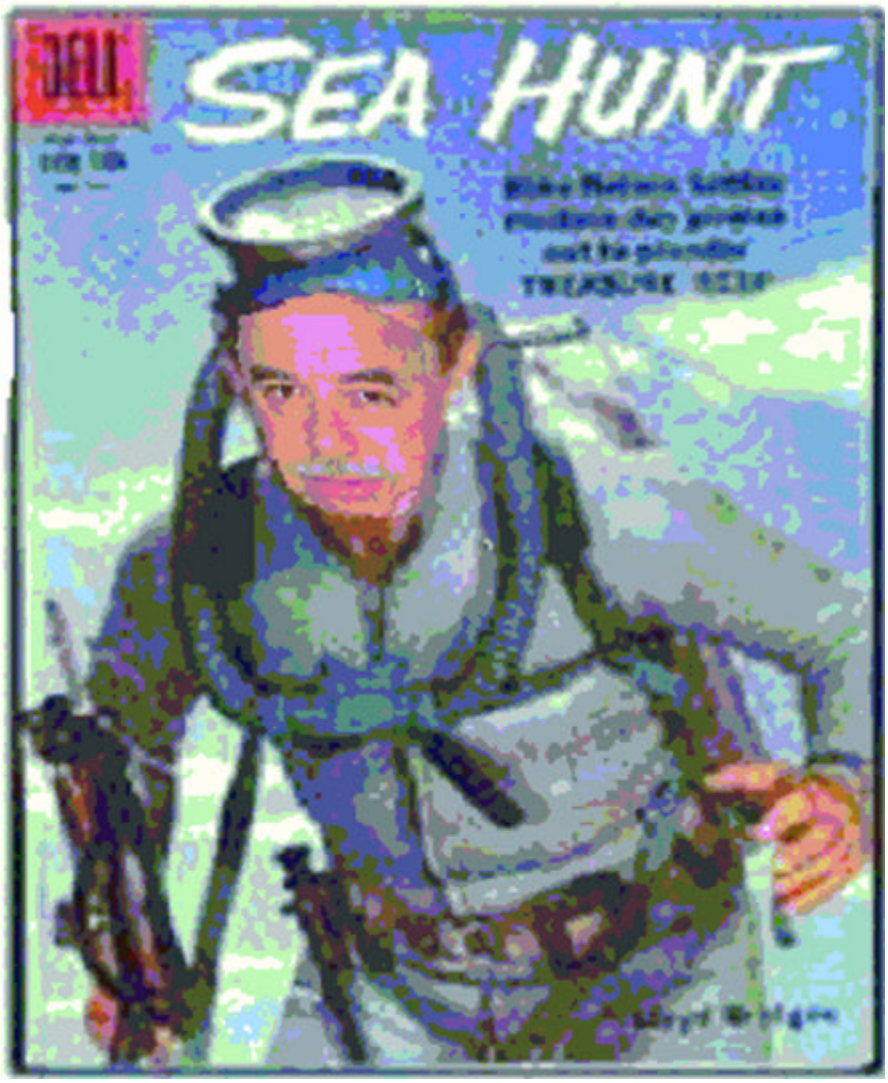
Recent news in REMFs (rear echelon medical force) includes the use of blood products as defined by theatre medical control. We have fielded the fibrin bandage and await its testing in battle. We have been advised that there is no authority or permission for use of Go Pills in SOF. The next iteration of the Tactical Combat Casualty Care is due to be published in the PHTLS guide. We need to assess the utility of colloid during this war as well as whether or not antibiotics prevented morbidity when given post wounding. The handheld pocket PCs with the SOCOM database for pre and post data collection are almost ready for deployment. Congress is making serious requests for the collection of this data and it is to the foresight of SOCOM medical leadership that SOF medicine is at the tip of the spear for this initiative.

At WARCOM, the database Special Warfare Information Medical Program has been launched for each of the component commands. Use it and it will pay off for NSW.

SSGN medical planning is on track with reps from SPECWAR, Submarine Force, and Deep Submergence. The ASDS is on track and completed half a sea trial today. It will be great when all the bugs are worked out. BUDS has added two new high-risk conditions to its protocol list: concussion and mediastinal emphysema. Both conditions were seen with increasing frequency over the past quarter. Discussion continues on whether to send SWCC Corpsmen to JSOMTC on graduation or to phase them in as the billets are filled.

SOF EMT-Paramedic cards are going to be given out per SOCOM Surgeon approval for the Corpsman/Medics who are qualified to be SOF Medics. The qualification is determined by graduation from SOCM and recertification every two years at SOFMST. The NSW Force Surgeon may recommend those who have been in NSW for a while to SOCOM for grandfather status, if they demonstrate sufficient corpsman ability. Master Chief Jefferson has the conn on the refresher training for those who are senior and did not go through SOCM training. Failure to be SOF Medic qualified will result in loss of SDAP.

This is my last submission to the JSOM. I will be PCSing to a new assignment at BUMED as the Specialty Leader for Diving Medicine, Radiation Health, and Submarine Medicine for the Navy Surgeon General. The former BUMED code 21 is now BUMED M3F7. My relief is CAPT Edward "Andy" Woods. CAPT Woods is a Rehabilitation Medicine specialist and qualified Undersea Medicine Officer. He will be coming from Director of Clinical Services, Branch Medical Clinics, Hawaii. I hope he enjoys his tour at Navy Special Warfare Command as much as I have. HooYah!



AFSOC

James Dougherty, MD
Col, USAF
Command Surgeon

UPDATE…AND FAREWELL

This will be my last journal submission as the Air Force component surgeon. I'll be leaving in a couple of months to start another job, back in the arms of Big Blue. I know my successor feels fortunate, as I have felt fortunate, to have the opportunity to serve the nation's finest. I have to confess that any sense of accomplishment I have pales in comparison to the achievements of our medical "operators" and command staff over the last three years.

The first year of the three was spent adapting to changes in the Air Force's expeditionary medical system, by robusting the training of our squadron medics, and by fleshing out our new Level II teams, the SOF MFST and CCATT. Almost immediately those elements were thrust into combat operations in Afghanistan, validating their worth over and over again by capitalizing on the Air Force's core competency in mobility by air. The combination of quick response to secure the wounded, resuscitation on scene, sophisticated care during transport by air to forward surgical teams, and early "damage-control" surgery, was a repeated success.

Where aeromedical evacuation was not available, the critical care transport teams were able to step in and apply a high level of care while moving the injured by expedient airlift to a point where the conventional system of medical care could take over.

The SOFME doc and medics further honed their skills in performing CASEVAC alert, in conjunction with pararescueman and other component medics. "Lifelines" of medical support made up of all these elements were able to reach out and pluck the casualty from harm, move them large distances, and maintain a level of care that approximates that available in many of our cities and hometowns back home.

On other fronts, the Air Force Medical Service recognized the critical skills brought to the medical mission by our flight surgeons, medics, surgical staff, and critical care personnel, by increasing our numbers, and transferring assets from other commands. The AFMS further recognized that our enlisted force has a training requirement that no other specialty comes close to matching; a skill set that takes over a year to train to. To more efficiently manage this small but precious medical "commodity," a pre-assignment training plan was approved. And, most recently, AFSOC medics have begun to train in the Special Operations Combat Medic course at the Joint Special Operations Medical Training Center, the world-class institution that conducts medical training to SOCOM standards.

Success breeds success. The fall-out from our folks' efforts to save lives and protect the force has been funding for research projects to benefit the warfighter and money to construct a new training facility at Hurlburt from current year funds ($600K).

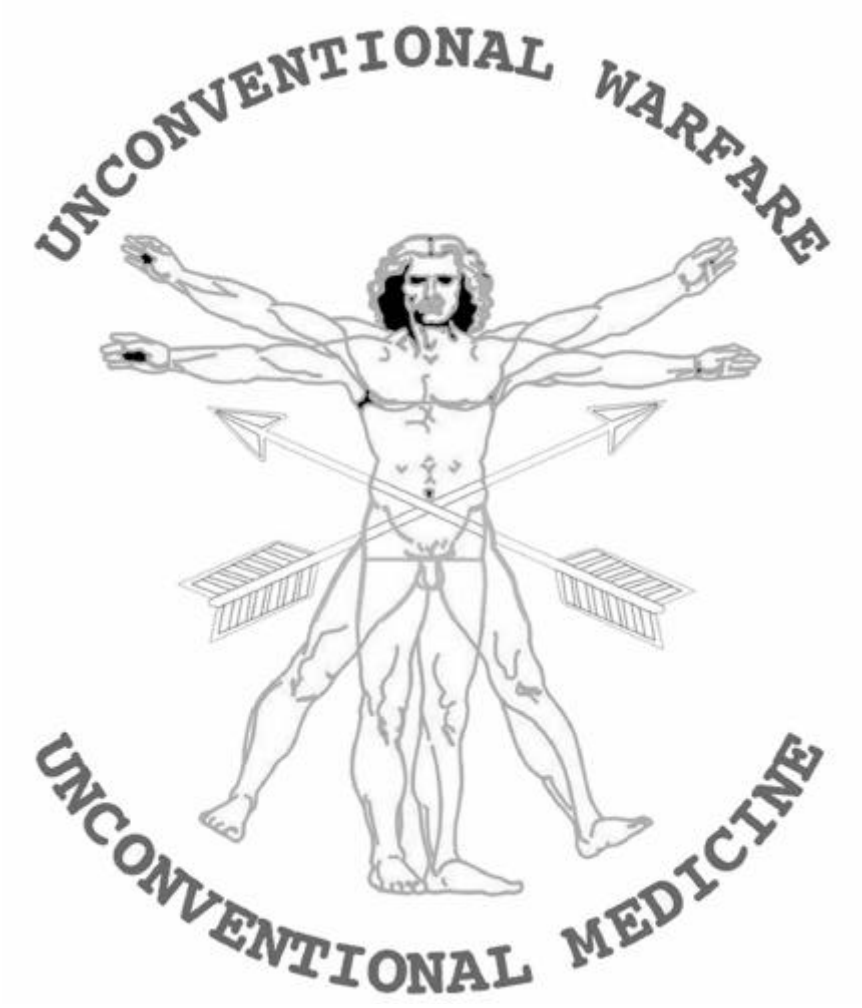
More resources flowed, this time to create a medical capability to support Foreign Internal Defense operations. Six officer and six enlisted personnel were identified to join the 6 Special Operations Squadron, a unique unit for the Air

Force: the only aviation unit in the Air Force whose mission is to train other nations' air forces to engage in combat operations. The unit's accompanying medics are also trainers: to teach foreign medical units how to support their nation's combat aviation. As trainers they step out of the direct role as medical providers, and become educators. For the line commander, those medics can often be the "wedge" that opens doors for the combat aviation package in a new foreign country.

Every medic in this command has been our best advertisement for what can be achieved. The lesson is clear: train the best, let them do their job, and the opportunities will flow. I can leave here knowing that the future will be challenging, and exhausting, but the possibilities are unlimited to serve the warfighter and their families, and support the nation's defense. I'm lucky to have been a part.

It's a wrap…

James Dougherty, Col, USAF
Command Surgeon



LTC Lou Nelon

The spring of 2003 brings with it a torrid pace for all SOF medics. With many veterans of Operation Enduring Freedom (OEF) and a talented new group of officers, NCOs, soldiers, airmen, and sailors far forward supporting current SOF operations, SOF medics continue to provide our forces with the finest combat medical support in the world! Aided by emerging technology and the previous lessons learned during OEF, SOF medicine is further validating both the requirement for and ability to provide critical surgical/resuscitative measures, CASEVAC, and aeromedical evacuation (AE) capability far forward while maintaining a very capable but small footprint.

Advances in medical technology are currently getting a great deal of visibility from multiple national media outlets. Specifically, the fibrin bandage has received the most public attention. This new product has significantly improved the SOF medic's "tool kit." However, from a Med Ops perspective, the actual employment and use of this product under Investigational New Drug (IND) protocols has proven extremely challenging. Complicated by the fact that the product was not ready for distribution prior to the deployment of most SOF into the CENTCOM AOR, the training and documentation requirements are extremely difficult at best. That being said, the combined SOF/Army Medical Department (AMEDD) training team did a laudable job accomplishing this mission.

Bottom line: Count on IND protocols in the field always being more difficult than you think and look for adequate off the shelf/non-IND alternatives. When it comes to introducing IND protocols to the field, SOF medics and commanders must carefully weigh the operational burden and potential benefit before committing to INDs. Many valuable lessons were learned with this most recent IND implementation and the USSOCOM SG will continually strive to provide a detailed assessment of operational impact vs potential benefit for future INDs.

Here at USSOCOM, along with the rest of the staff, the Surgeon's office is busy developing, updating, integrating, and implementing the new policies and procedures that are required to assume our new potential role as a "Supported Command." Besides the ongoing reorganization of the existing USSOCOM staff, future additional manpower billets are currently under review. The SG has developed a future manpower requirements document that expands both our functional and joint expertise. We are hopeful that an additional Med Ops Plans billet will be approved during this initial manpower review to allow the USSOCOM SG to better meet the new requirements and operational responsibilities of the HQs.

In addition, the Army is filling the critical Special Operations Command Korea (SOCKOR) Medical Planner position later this summer. This is good news as far as expanding the future pool of fine officers to follow the ground breaking efforts of the Air Force Medical Planners who established the first consistent and outstanding medical operations/plans expertise at the Theater Special Operations Commands (TSOCs)

Finally, within the USSOCOM SG's Office, I am leaving this summer to assume another SOF assignment and want to introduce the incoming Chief, Medical Operations. MAJ William Schiek is coming from the Directorate of Healthcare Operations, Department of the Army Office of the Surgeon General (DAOTSG), and will arrive in early June. His previous SOF experience along with his impressive operational background as a Brigade S-3 and OTSG Operations Officer have prepared him to have an immediate and significant impact in the SOF Medical Operations arena.

I am certain that the USSOCOM SG Medical Operations Team of COL Heintz, MAJ Schiek, LtCol Lorraine, and MAJ Darby will continue to provide all of our SOF medics with the best possible support - use them! I look forward to crossing paths with many of you in the future.

"I triple guarantee you, there are no American soldiers in Baghdad."
Iraq Information Minister

Except maybe for Capt John Crowe (left),
SOCCENT/CFSOCC Medical Plans Officer

Greetings from the USSOCOM/SG office

Welcome to CPT Steve Briggs as the USSOCOM Surgeon's Chief, Medical Education and Training, aka "the new guy."

I briefly want to thank the leadership who have entrusted me with this new job opportunity. I would also like to take this time to make a commitment to the SOF medics to keep an open ear to their needs.

Day three and I have learned that there are many different opinions and convictions as to what a SOF medic should be. For over 23 years I have worn a "green" uniform. Recent events and joint military operations have made me quickly think "purple." As this office moves forward to standardize and to bring the different services under one umbrella, I look forward to working with all the different SOF elements.

As the "new guy" I have recently been briefed as to the concerns of the SOF medic. "Medtruth" surveys are being read and the SOF medic's voice is being heard. From these surveys SOF medics have voiced their concerns regarding difficulty, expense, and lack of applicability of some of the task of civilian EMT-P versus what their mission truly encompass. Thus, one project that has taken the forefront is the statehood of this office for credentialing the SOF medic as a paramedic to truly reflect the needs of the SOF medic. With this comes uncharted territory and limited resources to see this come to fruition. Please have patience!

Please fill free to contact me for any SOF Medical Educational and Training needs and concerns.
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My bio is as follows:

CPT Briggs enlisted in the army in 1980. He completed his MOS and airborne training and he then served as an instructor for "Medlab" at the John F. Kennedy (JFK) School for Military Assistance. He was assigned to C/1/7 SFG(A) from 1984 until 1989 as a Special Forces Medic. He was again assigned to the JFK schoolhouse as an instructor at the Special Forces Assessment and Selection course and then "Medlab" from June 1989 to March 1994. His follow-on assignment was back to 7th Special Forces Group, this time to 2nd Battalion. He served there as an 18D, 18F, and 18Z. From April 1996 to June 1998 he attended the AMEDD schoolhouse to embark in a new career as an officer (physician assistant). He left the SOF community from October 1998 to June 2001 to broaden his knowledge of the conventional side of the Army. OK, it was a service obligation! At this time he was assigned to 2-17 Field Artillery in Korea and then 2-8 Field Artillery in Fort Lewis, WA. In Washington he reemerged in the SOF community and was assigned as the 3rd BN, 1 SFG Physician Assistant. He currently is assigned as the Chief, Medical Education and Training for the USSOCOM Surgeon's Office.

During his military tenure he has served as a SOF medical operator in both an enlisted and officer roll. He has served in Central and South America and the Pacific Rim. Joint Operations include anti-narcotic operations in Bogata, Colombia and Operation Enduring Freedom-Phillipines.

Education and qualifications include: BS, Methodist College, NC, 1994; BS, University of Nebraska, 1998; MPAS, (Family Practice), 2000; Jump Master and Flight Surgeon.

Mission of the USSOCOM Surgeon's Education and Training Section

BACKGROUND

There are many opinions and rumors of what the newly formed USSOCOM Department of EMS and Public Health and the Command are trying to accomplish. Recently, I visited the schoolhouse at Fort Bragg to attend a class graduation. While there, I talked with many of the instructors. The perception seemed to be that we (USSOCOM) are trying to take control of the schoolhouse. Let me set the record straight. It is the vision and goal of the USSOCOM Surgeon to enhance the overall medical capability across the joint operational battlefield. That's it!

Each joint Special Operational Force (SOF) medic needs to have a basic educational background in trauma medicine. It doesn't matter what color uniform that these medics wear. One cannot intelligently argue that one should be more trained than another in managing the basic combat casualty. It is reassuring and prudent for medics to know that as they trans-

fer care of a patient to another care provider that they are ensuring the patient will receive the same level of care, if not better. It is this office's intent to identify those common needs and to develop the means to meet those needs across all Services.

In 1981, as an instructor of the then United States Army John F. Kennedy Institute for Military Assistance (USAJFKIMA), it was common for individual bias, experience, and personalities to set training curriculum and standards. In the mid-80s there were revisions to USAJFKIMA and the schoolhouse; training came under TRADOC and the schoolhouse changed its name and the way they conducted training. This change did not come smoothly or without objections, as we are now encountering.

During this time there was also a public outcry for ensuring that military medicine meet "a standard of care" mimicking that set forth by the public sector. With this came the need to credential healthcare providers. The only credentialing bodies, again, were in the public sector. Thus, in the late '80s the curriculum for the Special Forces medic changed to meet the standards set forth by the civilian credentialing body, the National Registry of Emergency Medical Technicians (NREMT).

Again, from its inception, there were many medics with vast experience in the field who were opposed to this change. There were some excellent aspects to adopting the NREMT program. However, the overall resounding rejection was that it differed from many organic military medical tasks and supplanted those tasks with other NREMT requirements that had little relevance to our military mission.

"SOF MedTruth Surveys" have been sent out to the SOF medic to connect the concerns of the medics in the trenches with this office and command. It has been an overwhelming complaint/request of the SOF medic to eliminate some of these NREMT-related tasks so that they can concentrate on those tasks that directly meet and enhance their Mission Essential Task List (METL).

PRESENT

In response to the SOF MedTruth results, we are establishing a USSOCOM Statehood which will set forth a minimum scope of practice and certification of joint SOF medical assets. This will permit certification programs, such as the new SOF EMT-Paramedic, to have the flexibility to adapt educational curriculums and credentialing that is conducive to our operational needs. These tasks will focus more on trauma medicine in our SOF environment and include the different joint SOF Mission statement needs.

Homeland defense and anti-terrorism are a new paradigm. Requirements for this cutting edge mission need to be explored and protocols developed. In addition, we are leaning forward in the foxhole and exploring state-of-the-art means of providing educational opportunities for the SOF medic to ensure we sustain a relevant role in homeland defense.

Many have voiced their concern about who will recognize this state. Frankly, as long as the end product and system sets the standard, the only one that needs to recognize this is us, the military; remember "the needs of the Army/Air Force/Marines/Navy" statement. It is a standard of excellence that we will set forth to meet the needs of those medics at the initial point of care--you!

Many states recognize the NREMT as their standard. However, there are states such as California and others, that have their own standard. If you want to practice your skills in California, you need to be credentialed by California. Likewise, we (SOF) have identified specific organic needs and if you are to work as a medic in SOF you will need to meet our new state requirements. Having said this, the USSOCOM Surgeon is strongly recommending that all medics retain their NREMT/State (California, Florida, etc) credentialing so that a civilian credential can be held for individual affiliation with civilian organizations. We are looking into ways to assist those who want to maintain this standard.

It will be the input of the frontline medics and the feedback of instructors, commanders, and all concerned that make this an outstanding program! Communication is the key to making this a successful endeavor. I highly encourage your comments! As the Borg says, "Resistance is futile." Finally, in developing this we are talking to higher institutes of learning and many are interested in what we are doing and where we are going… more to follow in future editions.

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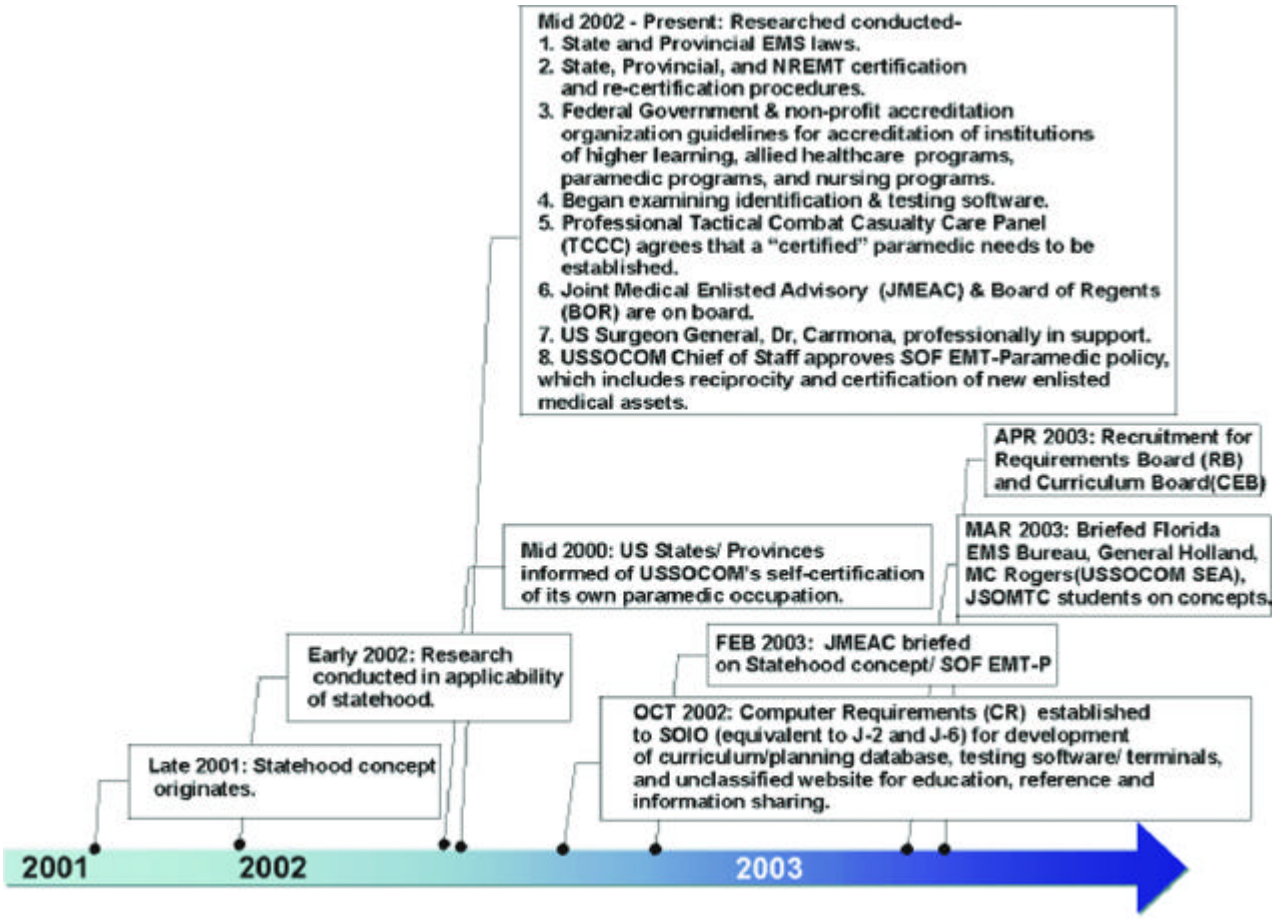


Figure 1 - Chronological History of the SOF EMT-Paramedic.

