The Society of U.S. Naval Flight Surgeons Newsletter

Volume XXV, Number 4 **http://www.aerospacemed.org** **October 2001**

President's Column

Well, here I am writing this column in sunny, warm, tropical Puerto Rico settling in as XO USNH Roosevelt Roads. I left BUMED early August for PR, leaving Conoly back in the states to help our younger daughter Lucy and her husband Jon with their new baby boy. Wow! A grandson (9lbs 6oz!) and I was able to see him into the world just the day before leaving for PR. What a wonderful and unexpected blessing and a great going-away "gift" from my daughter and son-in-law!

Puerto Rico is very nice—sun, sea, sand, and sail—and the XO job is proving challenging as I had expected. It's been a steep learning curve so far. In the last 2-3 weeks I've become acquainted with an obviously talented medical, nursing, medical service, and hospital corps staff of professionals, and a really good civilian staff. I've learned more about hospital renovation and "partnering" with military and civilian contractors than I thought I'd ever have to know. I've studied our SORM inside and out (with an eye with the CO on change), and I have become somewhat knowledgeable on the intricacies of "GS" timekeeping, command management control, command evaluation and organizational performance improvement programming, and data quality management—along with a myriad of other hospital related issues and programs. And, out of necessity, like the hospital's prior XO, CAPT Rick Gilbert, I've become in this short time somewhat of a tropical weather expert (we're right in the middle of hurricane season, you know.) Needless to say, disaster preparedness is more than just a passing interest down here. My wake-up call came with Tropical Storm Dean. Sorry CAPT Nick Davenport—you are not invited down here (…inside joke). So, I've hit the deck running and already having fun. And on top of that, I have a great CO with strong participatory leadership skills. That makes my job a lot easier.

I've also had the chance and pleasure to meet with our local Flight Surgeons—LT Pete Shumaker attached to the hospital and LT Gary Mullen with VC-8. Great guys. We had lunch together about a week ago. I found out there were a number of aviation line medical/hospital problems, including lack of a Memorandum of Understanding

(continued on page 2)

IN THIS ISSUE

THE SOCIETY OF U.S. NAVAL FLIGHT SURGEONS
P.O. BOX 33008
NAS PENSACOLA, FL 32508-3008

The Society of U.S. Naval Flight Surgeons is a nonprofit organization. Its purpose is to advance the science, art, and practice of aerospace medicine and the mission of the U. S. Navy and the U. S. Marine Corps; to foster professional development of its members; and to enhance the practice of aerospace medicine within the Navy and the Marine Corps.

Membership is open to all flight surgeon graduates of the Naval Operational Medicine Institute. Subscription memberships are available. Dues are $20.00 per year, or $300.00 for a lifetime. Contact the Secretary or Treasurer for more information or a membership application form.

(continued from page 1)

(MOU), lack of hospital AVT support, and inability for hospital SAR corpsmen to complete aircrew training. With the good professional relationship that exists between VC-8 and the hospital Flight Surgeons and with hospital leadership support, these problems should be easily corrected. It's nice to know I that I can still contribute locally to Aerospace Medicine—my operational "love." I also look forward to keeping aviation medicine and family practice skills up along with XO obligations—an exciting, but daunting challenge. We'll see.

Other notes of interest as of the writing of this column:

—First with regards to our primary goals for this year—the establishment of a permanent historian and a membership committee—the Board of Governors will be teleconferencing soon to discuss and take action on these. Along these lines, please check out the enclosed proposed change in our newsletter name and front-page format. The idea of a "history" related front-page format and a change in newsletter name came from reviewing old SUSNFS goals and future direction. Since focusing on history is one of our goals this year, the front page reformatting seems appropriate. Let LCDR Padgett and me know what you think of both.

—Second, it's way overdue for us to establish an official Membership Committee. Even before the proposed Bylaws change is sent out for membership vote, CDR Glenn Merchant will be working closely with LCDR Padgett to increase the number of our full memberships, i.e., both SUSNFS and AsMA membership. Please contact Glenn or Bill if you are willing to help in this effort.

There is a lot of exciting "stuff" going on in Aerospace and Navy Medicine and plenty of opportunity to demonstrate honor, courage, and commitment—and to excel professionally. I encourage you to jump on board if you aren't already or stay on board if you are. Until next time…

Godspeed,

CAPT C.O. Barker, MC, USN
XO Naval Hospital Roosevelt Roads
cobarker@rroads.med.navy.mil
(787) 865-5783 DSN 831
FAX (787) 865-5759

From the Secretary

Bravo Zulu to all past and present Flight Surgeons. In the last few months I have experienced many wonderful things based on the **reputation** that you have made for this community.

In June I did a carrier rotation on the USS Theodore Roosevelt with the Senior Medical Officer CDR Bob Frick. Being a Pediatrician, this was my first operational experience. What a different world it was out there. The professionalism among the crew was a real treat to behold. Lieutenants M. T. Newton, Robert Guardiano, and Kevin O'Rourke were the deployed Flight Surgeons with whom I had the pleasure of working. These three were actively involved in medical sick-calls as well as taking care of their own squadrons. They made it a point to teach the corpsman and were equally helpful showing me the ropes of an operational Flight Surgeon. They have a **reputation** on the Roosevelt of being hard-working professionals and I could not agree more.

When I discovered the thrill of catapult shots and the ease of getting S-3 rides, it was my set of wings that allowed me to become a flight junkie. I was made to feel quite welcome in the squadron despite not knowing any of the pilots previously. Due to your hard work reinforcing the Flight Surgeon **reputation,** the squadron accepted me as a professional worthy of their flight time. For someone who has yet to work as a Flight Surgeon, this acceptance was unexpected.

My saga of returning from the Puerto Rican operating area is long and of little interest to most of you. However, part of the trip involved a 9 hour flight with an Air Force tanker. Once again, the Flight Surgeon wings opened up opportunities. The crew of the tanker invited me up into the cockpit to engage in some showmanship and conversation. I got to see close-up the refueling of the Roosevelt's squadrons with high performance aircraft lined up off our wing waiting to fuel. It was a beautiful sight. The lengthy flight passed quickly with a crew interested in the different operating procedures among our services and obvious respect for Flight Surgeons. Once again as a direct result of your hard work and **reputation**, I was benefitting.

So we know Flight Surgeons have a great **reputation**. And we know it remains that way due to the awesome job you all are doing in the fleet today. But the reputation had to come from somewhere. This is why CAPT Barker and others feel we must as a Society record our history. There were many Flight Surgeons that steered our community to where it is today and lessons that they provided will strengthen our future if we don't forget them.

As part of the effort to document the Flight Surgeon history, I have had the pleasure of talking with CAPT Frank Dully (ret) and learning about some of the battles that were fought to make our community special. CAPT Dully has provided us with articles that you will see in the newsletter. I ask others out there to follow his lead and share with the community our history. Aerospace Medicine is an amazingly strong and coherent community that has gained the respect of the operational Navy. We need to understand how we developed this **reputation** and marvel at how special Flight Surgeons are.

You will see a proposed title page change in this newsletter. CAPT Dennis Deakins pointed out a newsletter called CONTACT was published by the Naval School of Aviation through 1959. CONTACT was full of information on graduating Flight Surgeon Classes, follow-on tours, and activities of the Aerospace Medicine community. Please let us know what you think about the proposed change.

Again, I thank all of you out there for continuing to strengthen the reputation of the Aerospace Medicine community. You may not recognize it in your day to day duties, but your work is appreciated. Your professional community is uniquely strong due to its camaraderie, professionalism and history. As an outsider just beginning to step into Aerospace Medicine, I have experienced the respect of others based solely on my Flight Surgeon wings. That is a true credit to your hard work. Continue to use SUSNFS to shape and strengthen the Aerospace Medicine Flight Surgeon community.

LCDR William S. Padgett, MC, USN
wspadgett@nomi.med.navy.mil
DSN 922-2314
(850) 452-2314

Specialty Leader (MED-23)

An era in the history of Navy Aerospace Medicine ended on 29 June 2001. This was when CAPT Charles Barker left BUMED as Director, Aerospace Medicine to assume the role as Executive Officer, Naval Hospital Roosevelt Roads, Puerto Rico.

The Aerospace Medical community will certainly benefit from CAPT Barker's many accomplishments during his tour in Washington, DC. CAPT Barker was extremely influential in determining the current billet structure of the Aerospace Medicine community and in establishing a training pipeline to meet the manning requirements of this structure. He brought Strategic Direction to the community by coordinating and driving the formation of an Aerospace Medicine Strategic Plan. He provided individual mentoring and guidance to both junior and senior Flight Surgeons in the community as the Aerospace Medicine Specialty Leader. He was a key proponent to ensuring that changes in Aerospace Medicine policy and practices are solidly grounded in the science of Aerospace Medicine (i.e., change in aviation vision standards). He played an integral part in initiating policy change in an often-resistant environment that would allow Navy Medicine to adopt programs that kept it in step with medical advances in the civilian community (i.e., PRK in the Navy). These are just a few of his many accomplishments for the Aerospace Medicine community and the Navy in general. Thank you Charlie and "God Speed" to you in your new endeavors at Roosevelt Roads.

For those of you who do not know me, I am CAPT Dwight Fulton and assumed the responsibilities as Director, Aerospace Medicine and Aerospace Medicine Specialty Leader on 16 JUL 2001. During my 22 years in Navy Medicine, I have completed clinical residencies in Family Practice at Naval Hospital Jacksonville and an operational residency in Aerospace Medicine at Pensacola, FL. I have done clinical tours at Naval Hospital Portsmouth, Branch Medical Clinic Mayport, and Naval Hospital Newport. My operational tours have included Wing Flight Surgeon (CVW-1) assigned to USS AMERICA, Flight Surgeon Blue Angels, Senior Flight Surgeon Naval Aviation Schools Command, and Senior Medical Officer, USS DWIGHT D. EISENHOWER (CVN-69). My last job prior to BUMED 23 was as Officer in Charge, Navy Environmental and Preventive Medicine Unit No. 2 in Norfolk, VA. Since arriving at BUMED, I have been on a very steep learning curve trying to educate myself on the many areas of responsibility that accompany this job. And, as insurmountable as it may seem, I am sure that with the assistance and guidance from all of you in the community, Navy Aerospace Medicine will continue to shine as a leader in the operational medicine arena.

One of my major goals over the next three years is to establish a Business Plan for Navy Aerospace Medicine. This arises out of concern that we, as a community, are very dependent on the anecdotal knowledge of those who have gone before us. And, for this reason, we often have to fight the same battles year after year as the personnel in leadership change. CAPT Barker took a huge step in establishing an Aerospace Medicine Strategic Plan that helps to direct and monitor our progress. I intend to persist in his efforts and will be contacting each of the action officers identified in the plan to ensure that we continue to move forward in the goals that we as a community have established for ourselves. However, it will be necessary to incorporate all of the processes developed within this plan into a documented Business Plan for the Aerospace Medicine community. This effort will help to clearly define all of our customers, to define our products and services, to define those processes that allow us to perpetuate our community (training, recruiting, retention, marketing), and to define a clear pathway for those personnel who

elect to choose Aerospace Medicine as a career. Ultimately, this Business Plan will help us to define what the actual cost is for conducting the business of Aerospace Medicine for the Navy. By putting it down on paper, we no longer will have to rely on anecdotal justification for how we do our business. Our justification will be in a clearly-defined Business Plan that can be reviewed annually and revised to adjust to any "political" changes that impact the Navy Aerospace Medicine community. This is an enormous process, but one that is necessary in a time when competition is keen for diminishing financial and personnel resources.

I think that one of the interesting things that I have found since my arrival in Washington is that these big "vision" items tend to get obscured by the day-to-day crises that our staff is forced to face. I will do my best to try to keep my focus where it belongs. I understand that we all have our "regular" jobs to perform, but I ask you all to keep a little room in your schedules to focus on some of these bigger issues that we, in the community, will all benefit from.

I truly am glad to be here at BUMED and am looking forward to working with and for everyone in the community during my tour as Director.

CAPT Dwight C. Fulton, MC, USN
Director, Aerospace Medicine
dcfulton@us.med.navy.mil
http://bumed.med.navy.mil/med23/default.htm
DSN 762-3451
(202) 762-3451
FAX 202-762-3464

(www.airbum.com/pireps/PirepAD-5.html)

The Mystery Plane

Once upon a time...

The year was either 1965 or 1966 and I was a student in SFS Class 111. NAMI owned a version of the venerated Douglas AD, the 4 place AD-5. It was used primarily in support of Ashton Graybiel's motion sickness research, but also was a convenient vehicle for NAMI senior staff to get their flight time. The Navy had already decreed that the AD would disappear from the fleet in '66.

I recall either actually seeing the airplane at NASP or I saw a photo, I can't remember which. The most striking thing about the bird was that the full NAMI name and not just the initials were written on the fuselage from below the national insignia, extending all the way back to the rudder on both sides. It was joked that the AD-5 was the only bird whose fuselage was long enough to carry such a name.

Several years later, perhaps when I was a Resident in 70 -72, I met the former NAMI pilot at Happy Hour at the Mustin Beach Officers' Club. He made a startling confession. On the evening in question, Sherman Field was hosting FCLP for a gaggle of students. The LSO doing the waving was a former shipmate of our AD-5 pilot, who after getting appropriate clearances to land, hailed his buddy with the words "Here comes the world's greatest Spad pilot!"

He then proceeded to ignominiously land gear up. The airplane was stricken from the inventory as a result of the damage. Only our AD disappeared in '66. The rest of the Navy waited a few more years to do it.

Anyone have pictures of the NAMI plane?? Or how about other interesting stories from the Flight Surgeon past?

CAPT Frank E. Dully (ret), MC, USN
frankdully@att.net

NASA News

Taking a few minutes before a simulator event, Navy flight surgeon and astronaut CDR Laurel Salton Clark called to give me an update on preparations for her upcoming mission.

She and the crew of STS-107, which is scheduled to fly next May, have just returned from two weeks at the National Outdoor Leadership School (NOLS). The School was founded in 1965 by Paul Petzoldt, a former Outward Bound chief instructor, and a WWII veteran of the famous 10th Mountain Division. The two-week course, conducted in the Wind River Range of Wyoming, included nine days and nights in the field. While astronauts have attended courses at NOLS in the past, taking advantage of the teambuilding, leadership, problem solving, and conflict resolution training, this was the first time a whole crew attended a course together. Though already a tightly knit group after a year's training together, STS-107 found the course to be very effective.

But there is still much work to be done to prepare for their flight. They will be on orbit for sixteen days, rather a long time for a shuttle mission, and each day will be crammed with about sixteen hours of work. Laurel is heavily involved in several life science experiments, including two in which she is a subject. One of these, a US sponsored project, will study calcium kinetics and protein turnover, looking specifically for mechanisms governing the metabolic alterations seen in microgravity. When she is not the guinea pig, she has plenty else to keep her busy.

On earth, cell cultures tend to grow in two-dimensional colonies. One advantage of microgravity is that they grow three-dimensionally, a more realistic simulation of their behavior in vivo. Laurel will be working with prostate cancer cells in culture with bone stromal cells, in order to study the proclivity of prostate cancer to metastasize to bone. (A similar experiment with breast cancer cells is scheduled for a later mission.) Again capitalizing on microgravity, Laurel will be growing zeolite crystals, which are used for many purposes, such as catalysts in chemical industries, with a structural perfection not possible on earth. And she will be growing protein crystals for study by x-ray diffraction. This technology is expected to make possible the design of

(Official NASA Photo)

"smart" drugs, capable of targeting specifically designated sites on viral particles, for instance.

