



The Society of U.S. Naval Flight Surgeons Newsletter

Volume XXV, Number 2

<http://www.aerospacemed.org>

April 2001

President's Column

A lot has occurred in the last year since our meeting in Houston. Our society has continued to mature in order to meet our members needs and to be the primary driving force for advancements in Aerospace Medicine. CAPT Charles Barker, your president elect, has taken the lead in making sure our society continued to improve the process of the business at hand. During this year we have seen the following change occur in our bylaws as approved by your executive board:

1. Creation of an Assistant Treasurer position, which will fleet up to Treasurer. The position will be limited to members located in Pensacola.
2. Inclusion of all of our Aerospace Medicine Team at the annual awards banquet.
3. Modification of the Officer voting process to require ballots be submitted prior to the annual conference.

These change will help insure SUSNFS, as an organization, can continue to mature.

This year has afforded me a unique prospective on our community from several different vantage points. I started my tenure assigned to NOMI with my primary goal to have NAMI return to being a command. On 26 July 2000, my last day at NOMI, NAMI became a reality again. We all need to thank CAPT Fahey for his support and vision for the future at NOMI. I then transferred to USNH Naples Italy, what a change in plans and what a great opportunity. As many of us had challenged our local MTF to meet the needs of the operational forces, now I have the ability



to make a difference in Italy. I challenge our more senior members to seek out opportunities to cross over to the MTF side. The more of us with operational experience that are in positions of influence in Claimancy 18 billets, the more we can drive these changes.

CAPT Natalie Willenberg will be the first full time Officer in Charge of NAMI. She is taking the reins from CAPT Valdez who has been the interim OIC. This will occur 27 April in conjunction with the graduation of the most recent Flight Surgeon Class. I know all of you join me in congratulating CAPT Willenberg on her selection and wish her the absolute

IN THIS ISSUE

President's Column	1
From the Secretary	3
From the Treasurer	4
Specialty Leader (MED-23)	5
Aeromedical Dual Designator Program	8
SUSNFS Election	10
Physical Standards (Code 342)	11
Psychiatry (Code 321)	14
Flea Bag (Internal Medicine)	18
NASA News	19
Safety Center	20
Mystery Case	25
Hyperbaric Medicine	25
RAM Corner - HIV PEP	27
Tetanus Shortage (MMWR)	31
Alternative Medicine	32
More Alternative Medicine	33
Primary Spontaneous Pneumothorax	37
Selected SUSNFS Merchandise Catalog	41
SUSNFS Renewal/Order Form	43



THE SOCIETY OF U.S. NAVAL FLIGHT SURGEONS
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<http://www.aerospacemed.org>

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The Society of U.S. Naval Flight Surgeons is a non-profit 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.

best. She will lead our Aerospace Medicine community through the many new challenges with her focused energy and broad experience.

In closing out my tenure as your president, I am very proud of the progress that our society and members have achieved. We are the recognized leader in not only aerospace medicine but in all of naval operational medicine. CAPT Charlie Barker, your president elect, is leaving BUMED 23 to become the XO at USNH Roosevelt Roads, PR. I thank him for his assistance, energy, professionalism, and friendship and I wish him the best in his new role. CAPT Dwight Fulton will be our new specialty advisor and BUMED 23. He is completing a very successful tour as the OIC of NEPMU-2 and will bring a broad based experience from both aerospace and preventive medicine. I hope to see all of you in Reno and always remember to "Get 'm Up, Keep 'm Up."

CAPT Fanancy L. Anzalone, MC, USN
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From the Secretary

Greetings,

AsMA is upon us...so it is time to lock up your reservations for the Aerospace Medical Association annual convention in Reno, which is slated for 4-10 May, 2001. SUSNFS and the Navy Residents in Aerospace Medicine will be setting up an informational and sales booth, so feel free to come lend a hand...or at least shake a few. This convention should be a good one.



The semi-annual Board of Governors meeting took place in January, 2001. Several changes were proposed and approved. First, an amendment to the SUSNFS Bylaws was proposed by the Board of Governors and approved by a simple majority of the members by mailed ballot to change the Treasurer's position to a two-year tour. The vote this year will be a one-time vote to retain LCDR Kleinberg as Treasurer for one year and to elect a new Assistant Treasurer for a two-year term, who will after his/her first year succeed to the office of Treasurer. This will provide the Assistant Treasurer the opportunity to train for one year before assuming the full responsibilities as Treasurer.

Other issues that were approved by the Board of Governors at the Semi-Annual meeting were changes to how the election process occurs. According to the SUSNFS Bylaws, the ballot period for the election of new officers is to be for thirty days, and the results are to be tabulated before the Annual Business Meeting and at that time announced. The Board of Governors agreed that SUSNFS should move to return to this policy, so the newly elected Officers can assume their responsibilities at the convention, as is dictated by the Bylaws. So, those who are "Full Voting Members" (members of **both** SUSNFS **and** AsMA) will be receiving a "snail mail" ballot in the next few days. If you are a Full Voting Member and don't receive your ballot, e-mail me and I will get one to you. Votes will not be accepted at the convention, voting will close on May 1, 2001. After all this is Florida...no Chads allowed.

Captain Anzalone and Captain Barker have been

spearheading an effort to ensure that the All Navy Luncheon is precisely that, All Navy. Part of that change is how we present the SUSNFS awards at the luncheon and how the luncheon has been viewed in the past as a "SUSNFS" luncheon. This year the cost of the awards and the program will be shared with the Aerospace Physiologist Association. All of the Navy's Aerospace community leaders will be represented on the stage, will present their respective communities awards and help to present the SUSNFS sponsored awards. Another change to the All Navy Luncheon will be in the way that the SUSNFS Awards are announced. Please come and enjoy!

That's all for now. Once again, Kudo's to **LCDR Bill Padgett** for putting together a splendid newsletter. He is finishing his third year of the RAM program, and has my endorsement for Secretary of SUSNFS for the 2001-2002 year.