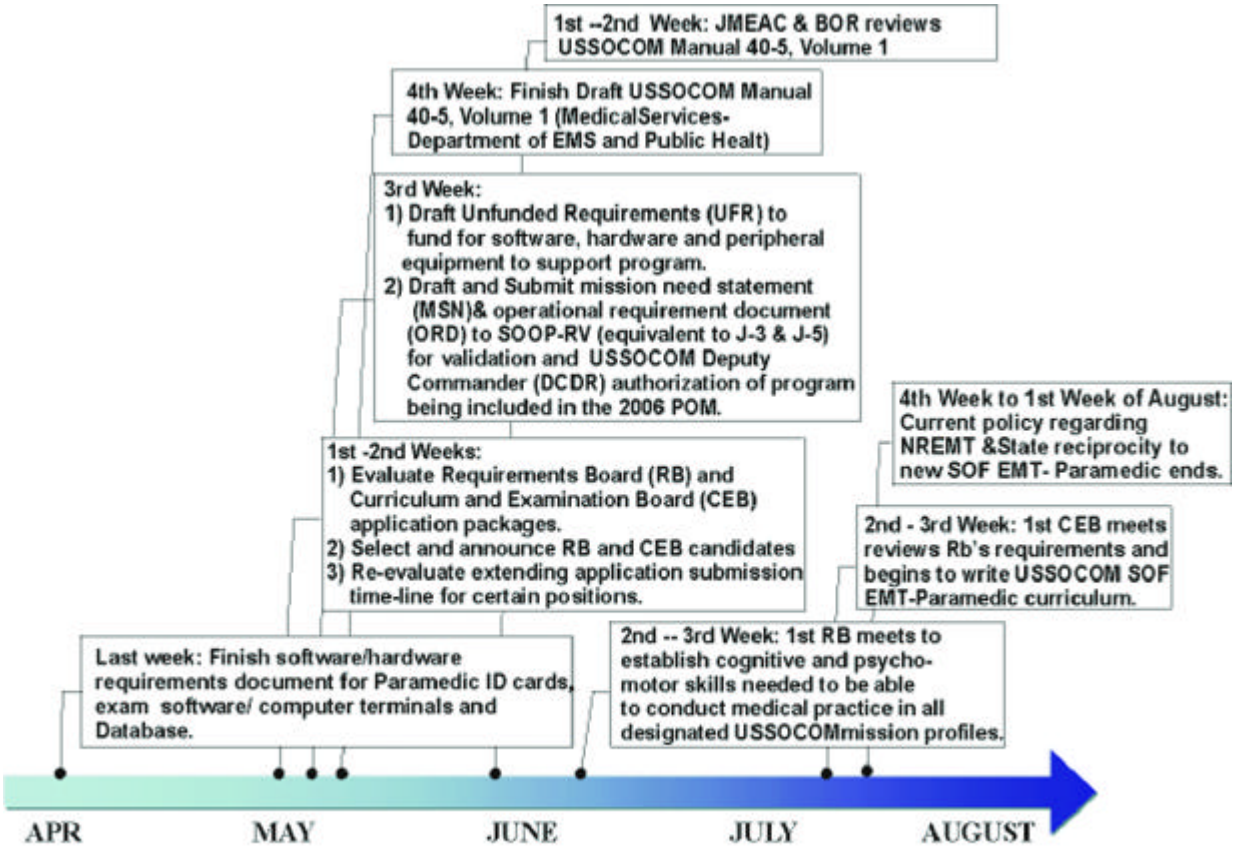


Figure 2 - Programs Short Term Milestones (Tentative, based on ongoing war efforts)

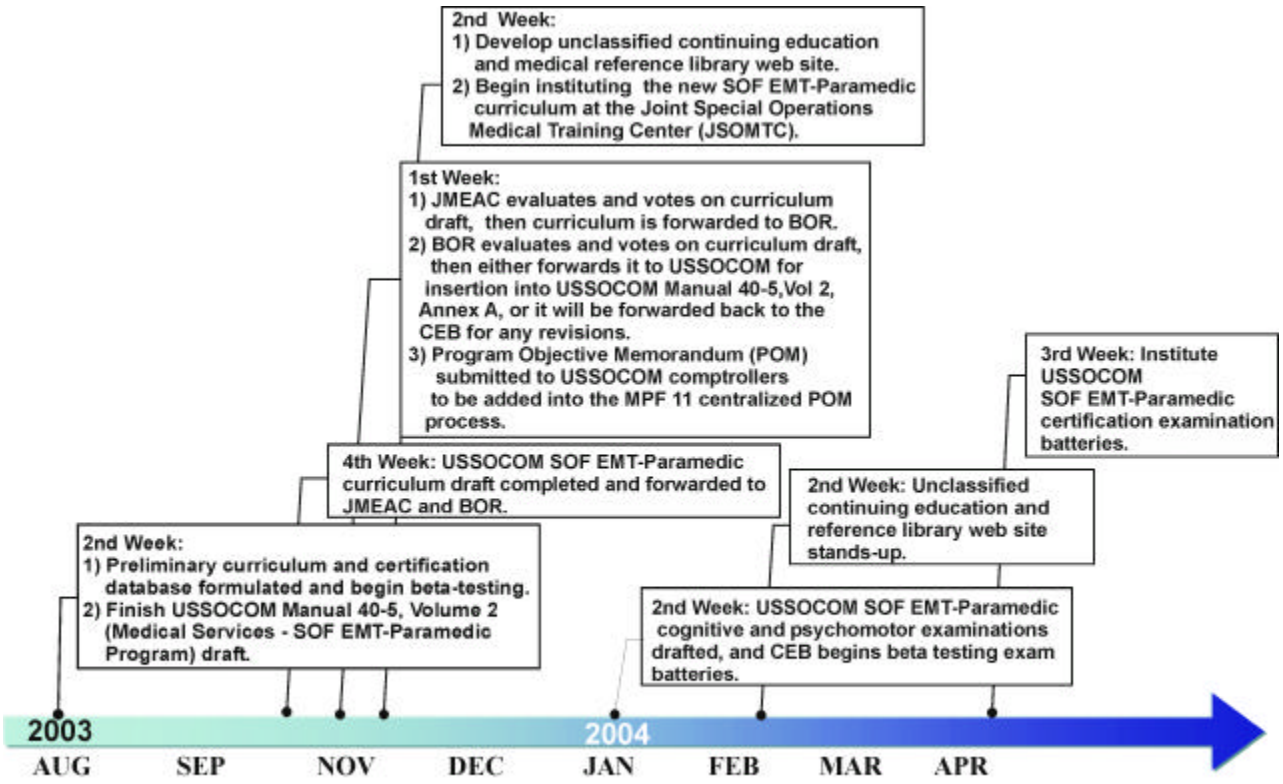


Figure 3 - Programs Long Term Milestones (Tentative, based on ongoing war efforts)

Bob Clayton

Biomedical Research and Development Update

The USSOCOM Biomedical Initiatives Steering Committee (BISC) conducted its quarterly meeting in March 2003 to discuss projects and programs that support Special Operations medical issues. One of the strong points of the BISC is the ability to rapidly address issues or requirements that come from the field. Recently the BISC funded two Combat Casuality Care panels that were focused on issues that emerged from operations in Afghanistan. The Tactical Combat Casualty Care Panel (TCCCP) was formed to review the Pre-Hospital Trauma Life Support protocols. The TCCCP Panel was made up of both military and civilian medical personnel who had extensive experience in far forward care and in emergency medicine. As a result of the TCCCP, the military chapter of the PHTLS manual is being rewritten to highlight those protocols that are relevant to military operational medicine. This will provide the foundation for developing a scope of practice that more realistically addresses the way SOF medical personnel practice their skills. Like most programs that start in SOF, a transition path has been developed so that this panel is now a DOD panel, which will be managed and funded by the Navy. Panel membership will remain as previously established, so that the continuity and momentum will continue. There are still several steps to be taken to finish the protocol approval process, but much headway has been accomplished with support coming from the Service Surgeons General, several esteemed members of the American College of Surgeons, the American Medical Association, and from the most recent "new" panel member, Vice Admiral Richard Carmona, Surgeon General of the United States. For those of you that may not know it, VADM Carmona started out as a 91B4S, a Special Forces Medical Sergeant, circa 1968.

The other panel consisted of SOF medics and corpsman that had recent experience in combat. The intent of this panel was to capture medical lessons learned, in order to determine what worked and what did not work and why. The meeting was held at the Institute of Surgical Research, in Texas. Approximately 20 medical personnel attended and were debriefed by a panel of researchers. One of the primary reasons of this meeting was to make sure that the BISC was focusing research on the needs of SOF medicine. A great spin off of this meeting was the understanding that the researchers came away with on what really happens in the field. Even those with the rose colored glasses began to understand what was important to a medic and how serious things can get down range. This was a great meeting, real medics telling how it really was and how sticks and rags medicine was saving lives, tending to the wounded, and facing reality, as sometimes no matter how hard you try, the clock runs out.

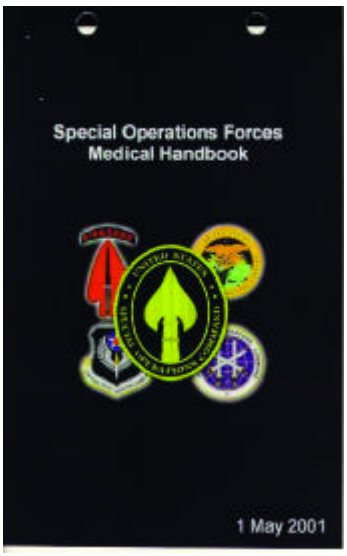
So the mission of the BISC is to fix what is broken and add some additional capability to the medic's tool kit to hopefully to add more time to the clock. I do not know if I have mentioned Mr Dave Saren before but he is the Program Manager for the Medical Technology (MEDTECH) projects. Dave is the moneyman; he supports the BISC by recommending to the Command what is funded and when. The BISC ranks and prioritizes the recommended projects. As a result of the Lessons Learned panel, those areas that were of the most concern to the medics have been bumped up for immediate funding. One of the projects is to develop new pain control for far forward use, for example, nasal ketamine. Another project is the Antibiotic Panel that was recently completed. The third project focuses on vital signs, i.e., which ones are most important to the medic in treating/managing trauma. There are several venues out there for generating feed back; I encourage each of you to energize those systems. The most direct is the SOF Truths, the SOFMSS debriefings, the Senior Enlisted Advisors, and the medical grapevine. The BISC is comprised of the Component Surgeons, wise men, but not mind readers. The Dry Fibrin Dressings are in the field under an Investigational New Drug protocol, the Chitosan Dressing has been fielded, the One Handed Tourniquet is in the field, and the SOF Medical Handbook has been published for almost two years. Sometimes no news is good news, but if you have used any of these devices, provide a little feedback; negative is fine, and if it is positive, that is fine also.

The BISC is putting the FY04 project together. If you have ideas or operational issues that need to be addressed, pass them to your Component Surgeon so they can be tabled.

Dry Fibrin Dressing

Chitosan Dressing

One Handed Tourniquet



SOF Medical Handbook

CE/CME ARTICLE

INTRAOSSEOUS VASCULAR ACCESS IN ADULTS: CURRENT STATUS AND MILITARY APPLICATION

Michael A. Dubick, PhD
John B. Holcomb, MD

ABSTRACT

Austere far-forward battlefield environments present numerous obstacles in providing adequate medical care to the injured soldier. In addition to logistic constraints that limit the volume of isotonic crystalloid fluids available to resuscitate the injured soldier, hypotension, environmental and tactical conditions including the wearing of MOPP gear, and/or the presence of mass casualties can combine to lead to excessive delays in obtaining vascular access. For many years now, intraosseous infusion has been a rapid, reliable method of achieving vascular access under emergency conditions in children. Although intraosseous infusion in adults was used extensively in the 1930s and 1940s, and a sternal puncture kit for bone marrow infusions was a common component of emergency medical supplies during World War II, only recently has there been discussion and experimental studies to evaluate intraosseous infusions in adult medical emergencies. Some medical elements of the US military having recently been re-issued and are using an intraosseous device, so it is timely to update our review of the literature on this technique. This review discusses the efficacy and safety of intraosseous infusions of drugs and fluids, including insertion times and flow rates achieved. Although the intent is to evaluate the feasibility of the technique in the injured soldier, literature cited from studies in children, experimental animals, and human cadavers are included to support the statements made and offer the reader the opportunity to read the original literature.

OBJECTIVES

1. **Describe intraosseous infusion sites for adults.**
2. **List types of fluids and drugs infused by the intraosseous route.**
3. **State feasible rate of infusion.**

Complete Test on Page 56--Answer sheet on Page 58
Completion of this article and test offers 1.0 CME and 1.2 CNE/CEH.

DISCLOSURE: The following presenters have indicated that their presentation will include discussion of commercial products or services. However, within the past two years, they have had no significant financial relationship with a commercial entity whose products/services are related to the subject matter of the topic they will be addressing or a commercial supporter of this educational activity. John B. Holcomb, Colonel, US Army; Michael Dubick, PhD, DAC

INTRODUCTION

Acute hemorrhage is the major cause of battlefield deaths in conventional warfare, accounting for 50% of fatalities.[1] In addition, in about 30% of the injured soldiers who die from wounds, hemorrhage is the primary cause of death. Many improvements in pre-hospital combat casualty care will be necessary before these traditionally high death rates can be lowered. While methods of improved hemorrhage control and the type and amount (weight and cube) of resuscitation fluids have been debated, the

actual route of fluid, drugs, and blood administration in the pre-hospital environment has been critically examined only lately. The most viable routes appear to be traditional venous cannulation with plastic catheters or intraosseous access. However, the injured soldier's hypotensive state, collapsed peripheral veins, combined with environmental and tactical conditions, and/or the presence of mass casualties are significant factors that may impede obtaining vascular access in a timely manner.

Although a recent study at an urban trauma center suggested that prehospital fluid administration in hypotensive patients with penetrating trauma offered no survival advantage when compared with patients who received little or no preoperative fluid, [2] it appears that some amount of resuscitation is required to prolong survival when the preoperative phase is greater than 90-120 min.[3,4] This endpoint of resuscitation is not well defined, but there is general agreement that some resuscitation will be required to sustain soldiers with delayed access to definitive hemorrhage control. In World War II, this endpoint was clearly defined in 2853 battle casualties as a systolic pressure of 80-85 mmHg, as long as the patient's color was good and skin was warm.[5]

Despite widespread use of venous catheters, it is recognized that potential major limitations of pre-hospital resuscitation relate to time delays and failure rates associated with obtaining vascular access.[6] In civilian emergencies, these problems have been associated with collapsed veins, clotting of the injection site, and the presence of obesity. For example, in cases of cardiac arrest or shock in 66 pediatric cases, IV access could not be obtained in 6% and required a minimum of 10 minutes in an additional 24%.[7] Under combat conditions, other than obesity, it is conceivable that these other problems will be magnified further by the difficulty of care while under fire. Furthermore, placement of venous catheters in hypotensive patients can be difficult, especially if the provider lacks regular experience in dealing with such patients. Therefore, investigations have begun to address improved methods for obtaining vascular access more rapidly and reliably, particularly in far-forward, austere battlefield settings.

Over the past two decades, an extensive body of literature has accumulated regarding the use of the intraosseous (IO) route as an emergency alternative to gain intravenous access. Most of the reports involved the pediatric patient, where the technique was considered the most useful and versatile alternative.[7,8] (A technique for insertion of an IO needle into the proximal tibia of children is described).[8] Historically, a sternal puncture kit for bone marrow infusions in adults was included in emergency medical supplies during World War II and was used to some extent.[9-13] Several accounts of recent intraosseous use in the adult trauma patient have also been published. These devices are FDA approved and are becoming readily available in trauma rooms and pre-hospital environments. A recent study with cadavers at the Walter Reed Army Institute of Research reported that Army Special Forces medics, Navy corpsmen, and Air Force pararescuemen found currently available intraosseous devices and needles easy to use.[14] In addition, certain medical elements of the US military have recently been issued a sternal intraosseous device and Special Operations Force medics have reported using this device during the recent conflict in Afghanistan. Use of IO devices is now being introduced into the training of US Army medics (91W). Since these devices are becoming more popular, we will review the available literature on their use. This paper will present a general overview of intraosseous infusion including history, known complications, types of fluids and drugs utilized and their rates of infusion, as well as the potential for intraosseous infusion in military operations. Many of the recent clinical studies have involved children, while others employed experimental animals and cadavers. Nevertheless, these studies are considered essential for this review to validate the technique for use in adult emergencies and provide essential information for potential users regarding practical insertion times, ease of use, and infusion rates for various fluids and drugs.

BACKGROUND

It was recognized in the early 1920s that the bone marrow could represent a non-collapsible "vein", thereby providing a means for obtaining rapid vascular access.[15] IO infusion techniques were widely used in emergency situations during the 1940s and 1950s where IO infusion of blood, fluids, and drugs into red marrow of the sternum or tibia was shown to rapidly and reliably enter the circulation.[16-23] For example, Tocantins showed that injection of Congo red dye into the rabbit tibia took approximately 10 seconds to reach the central circulation.[16] In fact, a review of the literature in 1990 indicated that any substance infused intravenously could be injected IO,

and substances injected into the bone marrow were almost immediately absorbed into the general circulation.

The use of IO infusion began to wane with the rapid development of plastic catheters and routine venous cannulations in the 1950s and 1960s, which generally could be left in place longer than IO needles. A renewed interest in IO infusion developed in the late 1970s as IO infusion into the tibia became an accepted practice for emergency vascular access in infants and children,[8,25-29] although other sites were used successfully as well.[30]

INFUSION SITES

The red marrow of long bones becomes slowly replaced by yellow marrow after age five. It is perceived that successful IO infusion requires red marrow, accounting in part for Fiser's recommendation of the tibia for children and the sternum for adults as ideal sites for IO infusions.[24] However, yellow marrow contains numerous venous sinusoids that can support modest IO infusion rates under standard infusion pressures.[13] Recent studies with human cadavers indicate that vascular access was achieved by injection into the yellow marrow[31] or in bones without a medullary cavity.[32] In addition, others have reported acceptable success rates for IO infusions in adult patients.[28,33,34]

In adults, the sternum, ankle (medial malleolus), or bones of the pelvic girdle remain sites of red marrow and have been re-examined as sites for IO infusions.[33-35] The clavicle also has been used successfully as an IO infusion site in adults.[36,37] The sternum is attractive as an IO infusion site for adults because it is a soft bone, has wide marrow space of relatively uniform geometry and lies under only a thin layer of skin.[35] The potential danger of using the sternum is that it overlies major vascular structures, and early studies reported that sternal infusions should not be attempted in children under three years of age.[27,38] Current sternal IO access devices are being developed with a high margin of safety, such that bone puncture through to the underlying blood vessels or heart in adults is not likely.[33,35]

The tibia has an advantage for IO access in that it has a large marrow space, but the outer cortical bone is very hard and manual IO devices cannot be placed easily in the adult tibia. However, tibial injection sites have been achieved successfully in adults,[34,39] most recently with an automatic device.[39,40] This device, known as a bone injection gun, incorporates a loaded spring to inject the needle into the tibia as illustrated and described, although the authors state that use in other sites is possible.[39] In addition, devices specifically designed for infusions into the adult sternum have also been developed.[33,35] *Table 1* summarizes the various intraosseous infusion sites explored experimentally in animals or clinically. Some sites have been utilized on numerous occasions, while the use of other sites reflect anecdotal reports. Taken together, these studies support the likelihood for at least two viable intraosseous infusion sites for adult emergencies.

INTRAOSSEOUS INFUSIONS

Over the years various drugs, fluids, and blood have been infused successfully into intraosseous sites in children and adults, as well as in experimental animals. Numerous studies have reported that effective anesthesia (local and general) in both children and adults can be achieved through the IO route.[39,44-46] In addition, IO sites were effective for emergency resuscitation in children[27,44,45] and for fluid resuscitation from hemorrhagic shock in experimental animals.[46-49] Representative drugs and fluids infused through an IO route are listed in *Table 2*. Some of the more common emergency drugs and fluids, such as Ringer's lactate and blood, have been infused IO by multiple emergency medical personnel or investigators in humans. IO infusion of investigational drugs and contrast media and dyes have generally been infused in experimental animals, although a few have been investigated in both animals and humans. In general, IO infusions have been applied in treating the entire spectrum of adult trauma scenarios, such as dehydration, hemorrhage and traumatic injury, cardiovascular collapse, and burns,[19,24,50-52] i.e., similar types of injuries and conditions that may be encountered in military casualties.

It was recognized that the tortuous vascular architecture of bone marrow presents substantial hydraulic resistance to infusions. Watson, et al [53] reported that this hydraulic resistance accounted for about 90% of the total resistance, and that there was little contribution of resistance from the IO needle itself. It has been shown that drugs, blood, and fluids can be delivered at acceptable flow rates of 20-25 ml/min via pressure bags at 300 mmHg or other high pressure infusion pumps.[31,35,53,54] As a consequence, a number of studies have reported essentially identical plasma concentrations or onset of physiologic effects of drugs and fluids when IO infusions were compared with both central or peripheral intravenous (IV) infusions in experimental animals.[46,55-62] *Table 3* summarizes typical flow rates achieved under various experimental conditions and how they compare with standard IV

infusion rates. For example, in a swine model of cardiac arrest, Spivey, et al [60] reported that sodium bicarbonate infusion via an IO route was equivalent, if not better than, peripheral intravenous infusion in raising blood pH. Warren, et al[59] compared infusion rates of normal saline through different IO infusion sites and at different infusion pressures in both normo- and hypovolemic piglets. They concluded that although there were statistically significant differences in flow rates among sites, they did not believe they were clinically significant, suggesting that infusions via the various IO sites were similar to an IV infusion. In addition, preliminary studies with adults or human cadavers have reported success rates of insertion and infusion of 80-100%, and times to successful infusion typically ran one minute or less.[21,39,63,64] *Table 4* summarizes the reported success rates and times to IO insertion in human patients and cadavers. As shown, the majority of insertions were completed within two minute in all studies.

Based on attempts at rapid IO infusion of large volumes of isotonic crystalloid solutions for resuscitation from hemorrhagic shock in animal models, it was concluded that such IO infusions may be useful to resuscitate small children, but would be impractical in adults.[27,31,46-48,65] Thus, some investigators concluded that under such circumstances, IO infusion would be acceptable initial therapy for adults, but that an IV should be started as soon as possible if the intent is to infuse large volumes of fluid.[46] This presumed limitation of IO infusion in adults has spawned recent studies to investigate IO resuscitation of hemorrhagic hypovolemia with hypertonic saline/dextran solution (7.5% NaCl/6% Dextran-70; HSD).[49,66] Since HSD is infused as a small volume resuscitation (at about 1/10 the shed blood volume), it could be infused via the IO route in adults in a timely manner. Perron et al[67] showed that a 250 ml dose of HSD (the proposed adult clinical dose) could be administered IO within four minutes through a sternal access device that automatically adjusts for variations in tissue and bone thickness to prevent the danger of puncturing underlying tissues.[63,66] Using this sternal access device, Dubick et al[68] evaluated hemodynamic variables and electrolyte concentrations, as well as evidence for histological abnormalities in lung and sternum, in euvolemic swine infused with a 4 ml/kg bolus of HSD via either the sternal IO or IV route. They observed virtually identical responses in hemodynamic variables, plasma volume expansion, changes in plasma protein concentrations and hematocrit, as well as plasma electrolytes when evaluated over the initial 120 minutes following infusion. Similarly, rapid restoration of hemodynamic variables was reported in hemorrhaged, conscious sheep, following HSD infusion into the sternum or through a central venous catheter.[66] Other studies have reported the effectiveness of IO infusion of HSD in resuscitating animals from hemorrhagic hypotension.[69-71] Consistent with previous studies, they found that delivery of an effective dose of normal saline was limited by the large volumes required and the high hydraulic resistance in the marrow. To date only one study has investigated IO infusion of HSD in humans. Chavez-Negrete et al[72] infused HSD IO and IV to patients with gastrointestinal bleeding. They found that HSD reduced the total fluid and blood requirements in these patients compared with standard of care infusions, and that sternal IO infusion of HSD was as effective as an IV infusion with no deleterious effects observed.