The good doctor will not be a passenger on this trip, even aside from the scientific work. Though no extravehicular activity (EVA) is planned for the mission, circumstances may require one, such as a system repair. Laurel is the spacewalk coordinator, who, from inside the orbiter, will talk two of her shipmates – including fellow Navy flight surgeon CAPT Dave Brown - through their procedures during the EVA. Finally, she is the secondary flight engineer during reentry, responsible for monitoring the electrical, hydraulic, orbital maneuvering, and reaction control systems, as well as the auxiliary power unit.

For more details on STS-107, go to http://science.ksc.nasa.gov/shuttle/missions/sts-107/mission-sts-107.html.

CDR E. F. Feeks, MC, USN
BUMED 23B
effeeks@us.med.navy.mil
(202)762-3457 DSN 762

(Official NASA Logo)

Physical Exams (Code 26)

My basic description of the Flight Surgeon's job is that (s)he needs to keep rearranging the priorities and accomplishing as much as possible, because there is no way to ever get it all done. **SAFETY** is the reason we have Flight Surgeons. RADM Moffett, in 1922, strongly advocated flight training for aviation medical officers stating that they needed to know about the aviation environment, and not be dead wood on deployments. He wanted them to be trained as naval aviators, and some 70 or so have been. The dual designator program is alive and well. Safety, Operational Risk Management, Human Factors are best accomplished by being in the squadron spaces, the hangars, AOM's, and flying. It means getting to know the people in the squadron(s), in the tower, and in the workspaces.

Providing examinations, and working military sick call are regular duties of a flight surgeon, and should be scheduled in as regular fashion as possible. Keeping a sign out board with a route of march when out of the medical spaces is the best way to avoid lost messages and being considered a deadbeat. Pagers and cell phones make it easy (and affordable) to be contacted today.

Being organized is something that comes easier to some than to others. Most of us are procrastinators and tend to get our desk covered. I'd consider a laptop and PDA essential to Flight Surgery practice today. Keeping Powerpoint presentations of **SAFETY** topics handy means they're more likely to be used. A folder on the desktop computer with links to key education and reference sites can make looking up topics really easy. MANMED and the Aviation Waiver Guide are two such useful links to have handy. Uniform regulations, personnel matters, your pay record, your officer qualification card, even your NATOPS physiology training are all web-based now. Keeping the FAA, Army and USAF standards and waiver guides on your desktop can make reference quick and easy for the Joint environment we see more and more today.

Almost everything we do in the Navy is done by instruction. Pregnancy, immunizations, NAVOSH, you name it, it's on the web. It often initially takes some searching, so it's a good idea to save them when you find them. The Virtual Naval Hospital site at University of Iowa is chock full of valuable references. I keep a GOTO folder on my desktop, as well as a REFERENCE folder in my DOCUMENTS. A FORMS_LKR folder keeps the multitude of forms, including TEMADD requests, LEAVE requests, SF-88, SF-93 (or the new DD2807, 2808), AEROMEDICAL SUMMARY template, SF-513 CONSULT, etc.

SAMS (the Shipboard Non-tactical Automated Data Processing System, SNAPS – Shipboard Automated Medical System) is the standard information system on all Navy ships, and is in widespread use in Marines and SpecWarfare communities. It should be available at all MTF's, since the health record will be on a floppy disk (supposedly) when an individual is transferred from a ship using it. Eventually SAMS, through TMIP (Theater Medical Information Program) and CHCSII will provide a much improved electronic medical record. The data repository is already up and running in Montgomery, AL. You need to become as familiar with these IM/IT tools as possible. AVT's receive modest SAM's training, and should be trained on TRI-MEP (the TriService Medical Examination Program). A new web-based version should replace TRI-MEP in the not too distant future. Eventually CHCSII will have a medical exam module, which will probably be the final tool. CHCS is to be turned off in 2007, when CHCSII is fully operational.

If you have any thought, recommendations, suggestions, concerning how a physical examination software application should look or work, then you need to provide that input now, rather than after the program is completed. Requirements definition is underway for CHCSII. Neither SAMS nor CHCS nor CHCSII for that matter, had defined the need for a physical examination program. Somehow, the OCCMED, ENVMED, MEDSURVEILLANCE folks hadn't seen the need.

You can send your comments to me.

KEEP 'EM FLYING, SAFELY!

CAPT Dennis E. Deakins, MC, USN
Physical Exams Code 26
dedeakins@nomi.med.navy.mil

Naval Safety Center

Aeromedical Clearance

As a part of my duties at the Naval Safety Center, I am one of a team of 14 to 18 experienced professionals that performs Command Safety Surveys at the request of a Navy or Marine Corps aviation unit's Commanding Officer. In my capacity as an aeromedical professional, I evaluate the performance of the command's aeromedical safety program. An issue I want to discuss is up-chits (AKA aeromedical clearance notices) and NATOPS Jackets.

During my surveys, I pull 6 or 7 jackets and review the medical clearance section of the jackets. OPNAVINST 3710.7 Appendix A states that Part C of the NATOPS Training/Qualification jacket shall contain the signed original of the current standard BUMED 6410/1 or 6410/2 (aeromedical grounding or clearance notices). Forms maintained include those covering annual flight physicals and most current up chits from any grounding period (the exception being a grounding notice that "expires automatically," in which case a clearance notice is not required). They will be retained until the succeeding year's annual flight physical clearance notice is received. Medical waivers shall be retained as long as they are in effect.

I have found that universally, NATOPS officers are doing a terrific job ensuring that all up and down chits that they receive are filed appropriately. The shortfalls I have found involve incomplete up-chits forwarded to the squadron by the Flight Surgeon. An example is a chit for an annual physical for an aviator who was found physically qualified and aeronautically adaptable Class 1 SGI Naval Aviator, the next block stated he had a waiver for ETOH. The chit was signed appropriately and the original was filed with no other forms in the medical clearance section of the aviators NATOPS jacket. There was no waiver letter from BUPERS or recommendation for waiver from a Flight Surgeon or NAMI in the section.

The problem above is that the aviator was NOT physically qualified and that he had a waiver for Alcohol Dependency NOT "ETOH". Second the NATOPS officer could not tell me what ETOH was and if there were any special considerations that were involved with this individual.

This pilot had a waiver in his medical record that stated he was not physically qualified and had to meet a number of conditions in order to maintain the waiver. The NATOPS officer and thus the CO of this Command were not aware of the conditions of the waiver since they do not review medical records. They only knew that he was "up and good to go" because the Flight Surgeon said so.

I recommend that Flight Surgeons work to ensure that they are accurately completing patient up and down chits including noting that if an individual is NPQ that the chit says so and ensure that the waiver section is filled out appropriately in English not "medical code" so that the command can understand what the waiver is for.

I recommend that Flight Surgeons periodically review the NATOPS, medical clearance sections for all their aviators to ensure that all the aeromedical clearance and grounding notices are complete, filed appropriately and that those people with grounding notices have turned them in to the squadron. Additionally, ensure that all individuals with waivers, have a copy of the (BUPERS for the Navy or CMC for the Marines) waiver letter in the NATOPS Jacket IAW OPNAVINST 3710.7R. If there are special conditions for the waiver, the enclosures that list these conditions shall be attached to the waiver letter. Remember that only BUPERS or CMC can grant a permanent waiver, so if there is only a temporary waiver from a local board recommendation, or a letter from NAMI stating a waiver is recommended, a little research is in order to determine if the waiver was granted.

Finally, I recommend that all aviation activities implement an SOP directing procedures for reporting to the commanding officer the waiver status of all command personnel on flight status, for ensuring compliance with provisions of waivers, and for the periodic internal auditing of the aeromedical section of the NATOPS jacket.

Keep 'em Flying, **SAFELY**

CDR Nicholas L. Webster, MD, MPH
Naval Safety Center Assistance Command Surgeon
nwebster@safetycenter.navy.mil
(757) 444-3520 Ext.-7268
DSN 546-3529 Ext.-7268
FAX (757) 444-7049

Life in the Yards

You've been assigned as SMO on a carrier scheduled for a yard period. Now what? First of all, you're going to have to learn some terms. Carriers go to the yards for several different reasons and each has its peculiarities.

The usual post-cruise maintenance is called a "PIA" (Phased Incremental Availability). It replaced the older term, SRA (Ship's Restricted Availability) and usually lasts 3-6 months, depending on what has to be done. (This is known as the "Work Package".) During all normal yard periods, there is work performed by the shipyard, contractors and work done by the crew (so-called "Ship's Force Work Package"), usually under the direction of the CHENG or Maintenance Manager.

(Nimitz in Newport News Shipyard)
(Chris Oxley www.nns.com)

A more in-depth yard period usually involves a period of time in dry-dock and is called, not surprisingly, a DPIA (Dry-dock Phased Incremental Availability). This usually lasts from 6-12 months and may go longer.

The next most intense period usually occurs once every seven to ten years, a Complex Overhaul, so-called "COH". This is an extensive, 24-month yard period where major alterations in ship equipment and design is accomplished. It always includes dry-dock time.

Next is the "mother" of all yard periods, the dreaded "RCOH" (Refueling Complex Overhaul). Restricted to nuclear carriers, it involves replacing the reactor cores as well as extensive power-plant modernization. Usually scheduled at the 25-year point in the nuclear carrier's life cycle, it lasts from 36-44 months, depending on growth work. (Growth Work is either necessary or needed repairs discovered during "open and inspect" evolutions. Panels are opened, perhaps for the first time in years, and what's behind them is inspected.) During RCOH, the ship is gutted and essentially rebuilt.

Finally, after COH/RCOH periods, there is usually a special yard period called "PSA" (Post Shakedown Availability). This usually lasts 3-5 months and is where guarantee/warranty work is performed. In addition, equipment that was not available during the original yard period or was selected too late in the process, may be installed.

During each of these evolutions, the Medical Department will be challenged. Not only will all health-care services have to be maintained, but special industrial medicine programs will also need to be supported. Where the department does this may become an issue. During PIA and DPIA, the medical spaces may or may not be usable, depending on the work scheduled. However, during COH and RCOH, medical will have to be evacuated and services provided from an alternate location. In addition to all this, the ship's work package will have to be supported. That means medical personnel will be completing space rehabilitation, damage control and 3M responsibilities as well as everything and anything else that comes up. In other words, your people will have to do their usual jobs as well as lots and lots of general ship's work. You will be busy…very busy.

The key is pre-planning. PIA's and DPIA's that do not require medical space abandonment are much easier to accomplish. However, realize that the noise levels may be such as to preclude reasonable work. You may have to shift hours or internal locations to accommodate noise. You may have to base sick call out of a BDS for a period of time. Should you enter a PIA or DPIA where evacuation of the spaces is required, you will have to off-load some or all of your equipment to a different location. (More about this later in the COH/RCOH discussion.)

(continued on page 10)

(continued from page 9)

During all yard periods, there will be crewmembers assigned to diverse, off-ship locations. Birth-Month Recall will become more difficult, but much more essential. Get the help of the other department heads, as well as the XO. If this program slips, even a little, everything else becomes more difficult.

During COH/RCOH periods, the entire ship will be evacuated, since chill water, ventilation, potable water, CHT and electricity will be shut down for prolonged periods of time. The off-loading of equipment is called "SCOOP" (Ship's Comprehensive Off-load Plan) and is critical to your success. First of all, you must determine which equipment, if any, will be reinstalled in the spaces during the rehab. Work affecting your department will likely be covered by an "ECP" (Engineering Change Proposal), a work package funded by the Navy and carried out by the yard. This ECP will include a list of equipment that will be installed, either provided by the contractor (contractor furnished equipment, "CFE") or by the government (government furnished equipment, "GFE"). This must be your Bible; if it's not on the ECP as scheduled for replacement, keep the one you off-load in the warehouse. You may need it later. Be certain you make an ACCURATE inventory of what is unloaded and where it is. DO NOT DUMP STUFF INTO RANDOM TRIWALLS! The SMO who has to rebuild the department will need to know where things are. (You never know, it could be you!) Things you will not need (things covered by an ECP) may be sent to DRMO or to other ships. Check with TYCOM Medical before you get rid of serviceable equipment, especially surgical instruments, anesthesia machines and scopes.

Consumables, such as drugs, gloves, etc. will be needed throughout the yard period to provide routine services to the crew. Remember that your OPTAR will be cut so act prudently. Send folks to hospital pharmacies whenever possible, especially when they require expensive medications. A problem will be where to store them, especially if you will be aboard the "FAF" (Floating Accommodation Facility). Carriers use the FAF during COH/RCOH periods at the Newport News Shipbuilding Company. It has limited medical and dental spaces and even more limited storage.

Throughout any yard period, the SMO must be aware of the total ship package, what's being done, how far along it is and how medical plays into the process. Remember that this is one of those times where you will have to be a whole lot more officer than physician. So much of what is going on will influence medical that you will have to be "up on the step" for the whole process. DO NOT MISS DEPARTMENT HEAD AND PRODUCTION MEETINGS! They will be your link to the overall picture and are vital to your decision-making.

Throughout the period, you will be challenged to come up with innovative ways of doing ordinary things. Where will you base your medical response team? How will you respond to injured shipyard workers not eligible for military care? These are just a few issues; there will be more. The only way to handle these issues is to pre-plan and use existing "lessons learned". Your ship won't be the first to go through the yards and won't be the last. Contact the TYCOM and get the lessons learned from the last ship to go through your kind of yard period. Contact the SMO of that ship. ASK QUESTIONS! ASK FOR ADVICE! Your biggest challenge will be to provide top-quality health care in an unusual setting. (Hey, you knew the job was challenging before you took it.)

After meeting all the special demands of the yard period, you will have to oversee the return to a fully operation carrier. That's not so bad after a PIA or DPIA. Many of your sailors will have been aboard during cruise and most training qualifications will be reasonably current. As you get ready to leave the yards, you will have to prepare for crew certification (CREWCERT) by the TYCOM. Force Medical can send you the guidelines and the Beacon computer program to manage the process is available through the Afloat Training Group (ATG). Things are not so straightforward coming out of a prolonged yard event such as COH/RCOH.

During COH/RCOH, medical expertise, especially corpsmen skills, may become rusty. In addition, a large part of the department turns over and Sailor qualifications (such as damage control and 3M) may be lost. You must do everything possible to minimize the corrosion of these capabilities and retrain those who need it. Take CREWCERT seriously and work towards it early.

At some point in the COH/RCOH process, you will begin to re-inhabit the medical spaces. This will require "unscooping" all the stuff you stored in the warehouse and loading back aboard. The process will be a nightmare if your inventory is inaccurate. That's why you must ensure you scoop it properly in the first place. Most likely, you will receive the spaces aft of the 113 bulkhead first, the lab, x-ray, treatment and operating rooms later and the ward last. Use the space turnover schedule to plan your on-load. Remember that on-loading equipment will require trucks, crane time and coordination with both the Air and Supply Departments for hanger bay space and elevator/crane use. Reinstallation of some of the equipment may also require rigging services from the shipyard. The work package manager can help with this.

Finally, test all equipment and ensure there are people in the department that can operate, trouble shoot and repair it. You may need technical assistance from the ship's information systems technicians. Determine this as soon as possible and give the Combat Systems Department as much lead time as possible. They will be incredibly busy as every department screams for computer help.

The yard periods are always difficult but always rewarding. It's a great feeling to know some of what you will supervise will effect Sailors for years and years. When building the TRUMAN, I liked to remember that the SMO who would decommission her 50 years after construction was probably yet to be born. Even more amazing, the decommissioning crew's junior corpsman's GRANDFATHER was yet to be born! That's having an impact!