Until next time, onward and upward. Choose happiness over sadness, forgiveness over judgement and may all your days be sunny...life is good!

Very Respectfully,

LCDR David K Weber, MC, FS, USNR

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From the Treasurer

Another year has passed and I am pleased to inform you that we have had a pretty good one. Sales have been steady and the Society continues to move forward. We have tried to reduce our inventory to the items which seem to generate the greatest interest. The result has been that we still have everything we started with including some sweat clothes with NAOMI logos. You may have noted some sale prices, and these will continue until the items have all been sold... so get them while they are hot!



Your Society appreciates your support and we want to encourage you to continue purchasing our wares. As you probably know, by the time you read this, the AsMA conference will be right around the corner. We hope to have a good turnout for this year's conference. We have had at least one award given to the AVT of the year, HM1 (AW/FMF) GORDON L. EDWARDS. This is one of the ways you as flight surgeons show your appreciation for the folks that support you. Your nominations are key to the recognition of their outstanding efforts and achievement. We have several endowed awards each year, but the nominations come from you. Don't forget your staff when it comes time for awards.

I wouldn't be the Treasurer without mentioning dues, so here's the pitch. Dues are one of the ways we keep the Society in business. We have had numerous calls regarding the newsletter and find that many have let their dues lapse. While we would like to continue sending the newsletter to everyone, it has become difficult to do so for two reasons. The first and most distressing reason is that we get SO MANY newsletters back because of incorrect addresses. This is such an easy fix. Just send us one of your change-of-address cards when you move. Or better yet, send us an e-mail when you get your new home/duty station address. Each returned newsletter costs us an additional \$.50 when it is returned, so you can imagine how quickly that builds up. The Society spends an average of \$25.00 each time the

newsletter goes out for mail with a forwarding address or for returned newsletters. Please help us control costs by sending your new address. The other problem is that because of a lapse in dues, we have had to cut costs and opt not to send newsletters to folks whose dues are over eight months in arrears. This allows for possible mistakes with mail handling. But for now, if you didn't get a newsletter, look at your last one and see when your dues expire. If they expired, that may explain not getting the newsletter.

Due to the complexity of the Treasury, the Board of Governors has added an Assistant Treasurer office, a two year position. The reason for this change is to add some continuity to the office of Treasurer, allowing the Assistant Treasurer to ramp up after the first year. So this year's ballot will have a vote to (hopefully) retain me for yet another year, and a second column for the election of the new Assistant Treasurer.

That is about all I have for now. It has been a great pleasure and honor to have served you as the Treasurer of the Society for this year. Thank you for the opportunity to participate in our Society as an Officer. I have enjoyed it immensely. "Keep those cards and letters coming folks," and most importantly "KEEP 'EM FLYIN'!"

Warmest Regards,

LCDR David C. Kleinberg, MC, USNR

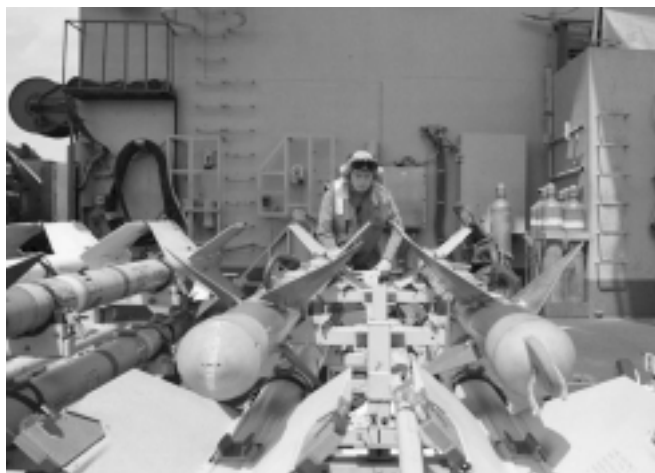
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Specialty Leader (MED-23)

“Fair Winds and Following Seas” to CAPT Frank H. Austin, MC, USN (Ret) on occasion of his “third” retirement.

I would like to take this opportunity to recognize and pay tribute to one of our society’s most revered members—CAPT Frank Austin, MC, USN (Ret). In November 2000, Dr. Austin was recognized by the Aircraft Owner’s and Pilot’s Association (AOPA) on the occasion of his retirement, and to hear CAPT Austin say it, “(his) third and last one.” AOPA President Phil Boyer presented the President’s Citation to CAPT Austin. The plaque read,



“Presented to Frank H. Austin, M.D.,
November 2000

In grateful recognition of nearly 50 years of
dedicated service to both military and
civilian aviation medicine.

Your enthusiasm for and commitment to
aviation has benefited aviators worldwide.
On your retirement, the Aircraft Owners and
Pilots Association honors your lifetime of
extraordinary contributions.

CAPT Austin has spent the last six years of his 87-year life in private practice limited to Aerospace Medicine serving as FAA Aviation Medical Examiner and Aviation Medical Safety Consultant. His first re-

tirement was from the U.S. Navy in 1978 after 32 years of service. Highlights included becoming a Flight Surgeon/Naval Aviator “Dual Designator” and the first Flight Surgeon to graduate from USN Test Pilot School in 1957. CAPT Austin trained as NASA support Flight Surgeon and went on deployments to monitor Al Shepard’s first sub-orbital flight from the Atlantic Ocean ship, John Glenn’s orbital flight from the Indian Ocean, and subsequent space flights from Perth, Australia, and from Hawaii. As a Naval Aviator CAPT Austin flew over 25 different models of aircraft as solo or command pilot and has logged over 6,500 hours flight time in both military and civilian aircraft. He completed his Masters in Preventive Medicine and was certified by the American Board of Preventive Medicine (Aerospace) in 1964. He was widely known as a lecturer and publisher with research focus on fatigue and stress in the aviation environment. CAPT Austin held many executive level positions in Naval Aerospace Medicine, including Director, Aerospace Medicine, BUMED (Code 23).