In addition to delivery of drugs and fluids, the IO site has been used for sampling to analyze blood chemistries, $PaCO_2$, pH, and hemoglobin, for typing and crossmatching blood and to detect latent malaria or other tropical diseases.[7,13,24,73,74] However, Ros et al[75] suggested caution in the microscopic evaluation of blood smears taken from an IO line, at least within the first 30 minutes after an IO infusion, as they observed changes in differential white blood cell counts and red cell morphology. Also, Hurren[74] reported that values obtained for potassium and glucose from blood obtained intraosseously were more variable than those obtained through standard IV lines.

In all, these studies support the feasibility of IO infusion of fluids and drugs in adult emergencies. The major limitation appears to be in attempting to infuse large volumes of isotonic fluids in a timely manner. However, historic data, human studies, and a growing body of animal data suggest that limiting the amount of fluid infused may be more beneficial until hemorrhage control is achieved.[2]

Safety of IO Infusions

Acceptance of the IO route as an alternative means to gain vascular access in emergency situations has been somewhat limited due to lack of knowledge, training, and safety concerns. Relevant to adults, these concerns include extravasation of drugs and fluids into soft tissue with development of compartment syndrome, bone fracture at the site of injection, and particularly, osteomyelitis and fat or bone emboli.

Complication rates reported after IO infusion into both the sternum and tibia appear to be similar to those reported following IV infusions of the same drug.[38,76] As might be expected, complication rates decreased with familiarity and experience of the technique.[7] The consequences of IO complications, such as osteomyelitis or extravasation of infused drug or fluid into soft tissue however have potentially greater clinical significance than complications following IV infusion. In general, extravasation of fluids and drugs typically has been associated with improper insertions or multiple insertion attempts into the same bone, rather than the type of IO needle employed, and has been implicated in the development of compartment syndrome in children and experimental animals when an extremity site is utilized.[77-81] Studies have shown that plasma concentrations of drugs are lower when infused into bone where multiple IO attempts have been made compared to a single insertion.[82] Therefore, every effort should be made to achieve IO access after a single attempt. An overall evaluation of IO infusions indicates that significant complications are relatively rare,[7,24,76,83,84] although some cases have been reported. This suggests that aseptic technique in the use of IO devices is both practical and effective. In addition, studies in children have reported that osteomyelitis was avoided if the IO needle was removed before 24 hours.[84] Current standard-of-care practice recommends that the IO device should be removed as soon as more conventional intravenous access can be obtained. It should also be noted that although fat emboli appear to be a common occurrence following IO infusions of fluids and drugs, they do not seem to have clinical consequence, [7,85,86] even when infusions are administered under pressure.[87]

In practice, there are conditions where IO infusion should be avoided, such as the IO site is on a fractured bone, infusion through dirty skin, or the presence of infection at the injection site.[7,76] In military scenarios, IO infusion through dirty skin may be unavoidable, but chances of infection can be minimized by replacing the IO needle with an IV line as soon as possible. The presence of bone diseases, such as osteoporosis, osteopetrosis, and osteogenesis imperfecta, are considered as contraindications for IO infusion, but may not be absolute limitations.[7] Nevertheless, the chances of encountering these diseases in military personnel are almost nil.

A review of IO complications by Fiser,[24] based almost exclusively on pediatric use in the tibia, reported an 80% success rate of insertion, and a 20% failure rate due to missed landmarks, a bent needle, lack of red marrow, or osteopetrosis. Other failures related to the needle slipping off the bone or the bone was harder than expected.[84] A 0.7% incidence (5/694) of localized cellulitis and formation of subcutaneous abscesses was observed. In addition, the incidence of osteomyelitis was observed to be 0.6% (27/4270)[24] and was often associated with continuous infusions for over 24 hours. In adults, recent use of IO access has been limited, so the success rate and complications await further clinical studies. However, Iserson and Criss[84] reported that radiographic evaluation of IO sites in humans 6 to 16 weeks after insertion, revealed no defect or bony distortion and Macnab et al[33] reported no complications or complaints at two months after sternal IO insertions in 50 patients.

Extensive histologic examination of the sternum and lungs two hours after HSD infusion reported a similar incidence of minimal lung inflammation, whether HSD was infused IV or IO.[68] Focal hemorrhage at the IO site was observed, as well as a small 2 to 5 mm region of hypocellularity.[66] None of the reported lesions was rated severe. In addition, extravasation of fluid into the skin above the sternum was not observed. In sheep, no physiologic nor histologic evidence of pulmonary embolism was found following IO infusion of HSD.[89] At one to two days following infusion, hematopoietic cells exhibited a focal washout in the vicinity of the infusion site. Histological specimens from the infusion site at two to six weeks after infusion showed replacement of hypocellular areas with fibrous tissue. All these changes were confined to within a 3 mm radius of the injection site. In the HSD studies, incidence rate and severity of lesions around the IO site appeared to be slightly higher in the normal saline group, reflecting the much greater volumes of normal saline required to achieve the same physiologic endpoints. Pollack et al[90] also did not observe significant adverse effects to tibial bone marrow in swine infused IO with standard emergency resuscitative medications and followed for up to three months. Also, neither the osmolality of the fluid nor its rate of infusion was related to histopathologic changes in the bone marrow of swine.[91] In contrast, it has been reported that 5% NaCl, administered IO in the proximal tibia of dogs, caused some marrow necrosis and endosteal damage, but the volumes required to induce these effects were not mentioned.[70] Most recently, Alam et al[92] reported that multiple IO infusions of hypertonic saline caused severe necrosis of the tibia two days after its infusion into the tibia of dehydrated pigs. Although these studies need confirmation, based on toxicity studies

of HSD and its individual components, large volumes of hypertonic fluids of any composition could be expected to induce tissue necrosis if the dose extravasated into soft tissue. Taken together, these studies may suggest limiting IO use of hypertonic fluids to a single dose, but they should not detract from the large body of literature citing the successful application of IO infusion for resuscitation in emergency situations.

TRAINING

Available evidence suggests that along with good medical care, proper training and practice will minimize most of the complications reported with IO infusions. Thus, training becomes an important component in the use of intraosseous infusion for obtaining vascular access under emergency conditions. Paramedics, emergency medicine residents, and nurses have employed chicken and turkey bones for training, and report that the technique is easily learned, even by observation.[44,83,93] These insertions have been successful even when traveling in emergency vehicles.[93] In contrast, data suggest that placing an IV line in a trauma patient in a moving ambulance takes 10-12 min with a 10% to 40% failure rate.[6] When properly inserted, dislodgement of the IO needle or device is rare. Although no definitive comparison studies have been performed, proper IO placements are potentially more stable than IV catheters, particularly under transport conditions or through thrashing motions by the patient.[12] In most studies, a one hour lecture, followed by one hour of hands-on experience has been considered sufficient training for paramedics and military first responders.[83,93-95] Similar observations were made most recently at the Walter Reed Army Institute of Research.[14] The specialized manikins available to teach pediatric IO access could be modified for training military and civilian first responders. While the use of local anesthetics prior to insertion of IO needles in children is uncommon, the need for application of local anesthetics at the insertion site, particularly the sternum, in conscious adults has not received much attention and requires evaluation.[39] It should be emphasized that IO is an option for obtaining emergency vascular access in a timely manner, and its application should not be used to imply that the health care provider is not proficient with IV access. It should also be mentioned that the current alternative for when standard IV access fails is a venous cutdown. This is not a trivial procedure in the hospital setting and is clearly much more difficult and time consuming in the field environment or under battlefield conditions. For example, a recent study in cadavers observed that the success rate for obtaining venous access was higher (92.3% vs 69.2%) using the IO route than a saphenous vein cutdown technique respectively and the number of critical and non-critical errors were significantly less in the IO group.[40]

CONCLUSIONS

Intraosseous infusion has been shown to be a rapid, reliable alternative to achieve vascular access under emergency conditions in children. Based on the available evidence discussed in this review, intraosseous infusions in medical emergencies in adults should be as reliable as it has been in children. In studies with experimental animals, adults, and human cadavers, the intraosseous route through the tibia and sternum primarily has been effective for the delivery of emergency drugs, fluids, and blood. Furthermore, it is possible to crossmatch blood and to obtain standard laboratory values through the IO route.[24,73] It appears to date that any drug or fluid infused IV is compatible with IO infusions.[7] In addition, the technique appears to be safe with few complications if aseptic conditions can be maintained and prolonged infusion times and multiple insertion attempts into the same bone are avoided. In addition, it is recommended that the IO needle be replaced as soon as more conventional IV access can be established. This practice would be similar to present standard-of-care replacement of pre-hospital IV lines once the patient has reached a definitive treatment facility. However, the majority of recent studies have involved emergencies in children and much remains to be evaluated in the use of IO infusion routes in adults. Future investigations will need to define the limitations of IO use in adults and preferred infusion sites, particularly as they pertain to use in combat situations. Other efforts will be needed to evaluate existing IO infusion needles and more automatic devices and to make necessary improvements. The ideal device or needle should be small, lightweight, reloadable or reusable, inexpensive, and easily inserted under any condition including blackout, yet be rugged enough to function in the tactical battlefield environment. A small, battery-powered device using disposable IO needles is currently under development to meet this need, but other devices are currently available.[96,97] Again, the IO technique is not advocated as a replacement for conventional IV techniques. Instead, it should be considered as a viable alternative under emergency situations where gaining vascular

access is imperative, but conditions (e.g., combat environments, wearing MOPP gear, etc) make it extremely difficult for even the most experienced healthcare provider to obtain IV access.

TABLE 1

INTRAOSSEOUS INFUSION SITES

SITE	SPECIES
Tibia	Human (Adults[39] & Children[29]), Pig[58], Cat[20], Rat[20], Dog[60], Cow[54], Sheep[53], Horse[55], Goat[98], Rabbit[48]
Ankle (Medial malleolus)	Human (Adults)[39], Pig[58]
Sternum	Human (Adults)[16], Pig[68], Sheep[66]
Iliac Crest	Human (Adults)[21]
Clavicle	Human (Adults)[36]
Femur	Human (Children)[29], Pig[58], Rat[20]
Humerus	Human (Children)[18], Pig[58]
Calcaneus (Heel)	Human (Children)[30]

Superscripts denote representative references

TABLE 2

DRUGS AND FLUIDS INFUSED IO IN HUMANS AND EXPERIMENTAL ANIMALS

Anesthetics	Cardiac & Vasoactives Agents	Fluids	Anticonvulsant	Neuromuscular Blockers	Antimicrobials	Other
Propofol[99]	Epinephrine[44]	Blood[23]	Phenobarbital[82]	Pancuronium[41]	Amikacin[56]	Diazepam[83]
Bupivacaine[100]	Dopamine[45]	Normal Saline[75] Plasma[51]	Phenytoin[104]	Vecuronium Bromide[105]	Clindamycin[108]	Heparin[76]
Lidocaine[44]	Dobutamine[45]	Lactated Ringers[7]		Succinylcholine[43]	Penicillins[34]	Contrast Media[36]
Sodium Pentothal[21]	Isoproternol[102]	Hypertonic Saline[76]	**Analgesics**	Atracurium[107]	Chlortetracycline[21]	Sodium Bicarbonate[44]
Ketamine[101]	Atropine[44]	7.5% NaCl/ 6% Dextran (HSD)[49] Dextran[21]	Morphine[106]	Suxamethonium[106]	Sulfadiazine[21]	Calcium Chloride[57]
	Adenosine[55]		Fentanyl[101]		Vancomycin[109]	Antitoxins[76]
	Digoxin[21]	4.5% Human Albumin[7] Hypertonic Glucose[23]				Methylene blue[110]
	Ephedrin[54]	Hydroxyethystarch[57]				Methylprednisone[77]
		Dextrose[44]				Vitamins[21]
		Isosal[103]				

Superscripts denote representative references. This table is not all inclusive. The reader is referred to the references for other drugs and experimental agents infused through the intraosseous route.

TABLE 3

SUMMARY OF INTRAOSSEOUS FLOW RATES OF DIFFERENT FLUIDS FROM PUBLISHED STUDIES

Investigator	IO Site	Infusion Device	Species	n	Flow Rates	Comments
Macnab et al[33]	Sternum	FAST device	Human adults	50	80 ml/min 150 ml/min	Gravity flow By syringe bolus
Iserson[34]	Malleolus	13 ga Jamshidi needle	Human adults	22	5-12ml/min	Flow under 300mm Hg pressure for 20-80min
Iserson & Criss[88]	Malleolus	13 ga Jamshidi needle	Human child, 9Kg	1	200ml/hr	Maximum rate for 5% dextrose
Waisman & Waisman[39]	Tibia & Malleolus	Automatic Bone injection device	Human adults	50	5-10ml, 15-20ml, 30-40ml/min	Crystalloid under gravity flow & under 300m Hg pressure manual pressure to syringe
Iwama, et al[36]	Clavicle, Lilac & Tibia	18 ga cook IO needle	Human adults	29 21 15	11.9±0.7ml/Kg/h3 2.2±4.5818.9±1.3	Flow by site under gravity & 59mm Hg. Compares to subclavian vein flow of 15.2±1.5ml/Kg/hr.
Hurren & Dunn[51]	Tibia	Spinal needle	Human child, 13Kg	1	50ml/hr	Total of 776ml of fluids infused over 48hrs
Guerrero, et al[64]	Sternum	Sternal access device, 15 ga shaft	Adult cadavers	68	50-100ml/min	Required 465-1000 mm Hg pressure
Watson, et al[53]	Tibia Sternum	15, 16, or 18ga needle	Adult cadavers, pigs, & sheep	20 10 6	Up to 180ml/min	For RL required 2000-2500mmHg pressure
Perron, et al[67]	Sternum	Sternal access device, 15 ga shaft	Sheep	6	50ml/min50ml/min	Flow for NS under 525±240mm Hg pressure
Neufeld, et al[47]	Tibia	18 ga spinal needle	Piglets	1	50ml/min	Flow for NS with manual pressure of 450-475mm Hg over 20min
Schoffstall, et al[65]	Tibia	18 ga spinal needle 13 ga marrow needle	Pigs 5.8Kg, 14.4Kg	8 8	5.8,19.2*ml/min 3.7, 14.5* 17.4, 51.9* 13.6, 45.9*	Flow for saline: gravity or *300mm Hg pressure. Flow for blood, gravity or *300mm Hg saline under gravity or *300mm Hg
Warren, et al[59]	Humerus,Femur ,Tibia, & Malleolus	13 ga bone marrow needle	Pigs, 12-23Kg	23	11.1, 41.3* ml/min 9.3, 29.5* 4.3, 17.0* 8.2, 24.1*	Flows by site under gravity on *300mm Hg. Compared to peripheral IV flows of 13.1 or 40.9* ml/min
Shoor, et al[54]	Tibia	13 ga needle	Calves	6	10±2ml/min27±23 2±141±2	Gravity + 60 mm Hg for NS100 mmHg200 mmHg300 mmHg
Hodge, et al[46]	Tibia	20ga spinal needle 13ga bone marrow needle	Dogs, 4-6Kg	4	11, 24*ml/min 13, 29*	Flow for LR, gravity or *300mm Hg
Gunal, et al[81]	Tibia	20 ga spinal needle w/stylet	Dogs, 13-17Kg	7	8ml/min	Normal saline

TABLE 4

TYPICAL INSERTION TIMES FOR ACHIEVING INTRAOSSEOUS ACCESS

Investigator	Device	Patients	n	Insertion Time	Comments
Macnab et al[33]	FAST sternal access device	Human adults	50	77+ 51 sec	Mean + SD
Guerrero, et al [64]	Sternal access device	Adult cadavers	68	12.5 ± 5.7 sec	
Schafer, et al [31]	15 ga Jamshidi needle	Adult cadavers	25	Range: 4-30 sec	
Iserson [34]	13 ga Jamshidi needle	Adults	22	≤ 1 min	
Iserson & Criss [88]	13 ga Jamshidi needle	Children, Adults	105	≤30 sec	
Waisman & Waisman [39]	Automatic bone injection device	Adults	50	1-2 min	From decision to infusion initiated
Fuchs, et al [93]	15 ga Jamshidi needle	Simulated pediatric model	12	Ranges 19.1 - 93.4 sec 13.8 - 158.5 sec 13.6 - 133.1 sec	At scene en route to FED w/ turns stop & go driving
Seigler, et al [44]	15 or 18 ga Jamshidi needle	Children	17	≤ 1 min	
Seigler [83]	15 or 18 ga Jamshidi needle	Children	69	≤ 1 min 1 -2 min	57% of patients 26% 10% 7%
Banerjee, et al [50]	18 ga spinal needle with stylet or 16 - 18 ga Hypodermic needle w/ stylet	Children	30	67 ± 7 sec	Success rate33% of IV cannulation within 5 min. Successful IV's took 129 ± 13 sec.

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Dr Dubick is currently the Senior Research Pharmacologist for the US Army Institute of Surgical Research at Fort Sam Houston.

He has a broad research and scientific background in pharmacology, nutrition, physiology, and toxicology. His research investigates fluid resuscitation of hemorrhagic and burn shock including the use of small volume hypertonic/hyperoncotic fluids and the use of intraosseous devices to deliver such fluids. Dr Dubick's research also investigates the mechanisms of oxidative injury as they relate to traumatic injury and the role of antioxidants in modulating secondary consequences of trauma.

Dr Dubick holds a PhD, Pharmacology and Nutrition, University of Southern California, 1978; a MS, Physiology, University of Southern California, 1975; and a BA, Zoology, University of California, Los Angeles, 1972. He has numerious performance awards from the US Army Medical Research and Development Command and the US Army Institute of Surgical Research. He has published 109 peer-reviewed articles, and 166 abstracts and presentations.

COL John Holcomb

Colonel John B. Holcomb graduated from Centenary College in Shreveport, LA, followed by the University of Arkansas Medical School in 1985, and completed his General Surgery Internship at William Beaumont Army Medical Center (WBAMC) in El Paso, TX. He was assigned as Clinic Commander in Sinop, Turkey from 1986-1987, and then returned to El Paso for completion of his surgical training. In 1991 he was assigned as a staff surgeon at Womack Army Medical Center, Fort Bragg, NC and with the Joint Special Operations Command, providing surgical capability for Special Operations assets. He deployed with JSOC for 9 years, and the experiences over those years continue to guide his research interests. Other past assignments include Chief of Trauma and then Assistant Chief of General Surgery at WBAMC, Chief of the Military Trauma Research Branch at the US Army Institute of Surgical Research, Director of the Joint Trauma Training Center at Ben Taub General Hospital, Houston, TX, and Associate Professor of

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TACTICAL SAFETY CONSIDERATIONS FOR CLANDESTINE LABORATORY MISSIONS

Christopher Trumble

ABSTRACT

Tactical operations conducted against clandestine laboratories are some of the most dangerous missions that special operations forces (SOF) personnel will encounter. The aggressive search for terrorists and terrorist involvement in drug manufacturing will have SOF personnel facing clandestine laboratories on an ever-increasing basis. This article discusses the importance of having qualified personnel assess health and safety issues, and highlights pre-mission, personal protective equipment (PPE), firearms discharge, and post-mission considerations associated with clandestine laboratory missions. Many of the safety considerations outlined in this article have application in confined space situations or where terrorists use chemicals and/or flammable materials to attack or defend a position.

Clandestine drug laboratories are not only encountered in the continental United States (CONUS) but also throughout the world. Special operations teams are regularly tasked with drug interdiction work due to the propensity for violent resistance to occur during raids. Not only the threat of "conventional weapons" (knives, guns, blunt instruments, explosive devices) exists but also, in the case of clandestine laboratories, there is the threat posed by the hazardous material (HAZMAT) environment. The intent of this article is to underscore the importance of having qualified personnel assess health and safety issues, and to highlight pre-mission, personal protective equipment (PPE), firearms discharge, and post-mission considerations associated with clandestine laboratory missions.

The following considerations are just that: considerations. Each situation will be slightly different and require some flexibility while still adhering to your agency's or department's standard operating procedures.

HEALTH AND SAFETY ISSUES

The production of street drugs involves the use of a number of chemicals that act to synthesize, extract, and purify (to a degree) the final product. The chemicals commonly encountered in these labs can be divided into three primary groups or classes: precursors, reagents, and solvents. The threats posed by these agents include high flammability (e.g., acetone, diethyl ether, ethanol, isopropanol, and petroleum ether), poison risk (e.g., metal poisons like mercuric chloride and lead acetate), respiratory irritation (e.g., acetic anhydride, hydriotic acid, hydrochloric acid, and methymine), and physical damage from strong acids (e.g., hydriotic acid, hydrochloric acid, nitric acid, and sulfuric acid) and strong bases (e.g., mythalamine and sodium hydroxide).

Generally, all illicit drug producing clandestine laboratories should be considered hazardous confined spaces. The majority of these facilities have all doors, windows, and ventilation systems sealed to prevent chemical odors from being released in detectible quantities. This sealing effort is to conceal the laboratory's existence from the local population, law enforcement, and rival criminal organizations. Combining the sealed workplace environment with the improper storage, use, and disposal of hazardous chemicals creates a highly toxic and potentially explosive environment.

PRE-MISSION CONSIDERATIONS

The usual preparation procedures used when planning a mission against any facility are used when planning a mission against a clandestine laboratory, with a few additional considerations. Any intelligence that can be obtained concerning the street drug being manufactured, where chemicals are being stored in the facility and how they are being stored are obvious types of high value intelligence.

Along with the strike team, you will want a chemist familiar with street drugs and forensics present or accessible via communications systems for consultation. Firefighters and emergency medical technicians (EMTs) (if not already a component of your team) need to be assembled prior to the operation and briefed on the possible hazards, chemicals present, and natures of injuries to be expected from fire, explosion, and/or chemical exposure. The fire response personnel will preferably be trained in HAZMAT response and confined space hazards.

Locations for emergency eye wash stations (figure 1) and chemical decontamination facilities (figure 2) should be established and their locations disseminated to all involved in the mission.

Figure 1 Emergency eye wash station

Figure 2 Chemical decontamination facility

Locations of triage areas should be established and may include pre- and post-decontamination triage areas. The anticipated number of personnel requiring decontamination should be estimated. The estimate should include suspects and innocent bystanders along with team and support members. Adequate sizes and quantities of decontamination materials should be procured from this.

Emergency care guidelines should be understood (agency policy and procedures that reflect hazardous location incidents) as to priorities and procedures for responding to contaminated victims. Is aid provided prior to decontamination? Under what circumstances is aid to be provided prior to decontamination? What measures need to be taken by the caregivers to protect themselves and the patient from (further) exposure?

The emergency medical personnel should know the locations of the nearest hospitals and what assets they possess (or lack) in experience and/or equipment to treat chemical and thermal burns, chemical exposure to skin, and inhalation injuries. Also, consideration should be given to available modes of conveyance (e.g., ambulances, helicopter) and what traffic flow will be like during the anticipated time of the mission. Can an improvised helipad be situated nearby and, if so, where? Keep in mind things go wrong and delays occur; prepare information to reflect this. The team commander should be thoroughly briefed prior to the mission's execution so modifications to the plan can be implemented if necessary.