CAPT D. W. Yacavone
Wing Surgeon, COMAEWWINGLANT

Preventive Medicine for Occupational Myopia

I can not be the only one to have observed a phenomenon clearly evident in the aviation community, perhaps also present in other select vocations and avocations, but absolutely absent in many professions. It is a sense of excitement. Of adventure. Of fun.

Before my retirement form Naval Aviation 6 years ago, the presence of such satisfying elements in my chosen profession were so ubiquitous as to be routinely taken for granted. To be reminded of their existence would have required an unlikely audience with a recruiter who was not yet burned out in his job. My circle of friends was essentially restricted to others similarly endowed. The last thing on our minds was philosophic discussion of our workplace. Consequently, we never even acknowledged that it was there. Now, from retirement, I see things that were really never there all the time that I never bothered to look at before. I am amazed to find that some professional civilian circles have no clue to the existence of the excitement and satisfaction that is military aviation medicine.

It now seems incredible to me that each day, occupational opportunities would arise that were exhilarating, and supremely worth looking forward to. Basically, the people I worked with really liked what they were doing. I am pleased to record that this feature of living is infectious. They were fun to be with. The converse is equally true: bored workers breed additional bored workers. I invite disbelievers to spend a day at the California Motor Vehicles Department.

I don't believe it was only the risk underwritten by flight itself that was the basic "turn-on"; rather, it was the magnetic appeal to an enthusiastic and confident overachiever of the sense of mastery and achievement in the unforgiving arena of flight: pilots and aircrew got their "strokes" from making their airplane perform to a high self-imposed standard. Flight Surgeons participated in this adventure by dealing with the clinical impact of operational issues associated with flight and flyers, and of course, in the more limited flying in the same arena that they themselves did. Professional and social relationships with these people were enormously satisfying. All that was

(continued on page 12)

(continued from page 11)
needed was credibility, an asset that had to be won in the airplane and the Ready Room, not the aviation exam room. Most flight surgeons are not pilots, though those of us with Navy wings have soloed. Nevertheless, we have been encouraged to learn to fly the same airplane flown by our unit, and many of us became moderately proficient in it, (the ultimate credibility ticket). Book learning does not cut it to teach what constitutes an OK-3 underlined, or a night hover over a horizonless sea. It was learned the same way you learn surgery -- by doing. Going straight up at Mach two was just an additional benefit. I did not fly or fly in airplanes as much as I would have liked, though some think the 2200 hours I bagged was more than my share. That certainly did not detract from my enjoying and basking in the vicarious glory that actually belonged to those whose life was flying Navy airplanes. There was meaningful satisfaction from being an institutional, integral, essential though unsung part of the aviation team. I came to accept without question that my patients failed to see a need for my service except as dictated by Congress. I, of course, know differently, and accepted as my challenge the doing of my job without making an issue of it.

That those in this "club" were not a simple cross section of the inhabitants of this great country never dawned on most of us because everywhere we looked, the same kind of person was found: only more clones of this adventuresome professional whose main goal in life was to be the best damn pilot in the squadron. At higher levels, this translated into being the best squadron in the wing, or the finest Air Group afloat, or the winner of the Battle "E". This drive was not merely deeply resident in the subconscious, it was right out front for all to see. Whether it was fixed wing or rotary, jet or recip, fighter or patrol plane, there it was. A friendly competitive camaraderie existed both within and between communities flying dissimilar airplanes that bespoke a hidden hierarchy between aircraft types, but they all possessed the same enth degree of motivation to be the best. It took some time to sort out that this very unique and self-selected group was not average in any sense of the word. It was almost palpable. Our wives commented on it. They saw the members of our communities living lives filled with excitement and purpose that did not necessarily give consideration to the legitimate demands of family life. Deployments were not fun for those always left at the pier. Professional growth and achievement were valued more highly than family values during the first decade or so of a typical aviator's career.

Aviation Medicine was never described to me as an alternative life style, but one look at the 1958 graduates of my medical school would suggest otherwise. Doctors are doctors, after all, and most of my classmates had fallen into a predictable professional lockstep early in medical school without even realizing it. They would train in a specialty, select a spot to hang out the shingle, practice medicine there for the rest of their lives, and be buried there. The closest thing to excitement was William F. Buckley, Jr., speaking at the County Medical Society meeting. Doctors in the military (not just Naval) aviation chose, wittingly or not, permanently or not, to break out of the classic stereotype and do something special. The practice of medicine anywhere, after all, has always been a potentially rewarding intellectual experience, if that is all you require. It teases the mind to come up with differential answers to real time clinical problems. Doctors become experts at deductive reasoning. In private practice, it frequently becomes gratifying remunerative enough to accept the lockstep imposed. Sometimes it doesn't.

Doctoring was no longer fun for me somewhere around the third year of my rural Connecticut family practice. The demands of such a practice effectively squashed any significant role in family life, a price paid by my wife and children who were unwarned that this was part of the lockstep. After sufficient black and blue to stimulate an evaluation of what the lockstep cost me, I got smart. My conclusion was that I had put myself at risk for being the richest corpse in the cemetery, and that there had to be more to life than this. I knew what I had to do, this statement being the modus operandi of the group I chose to join. I sold my renumerative practice and accepted a commission in the US Navy. It was the smartest thing I ever did. Flight Surgeon training at Pensacola appropriately punched my credibility tickets. One of the first and hardest lessons learned in aviation is that deductive reasoning does not fly airplanes. The T-34 was a humbling experience without equal in my professional life. But compared to the price paid for the lockstep, it was a bargain.

I was a US Navy Flight Surgeon for nearly a quar-

ter of a century before I returned to the nether world out there, where the exciting and fulfilled people I have described above are infrequently found. Instead, I saw too many doctors bored with their humdrum practices; timeclocked 8 to 5 jobs everywhere, some of which require different working hours, but gave the same low quality return; professionals of all kinds lived from day to day rubbing elbows with mediocrity, and indifference. The crowning insult: politicians were cooking up ways to extract the only satisfaction left in professional life.

Take time to smell the roses while you are in military aviation. Flight Surgeons are blessed with an adventuresome environment that is brimming with life. It is not so everywhere.

CAPT Frank E. Dully (ret), MC, USN
frankdully@att.net

Editors Note:

CAPT Frank Dully submitted this article to SUSNFS JAN 1994. He retired in 1987 after a career that included two carrier SMO tours, multiple flight surgeon tours, AirPac Force Medical Officer, Director of Training at NAMI, and Commanding Officer of NAMI. CAPT Dully is active in helping the Society formalize the history process. 7 years after writing this article, CAPT Dully will still tell you those were the best of years. Take time to enjoy the unique world you live in.

(F-14 Tomcat catching wire

Tropical Medicine Update

West Nile Virus

Introduction

West Nile Virus (WNV) is a mosquito-borne viral cause of encephalitis that was previously limited to Africa, Europe, the Middle East, and Asia [1]. WNV emerged as an epidemic disease in North America during the 1999 epidemic/epizootic in New York [2]. Since its emergence in 1999, WNV has spread into the Southeastern United States and caused infections in birds and encephalitis in humans. At least three cases of WNV encephalitis have been confirmed in Florida in 2001 [3]. One patient from Atlanta died from WNV encephalitis in August.

Flaviruses and the Japanese Encephalitis Complex

WNV belongs to the Japanese encephalitis complex of the genus Flavirus. Other flaviviral groups include Yellow Fever; the Dengue virus complex; and the tick-borne virus complex including Omsk hemorrhagic fever viruses, Kyasanur Forest virus, and Powassan virus.

The Japanese encephalitis complex of Flavirus has a worldwide distribution with St. Louis encephalitis being the agent endemic to the US. The viruses are maintained in a natural cycle with birds as the vertebrate host and Culex sp mosquitoes as the vector [1]. The incubation period is 4 to 21 days. The majority of infections are subclinical with 300 asymptomatic cases for every symptomatic case. Infections occur in patients of all ages, but severe and sometimes fatal cases of encephalitis are more likely to occur in elderly patients [4].

West Nile Fever

Infection with WNV usually presents with fever, lymphadenopathy, rash and polyarthropathy [4]. Hepatitis, myocarditis, and polyarthropathy can also occur. The most serious manifestation is neurologic with encephalitis, aseptic meningitis, and myelitis [4]. The fatality rate is 5% with most deaths occurring in the elderly [4]. Treatment is supportive. Laboratory diagnosis is by viral isolation, antigen detection, or

(continued on page 14)

(continued from page 13)
polymerase chain reaction of tissue, blood, CSF, or other body fluid and by immunohistochemical testing or immunofluorescent staining of tissue [5, 6]. WNV can also be diagnosed by detection of IgM in CSF or with serologic tests by demonstrating a fourfold rise in antibody in paired serum samples or both IgM and IgG in a single serum specimen [5].

Recent Epidemics and Epizootics

Epidemics of WNV in humans have occurred in recent years in Romania (1996), Tunisia (1997), Russia (1999), Israel (1999, 2000) and the United States (1999) [1, 7-9]. Epizootics have occurred in horses and birds in Morocco (1996), Italy (1998), Israel (1997, 1998, 1999), Russia (1999), France (2000) and the US (1999) [1, 7, 10]. The 1999 epizootic/epidemic in New York was the first introduction of an Old World flavivirus into the Americas in recent history [7].

The 1999 WNV outbreak was centered in the Queens section of New York City and resulted in 62 laboratory-confirmed human cases with seven deaths. Thousands of birds and 9 horses died [1]. WNV-positive birds and Culex pipiens mosquitoes were found in New York, New Jersey, Connecticut, and Maryland [1]. The epidemic peaked in August, and the last reported case was in September. Reverse transcription-polymerase chain reaction studies suggest that the WNV epidemic in New York in 1999 was caused by the introduction of a WNV strain that had been circulating in Israel [8]. The mode of transportation of this WNV strain from Israel to the US has not been determined.

The Expanding Epidemic in the Eastern US

Migratory birds are felt to be responsible for the spread of WNV in the Western Hemisphere [11]. Dead bird surveillance is useful for early detection of WNV epizootics/epidemics [12]. Dead crow reports and WNV-positive birds precede human cases by three or more months [12]. ArboNET is a cooperative WNV surveillance system established in 2000 to detect the epizootic that precedes the human epidemic [5]. Epizootic activity in birds in 2000 was widespread and was reported in the District of Columbia and 12 eastern states ranging from Vermont to North Carolina [5]. In 2000, 21 human infections were confirmed in New York, New Jersey, and Connecticut [5]. Nineteen patients were hospitalized with encephalitis, meningitis, or meningoencephalitis with two (11%) fatalities [5].

As of 25 July 2001, WNV had been detected in an expanded geographic region of the eastern US including Florida and Georgia (Figure 1) [13]. The first human infection in the US in 2001 was identified in Madison County, Florida. The onset of illness on 15 July 2001 is the earliest reported date of WNV encephalitis in the US since its recognition in 1999 [13]. Nine equine infections were identified in horses in Jefferson County, Florida. Avian infection was confirmed in the District of Columbia and nine states ranging from Massachusetts to Florida. Crows account for 88% of the infected birds. WNV has been identified in other species of Culex mosquitoes [13].

Summary

West Nile virus is a flavivirus from the Japanese encephalitis group. WNV had previously been well recognized in Europe, the Middle East, Africa, and Asia. It was recently introduced to the United States resulting in an epizootic/epidemic in the northeastern states in 1999. Migrating birds have spread WNV to the southeastern states. WNV can cause a serious encephalitis or meningoencephalitis that can be fatal especially in the elderly. Prevention and control measures include the ArboNET surveillance system, mosquito larvae control, and personal protective measures. Dead birds should be reported to local public health agencies.

References

1. Deubel V, Gubler DJ, Layton M, Malkinson M, et al. West Nile Virus: a newly emergent epidemic disease. Emerg Infect Dis 2001;7(Suppl):
2. CDC. Outbreak of West Nile-like viral encephalitis- New York, 1999. MMWR 1999;48:845-9.
3. Florida Department of Health. Florida's Third Human Case of West Nile Virus Encephalitis Reported. www.doh.state.fl.us/disease_ctrl/epi/htopics/arbo/press_releases.htm. Aug. 20, 2001.
4. Tsai, TF. Flaviruses. Mandell, Douglas, and Bennett's Principles and Practice of Infectious Diseases (5th edi-

(continued from page 7)

tion). Mandell GL, Bennett JE, Dolin R (eds). Churchill Livingstone 2000; Chapter 142..
5. Marfin AA, Petersen LR, Eidson M, et al. Widespread West Nile virus activity, eastern United States, 2000. Emerg Infect Dis 2001;7
6. Shieh W-J, Guarner J, Layton M, et al. The role of pathology in an investigation of an outbreak of West Nile encephalitis in New York, 1999. Emerg Infect Dis 2000;6:370-2.
7. Peterson LR, Roehrig JT. West Nile virus: a reemerging global pathogen. Emerg Infect Dis 2001;7
8. Giladi M, Metzkor-Cotter E, Martin DA, et al. West Nile encephalitis in Israel, 1999: the New York connection. Emerg Infect Dis 2001;7:
9. Weinberger M, Pitlik SD, Gandacu D, et al. West Nile fever outbreak, Israel, 2000: epidemilogic aspects. Emerg Infect Dis 2001;7
10. Murgue B, Murri S, Zientara S, et al. West Nile outbreak in horses in southern France, 2000: the return after 35 years. Emerg Infect Dis 2001;7
11. Rappole JH, Derrickson SR, Hubalek Z. Migratory birds and spread of West Nile virus in the western hemisphere. Emerg Infect Dis 2000;6:319-28.
12. Eidson M, Kramer L, Stone W, et al. Dead bird surveillance as an early warning system for West Nile virus. Emerg Infect Dis 2001;7
13. CDC. West Nile virus activity- eastern United States, 2001. MMWR 2001;50:617-9.

CDR R. Wesley Farr, MC, USNR
Chief Resident, Aerospace Medicine
rwfarr@nomi.med.navy.mil
(850) 452-4178
DSN 922-4178

The Diving Aviator

CAPT Jesse Monestersky is currently stationed in Yemen with the State Department. He is an Occupational Medicine and Family Practice Specialist as well as a Flight Sugeon and Hyperbaric Medical Officer. CAPT Monestersky will be joining the RAM program later this year.

While this is a single case report, it is of value to physicians with interests in dive medicine and military flight surgery, because of the issues that are raised. A discussion and literature review follows, as well as recommended informational resources.

Case Review

The patient is a 51 y.o. male USAF pilot, currently on DIFDEN orders, who suffered an ear injury while SCUBA diving. He was advised to not dive again, but he is now expressing an interest in resuming diving, and wants to know the risks in doing so. He is particularly concerned because he is interested in SCUBA instructing after military retirement. He is physically fit, currently working in OCONUS, and has no prior history of dive-related medical problems. On the day of the mishap dive, the patient recalls that he had a "mild head cold", had difficulty clearing his ears during descent, and noted further difficulty on ascent. He was somewhat surprised, because he had dived in the past with a cold and didn't have any problems.

The dive in question lasted a total of 45 minutes, with a bottom depth of 60 feet. Upon surfacing and entering the dive boat, he noted hearing loss and tinnitus in the left ear. He also experienced transient dizziness when he attempted to clear the ear using the Valsalva maneuver. The hearing loss and tinnitus persisted, and he noted brief dizziness with any Valsalva attempts for approximately a week thereafter.

(continued on page 16)

(continued from page 15)

He contacted me long distance by phone, and was advised to seek consultation at (U.S.) Landstuhl Army Regional Medical Center (Europe). Landstuhl, outside of Ramstein Air Base (USAFE), has specialty support in audiology, otolaryngology, and dive medicine.