CAPT Austin retired the “second” time in 1994 after many years of federal service. Positions included Medical Operations Assistant for Life Sciences at NASA Johnson Space Center from 1978 to 1980, and Flight Surgeon at NASA AMES Research Center with Kelsey Seybold Clinic until 1984. In 1987, he was selected to be the Federal Air Surgeon at FAA headquarters in Washington, DC, and from 1987 to his second retirement in 1994 CAPT Austin served as Crew Systems Engineering Manager at the NASA Space Station office in Reston, VA. His work there involved human factors in design of Space Station “Freedom,” as well as in design of environmental systems, EVA suits, and other support systems.

CAPT Austin has been a member of the Aeromedical Association (as AsMA was originally called) since 1951. He has served as its President. He was also the organizer and founding President of our Society—SUSNFS. He was also the impetus behind the organization of the International Association of Military Flight Surgeon Pilots (IAMFSP), just recently recognized by AsMA Council as an official affiliate. He is a member of many other aviation associations and societies, a witness to his continued love and commitment to aviation and aerospace medicine.

He is recipient of many awards and much deserved recognition for his outstanding contributions to aerospace medicine over these many years.

When asked how he and his wife Anne, also 87 years old, are doing, CAPT Austin says simply, "Pleased to be ALIVE!" I know each of you join me in saying to CAPT Austin and Anne, "GODSPEED in your 'last' retirement and may God bless you both with many more years with us!"

Current MED-23 News and Issues

MED-23

The Aeromedical Dual Designator (AMDD) Selection Board met in December and made final selections based on Naval Aviation need. Congratulations to our newly selected AMDDs:

CDR Jonathan Cayle, MC
LCDR William Davis, MSC
LT Gustavo Gierber, MSC
LCDR Frank Harris, MC
LCDR Edwin Park, MC
LCDR Clay Wilkins, MC

Alternates included:

LT Craig Borgie, MC
CDR Mitch Brown, MSC
LCDR David Weber, MC

Graduate Medical Education Selection Board (GMESB) selected four RAMS for 2001. Of these, three accepted training. We are pleased to announce that CAPT Jesse Monestersky, LCDR Wendell Mew, and LCDR Wayne Caroleo will enter training this summer. 75 interns were selected for FS training.

A comprehensive revision of all aviation vision standards has been endorsed by BUMED, approved by CNO and CMC. An ALNAV message delineating these changes most likely will be distributed by the time you receive this newsletter. Kudos to CDR Bill Busch, LCDR Ken Uyesugi, and other members of the Aviation Vision Standards Working Group for the tremendous amount of work and excellent product!

NATOPS 3710.7 series changes have been submitted to authorize use of The Performance Maintenance in Continuous Flight Operations: A Guide for Flight Surgeons. Both CNO and CMC have approv-

ed its use by Commanding Officers in consultation with their Flight Surgeons. At the same time, the folks in the Directives shop are working with us to assign it an official publication number, in order to facilitate referencing it. This will provide the mechanism for periodic review and revision.

CDR Feeks recently represented Navy operational medicine at a Post-deployment Clinical Practice Guidelines Toolkit Development meeting in San Antonio. The two-day, Army-sponsored event was actually the kickoff of a project to equip clinicians with a standardized process for evaluating deployment-related illnesses in a way that both dispels misinformation and builds trust with the service member.

Please mark your calendars to be in Reno, NV, Saturday, May 5, for our all-day Annual Navy Aerospace Medicine Strategic Planning Session before AsMA begins May 7. This year's theme is "Focus on Evaluation." We have four major goal groups, seven strategic goals, and over 30 strategic objectives with action officers for each. This will be a great time for sharing information, for updating each other on objectives, and for making course corrections. It'll also be a great time for renewing friendships. We are scheduled to meet in the Genoa Room of the Nugget Hotel from 0800 - 1630. See you there!

C.O. Barker
SUSNFS Vice President

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Web site: <http://bumed.med.navy.mil/med23/default.htm>

MED-231

The Aerospace Physiology program met at NAS Jacksonville (4-8 Feb) for the annual Fleet Air Introduction/Liaison of Survival Aircrew Flight Equipment (FAILSAFE) symposium sponsored by NAVAIR. The meeting focused on the introduction of new and modified flight and survival equipment to the Fleet. Aeromedical Safety Officers and engineers had the opportunity to discuss specific issues with and distribution strategies for new equipment being sent to the Fleet. The Awards Banquet provided an opportunity to recognize exceptional performance. LT Dave Buzzetti (MAG-12) received the "Physiologist of the Year" award. SSGT Dave Klobnock (NAVAIR PMA202) received the "Robert Graham Enlisted Award". Mr. Barry Branham (NAWCTSD) received the "Civilian of the Year" award, and CAPT Bob Matthews (BUMED 231) received the "Special Award" for sustained contributions to the program. Mr. Tom Nelson, retired Naval Aviator provided spirited remarks on his flying experiences from designation (1956) to retirement in 1964. His experiences included, rescuing a crewman after ditching, surviving 5 'in-flight' engine fires, being hit by a rocket and an electrical failure at night during instrument flight. Quite a program.

MILCON construction for new Water Survival Training Facilities continues on schedule. Pensacola, Norfolk and Cherry Point well underway. A decision on Pax River has been postponed until final funding requirements for FY00 Navy Military Medical Construction is determined. The Whidbey Island project has been moved to FY02 and funding was move to the 02 POM request.