The agency responsible for environmental protection issues for the area of the intended mission may need to be contacted and have a representative attend. This is especially true if you anticipate discharges of toxic chemical fumes or effluent. Another related pre-mission task is determining the anticipated direction and speed of prevailing winds for the mission day. This will provide you with an evacuation guideline if there are local residents that may be affected.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

How much PPE is appropriate will be dependent upon a number of factors. These factors include departmental/agency policy, recommendations by the chemist, degree of hazard, nature of mission, and anticipated duration of mission. It should come as no surprise that all PPE garments (figures 3-5) have advantages and disadvantages and that there is no one material that is resistant to all threats. For this reason, it is of paramount importance to have a wide variety of PPE styles available that are tailored

Figure 3 Tyvek suit



Figure 4 Tyvek boots, chemical protective overboots, and chemical protective gloves

Figure 5 Self-contained protective garment

to various degrees of threat. Specially trained and knowledgeable personnel should select the appropriate PPE method based upon a thorough evaluation of the proposed mission.

Inhalation injury is a real threat in clandestine laboratory missions, and there are a number of respiratory PPE available (figure 6). Selection of the appropriate style of respiratory PPE should be based upon an informed and well-researched study of the various systems available and the nature and concentration of threat chemicals. Selection may also be dictated by departmental policy.



Figure 6 Supplied air respirator, air purifying respirator and dust mask

Considerations include chemical degradation, penetration, and permeation. Chemical degradation is when a chemical reaction occurs between the PPE material of construction and the threat chemical. This results in an adverse change in the physical properties, or in other words, a reduction in the protective abilities of the PPE. Penetration evaluation involves assessing the ability of a potential threat chemical to pass through PPE areas such as openings, imperfections, seams, and zippers. Permeation is the ability of a threat chemical to pass through the

PPE material of construction. A simple example of permeation is the new water resistant materials that allow water vapor to pass through but deny the passage of water drops.

Common materials that are employed in the construction of PPE include butyl rubber, chloropel, natural rubber, Neoprene, Nitrile, Nomex, polyethylene, polyvinyl alcohol (PVA), polyvinyl chloride (PVC), Saranex, Tyvek, and Viton. Each of these materials' chemical compatibility should be researched and compared against the anticipated chemical threat to determine suitability. It should be noted that all areas of potential exposure need protection. The head (helmet, balaclava), face and eyes (goggles, face shields), hands (gloves), and feet (boots, shoe coverings) are all areas that may require protection.

The author has observed a number of entry team members with the tip cut off the trigger finger portion of their nomex gloves (figure 7). Nomex gloves protect your hands from burn injury. You are leaving your trigger finger exposed to injury by cutting away the covering. It is probably unnecessary to go into further detail as to why this is not the wisest thing to do. Other considerations to PPE selection

Figure 7 Nomex glove with finger cut off

may include electrical conductivity (electrical fences, booby traps, static electricity), flammability (chemicals, booby traps, explosions), and the nature of respirator system employed (whether air purifying or self contained breathing apparatus [SCBA]).

Entry equipment used by the team may not strictly be considered a piece of PPE but must still be addressed in this context. As stated earlier, you will probably be dealing with a hazardous confined space situation. Any spark generated, even by static electricity, could prove disastrous to your mission. With this in mind, all entry tools should be manufactured from non-conductive composite materials that are resistant to sparking. These non-conductive tools include sledgehammers, rams, Halligan tools and bolt cutters (figure 8). Consideration should be given to only using intrinsically safe flashlights during the mission. Intrinsically safe means they are specially designed for hazardous locations and will not cause

Figure 8 Non-conductive Halligan tool and sledge hammer by Blackhawk Industries

an explosion. This is important because, if there is the presence of explosive vapors in highly concentrated levels and you drop a flashlight or the bulb blows, a spark or exposed glowing filament can cause an explosion.

Instruments to monitor the air quality within the facility, along with proper training in their use, should be an integral component of the team's equip-

Figure 9 Air quality monitoring equipment by Drager and ChemPro

ment list (figure 9). It is likely that air quality within the clandestine laboratory will be poor, and the lab should be considered a hazardous/potentially explosive location. The same considerations for the flashlight are applied to monitoring equipment—ensure it is intrinsically safe and rated for the threat level you anticipate.

This list is brief and does not include the usual PPE associated with tactical missions such as ballistic vests, body bunkers, etc. (figure 10). Each scenario will be unique and will require an individual solution to anticipated threats. When in doubt, protect to the highest potential threat level. Finally on this subject, if you have the appropriate equipment, use it. This may seem obvious, but all too fre-

Figure 10 Ballistic vest (by PACA) and Body Bunker

quently PPE equipment is not used for a number of reasons including, "we assumed we didn't need it," "it is too heavy," "too hot," etc. These reasons (excuses) probably won't go over well during an inquest, investigation, civil suit, or funeral wake.

FIREARMS DISCHARGE CONSIDERATIONS

The narcotics trade is a very lucrative business for criminal organizations and as such, the business is usually fiercely protected via armed force. As a consequence, clandestine laboratory raids may result in the necessity for gunfire to be exchanged. During the discharge of a firearm a spark is generated and often there is muzzle flash, and cylinder gap flash in the instance of revolvers, which are byproducts of the firing process. Firearms discharge, combined with being in close proximity to explosive gases is an obvious recipe for disaster. Since not responding to gunfire is not always prudent, we should, 1) realize the potential danger and plan for it and 2) find ways to mitigate the threat.

During the 1980s the Drug Enforcement Agency's (DEA) Clandestine Laboratory Enforcement Team (CLET) conducted studies with sound suppressors attached to 9x19mm caliber submachine guns (figure 11) in an effort to determine their effectiveness at arresting muzzle flash. The Firearms Training Unit (FTU) concluded (and it is also the author's experience) that not all firearms muzzle flash is stopped as a result of employing a suppressor. Some people would argue, at this point, that there is no need to employ a suppressor during clandestine laboratory operations, but the suppressor may still have some merit if reduction in the flame emitted provides a lower propensity for an explosion to occur. Additionally, suppressors can have advantages in close quarters battle (CQB) situations unrelated to use in hazardous locations.

Figure 11 Heckler & Koch 9x19mm caliber submachine gun attached with sound suppressor (H&K MP5SD)

All this emphasizes the need for flame retardant garments that protect the entire body including the head, hands, and feet.

Realizing that higher concentrations of explosive vapors in the atmosphere produce greater potential for explosion, we should take steps to reduce the concentrations. Opening doors, vents, and windows are the easiest methods of immediately ventilating the structure. Note as well that if the clandestine laboratory produces street drugs such as alphaprodine, fentanyl, lysergic acid diethylamide (LSD), and/or MPPP (meperidine), they should not be ventilated in populated areas (unless previously evacuated) because the dusts and vapors possess extremely high levels of toxins (permission or pre-notification of environmental agency may also be required). This serves to emphasize the importance of good intelligence and having a knowledgeable chemist present. If exhaust fans are to be used to draw the vapors out of the building, they need to be intrinsically safe.

Along with the risks associated with discharging firearms it should be obvious that the same risks of explosion and/or fire exist with the use of explosive entry techniques, flashbangs, smoke grenades (figure 12), and gas grenades. Another sometimes overlooked risk is that chemical containers can be knocked over and/or doors can strike hanging wires and cause sparks during a traditional ram entry technique, therefore caution should be exercised if employing this technique.

POST-MISSION CONSIDERATIONS

Figure 12. Flash bangs and smoke cartridges manufactured by Defense Technologies (Def-Tec)

Evidence preservation and collection is of great importance. The legal case will be dismissed if evidence is improperly preserved or collected, and the entire mission will have needlessly endangered people, wasted assets, and in short, been a failure. Maintaining security around the site pre- and post-mission is essential to ensuring safety and preserving evidence integrity and will contribute to the success of the mission.

Once the laboratory has been secured, the water and sewage systems should not be used and sampling should take place to determine if chemicals have been disposed of via water and sewage lines. Not only is this an evidence preservation concern, but it is also a safety issue. In one instance, a clandestine laboratory was operating in a residence, and the indoor well (located in the basement) was used for hazardous chemical disposal. The well was contaminated to such a degree that all of the local dwellings drawing water from the same underground source had severe water contamination. Situations like these can lead to further charges under environmental protection laws; violations of environmental laws can result in stricter penalties and are more difficult to plea bargain than many drug laws.

Proper planning for and timely implementation of proper procedures will contribute to saving lives if any injuries transpire during execution of the mission. This will have a positive impact on maintaining community support for missions against clandestine laboratories. Community support of these types of government actions is critical and the importance of thorough triage procedures and decontamination planning cannot be emphasized enough.

As a mechanism of mitigating injuries, proper decontamination is necessary to reduce the transfer of potentially dangerous materials to clean or safe areas. Mechanisms used to decontaminate include emulsification, degradation, disinfection, dilution, absorption, removal, and disposal.

Emulsification involves using an emulsifying agent (i.e., soap, detergent) to produce a suspension of ordinarily immiscible/insoluble materials. The emulsification mechanism of decontamination is commonly used with patients to wash away contaminates. Degradation is a process that is not generally used on living tissue; it involves using a chemical reaction to degrade or neutralize a contaminated item. Disinfection is a decontamination mechanism where any etiologic hazard is removed by the disinfectant destroying the microorganisms and their toxins. Commonly used disinfectants are chlorine bleach and hydrogen peroxide. Dilution is a mechanism of decontamination that is commonly used with contaminates that are miscible. Dilution involves reducing the concentration of contaminates by introducing large quantities of solvent. Caution is necessary if using dilution because some contaminates are water reactive, and if water is used as the solvent severe chemical or thermal burns to the patient can result. The absorption mechanism of decontamination is when the toxic liquid or gas is penetrated into another substance, not unlike a sponge absorbing water. This mechanism is not practical for decontaminating victims but is generally used in large-scale removal of environmental contaminates. A typical example of absorption is when absorbent pigs are used to soak up oil or chemical spills on waterways.

Disposal is not really a decontamination mechanism as the object is not decontaminated but rather discarded. Disposal is not often used with patients themselves but is often used for their garments. Disposable outer protective garments can be disposed of quickly and easily in the appropriate hazardous waste containers (figure 13) and shipped to approved hazardous waste disposal sites. Some sites require specific identification of contaminants and the on-site chemist could be of assistance with this.

Figure 13 Examples of hazardous waste containers (Questar Inc) and label.

PROPER DECONTAMINATION GUIDELINES SHOULD INCLUDE:

* An organized and logical sequence of steps (figure 14).
* Each person or item being decontaminated should be isolated during the process.
* Suspects and bystanders who require decontamination should not be neglected.
* Each decontamination area should be clearly iden-

tified as to its task.

* All run-off, as a result of decontamination, must be collected and containerized for proper disposal.
* A method of immediate containment of discarded items should be available.
* All discarded items, decontamination run-off, and hazardous materials should be properly secured, identified, and then disposed of by a qualified hazardous waste disposal facility.
* To reduce the possibility of ingestion of toxic chemicals, no eating or drinking should take place at the clandestine lab site or anywhere downwind of the decontamination area.

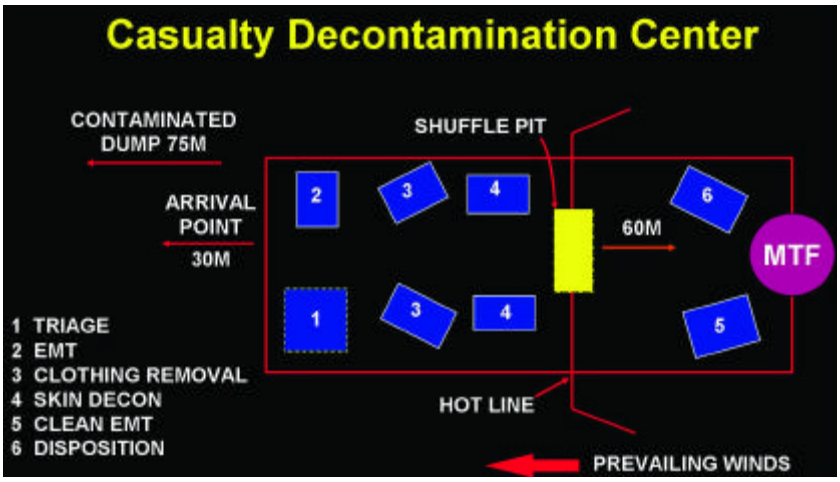

Figure 14 Casualty Decontamination Center layout.

Decontamination should begin using the least aggressive method and then incrementally progress to more aggressive techniques. The first areas to be decontaminated should be wounds and contaminated orifices followed by areas of intact skin that have the greatest extent of contamination.

The steps in a typical decontamination process are as follows:

1. Remove the majority of contaminant from the patient
2. Assess patient and perform any immediately necessary treatment
3. Fully decontaminate (clean) the patient
4. Decontaminate all staff
5. Decontaminate the decontamination area

In the event of chemical exposure there should be chemical exposure documentation reporting forms (SF600, DD 2796, or civilian equivalents) available along with appropriate health insurance claim forms. These forms should be filled out as soon as possible and in accordance with your agency's policies and procedures. The importance of properly completing these forms, thereby securing medical assistance at a later date for health problems that develop as a consequence of past chemical exposure, cannot be overstressed.

This article is not meant to be an all-inclusive training document but rather a brief overview of mission safety considerations involving clandestine laboratories. The scenarios presented in this article have demonstrated the importance of having qualified personnel present to assess health and safety issues. Missions conducted against clandestine laboratories will have a higher overall rate of success if attention is given to pre-mission, PPE, firearms discharge, and post-mission considerations. The planning and execution of tactical missions is complex, challenging, and, if successful, fulfilling. One planning and execution guideline that seems to be a constant in all missions is "Always watch your six."

Home Lab

Christopher Trumble has a degree in Mechanical Engineering and was a firearms expert at the Centre of Forensic Science (CFS) in Toronto, Canada. Responsibilities included providing expertise in weapons, armor, and forensics to the law enforcement community, Canadian military, the medical community, and the courts.

Mr Trumble immigrated to the United States seven years ago to provide expertise to U S law enforcement, military, and government agencies. He has previously authored articles for the Association of Firearms and Toolmark Examiners (AFTE) Journal and Small Arms Review (SAR) Journal. He has also provided assistance to the Federal Bureau of Investigation (FBI), Bureau of Alcohol Tobacco and Firearms (BATF), Drug Enforcement Agency (DEA), state, county, and municipal law enforcement agencies, and testified as an expert witness in criminal court cases. In addition, Mr Trumble has worked on military projects with the US Naval Space Warfare Center (SPAWAR), United States Special Operations Command (USSOCOM) and is currently under contract with the United States Army Aeromedical Research Laboratory (USAARL) as a research engineer.

Mr Trumble's mass casualty incident experience includes responding to multiple shooting and civil unrest incidents in the United States and Canada. He has completed numerous weapons, emergency response, and counter-terrorism related courses from the Federal Emergency Management Agency (FEMA), military, and numerous law enforcement agencies.

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    www.epa.gov
15. U.S. Federal Emergency Management Agency (FEMA)
    www.fema.gov
16. U.S. Fire Administration
    www.usfa.fema.gov
17. National Fire Protection Association (NFPA)
    www.nfpa.org
18. Occupational Safety & Health Administration (OSHA)
    (safety, exposure and monitoring)
    http://www.osha-slc.gov/index.html
19. HAZMAT For Healthcare (training protocols and informa tion) http://hazmatforhealthcare.org/
20. National Institute for Occupational Safety and Health (NIOSH) (respirators)
    Main web page:
    http://www.cdc.gov/niosh/homepage.html
    Respirator web page:
    http://www.cdc.gov/niosh/respinfo.html
21. Environics USA Inc. (ChemPro 100)
    http://www.environics.fi/

USACHPPM Provides Real Time Assistance to JTF-510 in Support of Operation Enduring Freedom-Philippines

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Abstract

The need for Force Health Protection among SOF units remains paramount as both frequency and duration of deployments increase. Simultaneously while SOF medical professionals combat DNBI threats, the integration of a medical surveillance program down range as directed by the Department of Defense will place additional demands upon these personnel. To accomplish the environmental surveillance mission, the United States Army Center for Health Promotion and Preventive Medicine - Deployment Environmental Surveillance Program (USACHPP-DESP) provides the necessary equipment, laboratory, analysis, and training required to monitor both short and long term environmental exposures for all SOF services while deployed in support of our nation's interests.

The Disease Non-Battle Injury (DNBI) threat associated with Special Operations Forces (SOF) personnel operating in an unconventional warfare environment in support of Operation Enduring Freedom - Philippines (OEF-P) could severely inhibit the Joint Task Force - 510 (JTF-510) commander's ability to accomplish the mission. The medical threats that posed daily risks for SOF personnel during Phase I of the operation included: vector exposure by sleeping in hammocks stretched between trees; consuming animals snared or raised locally and prepared by host nation counterparts; drinking water from indigenous springs and wells; conducting personal hygiene in local streams; and executing physically demanding operations in mountainous tropical jungle terrain.

The JTF-510 Preventive Medicine (PM) team, initially composed of an Army Environmental Science Officer (ESO), Air Force Bio-Environmental Engineer Craftsman, and an Air Force Public Health Craftsman, supported the 600 joint US personnel, of which 160 were from SOF Units. Organic to the Special Forces (SF) Battalion, an Army PM Specialist was the only other PM professional within the theater and the primary effort of support for the JTF-510 PM team. During Phase I, the JTF-510 Area of Responsibility (AOR) encompassed three southern islands in the Philippines with personnel operating in camps ranging from established hardened structures and fixed facilities to the aforementioned austere conditions. In order to reduce the DNBI risk for the JTF-510 Commander from extremely high to moderate, a small but aggressive joint PM team was challenged to prevent the degradation of personnel health before the deployment order was published. Simultaneously while combating DNBI threats, the integration of a medical surveillance program in accordance with DOD Directive 6490.2-Medical Surveillance,[1] DOD Instruction 6490.3-Implementation and Application of Joint Medical Surveillance for Deployments[2] and Joint Memo MCM 0006-02[3] placed additional demands on the JTF-PM team.

To increase the capabilities of the JTF-510 PM team, points of contact were established and verified with the US Army Center for Health Promotion and Preventive Medicine (USACHPPM) -- Deployment Environmental Surveillance Program (DESP), Edgewood, Maryland. Not fully knowing whether the TDA organization could support a Special Operations mission, their value added before and during Phase I of the operation was unequivocal.

During the pre-deployment deliberate planning process, comprehensive Industrial Hazards Assessment (IHA) Reports of each major city in which personnel would be deployed were developed

by USACHPPM-DESP in concert with the Armed Forces Medical Intelligence Center (AFMIC). These reports identified potential acute and chronic health hazards associated with industrial operations which could affect deployed personnel and identified three and five kilometer buffer zones for planning purposes. An all-inclusive one page, tri-fold, *Staying Healthy Guide* was developed and forwarded via electronic mail for comprehensive distribution among JTF-510 personnel (http://chppm-www.apgea.army.mil/deployment/shg/Tri-Fold/Philippines_SHG011_0302.pdf). This document outlined all the potential medical threats and their countermeasures within the Philippines to include but not limited to vector, arthropod, food, water, and environmental threats. Sampling equipment included: mini-volume particulate air sampling pumps; an environmental backpack with deployment sampling kits composed of soil, water, and air sampling media, and additional sampling equipment that was provided in an expeditious manner for use during the environmental baseline site characterization processes. Each water and soil kit contained appropriate sampling containers/vials with the necessary preservatives added to each sample for the testing of inorganics, volatile and semi-volatile organic compounds, herbicides, insecticides, and metals. Upon arrival of the sampling equipment, the USACHPPM-West Subordinate Command, Field Preventive Medicine Division, Fort Lewis Washington provided additional training and tools necessary to execute the medical surveillance mission.

During Phase I, the JTF-510 PM mission focused on minimizing DNBIs and initiating a medical surveillance program reducing potential health threats resulting from short-term (up to 2 weeks) and long-term (up to one year) exposures. Soil samples were collected for chemical analysis of contaminants that could pose potential health hazards prior to land development by Logistics Civilian Augmentation Program (LOGCAP) personnel. These samples provided the environmental site baselines for a Forward Aerial Refueling Point, proposed motor pool, 200 and 100 man fixed facility base camps, and 2 dining facilities in 3 distinct locations. Utilizing the water sampling kits, samples were collected from both potable and non-potable sources which included existing raw well water, municipal distribution systems, and both raw and purified water from two newly drilled deep wells.

Both the soil and water sampling kits were shipped to the USACHPPM laboratory for analysis to determine if any contaminants exceed the short and long term exposure guidelines as established in USACHPPM Technical Guide 230,[4] Technical Bulletin Medical 576[5] and 577,[6] and the US Environmental Protection Agency drinking water standards. In approximately two weeks, analytical data was provided to the JTF-510 PM team in an Environmental Site Characterization and Operational Health Risk Assessment. This report provided a risk assessment by means of identifying the hazard, assigning a risk level, and providing a confidence level. Conclusions and recommendations were provided for the preventive medicine team to implement or convey to the JTF-510 Commander regarding potential environmental hazards to the deployed personnel.

Mini-volume particulate air sampling pumps

Soil sampling kit

Water sampling kit

USACHPPM-DESP compiled the data collected from the soil and water baseline sampling into a consolidated deployment data base for utilization by the JTF-510

PM team as a reference and template for future sampling efforts. All sampling results, IHAs, and *Staying Healthy Guides* were incorporated into a secure internet site dedicated to OEF-P (http://usachppm1.army.smil.mil), just one of many created by USACHPPM - DESP since the global war on terrorism was initiated. PM personnel will collect supplemental information as the operation transitions into Phase II of OEF-P, providing a historical database of possible environmental threats or issues encountered by deployed or deploying JTF-510 personnel.

As both frequency and duration of deployments increase, the need for force health protection remains paramount. To meet the environmental surveillance mission as outlined in DOD Directive 6490.2, DOD Instruction 6490.3, and Joint Memo MCM 0006-02, USACHPPM-DESP is providing the beacon for deploying preventive medicine personnel.

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DRUG THERAPY: BUILDING THE KNOWLEDGE BASE

MIKE MONTOYA, RPh

ABSTRACT

Nonsteroidal anti-inflammatory drugs (NSAIDs) are often used for their analgesic, antipyretic and anti-inflammatory properties. They are effective and widely available, but do carry adverse effects if certain guidelines are not followed. This is the first in a series of articles that will discuss the basic mechanisms of drug therapy commonly administered by Special Operation Forces (SOF) medics. Each drug class presented will focus on common mechanisms, side effects, and special considerations in their selection and application. Through the understanding of these principles, the SOF medic can optimize the effectiveness of a chosen drug therapy and minimize adverse effects.

Of all treatment options available to the special operations medic, it is likely that drug therapy is the most common. Drugs covering several classes are available to treat most injuries and illnesses that are encountered in the special operations environment. Special Operation Forces (SOF) medics learn these drugs in training and later expand their drug knowledge while treating patients. This practice is a tried and true method that reinforces drug knowledge, however; this method does limit the ability to learn other drug treatments outside a given scope of practice. When drug knowledge is limited, important considerations such as side effects and monitoring parameters could be overlooked. Being limited in drug knowledge not only limits the ability to select or recommend a medication, it also limits the outcomes of patients who receive these types of medications.

Learning new drugs can be a challenge. Reading through drug guides leaves few connections to retain drug knowledge and it becomes quickly forgotten if not promptly used; in contrast, learning drugs by classification increases therapeutic options available for treatment. This allows a medic to predict, with a fair degree of accuracy, how a given drug will affect a patient and the parameters involved for monitoring drug efficacy and side effects.

This article is a first in a series that will discuss several classes of medications used in emergency and clinical settings. The articles will focus on providing the SOF medic with a solid foundation of drug knowledge for a given class. If a medic can associate a drug within a class, its therapeutic mechanisms, adverse effects, and monitoring parameters can be established resulting in optimized patient care.

NONSTEROIDAL ANTI-INFLAMMATORY DRUGS

The first drug class of this series is nonsteroidal Anti-inflammatory drugs, or "NSAIDs." NSAIDs are widely used for their analgesic (pain relieving), antipyretic (fever reducing) and anti-inflammatory properties. They are unrelated to the body's endogenous corticosteroid compounds (such as cortisol) and do not suppress the body's corticosteroid production. They are used alone, or as adjuncts to opioid (narcotic) analgesics and muscle relaxants to provide relief of pain and inflammation associated with musculoskeletal and soft tissue injuries.