The symptoms were still present several weeks later when he finally flew to Germany for his evaluation. He was seen there by an otorhinolaryngologist and a dive medical officer, and was started on a week's course of oral dexamethasone. Although he was not given a specific diagnosis, both physicians advised him to never dive again. Audiometry had revealed a unilateral high frequency hearing loss.

The pilot now wants to know if may be safe to return to civilian (not military) diving. He is an Air Force officer previously in combat control special operations, and is a military trained diver with 20 years of diving experience. He is no longer involved in special operations or military diving so his concern is strictly about future recreational diving and scuba instructing.

He has one other significant medical issue. One year ago he had an apparent myocardial infarction, with chest pain and a transiently elevated Troponin I without any EKG changes. A subsequent Thallium cardiac stress test and coronary angiogram were both normal. [Such findings are consistent with a mild subendocardial infarction.]

The patient presented to the local clinic one month after he suffered the hearing loss, and was seen by me. On physical exam, all findings were normal except for a left sided hearing loss. The working diagnosis was left inner ear barotrauma, exact type uncertain, with the additional diagnosis of prior mild subendocardial infarction.

The major issues involving this patient are: (1) What is the differential diagnosis of dive-related inner ear injury? (2) What additional evaluation may be necessary? (3) When will he be fit to return to diving, if ever? (4) Is it necessary or even appropriate to have him undergo a test run in a hyperbaric chamber before making such a decision? and, (5) what should his aeromedical disposition be?

Consultant opinions of this case:

Two otorhinolaryngologists [one Navy (JP) and one civilian (SH)] and one Navy diving medical officer (SG) were consulted.

Although both ENT consultants agreed that the most probable diagnosis was perilymph fistula, their opinions were mixed regarding the patient's fitness to return to either recreational or military diving. Advice about future diving ranged from no more diving per the civilian physician (SH), who is a consultant to the Divers Alert Network, to cautious return to diving per the Navy otorhinolaryngologist (JP). SH thought that the tinnitus and high frequency hearing loss both suggest cochlear damage, which can occur with a fistula. SH stated that the damage is usually permanent, although some small improvement is possible over time. SH also felt that with a return to diving the patient might be at increased risk for further hearing loss and even total deafness on the affected side. Moreover, SH was concerned that a forceful Valsalva could potentially cause a reopening of the fistula leading to potentially dangerous vertigo while submerged. And, if there were a recurrence of the fistula, the possible worsening of the hearing loss and vertigo might well affect his daily non-diving activities.

JP thought that the patient might return to diving if he is willing to assume some risk. But he cautioned that at the first hint of trouble clearing his ears the dive should be stopped.

As mentioned above, both ENT consultants agreed on perilymph fistula as the most likely explanation for this case of inner ear barotrauma. Both agreed that the most likely cause was his diving with a "head cold" which caused Eustachian tube dysfunction. A forceful Valsalva then created an implosive or explosive rupture of the round or oval window, resulting in a round or oval window fistula. Both otorhinolaryngologists added that the patient essentially performed a fistula test by repeatedly eliciting dizziness with Valsalva for a week after the injury. JP added that since the problem was temporally associated with a dive, the likelihood that the symptoms were caused by another condition such as Meniere's disease or acoustic neuroma was minimal, therefore there would be no significant benefit in doing further studies.

Treatment of an acute perilymph fistula, per the civilian consultant, is bed rest with head elevation and oral steroids to allow the injured area to heal. This was in fact what the physicians who saw the patient in Germany recommended.

Regarding the advisability of performing a test in a hyperbaric chamber, JP thought that it was unnecessary and might present a small risk. However, if a test were done and the patient experienced further hearing loss and vertigo, he would at least know with certainty that diving should definitely be avoided in the future! SH thought that a hyperbaric chamber test should not be done, as it might aggravate the condition.

JP felt that if the patient decides to dive again, he should only do it if the Eustachian tubes are patent and he can Valsalva easily.

The Navy diving medical officer, SG, stated that there are plenty of working divers in the Navy who have hearing loss and tinnitus, and since the dizziness has resolved, he should be OK to return to diving. He also agreed that the differential diagnosis also includes round and/or oval window rupture. He further commented on the suspected mild subendocardial myocardial infarction, feeling that this should not keep the patient out of the water in view of the normal subsequent workup.

Fitness to Fly:

Finally, concerning aeromedical disposition, JP stated that Navy aeromedical policy on a presumed healed perilymph fistula is to ground the aircrew member for one year. If there are no problems during that time, the crewmember may, upon receiving a waiver, return to flying if the Eustachian tubes are functioning normally. Furthermore, there is no requirement for surgical repair if all evidence points to the fistula having healed spontaneously, as many do.

Current US Air Force aeromedical policy on perilymph fistula is outlined in their Waiver Guide, and indicates that each case is determined individually, with no specific written policy on fistulas. Persistent vertigo or significant hearing loss would not be waivered. But if symptoms resolve, the Aeromedical Consultation Service may recommend a waiver after a period of observation ranging from several months to a year.

Literature Review:

A PubMed literature search was done on the following key terms: inner ear barotrauma, perilymph fistula, and round and oval window rupture. Eleven citations are listed below. A review of the pertinent literature provided some additional points of interest beyond what the consultants contributed.

The differential diagnosis list for inner ear barotrauma is: rupture of the round or oval window, inner ear decompression sickness (vestibulo-cochlear DCS), arterial gas embolism (pneumolabyrinth), inner ear hemorrhage, tear of the labyrinthine membrane, and perilymphatic fistula. The diagnosis most consistent with this patient's problem is perilymph fistula.

A perilymph fistula by definition is an abnormal communication between the perilymph space of the labyrinth and the middle ear. In short, it is a leak. Fistulas may involve one or both of the windows (round and/or oval), but can also involve the lateral semicircular canal. Perilymph is a thin fluid secreted by the epithelium of the membranous labyrinth, a thin fibro-serous membrane that lines the osseous labyrinth and vestibule. In composition, it is similar to cerebrospinal fluid. This fluid bathes the vestibule, semicircular canals and scala tympani of the cochlea.

The diagnosis of perilymph inner ear barotrauma can be made clinically if one sees the classical triad of sudden hearing loss, tinnitus and vertigo, especially if the dive profile is inconsistent with decompression sickness and there is a history of Eustachian tube problems during the dive. If symptoms persist for more than 24 hours, an exploratory tympanotomy can be performed to verify the presence of clear fluid leaking from the round window niche or from the area of the stapes footplate. Some new diagnostic methods include IV application of fluorescein with fluorescence endoscopy of the middle ear. A CT scan may reveal a pneumolabyrinth. The diagnosis in a diver can be elusive, and it is often debatable as to whether or not an exploratory tympanotomy should be done, especially if there are no pathognomonic signs of perilymph fistula, such as pneumolabyrinth or fluorescein leak. The decision to explore is made easier if the patient has suffered direct trauma to the stapes or round window membrane, but pressure changes during a dive almost never cause such trauma.

Treatment should include hyperbaric oxygen only if inner ear DCS [decompression syndrome - type II (neurologic)] or AGE is suspected. The problem however, is that one must distinguish between inner ear DCS (nitrogen bubbles in the labyrinthine vasculature) or

(continued on page 18)

(continued from page 17)
AGE (arterial gas embolism) vs. inner ear barotrauma (perilymph fistula or frank round window rupture), as HBO is recommended for DCS and AGE but is contraindicated in the latter!

DCS is more likely when there are other manifestations of DCS [e.g., type I (joint or skin involvement), or type II (neurologic or pulmonary)]. The chance of DCS can also be judged from the history of the dive profile; the risk of DCS increases with deeper depth and longer duration, or if there are repeated dives, if dive table guidelines are exceeded (AKA, dive table excursions), if surface intervals between repetitive dives are brief, if there are any accidents, and if the onset of symptoms occur on ascent (decompression). AGE is of sudden onset during ascent or within minutes of surfacing, is stroke-like in nature, and may have severe cerebral or pulmonary features. Conversely, ear barotrauma is more likely if the dive is shallow, if symptoms begin during descent (compression), there are middle ear symptoms such as pain and pressure, and there are tympanic membrane findings. Concomitant paranasal sinus pressure, pain, or epistaxis may accompany ear barotrauma, especially if the inciting cause is an upper respiratory infection.

Regarding surgical treatment of perilymph fistula, if the middle ear is explored and there is more than microscopic perilymph leakage, or (in the absence of visible fluid leakage) the symptoms of vertigo and fluctuating hearing loss are persistent or worsening, a tissue graft can be used to cover the round window. Graft materials have included tragal perichondrium bolstered with Gelfoam, temporalis muscle fascia, and fat. When a leak is strongly suspected but no site is obvious, some surgeons will "patch" both the round and oval windows. Of interest is that an acquired perilymph fistula is one of the few causes of sensorineural hearing loss that can be surgically improved.

The specific pathology behind the hearing loss, tinnitus, and vertigo is not entirely clear, but since these three symptoms also occur in Meniere's disease, it is possible that there is something in common between the two. Meniere's disease symptoms are felt due to an increase in endolymph pressure in the membranous labyrinth. When there is a perilymph leak, which presumably causes a decrease in perilymph pressure, there may be a simultaneous relative rise in endolymph pressure. This may lead to the same sensory organ injury that occurs in Meniere's. However, in most cases of fistula the symptoms don't last as long and aren't as severe, so the resulting injury is presumed to be less significant, although some residual hearing loss may persist indefinitely.

Fitness to Dive:

In the older medical literature, patients were universally counseled to permanently refrain from diving. However, some of the newer literature reveals that divers who fully recover from inner ear barotrauma may return to diving as long as they exercise caution. This change in thinking is based on a small sample of patients (20) who had suffered inner ear barotrauma, but continued to dive against medical advice. They were followed for 1-12 years, and no further deterioration in cochleovestibular function was noted. Perhaps categorically recommending against further diving may be unduly restrictive.

Summary:

Whenever someone under your care suffers hearing loss (with or without vertigo) during or following ear barotrauma, the diagnosis may well be inner ear barotrauma, and not just a simple middle ear effusion caused by Eustachian tube dysfunction. The presence of vertigo makes inner ear barotrauma more likely, but even if there is no vertigo, it is advisable to obtain consultation with an otorhinolaryngologist and hyperbaric medicine specialist whenever a diver or aircrew suffers a hearing loss that is out of proportion to the physical findings. Most importantly, advise your patients to refrain from diving if they are experiencing any symptoms of an upper respiratory infection.

Recommended Hyperbaric and Dive Medicine Resources:

For those who wish to obtain information on related hyperbaric and dive medicine topics, or to find consultants, there are a number of good resources. Several particularly recommended organizations include (not an all-inclusive list):

1. DAN (Divers Alert Network): Located in Durham NC, DAN is affiliated with Duke University, telephone num-

bers (800)-446-2671, and (919)-684-2948, [website http://diversalertnetwork.org].
2. UHMS (Undersea and Hyperbaric Medical Society): Located in Kensington MD, telephone number (301)-942-2980 [website http://www.uhms.org].
3. USAF School of Aerospace Medicine, Davis Hyperbaric Laboratory on Brooks AFB, TX; telephone number (210)-536-3281 or DSN 240-3281 [website http://wwwsam.brooks.af.mil].
4. NAMI (Naval Aerospace Medical Institute), Code 327: Hyperbaric Division: On NAS Pensacola FL, telephone number (850)-452-3297/3409 and DSN 922-3297/3409 [webpage http://www.nomi.med.navy.mil]
5. Navy Experimental Dive Unit (NEDU): NAVSEA (Naval Sea Systems Command) CSS (Coastal Systems Station), Panama City FL; telephone number (850)-230-3100 [webpage http://www.nedu.navsea.navy.mil]
6. Navy Dive & Salvage Training Center (NDSTC): NAVSEA, CSS, Panama City FL; telephone number (850)-234-34651 and DSN 436-4651 [webpage http://www.cnet.navy.mil/ndstc]
7. Diving Medicine On-line: Webpage http://www.gulftel.com/~scubadoc.

Consultants utilized:

1. Jay Phelan, CDR MC USNR; Head, Otorhinolaryngology Division, NAMI (jrphelan@nomi.med.navy.mil)
2. Dr. Shannon Hunter, ENT consultant for DAN (Email: hunte023@mc.duke.edu)
3. Steve Giebner, CAPT MC USN DMO Head, Hyperbaric Division, NAMI(sdgiebner@nomi.med.navy.mil)

Literature Review:

1. Adkisson, GH; AP Meredith: "Inner ear decompression sickness combined with a fistula of the round window. Case Report." Ann Otol Rhinol Larynol, 1990Sep99 (9 Pt1):733-737.
2. Bohm, F; M Lessle: "Round window defect in divers." Laryngorhinootologie 1999Apr, 78(4):169-175.
3. Gil, A; A Shupak, H Lavon, Y Adir: "Decompression sickness in divers treated at the Israel Naval Medical Institute between the years 1992 to 1997." Harefuah 2000May1, 138(9):751-754 & 806.
4. Goto, F; K Ogawa, T Kunihiro, K Kurashima, H Kobayashi, J Kanzaki: "Perilymph fistula – 45 case analysis." Auris Nasus Larynx 2001Jan, 28(1):29-33.
5. Kleemann, D; S Nofz, I Plank, A Schlottmann: "Rupture of the round window – detection with fluorescence endoscopy." HNO 2001Feb, 49(2):89-92.
6. McGhee, M; J Dornhoffer: "A case of barotrauma-induced pneumolabyrinth secondary to perilymphatic fistula." Ear Nose Throat J 2000Jun, 79(6):456-459.
7. Nachum, Z; A Shupak, O Spitzer, Z Sharoni, I Doweck, C Gordon: "Inner ear decompression sickness in sport compressed-air diving." Laryngoscope 2001May, 111(5):851-856.
8. Parell, G; G Becker: "Inner ear barotrauma in scuba-divers. A long-term follow-up aft after continued diving. Arch Otolaryngol Neck Surg 1993Apr, 119(4):455-457.
9. Roman, S; B Bourliere-Najean, J Triglia: "Congenital and acquired perilymph fistula: review of the literature." Acta Otorhinolaryngo Ital 1998Aug, 18(4Suppl59):28-32.
10. Sheridan, M; H Hetherington, J Hull: "Inner ear barotrauma from scuba diving." Ear Nose Throat J 1999Mar, 78(3):181, 184, 187-187.
11. Yaniv, E; D Hacking, L El-Ziv: "Perilymphatic fistulas: are they exclusive to the round and oval windows?" Laryngoscope 1986Apr, 96(4):360-362.

Appreciation: Is extended to the consultants at NAMI [Drs. Jay Phelan (ENT) and Steve Geibner (DMO) and DAN [Dr. Shannon Hunter (ENT)] who responded to JM's query.

CAPT Jesse Monestersky, DO, MS, MPH
MC, USNR (FS,HMO)
monesterskyjh@state.gov

(Mass Casualty Drill in Hangar Bay)

CHECK YOUR LABELS AND VERIFY WE HAVE YOUR EXPIRATION DATE ON YOUR DUES CORRECT!!!!!!
(wspadgett@nomi.med.navy.mil for corrections)

ACLS Update

Overview

Significant changes have occurred in the ACLS guidelines. I would highly recommend familiarization with the contents from ***Circulation.*** 2000;102:I-86. Also, www.emedmag.com/stories/storyReader$225 has a detailed review. This overview will attempt to highlight the important changes to ACLS. We cannot cover all the changes in detail, so the reader is advised to update their provider course. The 2000 Guidelines were developed toward an evidence-based and internationally applicable set of guidelines. The good news is that the basic format and many of the algorithms have changed little. Basically, we can break this down into several categories:

- Advances in Airway Management
- Recommendations for Circulatory Adjuncts
- Defibrillation Changes
- Pharmacology for the Future
- Acute Coronary Syndrome
- Acute Ischemic Stroke
- Special Resuscitation Situations

ACLS Approach to Cardiovascular and Cardiopulmonary Emergencies:

The new ACLS approach is a simple 8-step sequence of actions that mimic ATLS including a Primary ABCD and a Secondary ABCD Survey.