The Anthropometry Working Group (AWG): Inputs from the AWG will be solicited to determine what action items still need to be addressed. CNATRA and NASC have worked very hard to install a process that ensures aircraft compatibility for all aircrew entering the training pipeline. A consolidation of data collection methodologies and comparison to aircraft data supplied by NAVAIR is still the objective. The prime objective is to utilize the Digital anthropometric Video Imaging Device (DAVID) for collecting human data. DAVID systems are presently being used at NAMI and the USNA for collecting anthropometric data on aviation candidates. Aeromedical Safety Officers (AMSOs) at TRAWINGs 5 and 6 are performing aircraft 'fit-checks' on candidates that the measurement data cannot definitely include or exclude from aviation duties. Digital cockpit mapping and digital 'human' mapping is the new technology that we expect to minimize the need for 'fit-checks'. Validation of the new technology is currently in progress. Information on Digital Cockpit Mapping can be found at: <http://pma202.navair.navy.mil/accom.html>

R.A. Mathews

Aerospace Physiology/Training Agent POC:

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Web site: <http://bumed.med.navy.mil/med23/aeromed231.htm>



MED-233

I recently took over for HMC Tom Schaefer, who departed for greener pastures at NAMI teaching 8409 school. Thanks for all of your hard work, Tom. I have some big shoes to fill but I'm working hard for you to get up to speed on the issues. If you need some help or advice don't hesitate to call or email me.

Search and Rescue Medical Technicians (HM NEC 8401): Action Memorandum to stand-up SAR Med Tech "C" school at Naval Aerospace Medicine Institute, Pensacola, FL, has been approved by BUMED. Curriculum and program implementation plans are being developed. Cost analysis currently underway.

Marine Corps issued a Universal Needs Statement (UNS) requesting an en route care system for casualty evacuation which would establish approximately 30 Type II Sea billets for SAR HM's to be used for casualty evacuation on the V-22 Osprey. The DOTES working groups are currently studying the feasibility of implementation. This will probably increase your basic level of training to a paramedic.

Aeromedical Enlisted Program, POC:
HMC (FMF) Jeff Carter
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Email: jhcarter@us.med.navy.mil

For all of us at MED-23,

Godspeed!
CAPT Charlie Barker



Aeromedical Dual Designator Program

The Dual Designator (Pilot/Physician) Program began prior to WWII when a few physicians were trained as Naval Aviators in order to meet the unique human engineering needs of Naval Aviation. For the past 50 years the focus of the program has been the Jet community and the billets predominated in research and development activities. Although the majority of the participants were Navy Pilots who had gone to medical school, a few physicians were also selected for pilot training. That physician group included a few dual designators like CAPT Dave Brown and the late "Sonny" Carter who became astronauts.



The Dual Designator Program has recently been updated. An improved understanding of the roles and capabilities of dual-designated, aeromedically trained officers has led to a more precise codification of the program. The fundamental intent of the program has always been to bring science into the cockpit. With that in mind the program was expanded to include Naval Flight Officers, as well as aerospace physiologists, aerospace experimental psychologists, and aerospace optometrists. Additionally, all three aviation pipelines (jets, helicopters, and maritime patrol) are to be represented. To reflect this change, the name was changed to the Aeromedical Dual Designator (AMDD) Program.

The AMDD program supports the Aerospace Medicine initiative by improving air warfare capability through advanced training and research. This will be achieved by utilizing the aeromedical and operational training and experience of the AMDD community. AMDDs act as a bridge between Fleet aviators and the medical communities and provide integrated operational and aeromedical guidance to the line for the purpose of improving mission success and safety.

BUMED established an Aeromedical Dual Designator Advisory Group (DDAG) to advise BUMED, BUPERS, OPNAV, and USMC regarding the management and goals of the program. The DDAG is responsible for screening applicants and providing oversight and guidance to the AMDD community. Membership of the DDAG includes representatives from BUMED, BUPERS, CNO N78/N789, CNATRA, and the AMDD community. The DDAG appointed subcommittee chairman to provide day to day oversight of the program. CDR Schindler is the Operations Chairman, schindle@vx9-1.chinalake.navy.mil. CDR Busch is the Administration Chairman, code233@nomi.med.navy.mil. CDR Belland is the Training Chairman, bellandk@nsawc.navy.mil.

The governing documents for the AMDD program have been revised. Those are the OPNAVINST 1542.4C, the OPNAV 3710.7R: NATOPs, and the AMDD business plan. Copies of the instructions can be found at <http://neds.nebe.daps.mil/>.

OPNAVINST 1542.4C specifies the application procedures. BUPERS will annually release a message to announce a formal selection board. Designated naval pilots and flight officers are the preferred applicants. Applications must be submitted to BUMED. The physical qualification requirements are the same as for designated aviators. The age limit is no more than 38 at the time of beginning refresher training. Applicants must also be a designated flight surgeon, aerospace physiologist, aerospace experimental psychologist, or aerospace optometrist.

Aeromedical specialists who do not hold a designation as a naval pilot or flight officer may apply. Those officers who are selected for pilot or flight officer training must meet the standards for aviator training and will incur the same active duty obligation for training. To be eligible, applicants must be 0-4 or below and no older than 34 at the beginning of training. Selection requires SG and CNO approval.

BUPERS convened a FY-01 AMDD selection board. The selectees will enter a BUPERS approved refresher training program or flight training as appropriate. Results are as follows:

- Jonathan Cayle, CDR, MC, FS, F-14A
- Bill Davis, LCDR, MSC, Physiologist, AH-1J
- Gustavo Gierber, LCDR, Physiologist, H-57
- Frank Harris, LCDR, MC, FS, F-18
- Edwin Park, LCDR, MC, FS, P-3
- Clay Wilkins, LCDR, MC, FS, Army UH-1
- Roderick Borgie, LT, MC, FS
- Mitch Brown, CDR, MSC, Optometrist

The point of contact for questions regarding the application process is CDR Bill Busch, the Administration Subcommittee Chairman.