NSAIDS USED IN THE UNITED STATES

- Aspirin (various brands)
- Diclofenac (Voltaren®)
- Etodolac (Lodine®)
- Fenoprofen (Nalfon®)
- Flurbiprofen (Ansaid®)
- Ibuprofen (Motrin®, Advil®)
- Indomethacin (Indocin®)
- Ketoprofen (Orudis®)
- Ketorolac (Toradol®)

- Meloxicam (Mobic®)
- Naproxen (Naprosyn®)
- Naproxen sodium (Anaprox®, Alleve®)
- Nabumetone (Relafen®)
- Oxaprozin (Daypro®)
- Piroxicam (Feldene®)
- Sulindac (Clinoril®)
- Tolmetin (Tolectin®)

MECHANISM OF ACTION

The therapeutic effect of NSAIDs is from their ability to inhibit the synthesis of naturally occurring compounds in the body called prostaglandins. At the biochemical level, prostaglandins mediate several important processes, including protection of the stomach lining, platelet agglutination, and renal blood perfusion. Prostaglandins are also produced when the body responds to tissue injury and are largely responsible for pain and inflammation associated with injury.

NSAIDs block an essential enzyme needed for prostaglandin synthesis called cyclooxygenase, or "COX". By blocking the COX enzyme, prostaglandin production is reduced, resulting in decreased pain and inflammation. NSAIDs also decrease fever caused by infection and other disease states. NSAIDs do not reduce body temperatures that are elevated by factors such as exercise or ambient temperature.[1]

SIDE EFFECTS

Prostaglandin is essential for maintaining the integrity of the gastric mucosa protecting the stomach lining from gastric acidity.[2] Frequent dosing of NSAIDs can reduce this prostaglandin-protective mechanism and leave the stomach vulnerable to ulcers. This effect is separate from NSAIDs' ability to irritate the stomach lining by virtue of their acidic chemical properties. The administration of NSAIDs with food will only decrease local irritation by the tablet and not serve to protect the stomach from NSAIDs' prostaglandin blocking effects. It is this blocking mechanism that is responsible for the side effect of gastrointestinal (GI) ulceration and bleeding. Patients with a history of peptic ulcer disease (PUD) or who are receiving corticosteroid therapy are at higher risk for gastrointestinal side effects.[3]

NSAIDs also inhibit a platelet clotting agent called thromboxane. The inhibition of thromboxane can result in increased bleeding (i.e. clotting) time.[4] Unlike aspirin, the anti-platelet effect of NSAIDs subsides when NSAID therapy is stopped. Increased bleeding risk with NSAIDs can occur in patients who receive anticoagulant or corticosteroid therapy.[5]

In addition to platelet and GI roles, prostaglandin serves as a renal vasodilator. In an otherwise healthy patient receiving rational NSAID therapy, renal perfusion is minimally affected. However, NSAIDs can decrease renal blood flow and glomerular filtration rate in patients with congestive heart failure, ascites, liver cirrhosis, and hypovolemia.[6] Such patients are poor candidates for NSAID therapy unless closely supervised by a physician.

The side effect profile of NSAIDs deserves consideration by the SOF medic when using an NSAID agent in combat medicine. In addition to gastric irritation, NSAID properties on platelet aggregation could exacerbate bleeding in patients with multi system trauma, internal injuries, active bleeding and those who are likely to undergo major surgery. Patients who are hypovolemic from injuries or illness are more dependent on prostaglandin's beneficial renal effects. Unless contraindicated, alternates to NSAIDs such as opioid (narcotic) analgesics should be considered.

Another important function of prostaglandin is the initiation and progression of labor and delivery and maintaining the patency of the ductus arteriosus of the fetus. Because of these beneficial prostaglandin effects, NSAIDs are ranked as risk factor "D" (positive evidence of human fetal risk) in the third trimester of pregnancy[7] and should generally be avoided in pregnancy unless supervised by a physician.

Drug allergies, ranging from urticaria to anaphylaxis are possible with NSAIDs. In addition to drug allergies, sensitivity to NSAIDs (including aspirin) can occur. Sensitivity is characterized by symptoms ranging from rhinitis and urticaria to bronchospasm and hypotension. It has been hypothesized that sensitivity reactions are not immune based reactions but occur from activation of inflammatory causing leukotrienes, a substance produced by the NSAIDs blocking of cyclooxygenase. Incidence of this effect is rare but can appear in 10-25% of patients with asthma, chronic urticaria, and chronic rhinitis.[8] It is recommended that patients who display sensitivity to aspirin or NSAIDs avoid this class of drugs.

KETOROLAC

Ketorolac (as Toradol® and generic brands) deserves special mention as an NSAID for SOF medics. It is available as an oral tablet and parenteral injection, possessing a high degree of analgesia when used parenterally. Several references have reported that parenteral ketorolac provides analgesic efficacy equivalent to moderate doses of morphine and

meperidine (Demerol®).[9, 10,11]

When used appropriately, ketorolac provides an effective level of analgesia for moderate to severe-acute pain without the sedative or respiratory depressant effects of opioid (narcotic) analgesics. It can also serve as an adjunct to opioid analgesics, resulting in lesser doses of opioids with fewer side effects. Current dosing guidelines by the manufacturer recommend ketorolac (both oral and parenteral forms) be limited to five days of continuous use.[12]

Ketorolac's side effects are similar to other NSAIDs, including GI, renal, and platelet effects. It is important to note that parenteral administration routes can still precipitate gastrointestinal side effects. Ketorolac is contraindicated as a pre-op analgesic for major surgery and in patients with incomplete hemostasis or high risk of bleeding.[13] The SOF medic should avoid its use in combat injuries when active bleeding or major surgery is a possibility.

In addition to its NSAID renal effects, ketorolac is renally eliminated (i.e. excreted through the kidneys), greatly increasing the incidence of adverse effects when using normal, recommended doses in geriatric patients (> 65 years) and in patients with impaired renal function. If such patients are candidates for ketorolac, the lowest possible dose (manufacturer recommends 15mg) must be used. Also, hypovolemia must be corrected before administering ketorolac.[14]

COX-2 INHIBITOR NSAIDS

COX-2 inhibitors are NSAIDs that retain traditional analgesic and anti-inflammatory properties with minimal effect on platelets and GI bleeding. Traditional NSAIDs target two enzymes, cyclooxygenase 1 and 2 (or COX-1 and COX-2). The prostaglandins formed by COX-2 are largely responsible for pain and inflammation while those formed by COX-1 provide gastric protection and platelet aggregation. By selectively blocking COX-2, pain and inflammation is decreased while sparing the beneficial effects of COX-1 prostaglandins. COX-2 effects on the kidneys have not been clearly demonstrated, requiring caution with COX-2 inhibitors in patients with decreased renal perfusion.[15]

Originally, COX-2 inhibitors were indicated for the treatment of pain due to rheumatoid arthritis, osteoarthritis, and dysmenorrhea. The manufacturers of celecoxib (Celebrex®)[16] and rofecoxib (Vioxx®)[17] have recently added the indication of acute pain to their prescribing information. Rofecoxib's prescribing information lists a study for acute pain performed at twice the daily-recommended dose for arthritis (subjects were given 50mg) on pain from post-orthopedic surgery and dental pain, comparing it favorably to sodium naproxen and ibuprofen.[18] The manufacturer recommends against the chronic use of 50mg dosing for acute pain.[19] Further studies are needed to demonstrate the role of COX-2 inhibitors in acute pain management when COX-1 inhibition is contraindicated.

Cost issues have been weighed against COX-2 inhibitors when compared to lower cost, traditional NSAIDs in the primary treatment of arthritis pain with inflammation. However, in patients who must avoid COX-1 side effects, COX-2 selective inhibition is a worthy consideration. Of the traditional NSAIDs, Etodolac (Lodine) has the advantage of being COX-2 selective with a low incidence of GI side effects.[20]

COX-2 inhibitors available in the United States

- Celecoxib (Celebrex®)
- Rofecoxib (Vioxx®)
- Valdecoxib (Bextra®)

The chemistry of current COX-2 inhibitors deserves special consideration for the SOF medic. All three agents contain a sulfonamide constituent that can trigger allergic responses in sulfa sensitive individuals. Refecoxib's indications state it can be used in sulfonamide sensitive individuals (clinical trials with 3.9% of test subjects having sulfonamide sensitivity exhibited no allergic response to rofecoxib).[21] The manufacturers of celecoxib and valdecoxib print sulfonamide sensitivity warnings in their prescribing information.[22,23] Although celecoxib and valdecoxib have contraindications in sulfonamide sensitive individuals, it would be prudent for the SOF medic to monitor all new patients of COX-2 inhibitors for sensitivity.

Use caution when prescribing or documenting celecoxib. Because of similar spelling, celecoxib (Celebrex®) has been a source of drug errors with citalopram (Celexa®, an antidepressant) and fosphenytoin (Cerebyx®, an anticonvulsant).

ASPIRIN

Aspirin, the originator of the NSAID class, also provides pain and inflammation relief, as well as fever reduction. Its most common side effect is GI irritation and platelet inhibition. By combining the tablet with magnesium and aluminum hydroxide, or a

slow dissolving enteric coating, direct GI irritation can be reduced. As with other NSAIDs, aspirin can cause or aggravate peptic ulcers if used long term. The platelet inhibiting effect of aspirin is unique among the NSAID class, due to its chemical structure (aspirin is acetyl-salicylic acid or "ASA"). Aspirin's "acetyl" group irreversibly inhibits the platelet agent thromboxane, requiring new platelets for the full restoration of the clotting process (a single dose of 650mg of aspirin in a healthy individual can prolong bleeding time for a period of four to seven days).[24] This irreversible effect of aspirin on platelets is used therapeutically for the prevention of thromboemboli. Other forms of salicylates, such as Doan's Pills® (magnesium-salicylate) or Pepto Bismol® (bismuth-subsalicylate) lack the platelet-binding acetyl group, thereby lacking aspirin's irreversible anti-platelet effect. This clotting interference or "bleeding" effect can be dangerous in patients taking anticoagulants, such as warfarin (Coumadin®) or heparin,[25] as well as in patients with combat wounds or those requiring major surgery.

Due to the epidemiologic evidence that has linked aspirin use to Reye's Syndrome, aspirin is contraindicated for the treatment of children with febrile viral illness. Acetaminophen would be better suited for this indication.

Choice and use of NSAIDs

Choice of NSAIDs is largely empirical. Costs, patient variations, and dosing regimens usually determine most NSAIDs used in musculoskeletal and soft tissue injuries. Therapy for seven days at recommended dosing intervals is usually enough to gauge the effectiveness of an NSAID. If symptom improvement does not occur, consider changing NSAIDs or re-evaluating the patient. If symptoms are improved during the day but increase in severity in the morning, consider shifting to a PM dose. There are no benefits of combining multiple NSAIDs.[26]

Using NSAIDs to treat pain in bone fractures is controversial. Several studies have shown NSAIDs can delay healing of fractures. The exact mechanism has not been clearly elucidated, but delayed healing has been reported in patients and animal models while receiving NSAIDs.[27,28] Unless guided by a physician, opioid analgesics would be a better choice for the SOF medic in the treatment of pain from unhealed fractures, reserving NSAIDs for healed fractures, musculoskeletal injuries and tissue injuries.

In general, initial NSAID therapy should be limited to one to two weeks. The patient should be evaluated for improvement of injury and NSAID related side effects before continuation of long-term therapy. NSAID therapy should be stopped and re-evaluated if unusual bruising, nosebleeds, constant fatigue, persistent GI pain, dark colored stools, or "coffee ground" emesis occur. These signs and symptoms could indicate impaired blood clotting or GI bleeding caused by NSAID therapy.

When treating musculoskeletal injuries, NSAIDs should be combined with adjunct treatments such as RICE (rest, ice, compression, if indicated, and elevation of the injured limb), physical rehabilitation, and slow reintroduction to activity.

Conclusion

These are the basic foundations of the NSAID drug class. By careful consideration of the mechanisms and properties of NSAIDs, important considerations such as drug selection, drug interactions, side effects, and monitoring parameters can be incorporated into the SOF medic's treatment plans. This will help ensure the best possible choice of drug therapy and optimize the patient's therapeutic outcome. Primum non nocere!

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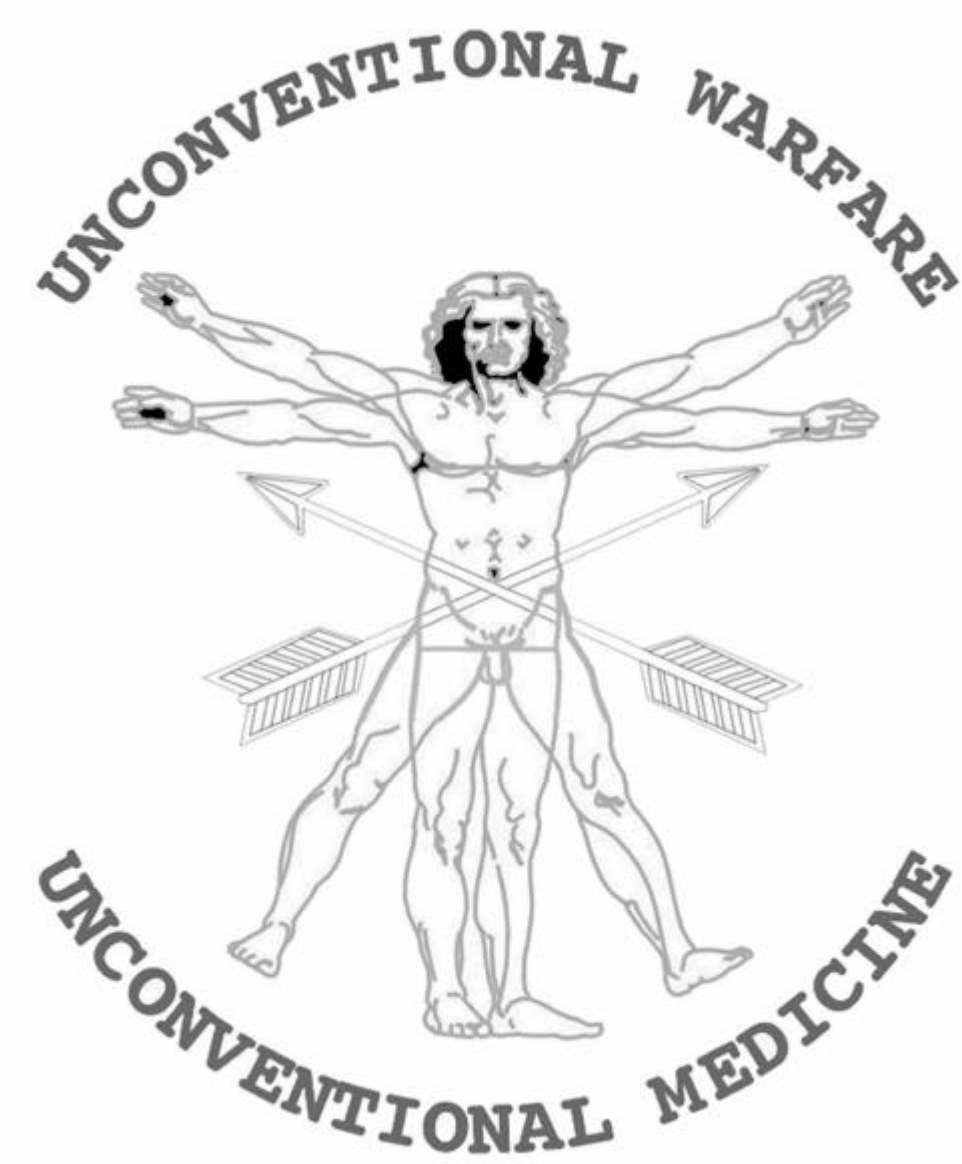

ANKLE SPRAINS

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Timothy J. Kocher, ATC/L

ABSTRACT

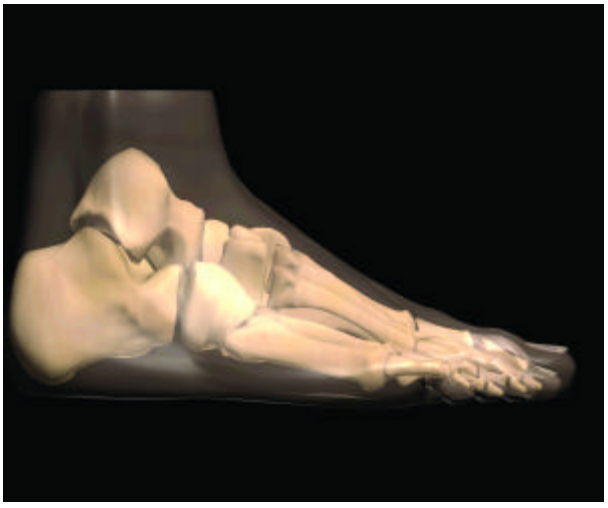
Ankle sprains are frequent injuries that are a familiar injury to both patients and medical personal. They occur from recreational events but also occur in work activity. Proper management demands understanding of the anatomy in order to prevent instability and prolonged recovery. About 10% of all ankle injuries can result in symptoms of instability.

While ankle sprains are a common problem, to both the patient and the examiner, the evaluation and treatment are often taken too lightly. Upon examination of the injured ankle, areas of tenderness are found so an x-ray is requested, with a negative result. The individual is advised that nothing is broken, that they only have an ankle sprain, and then reassured that they will get better soon without any treatment.[1,2,13] Bröstrom suggested that a complete rupture of a ligament occurs in a high frequency of patients.[3] If inadequately treated, some chronic ankle sprains will develop instability. Correct initial assessment is fundamental to achieve a good result.

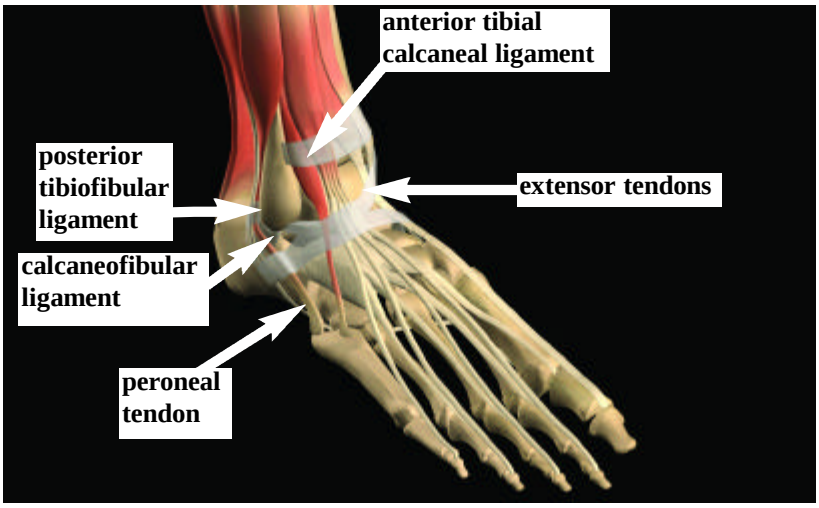
EXAMINATION AND TREATMENT

The correct terminology should be used.[4,6] If ankle ligaments are injured, the terminology should be a sprain. If the tendons are injured, a strain has occurred. The term 1st, 2nd, and 3rd degree suggests the amount of tissue torn in the injury. A first degree injury may hurt a great deal but the ankle is stable while a small number of fibers are torn. A third degree injury may be a complete or nearly complete tear and little pain may be present initially because sensation may be altered. Re-examination must be performed in a day or two.

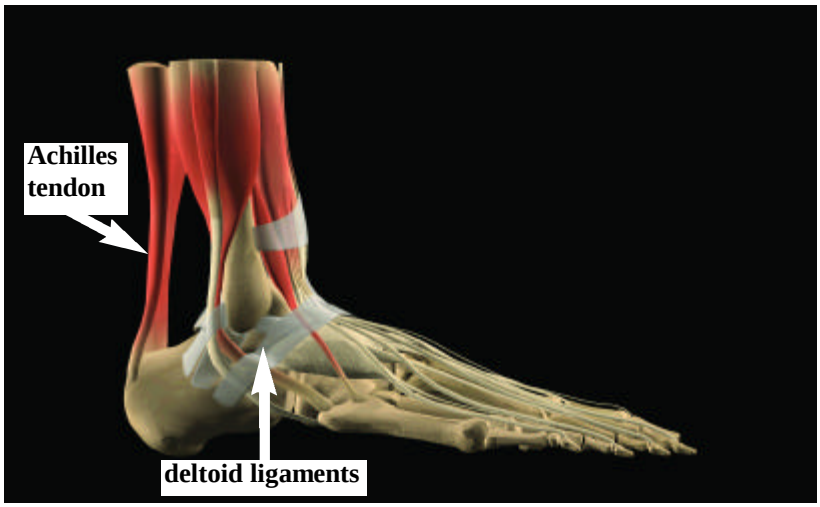
The Jackson Protocol may be used as a more functional classification.[5,8] The West Point ankle



sprain grading system is another tool that can be used in the assessment of an ankle injury. It includes the location, swelling, ability to weight bear and the amount of instability by examination.[13] A grade I injury has a minimal amount of swelling and the patient can fully weight bear on the injured ankle. A grade II has moderate swelling and significant pain with weight bearing. A grade III has global swelling and inability to weight bear on the ankle.



If the mechanism of injury is known, or can be determined, the nature of the injury might be more apparent.[13,14] The ankle is structurally strong in some positions and weaker in some other positions. If this can be determined it may help identify if the patient needs an x-ray, a brace, a cast, or even surgery. Additional injury to the foot and foreleg must also be considered because the ankle may be very painful with the result that the individual may not be complain of pain in other regions until they are palpated or stressed.



Anatomy of the Ankle

The ankle is described as a mortise joint. The stability comes from this bony architecture and the ligamentous structures.[8,9,13,14] The lateral side of the ankle is longer and, as such, provides a bony buttress preventing displacement of the talus laterally. The talus is trapezoidal in shape and is narrower posteriorly and wider anteriorly. Thus, as the foot is plantarflexed, it is less stable and when it is dorsiflexed, it is locked into the ankle joint.

If an injury occurred with plantarflexion inversion, the lateral ligaments are stressed. The posterior talofibular ligament, calcaneofibular ligament, and the anterior talofibular ligament make up the lateral collateral ligament. When an injury occurs in plantarflexion, the anteriotalofibular ligament is the ligament which is stressed the earliest and is most often torn.[4,8] The posterior talofibular ligament is the next most vulnerable while the calcaneofibular ligament is the least vulnerable unless dorsiflexion was present, then the calcaneofibular ligament is more vulnerable.

On the medial side of the ankle the deltoid ligament and medial malleolous supports the ankle joint.[11,12] If significant pain and swelling are present medially, bony injury must be strongly suspected. It would be unusual to have an isolated deltoid ligament injury. Typically a medial malleolar fracture or a syndesmosis injury has occurred.

Tendons, which can be injured, include the

Trapazoidal shape of the talus allows for greater mobility of ankle in planter flexion and hence, more frequent risk for injury.

peroneal tendons laterally when the ankle is forced into marked inversion. If the ankle is also dorsiflexed and inverted, the tendon may be subluxed from behind the fibula.[8,11,14] If the ankle is dorsiflexed and externally rotated, the syndesmosis can be ruptured and injury to structures in the calf may occur. Frequent reevaluation must be performed in this injury to ensure that a compartment syndrome, should it develop, is recognized. If the ankle is forced into marked plantarflexion, the anterior tibialis tendon and anterior capsule are vulnerable. If the ankle is planarflexed and everted, the posterior tibialis tendon can be injured.

PATIENT HISTORY

Sometimes the nature of the injury is unknown by the patient and often it is explained incorrectly by the patient. If this occurs the patient should attempt to demonstrate the injury to make it more clear how the ankle was injured.[8] If the patient can demonstrate how it occurred such as while running in the field, jumping off a ladder or off a ledge, or perhaps someone stepping onto the patient's foot while playing basketball or volleyball, the desciption can give clues as to the nature of the injury. Knowledge of preexisting injury can be helpful in knowing how to treat this occurrence

PHYSICAL EXAMINATION

Simply looking at the ankle and foot and comparing it with the uninjured ankle should be the first step. Examination of the well ankle relieves the individual as to the nature of the examination and to what a normal exam, for this patient, should be. Inspection of swelling, deformity, abrasions, and ecchymosis should be noted.[6,8,12,14] Examination with the patient sitting as well as standing and, if possible, ambulation should be done. Localize the area of maximum tenderness with touch by a single finger, rather than just having the patient state that it is over the entire lateral or medial side, if at all possible to localize a specific ligament complex of injury. Making note of where the patient locates the pain over the tendon, ligament, or over the bone and finally testing range of motion passively, actively, and the ability to resist motion is very important in the assessment. Ligament stability must also be evaluated. Neurovascular assessment should be recorded. Ideally, the exam should be repeated in several days.