Primary ABCD Survey – focuses on CPR and defibrillation as an assess-manage cycle.

First:
- Check responsiveness
- Activate emergency response system
- Call for defibrillator

A =**A**irway: open the airway
B =**B**reathing: provide positive-pressure ventilations
C =**C**irculation: give chest compressions
D =**D**efibrillation: assess for and shock VF/ pulseless VT

Secondary ABCD Survey – focuses on more advanced assessments and treatment.

A =**A**irway: provide advanced airway management (tracheal intubation, laryngeal mask airway (LMA), Combitube)
B =**B**reathing: check for adequate oxygenation and ventilation, including:
- Primary confirmation (PE) of proper placement of airway device
- Secondary confirmation (ET - CO2 detectors, esophageal detector devices) of proper device placement
- Continuous or intermittent monitoring of CO2 and oxygen levels
- Active effort to prevent tracheal tube dislodgment, using commercial holders, rather than the traditional tape-and-tie techniques

C =**C**irculation: obtain IV access, determine rhythm, and give appropriate agents
D =**D**ifferential diagnosis: search for, find, and treat reversible causes

Advances in Airway Management

Endotracheal Intubation is still good!

- There is now emphasis on adequate training (only those trained should intubate) and sustainment of intubation skills
- Strong recommendations for esophageal detector devices (EDD) to confirm placement
- End-tidal CO2 detectors in non-arrest victims
- Use commercial tube holders to prevent displacement
- Tidal Volume is LOWER at 6-7 ml/kg over 1.5-2 seconds, RR= 12-15 except for status asthmaticus

New Advanced Airway devices:

Esophageal-tracheal Combitube (ETC)
- invasive double-lumen airway
- most commonly finds its way to esophagus; with balloons inflated, it isolates the oropharynx above the upper balloon

- advantages over BVM by isolating airway, reduction in the risk of aspiration, and more reliable ventilation
- advantages over ETT by easier to learn placement than for ETT and skill sustainment more likely with ETC than with ETT
- ventilation and oxygenation with ETC comparable with ETT
- should be used with an end-tidal CO2 or EDD to ensure proper placement

Laryngeal mask airway (LMA)

- tube resembles endotracheal tube, with cuffed, mask-life projection at distal end
- when inflated, cuff seals larynx, with distal tube opening above the glottis – provides clear airway
- Advantages of LMA
  - More secure and reliable
  - Regurgitation less likely
  - Provides ETT equivalent ventilation
  - Training simpler than for ETT
  - Advantage OVER endotracheal intubation when patient access is limited, e.g., neck injury

Circulatory Adjuncts

There are numerous new adjuncts now on the market with some requiring additional personnel, training, or equipment. They are most beneficial when started early in the treatment of cardiac arrest, so use is often limited to in-hospital settings. ***The important point is that no CPR adjunct has been shown to be universally superior to standard manual CPR for pre-hospital BLS.***

CPR Techniques:

- 15:2 with unprotected airway
- 5:1 with protected airway no longer pausing for a breath
- Interposed abdominal compression (IAC-CPR)
  - Manual compression of the abdomen by an extra rescuer during relaxation phase of chest compressions
  - Clinical trials demonstrated improved outcome when IAC-CPR was compared with standard CPR for in-hospital resuscitation; no survival benefit in out-of-hospital resuscitations
  - Recommended as alternative intervention to standard CPR for in-hospital resuscitations
- High Frequency CPR (Rapid Compression Rate)
  - Greater than 100 compressions per minute
  - Some studies show improved cardiac output, aortic and myocardial perfusion pressures, coronary blood flow, and 24-hour survival
  - Listed "indeterminate", however has been incorporated into BLS guidelines
- To a lessor extent:
  - Active compression-decompression (ACD-CPR)
  - Vest CPR
  - Mechanical (piston) CPR
  - Simultaneous ventilation-compression CPR
  - Phased thoracic-abdominal compression-decompression CPR

Defibrillation Changes

There are two big changes on the defibrillation front. The first, ***early defibrillation***, is still the "best thing going." Early defibrillation should be the goal of all emergency responders including in-hospital and outpatient facilities. Remember the chances for a successful defibrillation is reduced 7-10% each minute! All CPR providers should be trained in defibrillation. This focus has facilitated the use of Automatic External Defibrillators (AEDs) which are being added everywhere (commercial air, clinics, hospitals, first responders). Waveforms are the other great change in defibrillation with ***Monophasic Waveforms*** (the one most of us are used to using) and the newer ***Biphasic Waveforms.*** Most new defibrillators and AEDs sense these different waveforms. The shock energies for Biphasic waveforms may respond to lower energy levels. The bottom line is that either Monophasic or Biphasic waveforms are OK and shock energies re-

(continued on page 22)

(continued from page 21)
main the same. Different energy levels (same or escalating) are both OK since it is the delivery and not necessarily the level that is the most important thing. Know your Defibrillator!

Pharmacology and New ACLS Drugs

Epinephrine
- Good experimental data suggesting improved perfusion and outcome
- Disappointing human data during resuscitation
- Continues as first recommended vasoconstrictor
- High dose use is de-emphasized (Class indeterminate)

Vasopressin
- "New Kid on the Block"
- An alternate vasoconstrictor to epinephrine for defibrillation resistant VF cardiac arrest
- Positive Epi effects without the side effects
- Longer lasting (10-20 minutes)
- 1 dose: wait 10 min. before more epinephrine or vasopressin
- Both animal and human studies showed positive results in VF Defib resistant in Return of Spontaneous Circulation, 24-hour survival, and hospital discharge

Lidocaine
- An old friend backed by poor evidence
- "Grandfathered" and remains in the algorithms

Bretylium
- No longer recommended, so "forget about it!"

Amiodarone
- The "New Favorite"
- Complex drug with effects on sodium, potassium, and calcium channels
- Costly new drug (300 mg IVP initially then 150 mg q 3-5' up to 2.2g/24°) used for treatment of atrial and ventricular arrhythmias ($1/mg)
- Has alpha and beta-adrenergic blocking properties
- Excellent for all tachycardias, especially if sick or failing heart

Glycoprotein IIb/IIIa receptor inhibitors
- Works on platelets to inhibit platelet aggregation
- Indicated for acute coronary syndromes without ST elevation

Other New Drugs include Tenecteplase (new fibrinolytic single bolus injection) and Low-molecular-weight heparin.

Acute Coronary Syndrome

New Guidelines:
- Pre-Hospital use of Fibrinolytics is NOT routinely recommended
- Thrombolytics = uncool
  Fibrinolytics = cool
- Class IIa: prehospital 12-lead EKG*
- Class IIa: prehospital fibrinolysis*
- Class I: antiplatelet therapy—IIb/IIIa glycoprotein inhibitors
- GP IIb/IIIa inhibitors for patient with Unstable Angina or Non-ST elevation AMI
- Be able to access EKG, localize infarct, use of adjunctive agents (MONA greets all patients), indications/contraindications for fibrinolytics
- ***But only under specific circumstances***

Acute Ischemic Stroke

New recommendations include pre-arrival alerting of ED and greater use of EMS system. New "stroke scale" for field and ED use (Cincinnati Pre-Hospital Stroke Scale, Los Angeles Pre-Hospital Stroke Screen = LAPSS).

Intravenous tPA:
- Within 3 hours of onset of symptoms
- Between 3-6 hours—NO!

Another alternative is Intra-Arterial Thrombolysis (of MCA 3-6 hrs)

Special Resuscitation Situations

Cocaine Induced Emergencies:
- Ventricular Dysrhythmias
  - use sodium bicarbonate
  - alpha adrenergic blockers
- Inappropriate Therapies
  - Non-selective Beta Blockers
  - Epinephrine (no data to suggest this inappropriate, however, after cardiac arrest presents)
- Acute Coronary Syndrome (caused by cocaine)
  - Benzodiazepines!!!!
  - Nitrates
  - Alpha-Adrenergic Blockers
- Inappropriate Therapies
  - Non-selective Beta Blockers

Calcium Channel Blocker Overdose or Poisoning
- Recommend pacemaker, vasopressors, Calcium

Beta Blocker Overdose or Poisoning
- Recommend pacemaker, vasopressors, Glucagon

Tricyclic Antidepressant Overdose or Poisoning
- Recommend Sodium Bicarbonate and Lidocaine
- Inappropriate treatment—Procainamide

Opioid Overdose
- Recommend Ventilation and Naloxone ASAP

Short Take on Algorithms

Remember, the algorithms direct the management of patients on the basis of one of three arrest rhythms: VF/VT, pulseless electrical activity (PEA), or asystole, and one of two nonarrest rhythms: bradycardia or tachycardia (stable or unstable). They all begin with the ***ECC Comprehensive Algorithm***, which directs the rescuer to simply identify the rhythm and pick the algorithm that goes with that rhythm. Think of these algorithms as support tools for the ACLS approach. On the Secondary ACLS Survey, when you get to "C":
- Gain access to the circulation
- Attach the cardiac monitor (if not already done)
- Identify the rhythm
- Give rhythm-appropriate medications

VF/Pulseless VT
- Distinguish persistent vs. recurrent VF/VT
- Use of vasopressin
- Use of amiodarone vs. lidocaine vs. procainamide vs. magnesium

Asystole
- Actively search in field for DNAR orders/status with explicit criteria now for stopping
- Death certification may be done in the field
- Prohibition on transporting failed ACLS with CPR
- Family presence at resuscitation efforts

PEA = Pulseless Electrical Activity
- New star in ACLS with many more conditions as its cause
- Remember the 5 "H's":
  - Hypovolemia, Hypoxia, Hydrogen Ion Acidosis, Hyper/HypoKalemia, Hypothermia
- and 5 "T's":
  - Tablets (drug OD, accident), Tamponade (cardiac), Tension Pneumothorax, Thrombosis coronary (acute coronary syndrome), Thrombosis pulmonary (PE)

Bradycardia
- Expanded causal list (electrolytes, toxicology)
- Treatment guidelines: unchanged since 1994

Unstable Tachycardias
- Specific treatment: unchanged (immediate cardioversion)
- More people with stable tachycardias will be defined as "unstable"
- More people with stable tachycardias will be cardioverted even if stable

(continued on page 24)

(continued from page 23)

Stable Tachycardias

- Since 1994: principles of tachycardia management profoundly revised
- Antiarrhythmics are proarrhythmic: do harm!
- More than 1 drug: great increase in danger
- Tachycardia patients and impaired heart: treat differently (Amiodarone)
- Many more useful drugs available
- More emphasis on specific rhythm diagnosis and treatment

Summary and Review

- Recognize the need to respond
- Conduct the Primary ABCD Survey
- Conduct the Secondary ABCD Survey
- Know and Apply the Cardiac Arrest Algorithms and "peri-arrest" algorithms
- Run the Code: know how to direct others during a resuscitative effort

Finally, don't forget Post-Resuscitation Care, which includes optimizing tissue and brain perfusion, maintaining appropriate BP, HR, ventilation, temperature, and identifying precipitating causes to prevent recurrence of arrest. It is my firm hope that you'll never need to use these in your billet. However, if the proverbial "poop hits the fan", I hope you'll be up-to-date and well prepared.

CDR Charles A. Ciccone, MC, USN
Assistant Chief Resident, Aerospace Medicine
caciccone@nomi.med.navy.mil
(850) 452-4178 DSN 922

(EA-6B Prowler VAQ-136 USS Kitty Hawk)
(www.chinfo.navy.mil)

Cover Proposal

Upon reviewing old SUSNFS newsletters it was noted there had been at one time a proposal to name the newsletter. While discussing with CAPT Dennis Deakins the history project and the need to update the website with the names of our forefathers, he produced a newsletter called **CONTACT** put out by the Naval School of Aviation Medicine in the 1940's and 50's. This newsletter was filled with information on and for Flight Surgeons. It would seem befitting to use this name on the current SUSNFS newsletter.

The initial proposal is located on the following page. Each quarter a historical person, event, etc. would be pictured with a short paragraph or two about its importance. The goal is to pay homage to our past both in the name of the newsletter as well as by highlighting significant parts of the history of Aerospace Medicine.

Please contact your board of governors with your thoughts on this proposal. Another option would be to just change the name but leave the front page as it is with the President's column leading off. More imaginative members may have better proposals which we would like to hear.

Like it, hate it, got a better idea, or don't care.....please still take the time to forward your thoughts to the board to help us make a decision.

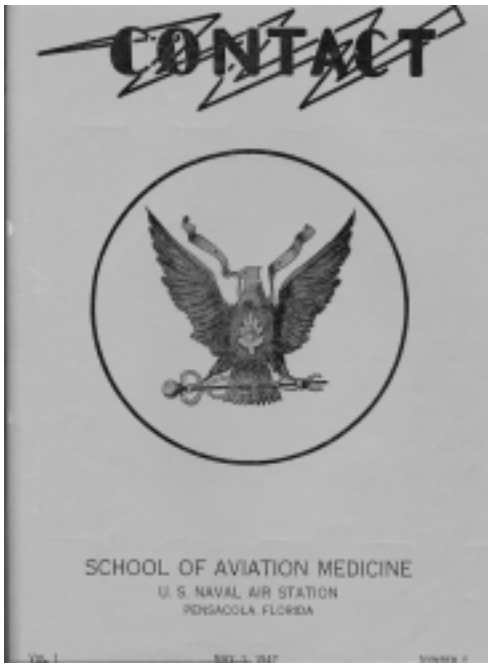
President:	**CAPT Charles O. Barker** cobarker@us.med.navy.mil
Vice-President:	**CAPT James R. Fraser** jfraser@safetycenter.navy.mil
Secretary:	**LCDR William S. Padgett** wspadgett@nomi.med.navy.mil
Treasurer:	**LCDR David C. Kleinberg** code265@nomi.med.navy.mil
Emeritus:	**CAPT Robert E. Mitchell (ret)** docpowc@juno.com
Past President:	**CAPT Fanancy L. Anzalone** flanzalone@naples.med.navy.mil
Board (00-02):	**CAPT Gerald S. Scholl** schollgs@cnal.navy.mil
Board (01-03):	**CDR Kris M. Belland** kbelland@pol.net
Board (00-02):	**LCDR Thomas B. Faulkner** thomas.faulkner@delta.com
Board (01-03)	**LCDR David W. Gibson** DWGibson@beaufort.med.navy.mil

Contact information also found on the SUSNFS website left side under OFFICERS.

CONTACT

The Journal of the Society of United States Naval Flight Surgeons

Volume XXV, Number 4
October 2001



(1941-1948 Cover)

(1948-1959 Cover)

Volume 1, Number 1 of **CONTACT** was published on 1 August 1941 by the School of Aviation Medicine. Captain Frederick Ceres, Medical Officer in Charge of the school, wrote in his foreword:

> *This issue of "CONTACT" is the first newsletter published by the Naval School of Aviation Medicine, Naval Air Station, Pensacola, Florida. Future issues will appear quarterly*
>
> *As the title suggests, the purpose of this newsletter is to maintain lines of communication between the School of Aviation Medicine and Naval Flight Surgeons and Aviation Medical Examiners, ashore and afloat; to furnish news-items and medical topics pertinent to their specialty; and finally to encourage them to write and submit ideas in order that this specialty, AVIATION MEDICINE, the surface of which has only been scratched, may be developed to the fullest military advantage.*

Web News

We continue to update the SUSNFS website at www.aerospacemed.org Please take a look at it and recommend improvements. We are attempting to collect a list of all Flight Surgeons past and present as well as which duty stations they worked. We are digging through old SUSNFS issues featuring CDR Heil's impressive lists, BONES issues, etc to compile the information. We are far from complete only cataloging about 600 of 6000 Flight Surgeons and would appreciate if you could forward to wspadgett@nomi.med.navy.mil any additions, errors, or comments.