CAPT Dave Hiland, MC, USN
Chairman,
Aeromedical Dual Designator Advisory Group
hilandda@cna1.navy.mil





2001 SUSNFS ANNUAL ELECTION

The 2001 elections are upon us, so it is time to consider those who have been nominated to stand office. Per the society Bylaws, voting of officers and amendments is limited to those SUSNFS members who are also members of the Aerospace Medical Association. Once ballots are made available to the membership, there is a 30-day waiting period until the vote is closed. This year the ballots were mailed by separate mailing on April 1, 2001. The vote will be closed on May 1, 2001. The results of the election will be announced at the 2001 SUSNFS Annual Business Meeting in Reno, Nevada.

Listed below are the nominees for the offices open for election with the terms of office defined in brackets.

Vice-President/President-Elect

CAPT Mary A. Anderson , MC, USN
CAPT James R. Fraser , MC, USN
CAPT Dwight C. Fulton, MC, USN
CAPT Stephen J. Selby , MC, USN

Emeritus Member

RADM James R. Fowler, MC, USN-Ret.
CAPT R. E. Mitchell MC, USN-Ret.

Secretary

LCDR Bill Padgett, MC, USNR
_____ (write-in)

Board Member (2001-2003)

CDR Kris M. Belland , MC, USN
CDR Louis E. Valbracht, MC, USNR

Treasurer (one-year term)

LCDR David Kleinberg, MC, USNR
(*vote to retain for one year)

Board Member (2001-2003, LCDR or Below)

LCDR David W. Gibson, MC, USN
LT Timothy O'Hara , MC, USNR

Assistant Treasurer (two-year term)

LT Anne White, MC, USNR
_____ (write-in)

* Per the Amendment to the Bylaws passed in February, 2001 the Treasurers office is now a two year term, the vote to retain LCDR Kleinberg will ensure a smooth transition and continuity. This is a one-time vote to fill both positions. The Assistant Treasurer will succeed to the Treasurer after the first year.

Physical Qualifications and Standards (Code 342)

Greetings from Code 342!

My name is Lt Col Brian Parsa, and I am the Air Force Medical Liaison Officer here at NAS Pensacola. I am working in Code 342 with CDR Brinker and LCDR Kleinberg, and process most of the waivers that you submit from the fleet. I have served on many operational tours with the Air Force, most of which have been overseas, across both the Atlantic and Pacific Oceans. I was serving in Korea before being honored with this assignment.

I am very impressed in the way Navy flight surgeons meet the unique challenges they face every day. Performing the mission from an aircraft carrier is a challenge most Air Force and Army flight surgeons will never have the opportunity to experience. There are also many similarities between the Air Force and Navy. We are all physicians, and carry the same medical board certifications.

I am pleased to report that we are getting close to being able to consistently process a new waiver within 24 hours of its submission. This is a radical improvement from a few months ago, and is the result of new technology, inter-service exchange of ideas, and a lot of hard work. In order to consistently maintain this turn-around time, I ask that you all be sure that waiver submissions are in compliance with the Waiver Guide, and these submissions are sent in as one package. We receive many packages that are split, i.e., half of the package is faxed one day, the rest sent several days later.

We may be in different services, but are all one profession. I appreciate the hard work that you are doing and I hope to see you at the AsMA Convention.

On occasion, we receive packages with a variety of issues that need clarification. We frequently return these packages to you for correction. If you get a package returned, please ensure that the flight surgeon for that particular service member is informed. This just helps us get the right information to the physician taking care of the patient.

A few things occur, which if corrected, can eliminate difficulties for the aviators as well as applicants. First, because of the significant decrease in time required to process waivers (see above) we ask that you limit requests to "expedite" a waiver to only three types of situation:

1. Flag officers
2. Flight Surgeons
3. Special Handling

In order to assist us with the handling of your package, it is very important that the flight surgeon write a very detailed history of the current problem and the circumstances surrounding the history of the problem. Additionally, it is extremely important for the flight surgeon to paraphrase ALL REQUIRED INFORMATION e.g. the results of consults. This means it must include the name of the physician who wrote the consult and the date/location of the consult and a brief summary of the findings/recommendations.

We have researched the natural history of the letters sent to you from BUPERS. We found that they keep the letters for about two years. They weren't able to tell us what happens to them after that, i.e. whether they are archived or destroyed. For that reason, Code 342 has been receiving a copy of those letters for many years and has been storing them on the microfiche of each aviator. While we have these letters in some cases, we do not have them all. It is therefore extremely important for each aviator to keep a personal copy of the waiver letter in a safe, secure place. Due to recent changes in our process, we may not be able to continue storing those letters. So tell all of your aviators to take good care of their copy of that letter. The flight surgeon can help by documenting the date and serial number of the BUPERS letter in the health record. This may facilitate locating the letter in the event it becomes lost.



If you have the opportunity to examine students from another nation, we recommend that you not disqualify them for routine dental Class III findings unless they are at significant risk for dental dysbarism. The home nation has found them fit to fly and reversing that finding can present significant difficulties for the student and the training command.

And now, a word from the MEA CULPA Department at Code 342. Recently, we discovered an error in the information we published in the last issue of the SUSNFS newsletter regarding waivers for alcohol disease (abuse/dependence). Our research tells us that “an AMS is not required to be submitted for an alcohol waiver continuance”. For all three years of aftercare, the necessary information should be annotated on the SF 88, 93, or 6120/2. After the first three years of aftercare, the necessary information should be annotated on a BUMED approved short form. Additionally, the initial waiver paragraph included old treatment levels and not the new level of alcohol care.