OTTAWA CLINICAL DECISION RULES

Stiell, Greenberg, and McKnight proposed that x-ray evaluation should be done if the patient is unable to bear full weight and walk on the injured ankle, if there is maximal tenderness on palpation of a bony prominence, or if there is laxity of the anterior tibial fibular ligament.[6,7] In younger patients, epiphyseal injury must be considered.

X-RAY EVALUATION

Ideally, at least three views of the ankle would be good to have.[7,13] The fifth metatarsal base and the midfoot or Lisfranc Joints should be seen on at least one of these views. The trainer, coach, medic, or medical practitioner in the field or at an event must make decisions based on experience as to the probability of injury and the severity of the injury. In the clinic, the orthopedist has at his disposal the ability to evaluate x-rays and may perform stress views and even order a MRI scan. If subtle changes are suggested, comparison x-rays of the normal ankle should be considered. Bone scans may be useful in evaluation of possible stress fractures and CT scans to evaluate bone and joints. MRI scans are used to evaluate ligaments, tendons, and joint surface to identify avascular necrosis, osteochondral injury, and synovial disease. If an infection is suspected, a MRI may be useful to determine if there is an abscess, osteomyelitis ,or a foreign body. However, to accomplish this with every sprain would be impractical.

TREATMENT

The treatment of fractures will not be reviewed since this is very specific to each injury. The treatment of ankle sprains depends, of course, on first making a correct assessment. Assuming that an inversion sprain is present the usual treatment is initially reduce swelling by the common standard "RICE" which is rest, ice, compression, and elevation. Bracing can be accomplished with the elastic ankle supports with Velcro straps (ASO or McDavid) or lace up ties, by taping with adhesive tape, or by commercially available stirrups such as an Air Cast Splint or similar appliance.[6] The addition of protection after the acute phase suggests "PRICE" with rest, ice, compression and elevation.[13] Of course, a cast or a cast boot could be applied but may be reserved for the more severe injuries. Crutches are not always advised except for a short period of time.

After the first phase is controlled, the restora-

tion of strength and motion should be instituted. This should be emphasized as dorsiflexion and plantarflexion exercises rather than inversion and eversion as the ankle may heal with ligamentous laxity. The peroneals must be strengthened but this should ideally be done with resistive or "buddy" exercises. As these activities progress the patient should be able to accomplish sets of exercises without swelling, local heat, and pain. Biking, swimming, walking, and resistive exercises should be added to this regimen of activity.

The next emphasis should be on restoring balance and proprioception to the ankle. The individual should be instructed to perform many activities of daily living while standing on one foot. Both legs should be schooled in this so proprioception is maintained in the non-injured ankle as well as the injured and can be used as a gauge to compare progress. Balance boards can be used and, if available, the BAPS (Biomechical Ankle Platform system) board is an excellent therapeutic aid.

Finally, the individual participates in activity with the trainer or medic watching as the individual jogs and runs forward, backward, side-to-side, and in figure of eight drills. The patient should be watched in order to evaluate for antalgic behavior such as a limp or asymmetrical movements. The ankle should be strapped or taped for these activities as well. The patient should next begin his or her sport or activity specific skills under the observation of the trainer or medic. If these can be performed to the satisfaction of the observer the patient may be returned to full activity.

When the rehabilitation is complete, the individual may be returned to athletics or to full rigorous activity with minimal risk for reinjury unless, of course, he or she is faced with the same unbalanced activity that injured the ankle originally. Correct strengthening, proprioception exercises, proper shoes, proper lacing of shoes or boots, and sock wear may be able to prevent some injuries initially.

No amount of training, physical therapy, and taping or splinting can prevent ankle injuries but the frequency and duration of recovery can hopefully be reduced. When an individual seems to fall outside the anticipated recovery phases then reevaluation with x-ray, and other sophisticated tests may be necessary to exclude stress fractures, osteochondral injury, or tendon ruptures.

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HUMANITARIAN ASSISTANCE MISSION IN KOSOVO

Craig Durck, MD

ABSTRACT

A Kosovar-Albanian boy was brought in by his father to 10th SFG(A) during a Humanitarian Assistance mission in his province. The father had been unsuccessful finding care from medical facilities in the past. His son had a large ventricular septal defect which over the course of over one year was able to be repaired through the perserverance of 10th SFG(A) ODAs and an international team of doctors.

It was 12 November 2000, day 7 of a 9-day Medical Mission to Serbian and Albanian enclaves in the Province of Kosovo. We were set up in a run down schoolhouse in a village that had a name but no sign. A father brought his little boy, 3 years old, to this building from his village, Dubrov, some distance away. According to the dad his son had been seen in the local medical facility in Gjalani but was told there was nothing that could be done for the boy. He had tried to get care at another facility but again was not successful. He had come here just to see if there was anything, anyway somebody could help his little boy. The boy had some kind of irregular heartbeat and could somebody just take a look. He was insistent.

We examined him. Leonard Vischi was his name. He was a beautiful little blond boy in an area of dark haired villagers. He was not shy, nor was he playful. He sat passively while being examined, just watching with his large eyes. His father said nothing.

Leonard Vischi did not have an irregular heartbeat; in fact, it was completely regular. What he had was a heart murmur. A murmur louder than anything I had ever heard. A murmur so loud that it was wondered if it could be something else. It was hard to believe this child could sit up, let alone walk, run, and play. It was hard to believe he was circulating much oxygenated blood. His dad was asked if he was able to play with the other kids. He said yes but Leonard seemed to get tired more quickly. It seemed likely that he had a VSD, Ventricular Septal Defect, or possibly a valvular malfunction. But really, short of having an advanced understanding of the dynamics of fluid non-laminar flow, there was no way to tell. We had no ultrasound capability, and in fact even with the exact diagnosis there was nothing we could do for this child. Camp Bondsteel was always a ticklish situation to try to get non-military into a military facility. Plus this was not a life, limb, or eyesight immediate emergency. This child needed a cardiologist and ultimately a cardiovascular surgeon.

Leonard was compensating well at his young age but he must have been right on that edge between the innocence of a little boy and the reality of heart failure. He was very small. He was not going to see adulthood. The chances of him reaching his teenage years were not good.

Sadly his dad was told that there was nothing we could do for him. We could not help. His best hope was to make contact with one of the Non Governmental Organizations (NGOs) working in and around Kosovo. He needed a specialist and probably a surgeon. They may have a system to get him to the experts, probably out of the country, that would be required for this type of patient. There were quite a few NGOs in the larger districts, none really out where we were. He understood. In fact this was probably what he had heard before. He picked up his son and was gone.

I did not like my answer or myself for having given it. There were other countries in this area. We knew how to deal with doctors. It was hard to think you did not give your best effort. We tried to catch Mr. Vischi before he left. He was not in the general area and after asking some of the locals milling about it was learned he had driven off not too long ago.

Back at Camp Bondsteel the Operations Officer of the CASH (Combat Support Hospital) was visited. He had nothing to offer. The surgeons had no contacts outside the wire. The final contact was the CASH commander. The thing I remember most about her was her comment "Save the children." Over the next couple of days a system of physicians was arraigned that were willing to see Leonard. An Italian military cardiologist in Pristine would begin the process, then if appropriate, a Spanish pediatric cardiologist. It was hoped that one of them could possibly send this child to a tertiary care facility for definitive treatment. Now we had to find Leonard Vischi.

We had tried this already. We had looked for a fellow who we had been able to arraign a dental follow up for. We had his name and his village. We had spent hours traveling from small village to small village trying to find him. We asked Kosavar-Albanians for directions. We asked Kosavar-Serbians for directions and they had nothing good to say about his village. We heard a shot fired. We gave up.

ODA 055 operating out of Echo 20 wanted to find the child. We cancelled our 2nd expedition to find someone. We left the country.

Nothing more was heard for over 2 years. On Friday the 27th of December while passing the SGM in the hallway we learned that ODA 055 did find Leonard Vischi. They took him and his father to Pristine to visit the Italian cardiologist. In fact they took him 4 separate times. Medical management failed and eventually he and his mother were flown to Italy where he had surgery to repair his heart. The surgery went well and Leonard returned home. He is now 5 years old. He plays with his friends. He doesn't get tired so fast.

For whatever reason, enough people cared enough about a small boy to change his life forever. For the better. Leonard will never know any of the names of the individuals that helped him. He may or may not know that many people did many good things to give him the opportunity to grow up. Maybe one day he will do something good for someone else, maybe not. But you just never know. You never can know that the seed you plant today, the small effort to do what's right or to do something good, may one day blossom into something even greater. It was wonderful to find out that Leonard Vischi got his surgery. It was great to see that so many took up his cause. He gets a chance. You just never know.

Major Craig Durck is the Group Surgeon for 10th SFG(A), and currently the JSOTF-N surgeon in northern Iraq. He is board certified in emergency medicine.

CONTINUING MEDICAL EDUCATION TEST

Intraosseous Vascular Access In Adults: Current Status And Military Application

JSOM

1. Major limitations of pre-hospital fluid resuscitation relate to time delays and failure rates associated with obtaining vascular access in profoundly hypotensive patients that may be magnified by the difficulty of care under fire.
   True or False

2. Intraosseous infusion as a means of obtaining vascular access is being evaluated in adults, but so far success rates are less than 50% and times to successful infusions exceed 4 minutes.
   True or False

3. Intraosseous infusions in adults have been successful at which sites:
   a) sternum
   b) medial malleolus (ankle)
   c) tibia
   d) pelvic girdle
   e) clavicle
   f) all of the above
   g) none of the above

4. It is reported that intraosseous infusion in adults can be achieved through:
   a) Red marrow
   b) Yellow marrow
   c) All of the above

5. Drugs infused via the intraosseous route include:
   a) Antibiotics
   b) Fluids and blood
   c) Analgesics
   d) Vasoactive agents
   e) a, b, & c only
   f) a & b only
   g) a, b, c, & d

6. Drugs, blood, and fluids can be delivered through an intraosseous route at acceptable flow rates:
   a) By gravity drip
   b) Under pressure via pressure bags
   c) Require large-scale infusion pumps to overcome the hydraulic resistance of the bone marrow.

7. Complication rates reported after intraosseous infusion into the sternum or tibia appear to be similar to those reported following intravenous infusions of the same drugs.
   True or False

8. To avoid serious complications from intraosseous infusion such as osteomyelitis, current standard of care practice recommends:
   a) Removal of the intraosseous needle or device as soon as more conventional intravenous access can be obtained.
   b) Removal of the intraosseous needle or device by 24 hours after insertion.
   c) a and b
   d) None of the above

9. Reports and surveys from health care professionals suggest that intraosseous infusion is a difficult technique that requires extensive training.
   True or False

10. Intraosseous route of infusion should be considered as a viable alternative to the intravenous route under emergency situations that may be complicated by combat environments or wearing of protective gear, etc.
   True or False

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POST-TEST – Answer Sheet
Intraosseous Vascular Access In Adults:Current Status And Military Application Page 22

1. T or F
2. T or F
3. a b c d e f g
4. a b c
5. a b c d e f g
6. a b c
7. T or F
8. a b c d
9. T or F
10. T or F

JOURNAL OF SPECIAL OPERATIONS COMMAND
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(Please use the scale to rank the following statements)

Poor	Fair	Satisfactory	Good	Excellent
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Intraosseous Vascular Access In Adults: Current Status And Military Application

Page 22

	Strongly Agree				Strongly Disagree
Educational Value:	5	4	3	2	1
I learned something new that is important.	_	_	_	_	_
I verified some important information.	_	_	_	_	_
I plan to discuss this information with colleagues.	_	_	_	_	_
Readability Feedback:					
I understood what the authors were trying to say.	_	_	_	_	_
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Pelvic Sling for Application in Special Ops Medicine

Michael Bottlang, PhD
Sam Scheinberg
James C. Krieg, MD

Pelvic ring fractures often cause life-threatening internal blood loss. Stabilization of pelvic fractures in the field within the first "golden hour" is most effective to control such pelvic hemorrhage. Traditionally, Military Anti Shock Trousers (MAST) have been applied for pelvic stabilization, but have recently been contraindicated due to complications and uncertain efficacy. To date, non-invasive alternatives for pelvic stabilization include reversed K.E.Ds, modified back braces, and the provisional use of a circumferential sheet. The application of such devices in special operations circumstances, i.e. in the dark under diverse tactical and environmental conditions, could be difficult if not impossible. In addition, the efficacy and optimal application of the latter devices has not been determined. Only most recently, researchers established optimal application parameters of pelvic stabilization by circumferential compression, and integrated these parameters into a Pelvic Sling device. This Pelvic Sling can provide optimal and safe stabilization at the accident site.

This article reviews research that established optimal parameters for stabilization of pelvic ring fractures at the accident scene. It furthermore describes the application and indications of the Pelvic Sling, and discusses considerations for Pelvic Sling employment in the field, pertinent to Special Operations needs.

Research

Biomechanical studies were conducted to determine prerequisites for the design of an optimized intervention for safe and effective pelvic stabilization.[1,2] Specifically, three aspects of circumferential pelvic compression were investigated:

1) how should circumferential compression be applied to best reduce and stabilize "open-book" pelvic fractures;
2) how much stabilization can it provide; and
3) how safe is this intervention.

Results delivered not only the compression required to reduce and stabilize a pelvic ring fracture, but also demonstrated that circumferential compression at the hip (around greater trochanters and symphysis pubis) was more effective as compared to compression at the waist (around the iliac crest). Applying the Pelvic Sling with proper tension around the hip reliably reduced "open-book" fractures (Figure 1). It dramatically improved the mechanical stability of the pelvis. In fact, the Pelvic Sling delivered as much stabilization as an invasive pelvic C-Clamp. In the field, the pelvic fracture pattern is most likely undefined, and a Pelvic Sling may be applied to lateral compression fractures of the pelvic ring. Research results demonstrated that even in this

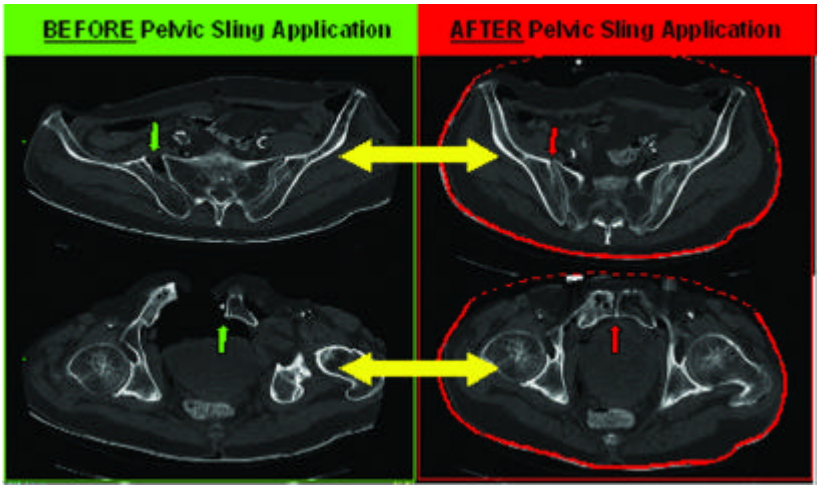

Figure 1 "Open book" pelvic fracture before and after reduction with a Pelvic Sling.

"worst-case" scenario, Pelvic Sling application with proper tension remained safe and did not significantly

Figure 2 Pelvic Sling employed in clinical trial

over-compress the pelvis.

A prospective multi-center clinical trial of the Pelvic Sling, funded by the US Office of Naval Research, further supported the results of these biomechanical studies on efficacy and safety (Figure 2; See www.pelvicsling.com). The clinical trial also demonstrated that the Pelvic Sling was well tolerated and did not cause ischemia or skin breakdown, even if applied for as long as five days.

FUNCTION

The Pelvic Sling is a non-invasive device that wraps around the patient's hip. The back and side portions of the sling are comfortably wide, soft, allow for passage of air, but do not stretch. At the front, the pelvic sling is narrower to allow better access to critical areas of interest in the polytraumatized patient, namely the perineum and the abdomen. Both ends of the sling are guided through a buckle, which is placed approximately over the pubis symphysis. Pulling on both ends of the sling in a lateral direction gradually and symmetrically increases the sling tension and reduces the pelvis. It provides equally distributed compression to the soft tissue envelope surrounding the hip, which in turn stabilizes the pelvic ring. Application around the soft tissue envelope of the hip

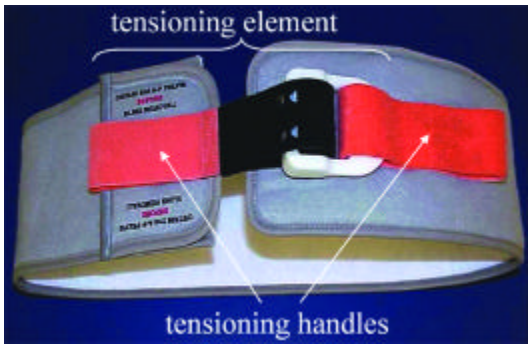

Figure 3 Functional elements of the Pelvic Sling

effectively prevents direct compression of prominent bony structures, which otherwise could effect the quality of reduction.

Most importantly, the buckle of the Pelvic Sling has a mechanism which automatically limits the compressive force to the previously determined proper level. If the required sling tension is reached, a mechanical stop is felt, accompanied by a "click" sound indicating that the pelvis is properly stabilized. This ensures reduction of pelvic ring fractures in a consistent and safe manner, regardless of the amount of tension applied by the first responder. Proper sling tension is maintained by simply pressing the tensioning handles onto the lateral sections of the pelvic sling, where they are held in place by Velcro. If required, the Pelvic Sling can be released and re-tensioned within seconds.

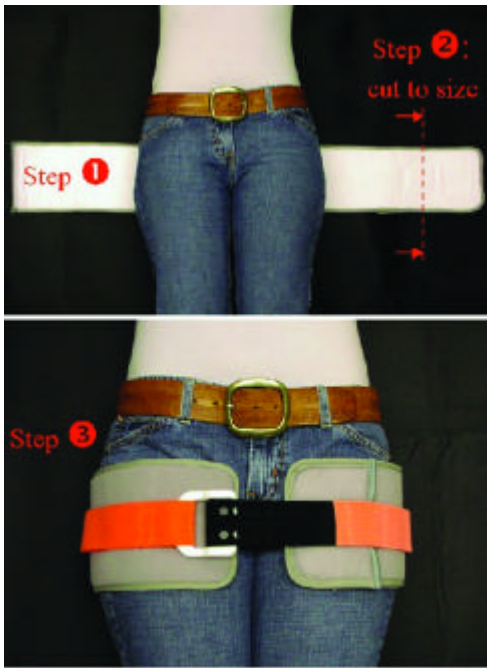

Figure 4 Pelvic Sling 3-step application procedure.

APPLICATIONS

The Pelvic Sling is applied in three steps, starting with the patient laying flat on the back (Figure 4). First, the Pelvic Sling is placed around the hip at the level of the greater trochanters and the symphysis pubis. This can be achieved by either lifting the patient, or by sliding the sling upwards from underneath the legs. Next, the sling ends are either cut to size, or folded inward to avoid overlapping of the sling ends anteriorly. Finally, the tensioning element is attached, containing the tensioning handles and the sling buckle. The Pelvic Sling can be tensioned by a

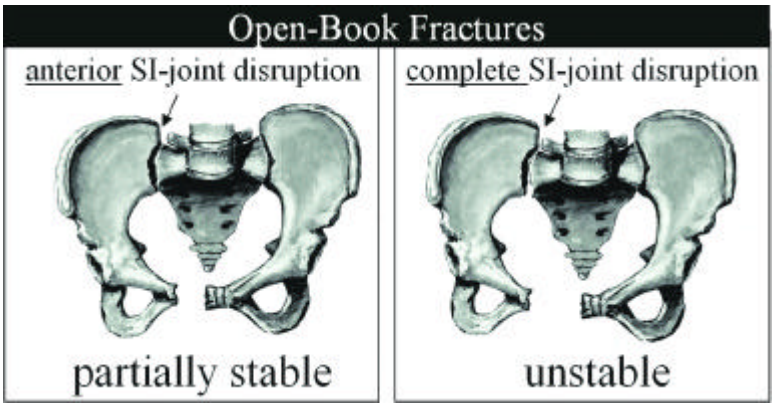

Figure 5 Unilateral "open-book" pelvic fractures.

single person, or more conveniently by two persons. Typically, it can be applied in less than 5 minutes. The Pelvic Sling can remain applied for several days, until definitive surgical stabilization of the pelvic ring can be provided. However, in case of prolonged application, skin conditions should be monitored. While the Pelvic Sling can easily be released and re-tensioned, this should be avoided if possible to promote and preserve blood clot formation.

INDICATIONS

The Pelvic Sling is indicated for application in the field upon suspicion of pelvic ring fractures to stabilize the pelvis before patient transport. It serves as an emergent, temporary intervention to reduce the risk of exsanguination from diffuse pelvic hemorrhage before definite pelvic stabilization can be provided. Early pelvic stabilization is a potentially life-saving intervention, for which reason a Pelvic Sling should be applied upon suspicion of any pelvic ring fracture. Open-book pelvic fractures are likely to benefit the most from this intervention (Figure 5). The risk for adverse effects in case of alternative fracture patterns is minimal due to the provision of circumferential compression at a proper and safe level. The Pelvic Sling can also facilitate the application of an anterior external fixator for definitive pelvic stabilization by maintaining pelvic reduction during fixator frame application.

Considerations for Special Ops Use

The Pelvic Sling is lightweight, radiolucent, and almost invisible on x-ray with the exception of two stainless-steel compression springs (Figure 6). It can remain on the patient for CT and MRI procedures. It is designed to function through the extreme ranges of normal ambient temperatures. It is waterproof, non-corrosive, but not fireproof. The mechanical "tension stop" device is automatic, audible, and palpable, allowing for use in the dark by a single person with minimal training. The Pelvic Sling design allows for low-cost mass production of a commercial, disposable device. The Pelvic Sling is a "one-size-fits-all" design, which conveniently can be cut to size. However, this device has neither been designed nor tested for adolescent use.

References:

1. Bottlang, M., et al.: Emergent management of pelvic ring fractures by circumferential compression. *Journal of Bone and Joint Surgery*, 84-A:2, 43-47, 2002.
2. Bottlang, M., et al.: Non-invasive reduction of open-book pelvic fractures by circumferential compression. *Journal of Orthopedic Trauma*, 16:6, 367-73, 2001.

Figure 6 Lightweight, compliant, and compact Pelvic Sling prototype.

GO/NO-GO
WHAT'S THE BIG DEAL?

David Hammer, MD
USSOCOM Command Surgeon

Over this past year of intensive operations in far-forward ugly places, fighting and winning, the issue of performance enhancement requirements and sleep augmentation tools have been coming up a lot. We are stuck with short-notice, trans-meridian travel, rapid response times, night operations, and remote locations where it is HOT in the day and COLD in the night (nighttime is the winter of the desert). It is no surprise that there are REAL requirements for performance and sleep augmentation tools for those out there in the fight. So, what's the big deal? Give them the pills and get on with it!

Well, we all wish that was true, and I wish it was as easy as it seems, and that these drugs that have been around for years really did what we all "hear" they do in making us better in the fight. Truth is that the problem is complex, just as complex as the special mix of DNA that makes each of us an individual, and though the drugs react on populations of people in a predictable manner, we can't assume that each individual will react predictably--therein lies the rub.

NO-GO = SLEEP

Sleep is necessary for survival and is influenced by a number of factors to include emotional state, light (in amplitude, in certain wave length, and luminance), noise levels, ambient temperature, etc. There has been a recent plethora of data on sleep issues and the use of sleep aids.