Remember to get on the Flight Surgeon Listserv hosted by NAMI at www.nomi.med.navy.mil/NAMI/index.htm This Listserv is the premier way to get the latest information relevant to your Flight Surgeon duties. The SUSNFS website has an **I saw it on the Listserve** section which will try to reference websites and files mentioned on the e-mails from NAMI. The SUSNFS website also has a **Download Repository** where we are collecting files of interest to Flight Surgeons. For example the newest rendition of the Performance Maintenance Manual is posted there as well as the PowerPoint presentation with speaker notes. Please forward files and recommendations for any part of the website.

SUSNFS is experimenting with an interactive mailing list which we hope to open up to the membership in the near future to facilitate discussions. In the meantime, Dougal Watson hosts the Aeromed-List that can be joined at http://members.ozemail.com.au/~dxw/List/aeromed-list_autojoin.html. The aeromedical list is an internet mailing list devoted to the human side of aviation. The wide variety of aeromed-list members have a common interest in aerospace medicine, physiology, human factors, and related fields. The members of aeromed-list use the service to discuss and debate a wide variety of aeromedical topics and to share information with one another. The members of aeromed-list are a diverse bunch representing many countries, airlines, military forces, universities, aviation administration organizations, flying clubs, schools, publications, and individuals from all over the world.

Naval Safety Center

The Naval Flight Surgeon's Pocket Reference to Aircraft Mishap Investigation Fifth Edition 2001 is now available and contains the recent changes IAW 3750.6R. The Pocket Reference is the result of a collaborative effort between contributors throughout Naval Aerospace Medicine. It is the product of many hundreds of hours of work by dedicated Aerospace Medicine professionals. The goal of this edition is to provide vital aeromedical mishap investigation information to all members of Aircraft Mishap Investigation Teams.

The Fifth Edition of this reference is available in an Adobe Acrobat Reader .pdf format and can be downloaded for electronic viewing at http://safetycenter.navy.mil/aviation/airmed/FSGuide.htm

This guide should be used immediately by all Naval Flight Surgeons. A copy of the guide has been sent to VNH to update their web pages. A printed Pocket Reference should soon be available from SUSNFS.

Thank you to all those who contributed to and reviewed the Pocket Reference. This collaborative benchmark work is now recognized as the world's best medical mishap investigation guide.

CAPT James R. Fraser, MC, USN
Naval Safety Center Command Surgeon
jrfraser@safetycenter.navy.mil
(757) 444-3520 Ext.-7228
DSN 546-3529 Ext.-7228
FAX (757) 444-7049

(F/A-18 Hornet VMFA-533 Tandem Thrust 2001)
(www.chinfo.navy.mil)

RAM Corner

Clinical Outcomes of Naval Aviation Personnel with Cholelithiasis

Cholelithiasis is of aeromedical concern in United States Navy (USN) aviators and other aircrew because of the risk of incapacitating pain, nausea, and vomiting during episodes of biliary colic. The prevalence of asymptomatic cholelithiasis in United States Air Force (USAF) pilots and navigators was estimated to be 2-3% (1). The annual rate of the development of severe and non-severe symptoms in patients with asymptomatic cholelithiasis is 1-4% (2). The calculated rate of severe symptoms in USAF aircrew is 0.1-0.7% per annum (1). Because of the low risk of developing incapacitating symptoms in military aircrew with known asymptomatic cholelithiasis, the US Navy allows waivers for aircrew with asymptomatic cholelithiasis and does not require cholecystectomy.

The risk of recurrent symptoms in patients with prior symptomatic cholelithiasis or cholecystitis is much higher that in patients with asymptomatic cholelithiasis, up to a recurrence rate of 69% over two years in one study (3). Therefore, the USN requires removal of the gallstones prior to granting a waiver to return to flight duties. The USN grants waivers after open conventional (CC) or laparoscopic cholecystectomy (LC). The USN also considers waivers after extracorporeal shock wave lithotripsy (ESWL). Waivers are not recommended after chemical dissolution of the gallstones.

Laparoscopic cholecystectomy was introduced in the US in 1988. The main advantages are a shortened hospital stay and decreased cost (4). The mortality rate for LC (<0.1%) is very low (4). The conversion rate from LC to CC is 5% (4). Bile duct injuries occur in 4% (4). Based on clinical experience over the past decade, LC is the preferred treatment for symptomatic cholelithiasis.

ESWL was first used in Munich in 1986 but is not approved by the Food and Drug Administration (5). Complete stone clearance is achieved in about 80% of patients one year after ESWL (5, 6, 7). More than one third of patients with clearance of stones after ESWL will develop recurrent gallstones (8). The cumulative recurrence rate of stones can be as high as 50-60% (6, 9-11). In one study of 158 patients who became stone free after ESWL plus ursodeoxycholic acid (UDCA), the stone recurrence rates (%) at 1, 2, 3, 4, and 5 years were 6 ± 2, 14 ± 3, 27 ± 4, 35 ± 5, 44 ± 6 (12). Of the patients with stone recurrence, 33% were symptomatic when they presented for their sonographic exam (12).

The current USN policy on cholelithiasis was established based on recommendations of the Aeromedical Advisory Committee at Naval Aerospace Medical Institute (NAMI) in 1992. Aviators with an incidental finding of a single stone are considered not physically qualified (NPQ) with waiver recommended as long as asymptomatic and not due to another disease process. The policy applies to candidates and designated aviators. These guidelines first appeared in the NAMI Waiver Guide in 1994.

METHODS

The NAMI Biomedical Database (Access, Microsoft Corporation) was searched for waiver requests for ICD9 codes for gallstones (574.2), gallstones with acute cholecystitis (574.0), gallstones without cholecystitis (574.2), acute cholecystitis (575.0), and cholecystectomy (P51.2). We then reviewed the microfiche records of aviation personnel with the above diagnoses. The rates of development of symptomatic disease and need for cholecystectomy or ESWL were noted in aircrew granted waivers for asymptomatic cholelithiasis. The clinical outcomes of aircrew who underwent treatment for symptomatic disease by cholecystectomy (CC or LC) were reviewed.

RESULTS

The search of the NAMI Biomedical Database detected 79 naval aviation personnel who had submitted waiver requests for gall bladder disease from April 1988 to August 2000. Forty-four (55.7%) aviators submitted no follow-up waiver requests. Thirty-five aviators submitted 84 follow-up waiver requests or renewals for a total of 163 waiver request submissions.

The initial diagnoses in the 79 aviators were previous cholecystectomy in 57 (69.6%), asymptomatic cholelithiasis in 19 (24.1%), symptomatic cholelithiasis in 2 (2.5%), and retained stone in 1 (1.3%).

(continued on page 28)

(continued from page 27)

There were no waiver requests for ESWL. Of the 57 aviators with previous cholecystectomy, LC was the most common procedure in 37 (64.9%). CC was reported in 7 (12.3%) and LC to CC conversions occurred in 3 (5.3%). The type of cholecystectomy was not apparent in 10 (17.5%) cases. Conversion from LC to CC was necessary in 3 (7.5%) of the 40 procedures that began as LC. The indications for these conversions were bleeding in 1992, adhesions in 1994, and inflammation and anatomic variant in 1995.

Waivers were granted or previously granted to 11 (50%) of the aviators with asymptomatic cholelithiasis and 51 (89.4%) with cholecystectomies for a total of 62 (78.4%) as shown in Table I. Waivers were not recommended in 11 aviators with cholelithiasis because of a retained gall stone in one aviator, symptomatic cholelithiasis in two aviators, and other disqualifying conditions in four aviators. No explanation for waiver denial was evident in 2 aviators. Waivers for 2 aviators were delayed until undergoing LC. The aviator with the retained stone was granted a waiver after LC.

In total, 65 (82.3%) aviators received waivers with 62 granted on the initial waiver request and three granted after undergoing LC. None of the aviators who received waivers for cholelithiasis or cholecystectomy had their waivers revoked later because of symptomatic cholelithiasis or retained common bile duct stone.

DISCUSSION

In this retrospective review, the majority of naval aviation personnel with asymptomatic cholelithiasis or previous cholecystectomy received waivers unless they had other disqualifying conditions. Aviators with symptomatic cholecystitis or retained stones received waivers after cholecystectomy. The majority of aviators who underwent cholecystectomy had LC consistent with civilian medical practice. The conversion rate from LC to CC was 7.5% consistent with the rate of 5% in civilian practice.

No aviators requested waivers for ESWL. The high rates of gall stone recurrence reported in the literature indicate that ESWL is not a viable option for the population of naval aviators. ESWL would be an option for people with significant underlying medical problems who were at high risks for complications of surgery.

None of the waiver recipients later developed symptomatic cholelithiasis or retained stones resulting in revocation of waivers. The study results therefore support current policy to grant waivers to aviators with asymptomatic cholelithiasis or previous cholecystectomy.

REFERENCES

1. Saboe GW, Slauson JW, Johnson R, Loecker TH. The aeromedical risk associated with asymptomatic cholelithiasis in USAF pilots and navigators. Aviat Space Environ Med. 1995;66:1086-9.
2. Friedman GD, Raviola CA, Fireman B. Prognosis of gallstones with mild or no symptoms: 25 years of follow-up in a health maintenance organization. J Clin Epidemiol 1989;42:127-36.
3. Thistle JL, Cleary PA, Lachin JM, Tyor MP, Hersh T, The Steering Committee; and the National Cooperative Gallstone Study Group. Ann Intern Med 1984;101:171-5.

(continued on page 40)

TABLE I. WAIVER RECOMMENDATIONS FOR AVIATORS WITH CHOLECYSTITIS OR CHOLECYSTECTOMY

Condition	Recommended (%)	Waiver Previously Granted (%)	Not Recommended (%)	Not Recommended Now (%)
Cholelithiasis	9 (40.8)	2 (9.1)	9 (40.8)	2 (9.1)
LC/CC (1)	50 (87.6)	1 (1.8)	3 (5.3)	3 (5.3)
Total	59 (74.6)	3 (3.8)	12 (15.2)	5 (6.3)

(1) Laparoscopic cholecystectomy (LC)/Conventional cholecystectomy (CC)

Payne Stewart Crash

Editors Note:

The following excerpt is from the report at www.ntsb.gov/publictn/2000/aab0001.htm concerning the crash of a Learjet Model 35 on 25 October 1999 with the golfer Payne Stewart on board.

ANALYSIS

GENERAL

The captain and first officer were properly certificated and qualified in accordance with applicable Federal regulations and company requirements. Their duty time, flight time, rest time, and off-duty activity patterns did not indicate any preexisting medical, behavioral, or physiological factors that might have affected their performance on the day of the accident.

Visual meteorological conditions prevailed along the route of flight, and weather was not a factor in the accident.

The airplane was properly certificated and equipped in accordance with Federal regulations and approved procedures.

No significant preexisting airframe or powerplant problems were discovered during a review of available maintenance records and interviews with maintenance personnel and witnesses who observed the airplane just before and during its final descent. There was no evidence in the wreckage of an in-flight fire.

INCAPACITATION OF THE FLIGHT CREW

The flight crew's last communication with air traffic control (ATC) was at 0927:18 eastern daylight time, when the first officer acknowledged an ATC clearance to flight level (FL) 390 and the airplane was climbing through 23,200 feet. Her speech was normal, her phraseology was accurate and appropriate, and Safety Board testing indicated that she was not using an oxygen mask microphone for this transmission or those that she had made earlier. The flight crew's failure to respond to repeated ATC radio inquiries beginning at 0933:38, when the airplane was climbing through about 36,400 feet, was the first indication of a problem on board the accident flight. As the flight continued, it deviated from its assigned course and failed to level at its assigned altitude (FL 390). There was no evidence that the flight crew attempted to intervene over the next 4 hours, as the airplane continued to fly off course, ascending to 48,900 feet, and finally descended to impact. These events indicate that the flight crewmembers became incapacitated at some point during the 6 minutes and 20 seconds between 0927:18 and 0933:38.

The continuous sounding of the cabin altitude aural warning during the final 30 minutes of cruise flight (the only portion recorded by the CVR) indicates that the airplane and its occupants experienced a loss of cabin pressurization some time earlier in the flight. Further, although the severity of the impact precluded extensive analysis, there was no evidence suggesting any alternative reason for incapacitation.

If the pilots had received supplemental oxygen from the airplane's emergency oxygen system, they likely would have properly responded to the depressurization by descending the airplane to a safe altitude. Therefore, it appears that the partial pressure of oxygen in the cabin after the depressurization was insufficient for the flight crew to maintain consciousness and that the flight crewmembers did not receive any, or adequate, supplemental oxygen.

Because this accident would not have occurred without both the loss of cabin pressure and the failure of the flight crew to receive supplemental oxygen, the Safety Board considered possible reasons for both of these key events in the accident sequence.

LOSS OF CABIN PRESSURIZATION

Availability of Bleed Air

Postaccident examination of the left and right bleed air shutoff/regulator valves (modulation valves) indicated that they were near their fully closed positions. Because the modulation valves are spring loaded to the open position and require bleed air to close, the nearly closed position of both valves at impact is consistent with a normal and adequate supply of engine bleed air from one or both engines. Further, these nearly closed valve positions indicate that there was a low demand for bleed air by the airplane's air conditioning and anti-icing systems and that both BLEED AIR switches, which were not recovered,

(continued on page 30)

(continued from page 29)
would have had to have been selected to the ON position. The nearly closed valve positions also indicate that the airplane's pneumatic system was intact, and, therefore, normal system pressure was being supplied to the air conditioning system flow control valve.

Lack of Bleed Air Supply to the Cabin

The flow control valve regulates the flow rate of conditioned bleed air entering the cabin for pressurization and heating. If there is no inlet bleed air, the valve main spring will close the flow control valve completely. Although, as previously discussed, bleed air was available to open the flow control valve, the condition of the flow control valve indicated that it was in its fully closed position at impact. The valve requires several seconds to move from its fully open to fully closed position in normal operation, indicating that the valve was in its closed position before impact. This closed valve would have prevented bleed air from entering the cabin, thereby preventing normal pressurization.

Closure of the flow control valve on a Learjet Model 35 and the resulting loss of bleed air supply to the cabin would cause the airplane to quickly lose cabin pressure (depressurize) at a rate dependent upon the cabin leakage rate. Computer simulations by Honeywell indicated that if a loss of normal bleed air supply to the cabin occurred at flight altitudes above 25,000 feet, the cabin altitude could ascend to 10,000 feet in about 30 seconds and reach 25,000 feet in about 2 1/2 minutes.

The military pilots who observed the accident airplane in flight before its final descent reported that the accident airplane's windshield was obscured by condensation or frost. Condensation or frost would be consistent with a loss of bleed air supply to the cabin. When bleed air is supplied to the cabin, the cockpit windshield receives a constant flow of warm air that prevents or removes condensation, regardless of the ambient temperature or pressure in the cabin. Thus, the windshield would be relatively clear following depressurization from a breach or other undesired outflow from the cabin with continued bleed air supply to the cabin, whereas condensation could form and remain on the windshield following a depressurization caused by a loss of bleed air inflow to the cabin. Therefore, the accident airplane most likely did not have an inflow of bleed air to the cabin.