The correct information follows:

Information required:

1. Complete flight physical, including Mental Status Exam (SF 88 and SF 93 or 6120/2).
2. Flight Surgeon’s narrative (Flight Surgeon’s waiver endorsement) to include:
 3. Detailed review of all factors pertaining to the diagnosis, including events preceding and after the initial clinical presentation.
 4. Statements concerning safety of flight, performance of duties, potential for recovery, and any symptoms of comorbid diseases or significant stressors.
 5. Documentation of compliance with after care requirements including abstinence, and AA attendance.
 6. Narrative Treatment summary. See treatment levels listed below***
 7. DAPA’s statement documenting aftercare including AA attendance.
 8. Psychiatric evaluation by a privileged psychiatrist or clinical psychologist. SECNAVINST 6320.24 (Boxer Law) does not apply in these cases.
 9. Internal Medicine evaluation (if indicated).
 10. Command endorsement is essential.
 11. Local Board of Flight Surgeons must reference BUMEDINST 5300.8 series.

*Please note Level 0.5 is not adequate treatment for aviation personnel diagnosed with alcohol abuse requesting a waiver. They must receive at least Level 1 treatment for alcohol abuse.



ANNUAL WAIVER CONTINUANCE

Information required during the three years of aftercare:

1. Complete flight physical (SF 88 and SF 93 or 6120/2).
 2. Flight Surgeon's statement on SF 88 and SF 93 or 6120/2: Concerning safety of flight, performance of duties, potential for sustained recovery, and any symptoms of co-morbid diseases.
 3. Document compliance with aftercare requirements including abstinence, and AA attendance.
 4. DAPA's statement documenting aftercare including AA attendance.
 5. Psychiatric evaluation by a privileged psychiatrist or clinical psychologist.
- SECNAVINST 6320.24 (Boxer Law) does not apply in these cases.

Information required after three years of aftercare:

1. Flight physical on BUMED approved Abbreviated Physical Exam (Short Form).
2. Flight Surgeon's statement on Short Form: Concerning safety of flight, performance of duties, potential for sustained recovery, and any symptoms of comorbid diseases.
3. Documentation of compliance with aftercare requirements including abstinence and AA attendance.



***** Current Treatment Levels**

Level 0.5 –IMPACT for an alcohol related illness or mild alcohol abuse.*

Level 1 – OUTPATIENT for a diagnosis of alcohol abuse.

Level 2 – INTENSIVE OUTPATIENT for a diagnosis of alcohol dependence.

Level 3 – DORMITORY for junior enlisted assigned to a barracks with a "buddy" system. Will attend level 1 or 2 outpatient treatment and live in the barracks at night.

Level 4 – INPATIENT (medical ward) for those at risk for withdrawal. Will attend level 2 or 3 treatment once medically cleared.

*Please note Level 0.5 is not adequate treatment for aviation personnel diagnosed with alcohol abuse requesting a waiver. They must receive at least Level 1 treatment for alcohol abuse.

If you have any problems that we can solve, just call or send us e-mail. We'll be glad to assist. Best wishes from all of us at "Code 342".

Jeff, Brian and Dave

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Psychiatry (Code 321)

First, a quick goodbye after almost four years in NAMI>NAOMI>NOMI>NAMI psych. I am off to be a “real” doc again, relearning the flight surgery trade. A hearty welcome to CAPT Tony McDonald who will be reporting in August and brings with him prior experience at NAMI psych, as Residency Training Director at Portsmouth, and extensive training in addiction medicine.

Many thanks for those of you who have called with questions and concerns and for your hard work at the front lines to keep our folks flying, safely. Best wishes for continued rewarding careers.

This SUSNFS will address the two subjects with the most questions; NAA and ETOH.

REVIEW OF NAA

The definition of NAA (*not aeronautically adapted* for winged aviators and *not aeronautically adaptable* for students) is:

- **The presence of an appropriately diagnosed personality disorder, or....**
- **The presence of personality traits that are deemed to be maladaptive to safety of flight, mission execution, or aircrew coordination.**

Just not liking someone, not believing them motivated, etc. does NOT meet the definition and NAA must not be used in those situations.

For a NAA determination to be formally established, the member must have the PD or traits diagnosed by a privileged psychiatrist or psychologist. The Aerospace Psychiatry Division at NAMI must concur with the NAA recommendation (either through a second evaluation of the member at NAMI or a thorough review of all evaluations and data from the flight surgeon and command). The flight surgeon can presumptively diagnose the PD/traits (like any other condition) but this must be confirmed by a psychiatric evaluation.

A finding that an aviator is NAA *MAY NOT BE*

WAIVED. On a case-by-case basis, the aviator who is found to be NAA may be re-evaluated at NAMI in two to three years if the following criteria have been met:

- The member must request a re-evaluation through his/her flight surgeon.
- The request must be positively endorsed by his/her flight surgeon and chain-of-command.
- The member must demonstrate evidence of maturation.
- The member must demonstrate outstanding performance at positions of increased responsibility (demonstrating ability to perform well under stress).
- The member must demonstrate that he/she has received some form of counseling to assist with his/her growth, maturation, and ability to deal with all situations in an adaptive manner.
- The member must be out of formal counseling for at least six months to demonstrate he/she is able to function well without the ongoing support of a counselor.
- There is no further evidence of the maladaptive traits initially leading to the NAA determination (or new maladaptive traits).
- The member must voice significant insight into the prior behaviors leading to the NAA determination (and what is different now).

If the above criteria are met and the member is re-evaluated at NAMI, there is no guarantee that he/she will be found aeronautically adapted/adaptable.



The past SUSNFS articles on alcohol have dealt primarily with the proper diagnosis and the waiver requirements. Please refer to your prior SUSNFS or the NOMI website for current guidance on these items.

This month will have a different focus. Please take the following quiz – mark either true or false.

1. I have been to at least one AA meeting in my life.
2. I personally review the signed attendance cards kept by the DAPA before recommending a waiver for alcohol abuse or dependence.
3. I know what the "First Step" is. I can help the aviator reframe this to minimize resistance.
4. I understand the role of the sponsor in recovery.
5. I know how AA defines alcohol abuse and alcohol dependence.
6. I have a list of the local AA meetings.
7. I know what the term "open" and "closed" meetings mean.
8. I have flipped open a Big Book at least once.
9. I know what the term, "two-stepping" means.
10. I have heard of BOAF.