There are any number of sleep aids from over-the-counter (OTC) medications to those requiring prescriptions and those that are scheduled as controlled drugs for a number of reasons. In the military, particularly the flying community, the use of these sleep aids is driven by the policy of the Service Surgeons General through their organizations. In SOF we are all subject to those rules and they must be followed as stated. Local rules may only be as stringent or more stringent. Some drugs are listed below for examples to discuss:

1. Benzodiazepines (all chemically related to diazepam or Valium) have a long half-life and problems with accumulation and hangover consequences. The side effects on the nervous system are potentially significant in their impact on normal function, and one has but to read the issues in any PDR or other drug reference material. Temazopam (Restoril) is in this class of drugs and though one of shorter duration, it is still significant in its adverse potential and can be detected for some time. All have problems of dependence and withdrawal if used chronically.
2. Zolpidem (Ambien) is a short acting sedative/hypnotic and a non-benzodiazepine drug. Its effects are gone in 4-8 hours dependent upon the patient, but prolonged use causes problems of dependence and withdrawal. It seems a much smarter choice of compound, but it is controlled and not without risk.
3. Zaleplon (Sonata) is another non-benzodiazepine with very short activity with no impairment usually after 4 hours. It is newer and AFSOC is checking it out very carefully. It too has side effects, but in a risk management approach they may be outweighed by the risks of doing without it in some well thought out scenarios.
4. Melatonin is a natural sleep hormone released from the pineal gland in normal people in response to circadian cycles and light exposures. This is available in OTC medications, from herbal medicine sources, and is also a complex drug/hormone that is out there and available. My experience with it finds that the source and the dose of active ingredients is highly variable in the various products, and many are found in the herbal retail outlets and marketed without FDA oversight requirements of efficacy and safety.

So what's the big deal? Give us the pills!

Well, studies over the last few years have shown there is more to the story. For instance:

1. The average adult requires 8 to 9 hours of sleep a night and most get less than 7 hours. Sleep debt is a situation we all find ourselves in and is critical. There is good evidence that we can, in the pre-deployment time if operationally addressed, make up for sleep debt, and in fact "bank sleep" in preparation for the deployment. Understanding of these phenomena should drive operational concerns but it usually doesn't.
2. Sleep inertia is another recent concern. Upon awakening, folks can be in a fog from seconds to often a half hour or so. Response time and napping techniques are therefore impacted and personal variability is again an issue and needs to be considered, particularly with rapid response time requirements.
3. Light, and the absence of it, luminance, and wavelength are all issues that impact sleep through influence on the pineal gland and endogenous melatonin release.
4. Core body temperature is involved, and cooling is associated with somnolence.
5. Food eaten is an issue, with amounts, types (tryptophan, tyrosine containing), hot versus cold, fatty versus heavy carbohydrate centric, timing of meals, etc, all concerns.
6. Liquids and their amounts are important relative to hydration state, content (caffeine, etc), hot versus cold, etc, and are all real concerns.

So, all these issues are players in the sleep world and they all must be considered when you tackle this problem. It may not be as simple as "popping a pill." Remember, "First, do no harm."

GO = AWAKE AND FUNCTIONING

Our ability to perform the skills that we deliver to the "fight" is what this is all about. Though deprived of sleep, performing in sustained operations, shifted in trans-meridian cycle, etc, it is imperative that we be optimized in our contribution to the effort. We have known for a long time that there are substances out there, again both OTC or prescription drugs, that can enhance performance. Or do they really?

1. Caffeine is present in coffee, colas, sodas, and any number of OTC medications and has been studied ad nauseum. I think most folks would indicate that it helps them and most would also agree that used close to sleep intervals, it can be

disruptive. Also, abstinence can be a cause of headaches and other withdrawal symptoms.

2. Amphetamines (to include methylphenidate or Ritalin, pemolene or Cylert) have been used and studied for years. Forty years ago they were not as controlled as they are today, and were readily available. The literature is full of articles with the good, the bad, and the ugly. Now they are tightly controlled and licit as well as illicit sources are constantly under scrutiny. This group of drugs is used in the treatment of narcolepsy and in attention deficit disorder (ADD) or attention deficit hyperactivity disorder (ADHD). These drugs are sympathomimetic (stimulate the sympathetic nervous system = fight or flight) so they should be PERFECT! However, the addiction/dependence potential and side effect profile makes them less than has been hoped. Problems with behavioral excitation, dependence, sleep rebound, appetite suppression and consequent weight loss, nervous ness, mydriasis (pupil changes), heart and blood pressure effects all are concerning. Also, and very importantly, alteration of the body's heat regulating system (just as with the ephedrine compounds) makes them less attractive in sustained desert operations. Additionally, there is significant potential for dependence and abuse with a real threat to cardiac parameters of heart rate, blood pressure, and stress to multiple organ systems. Withdrawal is an additional significant potential problem.
3. Ephedrine (Ephedra, Ma Huang) is an amphetamine related, OTC available drug sold again by herbal retailers and is also found in OTC asthma medications. It is touted for a number of uses, but its safety is clearly a "hot" topic in FDA discussions given the serious nature of the side effect potential--cardiac, neuropathy, myopathy, tremors seizures, heat metabolism issues, heart attacks, stroke, and death. Additionally, the herbal preparations have variable strengths and the FDA has no controls over efficacy and safety. There are a number of military prohibitions for its use and more may come soon.
4. Modafinil (Provigil) is a newer drug that came out of the research of the early 1990s with amphetamine-like properties of alertness and is not encumbered by the negative side effects of the amphetamines. It induces long-lasting wakefulness without behavioral excitation and sleep rebound, and the effect does not rely on endogenous catecholamine. There appears to be no mood alteration, addiction potential, and withdrawal concerns. It doesn't alter heart rate, blood pressure, sweating, pupil size, etc. It shows terrific promise, but more study is needed and is underway.

So, these tools are available and the line commanders are out there asking, "What's the problem? Make a plan and get on with it!" Wouldn't it be great if it were that simple? Many issues are at hand. For instance:

1. Caffeine use has been studied in sleep deprived

shooters and it does improve alertness and target acquisition, but does not improve target scores. It may be the tremor, etc, so more needs to be done, and until then, sleep is best, so it needs to be planned for.
2. We fight at night in all sorts of conditions and the alteration of pupil size, tearing, saliva production, GI motility, etc all are issues.
3. We also know that sleep deprivation alters serum cortisol levels, carbohydrate metabolism and insulin resistance, stress management, and our ability to fight off infection. So something needs to be done!
4. The fix needs to take into account the individual, not only in his/her biochemical uniqueness, but also his/her role in the mission and timing in that role. Think of some aircrew--the pilots need to be optimized at certain times, the gunners at others, the loadmaster at others, the weapons systems people at others, etc. Treating them all the same and having them at peaks and valleys of consciousness at the same time may be fruitless.

The issue is hot, the requirements are there,

and the good news is that there is a lot of effort out there trying to solve these issues. Hopefully, we will soon see real solutions to optimizing our folks for military operations and that the solutions will spill over into the civilian world for help with shift work

optimization, sleep disturbance treatment, and a host of related civilian problems. The Air Force Office of Scientific Research (AFOSR) has been gathering data and sponsoring scientific study through their Chronobiology Workshops for several years now and we are engaged with them. The recent mailing of the 2003 Abstracts of the AsMA Scientific Sessions to occur at the Aerospace Medical Association Meeting in May of this year contains numerous studies ongoing to address the issues we are dealing with. Recent concerns in the news media about the "GO/NO-GO" use of drugs, though fairly negative, have also stimulated interest in these issues.

So, for now, we all need to fully understand and follow the guidance out there, be conservative in our recommendations to our commanders, and seek advice through the medical channels to give commanders the best data available while they wrestle with the decisions at hand. It is critical to plan for sustained operations in work/rest cycles, meals (content, temperature, quantity, and quality), fluid requirements (kind and temperature and amounts), and be aware that our guys tend to visit the nutrition supplement stores on their own initiative looking for licit items to improve their endurance and performance and that these compounds may have an impact with any other chemical solution. We have a lot of work to do before we solve these issues, but the interest is peaking and, I believe, solutions are in sight. Stay tuned to the literature and the service medical centers to get ideas and solutions for the future. We at HQ USSOCOM are working these issues with our Component Surgeons and we will keep you apprised of any successes.

Legacy

Unique challenges always confront rescue personnel when disasters strike in high-rise structures. Long before the acts of terror on the World Trade Center in 2001, even before the tragedy at Las Vegas' MGM Grand Hotel in 1980, Special Operations personnel were confronted with one of the most complex and dangerous situations to face high-rise buildings: Fire. The following is one of the earliest such high-rise structure disasters.

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Spain's Towering Inferno

Wayne L. Fisk, CMSgt (Ret), Pararescueman

A1C (E-4) John Pighini in SEA, circa 1967.
(Photo from private collection of SMSgt Pighini, USAF, ret.)

To the Pararescuemen (PJs) of Detachment 9, 67th Aerospace Rescue and Recovery Squadron, the early rising sun was the announcement of just another bright, sunny July day in Spain, a day that--if anything--promised to get hotter as it continued. Pararescue NCOIC Technical Sergeant (E-6) John L. Pighini and several members of his team were just finishing a PT jog on Zaragoza Air Base hoping they had successfully avoided the majority of the promised heat still to come. Left to their druthers, they all agreed they would rather not get any hotter than what they presently were, a rather waggish understatement since they were now thoroughly drenched in sweat after beating the pavement for the last six miles.

To TSgt John Pighini, it might seem as though his entire PJ career was well on the track to being just one hot (temperature-wise) assignment after another. After completing pararescue training in 1966, he had been assigned to a combat tour in Southeast Asia where he flew Jolly Green rescue and classified missions into Laos and North Vietnam. And while subsequent postings to PJ teams took him to such plush locations as California, Hawaii, and Florida, he was convinced the only places his USAF career would ever put him were to hot assignments. This day in July was not to alter his career track record.

Slouching into the Operations Section in his wet running shoes, John sensed a tension in the air that was all too familiar to him in his 13-year PJ career: Something was up. The operations NCO was bent over his desk scribbling frantic notes while listening intently to the base alert telephone pressed against his ear. Leaning over him were the commander, operations officer, and several pilots, all trying to read what was being written. Hard glances darted between the unit's officer leadership as the notes began to make sense: The ancient city of Zaragoza, 170 miles northeast of Madrid and for which the base was named, was burning; more correctly, the city's largest, most prestigious, high-rise hotel was going up in flames. The USAF command at the air base was being asked to assist.

In a handful of minutes the unit's alert helicopter, a UH-1N two-engine Huey, with PJ Sergeant (E-4) Charley Hart aboard, was launched. As it raced to the scene to assess the situation, John--also the unit's acting first sergeant--ordered the maintenance section to ready the remaining two birds for immediate launch also, no easy task since both birds had been partially disassembled for maintenance, with systems parts scattered on the tarmac. John's two other assigned PJs, Sergeant Kurt Hair and Airman First Class John Magee, were ordered to collect all the team's medical and mountain operations gear for a virtually unknown bare-knuckles rescue concept that had yet to be proven in either the military or civilian communities: high-rise rescue operations.

Ten minutes later the initial report from Charley Hart was dismal. The entire hotel was going up in flames; uncontrolled fire and billowing smoke

Zaragoza AB's PJ team at winter training in Germany. From left to right: Pighini, Hair, Hart, Magee. *(Photo from private collection of SMSgt Pighini, USAF, ret.)*

were racing through the central air conditioning duct system igniting every floor of the eleven-floor structure; hundreds of tourists were trapped in their rooms, on their balconies, and on the roof top; some had already leapt to death and injury; only a few of the local Spanish firefighting ladder units could reach even as high as the sixth floor; things were going to become very bad very soon.

Then Charley went off the air. Having spied a small group of survivors escaping to the hotel's rooftop swimming pool, he directed the pilot to a precarious landing at a corner of the roof and began loading the near-hysterical victims aboard. A choking, suffocating smoke drawn in by the Huey's rotor-wash offered no discrimination between rescuers or victim; and in a seeming conspiracy, rising heat thermals buffeted the small helicopter as though it were a ping-pong ball in a lottery machine. When loaded with what few people it could take, Charley waved it away and began assembling another load.

Meanwhile back at Det 9, the aircraft maintenance team had concentrated all of its efforts to bring the least mechanically depraved Huey up to flight status and had it ready for launch. TSgt Pighini threw on the first lift of mountain gear and medical equipment, then jump aboard himself for an immediate tactical departure. As the bird shot to an altitude of several hundred feet, the skyline of Zaragoza emerged in his distant view, an ominous thick column of black bellowing smoke rising high above it, marking the disaster site.

With the pilot nudging the airspeed indicator to the red line, the flight was a mere six or seven minutes. The crew became silent as the distance narrowed, awed at the conflagration and the destruction it was causing. "Oh, crap," John thought as he appraised the situation, "This is going to be a bad one."

Webster defines "...bad..." as something that is not good or disagreeable, of something causing injury or being harmful; also, of something existing in a wicked quality or state. It is used in the broadest comparative sense in which something may range from being merely unsatisfactory to utterly depraved.

The scene before John, and in which Charley Hart was at its epicenter, was injurious, wicked, and utterly depraved. Inside the once-grand Hotel Corona de Aragon, flames and smoke had raced down hallways and up stairwells trapping hundreds in their rooms. Occupants who could not jump to safety or who were not rescued by the limited reach of the ladder trucks, suffocated en masse in their individual rooms. One honeymooning couple, with their freshly prepared breakfast on the table before them, died in each other's arms. One frantic, half-clad man residing on a lower-level floor tied a mattress around himself and plunged out a window to the street below. Utterly amazing, he walked away.

From his inbound flight approach overhead, John could see Zaragoza AB fire trucks with extendable ladders just arriving on-scene below; now a two-pronged, above-and-below rescue approach could be made. But if that thought was comforting, it was only for a fleeting moment, as clearly visible at a corner of the rooftop that was not aflame or cloaked in

Fire scene from street. Note limited reach of ladders. *(Photo from private collection of SMSgt Pighini, USAF, ret.)*

smoke, was Charley Hart and another handful of survivors. John could also see that Charley's Huey was some distance away in the center of a bullring parking lot-cum-improvised HLZ with crowds of emergency medical personnel surrounding it. It was obvious what needed to be done, and the inbound Huey maneuvered through a spider web of power lines, TV antennas, and adjacent building to a hover and plucked away the small group.

However, whatever sense of accomplishment the crew may have garnered from that successfully executed tactic, all of it was instantly obliterated when John called out a sighting at one of the upper-most-story windows. Highlighted against thick, jet-black smoke roiling out of an open window was a teetering, half-clad man about to jump. Clearly visible respiratory convulsions indicated he was on the brink of death, either by inhalation or by submitting to the forces of gravity.

The pilot immediately swung the Huey around and began a hover approach; simultaneously, John yanked what was known as the jungle penetrator from its stowed position. When attached to the aircraft's high-speed hydraulic rescue hoist system, which utilized a three-eighths-inch mesh-woven steel cable some 250 feet long, he could be lowered to the stricken man in mere seconds. But would he be in time?

The crew worked with lightning speed. With Charley now assuming scanner duties to call out obstacle clearances on the left and the copilot monitoring critical instrumentation readings, the pilot brought the helicopter to an unmoving hover, like a humming bird frozen in mid-air, a safe distance away from the smoking structure. Simultaneously in the cabin compartment, the flight engineer grabbed for the hoist's control lever and began unreeling the drum-stowed cable and rescue hook that would attach to the jungle penetrator. As he had done a hundred times before, John shinnied himself onto the penetrator, a spasticated procedure at best in the Huey's cramped cabin. Reaching out, he snatched the offered rescue hook from the flight engineer's hand, snapped it on penetrator's attaching ring, and swung unhesitatingly out into space. Immediately he felt the hoist motor engage, the first ten feet of cable lowering him at an excruciatingly slow rate of a mere fifty feet per minute. Then the high-speed gear engaged, plunging him downward at 200 feet per minute.

In seconds John arrived at a suspended position some twenty feet adjacent to the stricken man, now unconscious, his body half-draped out the window. Realizing the next few moments and actions would determine the man's fate, he quickly appraised the situation: "If I can get to him without being overcome by those frigging fumes in that damn smoke, and if I can direct the flight engineer by hand signals through that smoky crap to the exact extraction point I want, and if I can maneuver the man's dead weight ("God, my humor's beginning to suck", he thought) onto the penetrator, all the while if the pilot can maintain a stable hover, hey, this guy's got good a chance of making it!"

Suspended some 140 feet below the helicopter, John hand-signaled to the flight engineer to begin moving the helicopter, and thus John, laterally to a position where he could grab the stricken man. Now directly above the heated smoke column, the small Huey began buffeting in the thermal affects. Equally bad, the rotor-washed swirling smoke began obscuring the flight engineer's view of John.

On the penetrator, John knew what was happening above. He slammed hard into the wall of the building, only to bounce off in a crazy gyrating spin. He reached out to stabilize himself, but was rewarded with a repeat of the initial impact. Damnit, he knew he was in the immediate vicinity of the window, if only he could find a handhold. Impacting the wall a third time, he lunged blindly and grabbed a hold on the window frame and a handful of curtains. The collapsed man was precariously balance in front of him; one erroneous nudge, one accidental movement, could send him sliding to his death.

John grabbed a hold of the frame with his other hand, and pulled himself into a crouch-like stance in the window. Hot, acrid smoke filled his lungs and stung his eyes. Yet through the bellows of the deadly black stuff, he could see the room totally ablaze and flames burning the carpet at the collapsed man's feet. It was now or never. He flipped down one of the penetrator seats, and struggled to place the inert body upon it. To this day he still doesn't know exactly how he managed to do it; only a super-human effort under life or death conditions can rationally explain that which normally cannot be accomplished. But by whatever means that he achieved it, the limp, soot-covered body of the man was before him, securely placed upon and strapped to the jungle penetrator.

Suddenly a tremendous body-crushing jolt ripped John and his victim upward into the top window frame. They slammed into the metal and concrete frame with such a force that had a portion of the jungle penetrator not taken the full impact, they

would have been severely injured or killed. Above him, the hovering helicopter had nearly been blown out of the sky as propane gas cylinders in the burning penthouse exploded into huge fireballs. The crew was in a deadly nose-to-nose battle with mounting circumstances and the forces of nature. The total gross power requirements placed on the over-tasked jet engines, combined with the hazards of the exploding penthouse, smoke, and thermal effects of the fire, plus John's and the survivor's predicament at the end of the hoist system, added by the immediate proximity of surrounding high-rise structures all seemingly conspired to impact whatever actions they may take, no matter how minute or seemingly insignificant.

Then dread words from the flight mechanic who was operating the hoist rang through the crew intercom system: "We've just lost the hoist! The cable is fraying!" The combined weights of John and the survivor, compounded by the severe impact into the building, had exceeded the tensile strength of the hoist steel cable, snapping a number of the woven strands. Headsets echoed with multiples of "Oh, shit!" To try and wrench the cable farther onto the hoist drum could snap the remaining woven strands. Similar outcomes in the past had happened under approximate circumstances.

Below, John and his inert survivor were taking a punishing beating. As though on a pendulum, they were being spun and bounced along the hotel wall in an uncontrolled oscillating arch. It was all he could do to wrap his arms and legs around the survivor and hug him tightly against the penetrator. While John was somewhat protected by his flight helmet, the half-clad, inert survivor had absolutly no protection, save that which John could provide. Still, the PJ was not to come out of the incident unscathed. He had taken the full impact of the initial collision into the building on his shoulder, and it felt as though it itself was on fire. Of greater concern was the severe damage sustained to the penetrator. He had fleeting visions of the whole thing coming apart and spilling them into the street far below.

Mercifully, the tumbling and pounding suddenly ceased, replaced by the sensation of spinning space: the helicopter was sideslipping away from the burning hotel. John twisted around to see where he was being taken. There on a nearby adjacent rooftop, people were waving and gesturing to land at their position. Guided safely over to the rooftop by Charley Hart and the flight engineer, the pilot lowered the helicopter until both John and his survivor were safely on the firm surface.

TSgt Pighini and survivor being carried to an adjacent rooftop. *(Photo from private collection of SMSgt Pighini, USAF, ret.)*

Untangled and unstrapped from the penetrator, John found his patient to be in full respiratory distress. To attempt to convey to the helpful non-English-speaking Spaniards what he wanted would take too long, so he began basic life support measures. In mere seconds, Charley Hart was at his side with the PJ medical kit. Their world became a microcosm of just one thing: Life. And everyone there knew it. The crowd that huddled around the two feverously working men instinctively moved backwards a few feet, some softly murmuring prayers. Then through the crowd, Spanish medical firemen with ACLS equipment burst forward and immediately took control of the effort.

As John and Charley disengaged themselves from the scene, they realized just how intent they had been in trying to save the injured man's life. There off to the side of the building they were on, was John's Huey in a hover waiting patiently for whatever assistance it could provide. The two PJs weren't even aware it had moved into position. Climbing aboard and ascending to a higher hover, they saw below them the extensive resources of Zaragoza city and the air base that were being employed.

Still it was not enough. Both helicopters were ordered back to the base. John's bird was immediately hot refueled (jet engines running), equipped with a new rescue hoist, loaded with rescue

Fire scene from street as rescue operations became more consolidated. Note reach of USAF fire ladder, far right. *(Photo from private collection of SMSgt Pighini, USAF, ret.)*

gear and medical supplies, and received Kurt Hair as additional PJ asset. Charley's bird was likewise refueled, loaded, and took on John Magee as an asset. Within twelve minutes after landing, both birds were airborne and enroute to the scene.

Once again at the burning hotel, John and Kurt were lowered to the rooftop where they quickly began to set up rappel and retrieval systems directly over trapped ninth-, tenth-, and eleventh-floor victims. Charley and John remained aboard their bird to make an aerial exterior reconnaissance of all the upper floors in the hopes of finding more people who could be rescued.

But just as John and Kurt were about to initiate extractions, the small cluster of people they were targeting suddenly disappeared inside the smoking room. Immediately reappearing in their place was a USAF firefighter; a Spanish and American firefighting team had successfully reached the uppermost floors and would evacuate the remaining survivors from within.

The PJs stood mute for a minute just looking at each other as if the news were too difficult to believe. Suddenly they were a team without a job. And, it registered well.

(Postscript: Seventy-one people died and eighty-one were injured severely enough to be placed in hospital. John never learned the disposition of his patient.)

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In 1979, TSgt Pighini and his pilot received the USAF's prestigious Chaney Award for Valor during what has became known as the Zaragoza Fire. Both John and Charley Hart received the Airman's Medal for Heroism. A few months later, John was selected as Zaragoza Air Base's Outstanding Senior Noncommissioned Officer of the Year. Upon completion of his assignment as Zaragoza, he was assigned to HQ ARRS where he became Pararescue's worldwide Chief of Pararescue Medicine. Four months after his retirement in 1983, he was recalled to active duty to establish and function as the superintendent of pararescue operations at the 24th Special Tactics Squadron. He was a member of tactical assault forces that participated on the SS Achille Lauro hijacking, as well as several foreign flag and all US flag aircraft that were hijacked during that timeframe. He permanently retired in 1987 and now lives in Georgia.

Senior Master Sergeant John Pighini at 24 STS, circa 1986. *(Photo from private collection of SMSgt Pighini, USAF, ret.)*

SOF RELATED BOOK LIST

The following is an compiled list of SOF related books recommended for your reading by those that were there. The list is complements of Len Blessing with the assistance of all of you. If anyone has other books they would like to add to the list, let us know. Three new books have been added since the Fall Edition.