Possible Explanations for the Closed Flow Control Valve

Investigators considered several possible explanations for the closed flow control valve on the accident airplane. First, Safety Board investigators considered whether the flow control valve might have malfunctioned and closed uncommanded. Investigators identified several mechanical failure modes that might have caused the flow control valve to close, including the loss of the venturi throat pressure sense line, damage to the actuator diaphragm, blockage at the actuator opening chamber inlet orifice, and blockage at the shutoff solenoid bleed port orifice. Because the condition of the wreckage did not allow investigators to determine whether any of these failures occurred on the accident airplane, the Board cannot exclude the possibility that the flow control valve closed uncommanded because of a mechanical malfunction.

Investigators also considered the possibility that the pilots failed to select the CABIN AIR switch to NORM, which activates the air conditioning system (and pressurizes the airplane), before takeoff. Even though the Taxi and Before Takeoff checklist specifies, in item 19, "CABIN AIR SWITCH - NORM," the FAA Special Certification Review (SCR) team observed that "there is incentive to leave the pressurization system off during taxi and takeoff in warm weather because inflow air can be hotter than cabin ambient air." However, without the cabin air conditioning system, the occupants of the airplane likely would have perceived a high cabin climb rate after takeoff, possibly causing discomfort. At about 10,000 feet cabin altitude, the cabin altitude aural warning should have begun to sound, further alerting the flight crew to the lack of pressurization. Although the pilots

could have manually silenced the warning, they would have had to repeat this action every 60 seconds. At about 14,000 feet cabin altitude, deployment of the passengers' oxygen masks would have provided an additional cue that the cabin was not properly pressurized. It is unlikely that the flight crew would have continued to climb despite this clear information that the airplane was unpressurized.

In addition, the first officer showed no signs of hypoxia in her radio transmission at 0927:18, when the airplane was climbing through 23,200 feet. Safety Board tests indicated that with the CABIN AIR switch off at this altitude, the cabin altitude would have been increasing to above 20,000 feet. With a cabin altitude of 20,000 feet, flight crewmembers would very likely have been impaired by hypoxia. Further, the cabin altitude warning was not heard in the background of these radio transmissions. While it is possible that the frequency of the pilot's headset, the airplane's radios, or the ATC recording system may have masked the sound of the cabin altitude warning, the lack of such a sound suggests that the airplane had not depressurized to a cabin altitude greater than 10,000 feet by that time. Therefore, although the Board acknowledges that flight crew failure to activate the cabin air-conditioning system before takeoff may be a valid safety concern for the Learjet Model 35, it considered this unlikely to have occurred on the accident flight.

Investigators also considered the possibility that the flight crew selected the CABIN AIR switch to OFF (closing the flow control valve) during flight. Step 4 of the Learjet Model 35/36 Aircraft Flight Manual (AFM) Abnormal Procedures checklist for a pressurization loss at altitude instructs pilots to select the WSHLD (windshield) HEAT AUTO/MAN switch to AUTO, thus initiating the emergency bleed air supply to the cabin. (The wreckage indicated that the windshield anti-ice [defog] shutoff valve was closed at impact, strongly suggesting that the emergency bleed air was not activated.) Step 5 in the Abnormal Procedures checklist instructs pilots to select the CABIN AIR switch to OFF, thereby closing the flow control valve. The accident airplane was not equipped with automatic emergency pressurization; consequently, if it had experienced a loss of cabin pressurization, the pilots should have executed this procedure to initiate the alternate, emergency source of bleed air.

There is no evidence that an earlier pressurization problem (such as an outflow valve malfunction or a break in the fuselage) preceded the closing of the flow control valve. However, investigators considered the possibility that the flight crew might have experienced (or thought that they had experienced) such a problem and responded by attempting to execute the abnormal procedure for a loss of pressurization at altitude but omitted step 4 (selecting the WSHLD HEAT AUTO/MAN switch to AUTO) before accomplishing step 5 (selecting the CABIN AIR switch to OFF). Therefore, the closed position of the flow control valve could have been a consequence of the flight crew's attempt to address a pressurization malfunction or failure (cause unknown), rather than its cause.

In summary, as previously discussed, an uncommanded closure of the flow control valve would have been sufficient to depressurize the airplane. However, there was insufficient evidence to determine whether the depressurization was initiated by a loss of bleed air inflow (caused by a malfunction of the flow control valve or by inappropriate or incomplete flight crew action) or by some other event.

Inadequate Maintenance Recordkeeping

The sequence of maintenance actions from July 22 through October 23, 1999, indicate that there were several pressurization-related discrepancies during this period. Maintenance records indicate that Sunjet Aviation personnel attempted to correct the discrepancies by cleaning the pressurization system outflow valve and performing system ground checks. Work on a staggered engine throttle condition, which resulted in the replacement of the left modulation valve on October 23, 1999, was also related to concerns about the pressurization system (as shown by Sunjet Aviation's reference to pressurization on the removed modulation valve's part tag). However, Sunjet Aviation was not able to provide records of pilot-reported discrepancies that led to these maintenance actions.

The investigation did not identify any evidence that the preceding discrepancies were related to the cause of this accident. However, if Sunjet Aviation had maintained pilot discrepancy reports (as required by its General Operations Manual), the Safety Board may have learned additional details about the frequency and nature of the airplane's prior pressurization-related problems and possibly been able to de-

(continued on page 32)

(continued from page 31)
termine whether they were related to a common problem. Further, available records from Sunjet Aviation did not verify whether the discrepancies were corrected before flight. In addition, the investigation revealed that maintenance work performed on the pressurization system under Work Order 5895 was not signed off by mechanics or inspectors and that Sunjet Aviation then operated the accident airplane on revenue trips with deferred maintenance on the pressurization system (without authorization under an FAA-approved Minimum Equipment List). The Board notes that Sunjet Aviation's failure to maintain pilot discrepancy records and its unauthorized operation of flights with deferred maintenance items reflects shortcomings in the company's procedures for identifying, tracking, and resolving repetitive maintenance items and adverse trends.

FLIGHT CREW'S FAILURE TO RECEIVE SUPPLEMENTAL OXYGEN

Following the depressurization, the pilots did not receive supplemental oxygen in sufficient time and/or adequate concentration to avoid hypoxia and incapacitation. The wreckage indicated that the oxygen bottle pressure regulator/shutoff valve was open on the accident flight. Further, although one flight crew mask hose connector was found in the wreckage disconnected from its valve receptacle (the other connector was not recovered), damage to the recovered connector and both receptacles was consistent with both flight crew masks having been connected to the airplane's oxygen supply lines at the time of impact. In addition, both flight crew mask microphones were found plugged in to their respective crew microphone jacks. Therefore, assuming the oxygen bottle contained an adequate supply of oxygen, supplemental oxygen should have been available to both pilots' oxygen masks.

The Safety Board evaluated several explanations for the flight crewmembers' failure to receive supplemental oxygen, including an inadequate quantity of oxygen or improper servicing of the oxygen bottle and the failure (or inability) of the pilots to don their oxygen masks rapidly enough following the loss of cabin pressure.

Oxygen Quantity

Investigators considered the possibility that there might have been an insufficient quantity of oxygen on board the accident flight to sustain the flight crewmembers while they addressed the depressurization. The oxygen bottle was found empty. Witness marks on the cockpit oxygen pressure gauge caused by the impact were consistent with an indication of no pressure in the oxygen bottle.

A Sunjet Aviation official stated to the Safety Board that the accident captain had reported that the oxygen pressure gauge was in the green zone, indicating adequate pressure of 1,550 to 1,850 psi, during preflight checks on the day of the accident. The airplane's maintenance records indicate that the oxygen bottle was last serviced with oxygen (by Sunjet Aviation) on September 3, 1999. Between this date and the date of the accident flight, Sunjet Aviation operated the airplane for about 104.6 flight hours, on 90 flights. The Board was unable to determine exactly how many of these flight hours were above 35,000 feet, but ATC voice tapes from one of the flights indicated that the airplane was cleared to FL 370 on one leg. Although no radar data for that flight were available, the Board estimated (using ground speed and distance) that the airplane would have cruised above 35,000 feet for at least 30 to 40 minutes during that round trip flight. The captain from that flight told investigators that when the airplane was above 35,000 feet during that flight, he used supplemental oxygen. Board calculations indicated that the flight crew's reported oxygen usage that day would have depleted the airplane's oxygen supply by up to 14 to 25 percent, depending on which mask was used. Even though oxygen use was required on this flight (and perhaps others) and was reported to have been used, the Board is aware that pilots do not always use oxygen when required by regulation.

The Safety Board contacted fixed-based operators (FBO) at 15 known destination airports visited by the accident airplane between September 26 and October 20, 1999, and none had any record of charges for oxygen servicing of the accident airplane. However, the Board cannot exclude the possibility that the airplane was serviced with oxygen after September 3, 1999, at a different airport or at no charge to Sunjet Aviation and that no record was made.

However, even if the oxygen bottle had been full at the beginning of the accident flight, the oxygen supply would have been completely depleted before impact because the Rogers regulator installed on one of the two flight crew masks would have automatically supplied 100 percent oxygen when the cabin altitude increased beyond 39,000 feet. This oxygen would have been released at 130 liters per minute at a pressure of approximately 0.5 psi even if the mask was not being worn by a flight crewmember, depleting a fully charged oxygen bottle in about 8 minutes. Therefore, the postimpact reading on the oxygen pressure gauge is not necessarily indicative of an inadequate predeparture oxygen supply on the accident flight.

In summary, the Safety Board could not determine the quantity of oxygen that was on board the accident flight.

Oxygen Quality

If the airplane's oxygen bottle had been improperly serviced with air, rather than oxygen, there would have been insufficient partial pressure of oxygen in the supplied mixture to avoid hypoxia at high cabin altitudes after a depressurization. The Safety Board is aware of an accident involving pilot incapacitation from hypoxia as a result of improper servicing of an oxygen bottle with compressed air. The oxygen source from which the accident airplane's oxygen bottle was serviced on September 3, 1999, was tested after the accident and found to contain 99.8 percent pure oxygen. However, because of the possibility that the oxygen bottle might have been serviced elsewhere after that, the Board could not rule out the possibility that the oxygen bottle contained air instead of oxygen.

Timeliness in Donning Oxygen Masks

Another possible explanation for the failure of the pilots to receive emergency oxygen is that their ability to think and act decisively was impaired because of hypoxia before they could don their oxygen masks. No definitive evidence exists that indicates the rate at which the accident flight lost its cabin pressure; therefore, the Safety Board evaluated conditions of both rapid and gradual depressurization.

If there had been a breach in the fuselage (even a small one that could not be visually detected by the in-flight observers) or a seal failure, the cabin could have depressurized gradually, rapidly, or even explosively. Research has shown that a period of as little as 8 seconds without supplemental oxygen following rapid depressurization to about 30,000 feet may cause a drop in oxygen saturation that can significantly impair cognitive functioning and increase the amount of time required to complete complex tasks.

A more gradual decompression could have resulted from other possible causes, such as a smaller leak in the pressure vessel or a closed flow control valve. Safety Board testing determined that a closed flow control valve would cause complete depressurization to the airplane's flight altitude over a period of several minutes. However, without supplemental oxygen, substantial adverse effects on cognitive and motor skills would have been expected soon after the first clear indication of decompression (the cabin altitude warning), when the cabin altitude reached 10,000 feet (which could have occurred in about 30 seconds).

Investigations of other accidents in which flight crews attempted to diagnose a pressurization problem or initiate emergency pressurization instead of immediately donning oxygen masks following a cabin altitude alert have revealed that, even with a relatively gradual rate of depressurization, pilots have rapidly lost cognitive or motor abilities to effectively troubleshoot the problem or don their masks shortly thereafter. In this accident, the flight crew's failure to obtain supplemental oxygen in time to avoid incapacitation could be explained by a delay in donning oxygen masks of only a few seconds in the case of an explosive or rapid decompression or a slightly longer delay in the case of a gradual decompression.

In summary, the Safety Board was unable to determine why the flight crew could not, or did not, receive supplemental oxygen in sufficient time and/or adequate concentration to avoid hypoxia and incapacitation.

PROBABLE CAUSE

The National Transportation Safety Board determines the probable cause of this accident was incapacitation of the flight crewmembers as a result of their failure to receive supplemental oxygen following a loss of cabin pressurization, for undetermined reasons.

Thrift Savings Plan

FEDERAL RETIREMENT THRIFT INVESTMENT BOARD October 2001
1250 H Street, NW Washington, DC 20005

Dear Member of the Uniformed Services:

Congratulations! On 9 OCT 2001 you will be eligible to join the Thrift Savings Plan (TSP). By participating in the TSP, you can enhance your retirement and save money on taxes at the same time. Even if you're thinking, "I just can't spare the money right now," or "I'm too young to be concerned about retirement," the TSP offers many advantages to you. Here are a few:

• The sooner you start contributing, the sooner your money can go to work for you. Your account will grow from the earnings on your contributions, and those earnings, in turn, will accrue more earnings. This method of accumulating wealth is known as compounding, and the longer your money is in your account, the more you can benefit from it.

• You have the flexibility to contribute as little as 1 percent, or as much as 7 percent, of your basic pay — plus any amount of incentive pay or special pay, including bonus pay. And you will be able to contribute higher percentages of basic pay in the future.

• Your TSP contributions are taken out of your pay before taxes are computed, so you pay less tax now. In addition, TSP earnings are tax-deferred. This means you don't pay Federal income taxes on your contributions or earnings until you withdraw the money — usually at retirement, when you are in a lower tax bracket.

• You can diversify your TSP investment among five different investment funds: the Government Securities Investment (G) Fund, the Fixed Income Index Investment (F) Fund, the Common Stock Index Investment (C) Fund, the Small Capitalization Stock Index Investment (S) Fund, and the International Stock Index Investment (I) Fund. Administrative and investment expenses associated with these funds are very low, and you can easily change the amounts you allocate to the different funds at any time by using the TSP's Web site, calling the ThriftLine (the TSP's interactive voice response system), or mailing in a form.

• You can transfer any amount of money into the TSP from certain qualified retirement savings plans in which you are already invested. For example, if you have money in a 401(k) plan from previous employment, you can transfer all or part of it into the TSP. Similarly, you can transfer your TSP account balance to an eligible retirement plan when you leave Federal service.

This Plan Summary discusses all of these benefits and describes other features of the TSP as well. It explains how to start contributing, summarizes your investment choices, and tells when and how you can take a loan or withdraw your money. It also previews forthcoming enhancements which will become available when the TSP's planned new record keeping system is in place. You should read this booklet in its entirety so that you can make an informed decision about participating and investing in the TSP. That way, you will not find yourself realizing years from now that you missed out on excellent tax benefits and an easy way to invest for your retirement.

Sincerely,
Roger W. Mehle
Executive Director
http://www.tsp.gov/uniserv/index.html

Awards

It is that time of the year again to start thinking about nominations for SUSNFS awards. The deadline is still a little off in the future, 1 March 2002, but you can start collecting the data. The awards will be presented during the Navy luncheon at AsMA in May. Contact the Awards committee, chaired by CAPT Michael R. Valdez at mrvaldez@nomi.med.navy.mil, (850) 452-8125 DSN 922, or fax (850) 452-514 for any questions.

Richard E. Luehrs Operational Flight Surgeon of the Year

Nominations should be submitted via the nominee's chain of command to their type commander, who will select the respective TYCOM Flight Surgeons of the year. Details regarding submission format and routing are contained in a forthcoming NAMI message to the TYCOM's.