If you got more than a score of 30% on this, congrats. It is probably better than the majority of your colleagues. . .OK – the point here is not to highlight how little most of us know about the entity of alcohol treatment, recovery and AA. But, then again, it is. . .Alcohol misuse diagnoses constitute over 50% of the waiver requests we review in psychiatry. All of you have several of your aviators in some stage of either evaluation or waiver process. In a general medical practice the estimate is as high as 20% of the patients have an alcohol misuse diagnosis (frequently not diagnosed and not treated). It is therefore amazing, that we as physicians are not taught how to be an active agent in the effective treatment of this disease process. Can you imagine knowing so little about the effective treatment of hypertension, hyperlipidemia, diabetes, or sinusitis?

The importance in knowing at least a modicum about the ETOH recovery process is to be both able to assist in an effective intervention with the aviator and be able to do an effective evaluation for the initial and annual waiver request process. We have been getting some pretty sloppy LBFS and flight surgeon statements with the packages that can be attributed to either extreme laziness or a critical lack of understanding of what questions to ask. Let's assume it's the latter. The hypercholesterolemia equivalent of what we are getting is:

"The member has been diagnosed with a high cholesterol level. He has been taking some pills for a while and his cholesterol levels are trending downward. A waiver

for this disorder is strongly recommended."

No joke.

So, in the effort of the education process, let's go through the questions above to see if there are some low hanging fruits in the learning curve.

I have been to at least one AA meeting in my life. If you have not had the experience of attending an AA meeting either in training, with one of your aviators, or other personal experience, there is no way you can ask intelligent questions about their experience. If you have an "F" here, please contact your local ATF and schedule yourself for their "visiting professional" course that usually lasts 2-4 days and will give you an introduction to the treatment and recovery process.

I personally review the signed attendance cards kept by the DAPA before recommending a waiver for alcohol abuse or dependence. The required aftercare requirement of 3 AA meetings per week the first year and one per week for years 2 and 3 must be documented to be valid. We are getting an increasing number of packages that state, "member attending required AA" and when we ask for the documentation it either doesn't exist or documents attendance that is much less than required. Please don't jeopardize your medical reputation (and credibility with your CO) by not ensuring the requirements for the waiver are met. The DAPAs/SACOs have the member take attendance cards to their meetings that are signed by the meeting secretary/rep. If this isn't happening, fix it!

I know what the "First Step" is. I can help the aviator reframe this to minimize resistance. It is, "I am powerless over alcohol and my life has become unmanageable." How many aviators do you know that are happy admitting they have no control and are powerless over anything? Very few initially. If you can explain to them a bit about AA and the 12 steps it can go a long way toward a more successful easing into this very foreign and scary world. One thing I like to do if they are nowhere near taking the first step as stated, is saying something like, "Perhaps you might agree that you are powerless over the fact that you have been told you have a problem with alcohol and your

(continued on page 16)

(continued from page 15)

life as you know it is now unmanageable – i.e. can't fly?"

I understand the role of the sponsor in recovery. For someone with the diagnosis of alcohol dependence, the role of the sponsor is crucial in their recovery. I am very suspect of someone without a sponsor. The sponsor is another AA who is well into recovery who acts as a combination of friend, teacher, and Gunny. They provide support, encouragement, and a loving kick in the butt if needed.

I know how AA defines alcohol abuse and alcohol dependence. Many an aviator gets wrapped around the axle debating the fine points of abuse versus dependence, and rebutting that they are not really an alcoholic. Play the aikido approach, step aside, allow them to spend their energy, and let them know that AA considers anyone with an alcohol problem one of their own. The fact that they are grounded is, by definition, a problem. Period.

I have a list of the local AA meetings. If not, how are you going to get them to one today? How will you know about asking them which they prefer? And, in the rare case where you doubt their veracity, when they tell you which ones they go to you can innocently state, "Oh, that one's a smoking meeting – how can you stand it?" – of course you have already noted that this meeting is a nonsmoking one and see what they say. . . .

I know what the term "open" and "closed" meetings mean. This knowledge is important for some of the same reasons as above. Open means that anyone can attend and closed means it is only for those who are alcoholic (remember, meaning anyone who has a problem with alcohol). Have you considered attending an open meeting with your aviator the first time? Or have you been "afraid" to? Hopefully you will have done this – our duties as an effective flight surgeon don't end at 1630. If you are hesitant to go to one, imagine how your aviator feels.

I have flipped open a Big Book at least once. If you are planning a discussion on the works of Pushkin

or Dostoevsky it helps to be literate in the genre. It is good to ask the member in recovery where they are in the Big Book and whether they are stuck on anything. What step are they on? Etc.

I know what the term, "two-stepping" means. You will occasionally get a member in recovery who brightly tells you at 90 days they are doing great, their life has turned around, and they are already off helping others. BEWARE!!! Frequently, this is someone who took their first step and is now on their 12th (helping others) – thus, 2-step. More than likely they have given a very superficial dusting of the really painful steps and are set up for a fall.

I have heard of BOAF. This is one of the most exciting tips I can give you to assist your alcoholic or abusing aviators. BOAF stands for "Birds of a Feather" which basically are AA groups for aviators, particularly commercial pilots. Until recently, there has been no published location of these groups (which meet in most major cities). It required a secret handshake and knowing which regular meetings the aviators in the area tended to go to so they might get invited to a "Birds" group. The beauty of the "Birds" is that they are aviators helping aviators. They can break through the usual bravado, denial, and intellectual resistance so characteristic of the alcoholic aviator. The Birds now have a website where the aviator can get a referral. It is www.boaf.org. Please try it!