TITLE	AUTHOR
15 Months In SOG	Thom Nicholson
A Concise History of US Army Special Operations Forces, with Lineage and Insignia	Geoffrey T. Barker
A Very Short War (about the last gunfight and the last sacrifices of the Vietnam-era war in the recovery of the crew and ship SS Mayaguez in 1975)	John F. Guilmartin, Jr
Advice and Support: The Early Years	Ronald H. Spector
Airborne and "Special Forces" (non-fiction, good quick references, especially for family or civilians)	Hans Halberstadt
Battle for the Central Highlands: A Special Forces Story	George E Dooley
Beyond Nam Dong	Roger Donlon
Blacjack -33: With Special Forces in the Viet Cong Forbidden Zone	James C Donahue
Blackjack -34 (Previously titled "No Greater Love")	James C Donahue
Bravo Two Zero	Andy McNab
Break Contact Continue Mission (fiction)	Raymond D. Harris
Bunard: Diary of a Green Beret	Larry Crile
Che Guevarra on Guerrilla Warfare	Ernesto Gueverra
Code Name Bright Light	George J. Veith
Code Name:Copperhead	SGM Joe R. Garner (Ret)
Covert Warrior	Warner Smith
Edward Lansdale: The Unquiet American	Cecil B. Currey
Elite Warrior	Lance Q. Zedric
Fighting Men: Stories of Soldiering	Jim Morris
Five Year To Freedom	James N. Rowe
From OSS to Green Berets	Col. Aron Bank (Ret)
Ghost Soldiers: The Epic Account of World War II's Greatest Rescue Mission (Ranger operation to free POWs in the Philippines)	Hampton Sides
Green Berets At War	Shelby L. Stanton
Green Berets at War: US Army Special Forces in Asia 1956-1975	Shelby L. Stanton
Green Berets in the Vanguard: Inside Special Forces 1953-1963	Chalmers Archer Jr
Guerrilla Warfare: On Guerrilla Warfare	Mao Tse tung
Hard To Forget	Steven M. Yedinak
Hazardous Duty	MG Jack Singlaub (Ret)
Ho Chi Minh: A Life	William J Durker
I Served	Don C. and Annette R. Hall
In The Village of the Man	Loyd Little
Inside Delta Force: The story of America's elite counterterrorist unit	Eric L. Haney
Inside the Green Berets: The First Thirty Years	Charles M. Simpson III
Killing Pablo: The Hunt for the World's Greatest Outlaw (read by a current SF medic who knows some of the guys involved in getting Pablo; told him that the book is pretty accurate, except what happened in the actual killing.)	Mark Bowden
Laos: War and Revolution	Nina S. Adams (Ed)
Logistical Support of Special Operations Forces During Operations Desert Shield and Desert Storm	Donald W. Betts

TITLE	AUTHOR
Long Shadows (fiction)	Kent White
Lost Crusade: America's Secret Cambodian Mercenaries	Peter Scott
MAC-V-SOG Command History Vol. I & II	Charles F. Reske
Medal Of Honor	Roy P. Benavidez
Mike Force	L H. Burrus
Mobile Guerrilla Force: Wth the Special Forces in Warzon D	James C Donahue
My Secret War	Richard S. Drury
Night Jungle Operations	Thomas B. Bennett
Night of the Silver Starts: The Battle of Lang Vei	William R Phillips
No Surrender (Japanese soldier who evaded capture and survived 30 years in the Philippines; it's a great book about perseverance and commitment to warrior ideals)	Hiroo Onoda
Once A Warrior King: Memories of an Officer in Vietnam	David Donovan
One Day Too Long	Timothy N. Castle
OSS to Green Berets	Aaron Bank
Parthian Shot	Loyd Little
Peoples' War, Peoples' Army	Vo Nguyen Giap
Perilous Options: Special Operations as an Instrument of US Foreign Policy	Lucien S. Vandenbroucke
Phantom Warriors, Book II	Gary A. Linderer
Phantom Warriors: LRRPs, LRPs, and Rangers in Vietnam, Book I	Gary A. Linderer
Prairie Fire (fiction)	Kent White
Project Omega: Eye of the Beast	Ernie Acre
Rangers at War: Combat Recon in Vietnam	Shelby L. Stanton
Reflections Of A Warrior	Franklin D. Miller
Rescue Of River City	Drew Dix
SF Bibliography: Collection of articles and other readings with Special Forces topics	Radix Press/Dan Godbee
Shadow War: Special Operations and Low Intensity Conflict	H.T. Hayden
Shadow Warriors: Inside the Special Forces	Carl Stiner and Tomy Koltz
Sideshow (the US, Khymer Rouge & Cambodia)	Robert Showcross
SOG and SOG Photo Book	John Plaster
SOG: Volume 1	Harve Saal
Soldier Under 3 Flags	H. A. Gill (PB)
SPEC OPS: Case Studies in Special Operations Warfare: Theory and Practice	William H. McRaven
Special Forces 1941-1987	LeRoy Thompson
Special Forces of the US Army	Ian Sutherland
Special Forces, the US Army's experts in Unconventional Warfare	Caroll B. Colby
Special Forces: A guided tour of US Army Special Forces	John Gresham
Special Men and Special Missions: Inside American Special Operations Forces, 1945 to the Present	Joel Nadel and J.R. Wright
Spies And Commandos	Kenneth Conboy
Strategy and Policy Background Umbrella Concept for Low Intensity Conflict	Alex & Hamilton Booz
Street Without Joy (French in Indochina; Good groundwork for SF in Vietnam)	Bernard B. Fall
Talking with Victor Charlie: An Interrogator's Story	Sedgwick D. Tourison, Jr.
Tam Phu	Leigh Wade
The Chindit War (good section on Merrill's Marauders)	Shelford Bidwell

A PLEA FOR YOUR PAST

This plea is written with the interest of documenting the history that active duty SOF medics are now making. It is directed to ALL medics, not just those operating in Afghanistan and Iraq. There is much more to being a SOF medic than combat and it is vital to document all of your experiences. I appreciate and fully support your need to maintain OPSEC, but after the sand in an hourglass drops its last grain, your stories will be valuable lessons for future generations.

My work with the first generations of Special Forces medics has taught me that the details of what seem to be unforgettable moments are indeed faded and blurred with the passage of time. Countless incidents of history have been lost and forgotten by your forebears. You have benefited greatly from their professional experiences in your training. This is evident in the exemplary duty you have and will continue to display. I implore you, on their behalf, to learn and heed a personal lesson from them as well.

First, maintain a file with ALL of your orders, awards, certificates, copies of After Action Reports, and all the other endless stream of military documents that come into your possession. These key source documents tell a rich story and can serve you well in later years when you're asked a minute detail. Trust me, some day you will be asked such questions. "When did you enter and complete medical training?" "Who were your classmates?" "What were your instructors' names?" "Who was the NCOIC?" "Who was the OIC?" "When did you get assigned to Group?" "When and where was your first deployment?" "Who was the other medic on such and such deployment?" Right now, you can probably answer these questions; three decades down the road it will cause you to scratch your head.

Next, keep a diary. This doesn't have to be a fancy or elaborate daily task. A small pocket-sized notepad to jot down your thoughts, feelings, and observations while they are still fresh in your mind will do nicely. It doesn't matter what you write, good or bad, because this is YOUR individual story. This documentation helps preserve what you experienced and when it is combined with other information from fellow medics, it tells a broader story. Always note the date, time, and place for an entry. Here are a few suggested entries:

- Unit designation
- Area of operations
- Team member names
- Weather conditions
- Supply and equipment problems
- Terrain features and plant life
- The names of the people you encounter and interact with
- Physical and dress descriptions
- Circumstances of injuries or illness' treated
- Insects and wildlife encountered
- Field expedient solutions to problems encountered
- Cultural beliefs and rituals of the indigenous
- Unique and humorous events
- Civic action operations initiated

The idea is to capture a snapshot that depicts the wide array of situations SF medics encounter and display their diverse abilities.

Last, take pictures. Label all pictures with the following in mind: who, what, when, and where. Who is in the picture? What does the picture depict? When was the picture taken? Where was the picture taken? This process of labeling will inevitably bring memories alive. Take a minute to make a diary entry describing the scene the picture depicts.

Keep all of these items hidden away in a box. Once the limitations of security classifications have been

lifted these items are a virtual treasure trove. They will provide you some great memories, are an invaluable resource for historians, and a legacy for your family. Maintaining a central depository for these items will assist in not scattering them, which all too often happens, when moving from post to post and house to house throughout your military and civilian careers.

I cannot count the number of times the men I have interviewed wish they had followed just a fraction of these suggestions. Your experiences can be valuable learning devices for future medics. Technology is improving the tools of the trade but there is no replacement or higher valued teacher than experience. Some day, thirty years from now, a family member or researcher such as myself will bedevil you with questions about your remarkable achievements and contributions - be ready for them.

Take this pleading message from the early day medics, who are joyously proud of you, and carry the torch forward for future SOF medics who will look to you for guidance, much sooner than you think.

Len Blessing

I am immensely disappointed--as I know you are--in the (lack of) participation by other SOF medical personnel, past and present. To think of all the brave, heroic, and educational stories that are going to waste because others fail to see the value--or fail to realize their contributions--in them. They apparently fail to understand (in my opinion) that their responsibilities to the Force continues even after they hang up the uniform. How else is history to be a learning tool (thus a guide for life, survival, and success) for the present and future?

While I am reluctant for this forum to be seemingly viewed as PJ-specific, perhaps it will sufficiently kick others in the crotch causing them to tell their stories, and then everyone will win. In the meantime, I'll keep trying to capture the PJ events for you, at least it will be a means to tell the PJ side of the medical ops.

Best wishes,
Wayne Fisk

The online access works great. Thanks for setting it up. As an Afghanistan-bound reserve psychiatrist (who could always be called upon to remember all that non-brain stuff from med school, like trauma or primary care), I appreciate this resource.

Regards,
Bruce Capehart

CASE STUDY

A Case of Blindness
Caused by a 9mm Simunition Marking Cartridge

Mitch Meyers, MD

It was a dark and stormy night … perfect weather for a counter-terrorism exercise with some of our foreign counterparts. It was also the perfect weather for incurring serious training injuries.

During a midnight assault on an apartment complex full of "terrorists," a foreign soldier role-playing as one of the bad guys lost his wraparound polycarbonate safety glasses during a close-quarters firefight and was subsequently shot in his right eye with a 9mm marking cartridge at point-blank range from an HK MP5.

Within minutes, an 18D Special Forces Medical NCO on the assault team had evaluated him and other injured soldiers and recommended CASEVAC to the nearest military medical treatment facility. CPT Jim Fulton, the 1st BN, 1st SFG(A) Physician Assistant and myself accompanied the injured soldiers in the back of a pickup to a nearby host nation military MTF. Due to the poor lighting and heavy rain we did not attempt any further examination on the casualties during transport.

Ten minutes later at the clinic it quickly became obvious that this soldier had more than a corneal abrasion or uncomplicated blunt trauma eye injury as originally thought at the assault site. The soldier had been keeping his right eyelid tightly shut in the field, but when pried open, a 1cm oblong white body covered in bright red was visible under the lid. His brown iris was not visible, only the white of his sclera, as if his eye was rolled backwards.

Surprisingly, the patient denied having any significant pain and did not seem too concerned about his injury or loss of vision. I attributed this to the fact that he must have been drinking since he reeked of alcohol.

With the help of a military physician at the clinic who spoke English, the injured soldier told us that he had been running away from one of the assaulters when his safety glasses were knocked off his face after running into a telephone or power wire.

Pulling out the foreign object would have been a technically simple procedure, but we were concerned that it might be embedded deep enough into the eye that vitreous fluid could leak out if we removed it. We chose to err on the side of caution. Along with the clinic's host nation physician, we decided that extraction of the sabot would best be done in a more controlled environment by an ophthalmologist located at a military hospital less than one hour away.

After the host nation ophthalmologist removed the sabot, his external eye exam was significant for torn conjunctiva and corneal injury. Further examination revealed that the patient had a marked loss of vision that was consistent with his displaced lens. He was then placed on IV antibiotics and told he would he would need a lens replacement and possibly a corneal transplant if he were to ever see well out of his right eye again. Two weeks later he was considered legally blind and traumatic cataracts were discernable on examination.

MEDICAL LESSONS LEARNED:

1) Alcohol and guns don't mix. Drunken soldiers are more accident-prone and alcohol abuse is not compatible with military service. In this case, impaired judgment may have contributed significantly to this soldier losing his protective eyewear and subsequently losing his vision. We suspected, but could not verify, that while inebriated he may have simply taken off his safety glasses because it was wet and dark and difficult to see with them fogged up.

2) Safety first. Tough, realistic training is vital because the more we sweat in peacetime, the less we bleed in war. However, most training injuries are easily avoided or ameliorated if proper risk assessment,

risk reduction, and other safety interventions are enthusiastically performed. Fellow soldiers observing his excessive use of alcohol could have had him pulled from the exercise and prevented a serious injury.

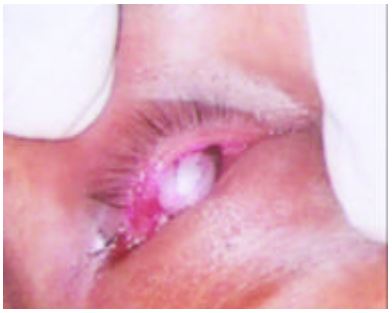
a. Proper use of PPE
b. Screening of participants prior to start of exercise/training.

3) Primum non nocere (First, do no harm). When in doubt, don't pull it out. After returning to Okinawa, I consulted a Navy opthalmologist about this case who wholeheartedly agreed that our decision not to remove the object ourselves was the correct one in this case. Besides being in the patient's best interest from a medical point of view, it was also the best course of action from a legal perspective as treating permanently handicapped foreign nationals could possibly expose us to future liability claims.

4) The importance of an on-site medic with proper training on potential injuries that could result in loss of life or limb.

Counter-terrorism training is all fun and games until someone gets his eye shot out…

The plastic sabots of the 9 x 19mm FX Simunition Marking cartridges have a muzzle velocity of 400fps and can travel a maximum distance of 660 feet.



The expended plastic sabot is better visualized here in this closeup of the eye. The non-toxic, water soluble, fluorescent red marking pigment has already been irrigated out.

Soldier with 9mm pistol and safety equipment. Mandatory safety equipment when training with paintballs and Simunition provides protection to the eyes, face, and groin. When available, throat protection should also be worn.

MAJ Meyers is a Special Forces Battalion Surgeon with a strong interest in the occupational injuries of soldiers. He received his MD from the University of Nevada and his MPH degree from Harvard University. He became board certified in General Preventive Medicine after completing his residency at Madigan Army Medical Center in Fort Lewis, WA. He is a former 11B Infantryman, 18B SF Light Weapons NCO, and 91B Medical NCO. His medical assignments include Brigade Surgeon for the 101st Airborne Division, and USASOC Chief of Preventive Medicine and Medical Intelligence. He is currently the Flight Surgeon and Dive Medical Officer for the 1st BN of the 1st Special Forces Group (Airborne) in Okinawa, Japan, working, training, and living the dream at the forward edge of freedom.

SOMA '03 Update

The first noteworthy item from SOMA is the news of the selection of one of our members, Captain James Portt, PAC, MMS, EMT-P, as the "PA of the Year" by the Association of Military Surgeons of the US (AMSUS), and even better, he was selected as the Federal Physician Assistant of the Year by the American Association of Physician Assistants. These are tremendous accolades for both Jim and SOMA. Furthermore, indicative of the humble spirit of the silent warrior, Jim distributed the financial award accompanying the awards to various veteran organizations, with a substantial part going to SOMA! Congratulations and thanks, Jim! New Life Member!

CAPT James Portt and Dr. Carmona, the US Surgeon General

SOMA '03 will open on Monday, 8 DEC 03, lasting until Thursday, 11 DEC 03, at the usual location - the Downtown Tampa Hyatt, Tampa, FL. The theme for this year is "Special Operations Medicine - Tip of the Spear for Today's Wars," stressing Afghanistan, Iraq, and homeland defense issues. There will be several noticeable changes for this year's conference. The involvement of the civilian tactical community will be greatly increased. Recognizing the likelihood that the military will be working closely with civilian communities in the event of a homeland mass disaster, SOMA is proactively increasing the civilian special operations medical community participation in the agenda, aiming to increase the cross-fertilization between the civilian and military SOF medics. In addition, Dr. Carmona, the US Surgeon General and prior 18D, has again agreed to attend. There will be several breakout panels scheduled to allow for ad hoc presentations by recent returnees from the conflicts de jour, giving us flexibility in programming, while still meeting the CME/CEU requirements. The military aeromedical conference will again be run concurrently with SOMA, offering SOF and non-SOF flight surgeons and medics the opportunity to inter-educate. Remember, these are the people who fly choppers into hot LZs to pick up SOF casualties. Mutually understanding each other's capabilities and missions, and even personally recognizing each other, may help you in the future.

Input to SOMA Agenda? If you would like to recommend speakers or topics for SOMA '03, or better yet, if YOU would like to give a talk yourself, contact the program committee (syevich@hotmail.com), or the civilian SOF POC (Bill Bograkos, irisbo@earthlink.net).

The second annual **SOMA Challenge** is scheduled for Tuesday, 9 DEC 03. Again, this combined physical fitness/medical scenario event will be highlighted by its unpredictability in types and number of events to reflect the unpredictable nature of the SOF mission. The events, however, will not be daunting, so no one should feel intimidated about entering, although the SOF super jocks and super medics will still feel challenged (you can still do well even if you have no medical background). Individuals, as well as two-person teams, can compete. For teams, the best score of the two participants for each event is used; both team members do not have to participate in the entire challenge - e.g. one can run, the other can take the tag and then swim. No special equipment can be used - in fact, no watches/timepieces will be allowed this year. Gloves may be used - but who knows if you'll need them? The prize categories will be: first

male overall; first female overall; first male team overall (mixed male/female teams will be considered "all male"); first all-female team overall; oldest individual finisher (regardless of place); oldest team finishing (determined by the combined ages of the team members).

WEBSITE CHANGE!!!!! Our website has changed. It is now **www.specialoperationsmedicalassociation.org**, a change from our previous site www.soma.org - due to circumstances beyond our control. We're working to get the old URL back.

Officer Rules Changes. A few changes in SOMA officer rules are proposed. The two-year term is too short for elected SOMA officers to master the learning curve required to be competent in organizing the annual SOMA Conference. Furthermore, a complete turnover of all 4 officers at every election drains the institutional memory, periodically resulting in 4 new officers who have to start all over again. Hiring an event planner did solve the problem of finding all the loose ends and tying them together. Any members who think they can do better should run for office this December. (It would help if you did not have a full time job.) Furthermore, with the expansion of SOMA to embrace our civilian counterparts, I want to ensure that both aspects of SOF medicine are well represented in SOMA. Therefore, I am suggesting the following:

Revised Officer Criteria

1. **SOMA President** can be anyone, from anywhere, with any background (medic, physician, administrator, civilian, military, street sweeper, etc). We have been fortunate in that three of the past four Presidents were SF qualified and physicians - and we were equally fortunate that Bob Leitch was so well versed in SOF and such a strong supporter of our original guideline - every thing for the SOF Medic!
2. **Two Vice Presidents**: A second Vice President will be added, to represent the civilian tactical medicine community. Both VPs must have a medical background.
   A. **Military VP**: Elect one from the SOF military (or ex-military) community; must be fully SOF-qualified (e.g. SF or Ranger tab; SEAL; PJ). NOTE: This is the only SOMA officer who must come from the "tabbed" military (or ex-military) community.
   B. **Civilian VP**: Elect one from the civilian tactical medicine community
3. **Secretary:** Must have military SOF background, but not necessarily "SOF qualified."
4. **Treasurer:** Any background; just equipped with a desire to promote SOMA.

New Terms of Office

1. All terms should be extended to three years, to take effect variably, depending upon the office (see below).
2. Terms will be staggered.
   A. The election for President will proceed as planned for this DEC 03.
   B. The present military Vice President will stay in office for an additional year (a 3 year tour). Staggering the President and Vice President terms will ensure one of the "presidents" will have experience in running SOMA.
   C. There will be an election for the newly proposed "civilian" Vice President. Staggering the VP terms will ensure that there will always be a VP who has experience in running SOMA.
   D. There will be an election this DEC 03 for the Secretary, since the previously elected Secretary resigned last year, and Bob McCumsey was conscripted as interim Secretary (thanks to Bob for stepping in!).
   E. The present Treasurer will remain in position for another year.

Memberships

Due to the number of continuing requests for SOMA Lifetime memberships, they will still be offered until 11 DEC 03 -- $500 for physicians, $400 for non-physicians. You can obtain these memberships by writing to the SOMA Treasurer, Russ Justice, at justicer@earthlink.net or through the **www.specialoperationsmedicalassociation.org** website. All SOMA 02 attendees should be receiving this Journal of Special Operations Medicine - and if you're not, contact Russ.

Steve Yevich
SOMA President

Photo Gallery

Coalition forces were hit by a 500 lb bomb at Tarnac farms. AF and Army SF responded via dust off to assist coalition medics and transported 7 patients back to Kandahar FST for treatment. This patient had to be staged outside the FST after the OR suite became full.

All Photos courtesy of Capt Keith Farrell, USAFR,NC

Picture of an arterial graft on patient from above incident.

Afghan Military Fighter (AMF) who stepped on a land mine and was transported to Kandahar FST where he lost the leg.

A foley catheter was used to tamponade the bleed of a soldier shot in the chest. Treatment was received at Kandahar FST and patient was then transported via C-17 to Ramstein.

Regarding the three pictures below:
Afghanistan children going to school cut through a poppy field and walked into a mine field. An anti-tank mine exploded and injured 14 children outside of Kandahar. Two American CH-47s responded with SF medics. The patients were triaged and treated, then flown to Kandahar in the middle of a dust storm. All American aircraft were on bypass due to near 0 visibility. British SF C-130 took the chance and landed IFR. The FST was unable to treat the kids due to two previous mass casualities that depleted supplies. The remaining supplies were needed for US and coalition forces. The children were retriaged off the helicopters and loaded onto the C-130. FST, CCATT, and AES personnel took report from SOF, stabilized the patients and then took off for the Kabul Spanish hospital. It was later reported that they had no pressurization, had to fly low, and that the crews experienced one hell of a ride. All the patients survived.

FST and 622 AES personnel preparing to intubate and stabilize the injured children in the C-130.

Two children post intubation on a Univent 754

On the Kandahar tarmac after all the kids were loaded and preparing to depart for Kabul via British SOF C-130 in April 2002.

Dedication

Jerry "Buck" O'Real Pope II
1967-2002

Ensign Jerry O'Real Pope II was born October 2nd 1967 in Tallahassee, Florida. He graduated from Leon High School in 1985 but his continued desire for competition, athletics, and undying devotion to his country led him to enlist January 1987 with the United States Navy for an opportunity to serve as a US Navy SEAL. He was a graduate of BUDs class 165. Upon graduation from Basic Underwater Demolition School, Petty Officer Pope was assigned to SEAL Team Four at Little Creek, Virginia. He later served as an instructor at the Joint Special Operations Medical Training Center. While stationed at Ft Bragg, he completed a Bachelor in Health Science with Honors at Campbell University. Upon selection to the Intra-Service Physician Assistant Program he maintained past standards by graduating in the upper percentile and with honors, earning a degree in Medical Sciences (Physician Assistant) from the University of Nebraska. Following an assignment to Branch Medical Clinic, Quantico he again heeded the call to service by volunteering for arduous and highly classified duty, which later took the life of our comrade.

"Buck", as his friends and teammates knew him, was not only the consummate professional within the special operations community but also one who possessed an uncanny ability to smile during events that would frustrate even the most patient of individuals. Often he would discuss his past misfortunes with a laugh and calming demeanor that would only make one wonder about how he was able to maintain his personal stamina and sense of humor during the most difficult of times. He often unselfishly volunteered for the worst of duties within his platoons and gave more than one could expect from any individual. He was a close friend to many and one that will be missed by all.

Ensign Pope was laid to rest in Arlington National Cemetery.

Special Forces Aidman's Pledge

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

Pararescue Creed

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

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

Navy Poem

I'm the one called "Doc"... I shall not walk in your footsteps, but I will walk by your side.I shall not walk in your image, I've earned my own title of pride. We've answered the call together, on sea and foreign land. When the cry for help was given, I've been there right at hand. Whether I am on the ocean or in the jungle wearing greens, Giving aid to my fellow man, be it Sailors or Marines. So the next time you see a corpsman and you 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.
AC USN

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