The Luehrs Award is the longest running award sponsored by the Society. It was initiated in 1975 in honor of Captain Richard E. Luehrs, MC, USN. Dr. Luehrs is somewhat of a legend in the naval aeromedical community. His career spanned 32 years of exemplary service ending in his untimely death in 1974.

The Luehrs Award is given annually to recognize outstanding performance in operational aviation medicine practice by a first or second tour Naval Flight Surgeon of the rank of lieutenant or lieutenant commander. Selection is based on: leadership qualities, dedication, initiative, resourcefulness and industry in carrying out their duties with the operational forces.

01	LT Sean Barbabella	87	LCDR David Brown
00	LT Alfred Shwayhat	86	LCDR Ivan Peacock
99	LT Sean Murphy	85	CDR Harold Howell
98	LT Troy Anderson	84	LT Arthur Kelleher
97	LT William Todd, III	83	LCDR Steven Hart
96	LT William Baugh	82	LT James Terbush
95	LT Barth Merrill	81	LT Jerry Rose
94	LT Joseph Shaughnessy	80	LT Thomas Daniel
93	LT Kris Belland	79	LCDR Ed Ellenbeck
92	LT Gregory Polston	78	LCDR Bruce Johnson
91	LCDR Glenn Merchant	77	LT Willis Martin
90	CDR Joel Lees	76	LT Wayne Judson
89	LCDR Daniel Carucci	75	LCDR John Randolph
88	LCDR Charles Brady, Jr		

Ashton Graybiel Award

Nominations should be sent directly to the committee. Three copies of the paper being nominated should be submitted.

The Ashton Graybiel Award was initiated in 1991 in honor of Captain Ashton Graybiel, MC, USN, who pioneered aviation medicine research. Dr. Graybiel served as Director of Naval Research for the Naval School of Aviation Medicine and Research. He provided consultation for many experiments undertaken by the School and was an acknowledged expert in the field of cardiovascular medicine. His work included the development of electrocardiographic techniques, experimentation with flight disorientation, studies on the physiological effects of altitude on humans, and work with the "Thousand Aviators" Study. He is affectionately referred to as the "Father of Naval Aerospace Medical Research."

This award is given annually to recognize outstanding contributions to the medical literature by members of the Society of U.S. Navy Flight Surgeons in support of some operational issue in Aerospace Medicine that has made a significant contribution with promise of long-term impact to the health and safety of aviation. Eligible recipients of this award should have conducted or been involved in an original research project and their papers published in the last year. By convention, only those papers published in the Aviation, Space, and Environmental Medicine journal are considered, unless the awards committee is made aware of papers published elsewhere.

2001 CDR David G. McGowan, MC, USN
2000 LCDR Douglas A. Weigmann, MSC, USNR
2000 LCDR Scott A. Shappell, MSC, USNR
1999 MAJ Carl M. Walker, MC, CAF
1998 CDR Victoria M. Voge, MC, USN, Ret.
1997 CDR Elwood W. Hopkins, III, MC, USNR
1995 CAPT Nader K. Takla, MC, USN
1994 CDR Michael H. Mittleman, MSC
1992 Jonathan Bailey Clark

Editors Note:

Please provide any information you have on corrections to the lists as well as missing award winners.

(continued on page 36)

(continued from page 35)

Sonny Carter Award

Nominations should be sent directly to the committee.

The Sonny Carter Memorial Award was instituted in 1993 in memory of Captain Manley Lanier "Sonny" Carter Jr., MC, USN. The award recognizes the Medical Corps or Medical Service Corps Officer who has made the most significant contribution towards improving the health, safety, and welfare of operational forces by promoting communication and teamwork among the aeromedical communities.

Before his death in 1992, Sonny Carter was somewhat of a legend in Aerospace Medicine. As a Naval Officer, Naval Aviator, Flight Surgeon, and member of the Astronaut Corps, he was respected for his technical abilities, energy, and dedication to his profession, and probably most of all, for his ability to inspire others. The Sonny Carter Award recipient is judged not only on accomplishments in the last year but also on a career history of aeromedical community involvement.

Criteria for selection include:

* Resourcefulness and dedication in promoting and accomplishing operational medical support.
* Demonstrated leadership in forming and promoting teamwork among the various aeromedical specialties.
* Demonstrated professionalism, integrity, unselfishness and respect for all aeromedical communities.
* Demonstrated communication skills, and embodiment of the spirit of cooperation.

2001 LT Alexander S. Brough, MC, USN
2000 CDR Kris M. Belland, MC, USN
1999 CDR P. Glenn Merchant, MC, USN
1998 CAPT Donald C. Arthur, MC, USN
1997 LT Jeffrey M. Andrews, MSC, USNR
1995 LT Marva L. Wheeler, MSC, USN

Robert E. Mitchell Lifetime Achievement Award

Nominations should be sent directly to the committee.

The Robert E. Mitchell Award was initiated in 1996 in honor of Captain Robert E. Mitchell, MC, USN for his 43 years of exemplary naval service and numerous contributions to naval aerospace medicine. Captain Mitchell is best known for his contributions to two long term aeromedical research projects, the "Thousand Aviators" study and the "Repatriated Prisoner of Wars" study.

This award is designated to recognize an emeritus Naval Flight surgeon for their career contributions to promoting and advancing the knowledge and science of aerospace and operational medicine.

2001 No nominations received
2000 CAPT Charles H. Bercier, Jr.
1999 RADM Daniel B. Lestage, MC, USN, Ret.
1998 CAPT Frank E. Dully, MC, USN, Ret.
1997 CAPT Frank H. Austin, Jr.
1996 CAPT Robert E. Mitchell, MC, USN, Ret.

Bruce W. Jackson Award

Nominations should be sent directly to the committee.

This Award, begun in 1999, is given annually in recognition of outstanding contributions to the practice of aerospace medicine as a Reservist and service to those sailors and marines that depend on their Flight Surgeon for their health and safety in peacetime and war.

2001 No nominations received
2000 CAPT Guillermo Salazar, MC, USNR
1999 RADM James R. Fowler, MC, USNR-Ret

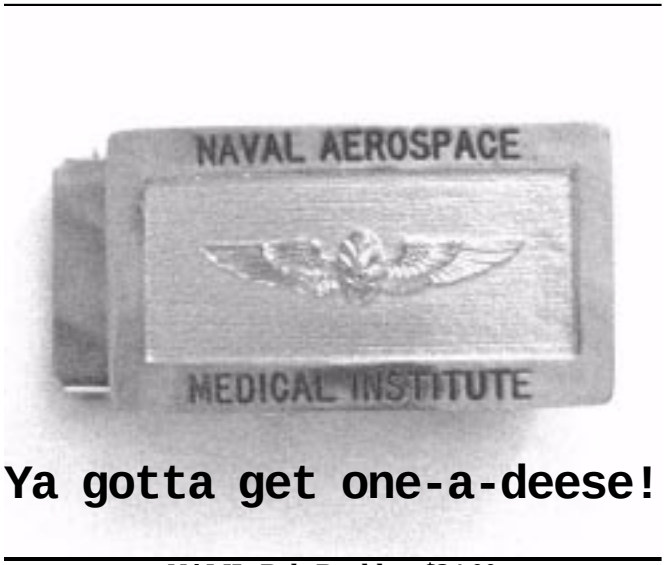
Aerospace Medicine Technician of the Year Award

Nominations should be sent directly to the committee.

The Aerospace Medicine Technician of the Year Award is open to all Navy Aerospace Medicine Technicians(AVT) in paygrades E-1 to E-6. The award is given to an AVT displaying outstanding professional performance, military behavior, leadership, appearance, adaptability, community spirit, self-education, and special contributions.

2001 pending
2000 HM1(AW/FMF) Gordon L. Edwards, USN
1999 HM2 (AW) Matthew R. Allen, USN
1998 HM2(SW/AW) Gregory S. Henry, USN
1996 HM2 Berg

Selected SUSNFS Merchandise Items Catalog



Ya gotta get one-a-deese!

NAMI Belt Buckle - $24.00

T-Shirt: FS Wings

Excellent Polo Shirts with FS Wings

Running Shorts

Sweat Shirt: SUSNFS "Leonardo"

Sweat Shirt: FS Wings

Selected SUSNFS Merchandise Items Catalog

Sweat Pants: SUSNFS Logo, NAOMI Logo, FS Wings

Polo Shirt: FS Wings

Way cool new SUSNFS T-Shirts

Pocket Reference, Travel Mug, CD: Ultimate FS

Sweetheart FS Wings Necklace, 14K Gold/Diamond Chip

Full Size 14K Gold Flight Surgeon Wings

The Society of U.S. Naval Flight Surgeons

PO Box 33008
NAS Pensacola, FL 32508-3008

Telephone: COM (850) 452-2257 ext. 1075; FAX (850) 452-5194; DSN 922-

Address Change, Subscription/Membership Renewal, Price List, and Order Form (Sep 2001)

#	ITEM	PRICE		SUB-TOTAL
	(Indicate Size and Color Where Appropriate)	*Non-Member/Member*		
___	T-shirt: SUSNFS "FS - Yesterday and Today" (M, L, XL)	24.00	19.00	_____
___	T-shirt: SUSNFS "Carrier" **Way Cool New One** (M, L, XL, XXL)	24.00	19.00	_____
___	T-shirt: FS Wings (children's XS, S, M; adult S, M, L, XL)	24.00	19.00	_____
___	Tank Top Shirt: SUSNFS "Leonardo" (M, L, XL)	24.00	17.00	_____
___	Running Shorts: (Blue with Gold SUSNFS Logo) (M, L, XL)	20.00	17.00	_____
___	Sweat Shirt: SUSNFS "Leonardo" (S, M, L, XL)	40.00	35.00	_____
___	Sweat Shirt: FS Wings (M, L, XL)	40.00	35.00	_____
___	Sweat Pants: SUSNFS Logo (S, M, L, XL)	30.00	24.00	_____
___	Sweat Pants: NAOMI Logo (S, L, XL)	5.00	5.00	_____
___	Sweat Pants: FS Wings (S, M, L, XL)	30.00	24.00	_____
___	Polo Shirt: FS Wings (M, L, XL) (Navy Blue, White)	38.00	33.00	_____
___	SUSNFS Patch	6.00	5.00	_____
___	FS Wings Tie	22.00	20.00	_____
___	FS Wings Women's Bow Tie	5.00	5.00	_____
___	FS Wings 'Skrunchie'	1.50	1.50	_____
___	**NEW - NAMI Flight Surgeon Belt Buckle!!!!**	**24.00**	**24.00**	_____
___	Travel Mug: SUSNFS Logo	6.00	5.00	_____
___	**2001 The Ultimate Flight Surgeon Reference CD - NEW!!**	**25.00**	**20.00**	_____
___	Naval FS Pocket Reference to Mishap Investigation	15.00	10.00	_____
___	Sweetheart FS Wings Necklace, 14K Gold/Diamond Chip	200.00	160.00	_____
___	Petite Sweetheart FS Wings Necklace, 14K Gold/Diamond Chip	150.00	120.00	_____
___	Sweetheart Physiologist/Psychologist Wings Necklace, 14K Gold	75.00	65.00	_____
___	Full Size 14K Gold Flight Surgeon Wings	240.00	200.00	_____
___	Mess Dress 14K Gold Flight Surgeon Wings	160.00	128.00	_____
___	Refrigerator Magnet: FS Wings (price includes shipping)	2.00	1.50	_____
		SUBTOTAL		_____
Shipping and Handling:				
	For all items (do not include refrigerator magnet):	$4.00 for 1st item, $1.00 for each additional item		_____
	For jewelry items - postal insurance (add for 1st jewelry item only):	$2.00		_____
Membership or Subscription Renewal:		___ years at $20.00/year		_____
Life Membership/Subscription:		$300.00		_____
		Total Amount Enclosed		_____ (check to SUSNFS)

Circle One **VISA / MASTERCARD** Card Number_____Expiration _____

Address change? **Y / N** Naval Flight Surgeon? **Y / N** Aerospace Medicine Graduate? **Y / N** Current AsMA Member? **Y / N**

Name_____ Rank_____
(Last) (First) (MI)

Circle All That Apply: **MC / MSC / MD / DO / PhD / USN / USNR / Active / Reserve / Retired / Other___**

Street_____City_____State_____Zip_____

Phone: Home (_____) _____ Work (_____) _____ E-mail_____

Command_____ FS Class_____RAM Class____ E-mail_____

(continued from page 28)

4. Greenberger NJ, Isselbacher KJ. Diseases of the gall bladder and bile ducts. In: Fauci, Braunwald, Isselbacher, et al, eds. Harrison's Principles of Internal Medicine 14th Edition CD-ROM. New York: McGraw-Hill; 2000;302:5.
5. Howard DE, Fromm H. Nonsurgical management of gallstone disease. Gastroenterol Clin N Am 1999;28:133-44.
6. Sackmann M, Niller H, Klueppelberg U, et al. Gallstone recurrence after shock wave therapy. Gastroenterol 1994;106:225-30.
7. Sackmann M, Pauletzki J, Sauerbruch T, et al. The Munich gallbladder lithotripsy study: Results of the first 5 years in 711 patients. Ann Intern Med;1991:290-6.
8. Wehrmann T, Marek S, Hanisch E, et al. Causes and management of recurrent biliary pain after successful nonoperative gallstone treatment. Am J Gastrenterol 1997;92:132-8.
9. Mulagha E, Fromm H. Extracorporeal shock wave lithotripsy of gallstones revisited: Current status and future promises. J Gastroenterol Hepatol 2000;15:239-43.
10. Schneider HT, Beninger J, Rabes U et al. Recurrent gallstone formation after successful extracorporeal shock wave lithotripsy. Am J Gastroenterol 1993;88:1399-404.
11. Adamek HE, Sorg S, Bachor OA Riemann JF. Symptoms of post-extracorporeal shock wave lithotripsy: Long term analysis of gallstones patients before and after successful shock wave lithotripsy. Am J Gastroenterol 1995;90:1125-9.
12. Carrilho-Ribeiro L, Pinto-Correia A, Velosa J, Carneiro de Moura M. Long-term gallbladder stone recurrence and risk factors after successful lithotripsy. Euro J Gastroenterol Hepatol 2000;12:209-15.

CDR R. Wesley Farr, MC, USNR
Chief Resident, Aerospace Medicine
rwfarr@nomi.med.navy.mil
(850) 452-4178
DSN 922-4178

CHECK YOUR LABELS AND VERIFY WE HAVE YOUR DUES CORRECT!!!!!!
(wspadgett@nomi.med.navy.mil for corrections)

SUSNFS EDITORIAL POLICY

The views expressed are those of the individual authors and are not necessarily those of the Society of U.S. Naval Flight Surgeons, the Department of the Navy, or the Department of Defense.

This Newsletter is published quarterly by the Society on the first of January, April, July and October of each year. Material for publication is solicited from the membership and should be submitted via computer file on floppy disk or e-mail attachment in Rich Text Format or MS Word ©.

Submissions should clearly indicate the author's return address and phone number. All submissions should reach the Editor one month prior to the scheduled date of publication. Correspondence should be sent to:

CAPT M.R. Valdez, MC, USN
Editor, SUSNFS Newsletter
P.O. Box 33008
NAS Pensacola, FL 32508-3008

FAX: COM (850) 452-5194 DSN 922-5194
E-mail: mrvaldez@nomi.med.navy.mil

Remember to get your
SUSNFS Gedunk!
by using the order form
on the inside of the back cover

The Society of U.S. Naval Flight Surgeons
P.O. Box 33008
Naval Air Station Pensacola, FL 32508-3008

Address Correction Requested

NONPROFIT
ORGANIZATION
U.S. POSTAGE
PAID
PERMIT NO. 459
PENSACOLA, FL