Please don't hesitate to call and ask us about any related (or unrelated!) questions.

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The Flea Bag

Welcome to another installation of the Flea Bag, where you read all about the things you wish you didn't have to deal with, but sometimes have to anyway. For this issue I thought I would discuss a case that involves one of those issues we have to deal with on an almost daily basis, anemia. Now anemia is way too broad a topic to fully discuss in the confines of this article so I will not attempt to enter into a dissertation on anemia in general. Instead, I will present a case that was presented to me by one of your colleagues and point out some interesting lessons learned.

JD is a 19 y/o SR applicant for naval aircrew. He has no physical complaints and appears healthy in all aspects, having recently successfully completed boot camp. Routine aviation physical exam labs were drawn revealing a mildly decreased hemoglobin and hematocrit of 12.6 G/DL and 37.8% respectively. While these values are not startling, they are certainly lower than the average male so further investigation was initiated. Because the patient was going to PCS imminently, a "shot-gun" approach to the anemia work-up was performed so that the patient would not be lost to follow up prior to completion of his evaluation. Iron studies (serum iron, TIBC, percent iron saturation, and ferritin) were drawn along with an ESR, TSH, hemoglobin electrophoresis, electrolytes and renal chemistries (BUN/Creatinine). The electrophoresis, TSH and serum chemistries were all normal. The labs revealed iron deficiency with serum iron of 30 microgram/dl (nl 49-181), TIBC of 408 micrograms/dl (nl 250-450), percent iron saturation of 7% (nl at reference lab of 13-59). However the ferritin was 85 nanograms/ml (nl 21-453).



These values left the clinician evaluating the patient a little perplexed. According to the percent saturation of iron this patient was iron deficient, however his ferritin, which we all know is the body's storage form of iron, was normal. How can he be iron deficient and have a normal ferritin? While this may seem impossible, it is theoretically possible. Let me explain how.

I intentionally left off the ESR value on this patient in the above lab values. Not surprisingly, it was elevated at 30 mm/hr (nl 0-9). Now I can tell you that not all clinicians will check an ESR as part of their anemia work-up, but in this case it was done to rule out inflammation as a cause of the member's anemia. Anemia of chronic disease can cause bone marrow suppression and may be reflected by a non-specific elevation of the erythrocyte sedimentation rate. I do not know why this patient's ESR was elevated as I did not have the opportunity to evaluate him myself. I can tell you though that knowing all the values for the ordered tests definitely helps explain this otherwise confusing picture.

Ferritin, aside from being the body's storage form of iron, is also one of the body's acute phase reactants. As such, it will also be non-specifically elevated whenever an inflammatory process is occurring, just like the ESR. Knowing that this patient had an elevated ESR, you would not be surprised to find that he has an elevated ferritin. But wait a minute, this patient had



a “normal” ferritin, that doesn’t make any sense, right? Wrong! Because this patient is iron deficient, he does not have adequate iron stores (i.e. ferritin) to mount an elevated response to whatever inflammatory process is occurring. The best he could do with the limited iron stores he had was to raise his ferritin to the normal level, making it appear as though he did not have iron deficiency. Had his iron deficiency been more severe his ferritin would never have risen to normal values and the picture would have been more clear.

The rest of the story is that once the issue of iron deficiency was cleared up the patient had bidirectional endoscopy which revealed healing esophagitis, the likely source of his iron deficiency. The remainder of the EGD and colonoscopy were both normal. He is now on iron replacement and doing well. By the way, he has been waived to begin training.

I have obviously left off some details in the interest of time and space (as well as poetic license). You’ll just have to trust me that the rest of the evaluation was adequate and that the patient was treated appropriately once the iron deficiency was diagnosed. The lessons learned here are very important. First, if you order a test, make sure you know why you are ordering it and

how to interpret the results. Second, if you don’t understand the results, ask someone else. The consultation is free and it may save the patient unnecessary repeat tests and speed up the time to reaching a diagnosis. Third, iron deficiency in any male or non-menstruating female needs to be evaluated. Even if the anemia is mild, as long as there are no other historical or exam findings to explain the iron deficiency (vegetarian diet, malabsorption, frequent blood donation, hemolysis, just to name a few) bidirectional endoscopy (EGD and Colonoscopy) is indicated. Menstruating females can be given a trial of iron replacement if there are not historical or physical exam factors indicating the need for endoscopy. Don’t forget to follow-up and make sure the replacement is working and if not to refer your female patients for endoscopy as well.

That about does it for this issue. Remember to call or write if you have any questions, comments or just want to talk about how great it is to be a Flea!

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**NASA
News**

CAPT Dave Brown, naval Flight Surgeon, pilot, and astronaut mission specialist, is making the best of an unanticipated reprieve. He and fellow Flight Surgeon-astronaut CDR Laurel Salton Clark are part of the crew of STS-107, a very medically oriented, sixteen-day mission that was to fly this summer. NASA recently announced that the mission would be delayed until April of 2002.

The delay gives Dave, Laurel, and the rest of the crew that much more time to perfect their mission. And it will be an ambitious one. Medical projects include serial exercise pulmonary function tests; tracer injections, with blood and urine collections to study microgravity calcium metabolism; and studies of bone cell cultures to augment the latter. Dave and Laurel's training as medical doctors make them uniquely suited to getting these experiments done, and done right the first time – important, since time in space is scarce.

One of the non-medical experiments will study the nature of combustion in microgravity: just try to imagine how a flame would behave with no "up," no buoyancy, and therefore no convection. Removal of that major variable that is gravity will permit formulation of fundamental mathematical descriptions of combustion hitherto impossible. And how should a fire be fought in space? One experiment will evaluate the effectiveness of water mist.

Another experiment will evaluate sand particle interaction in weightlessness, and will have applications in understanding the behavior of soil during earthquakes, and the consequent damage to large structures, such as buildings, unlucky enough to be sitting on that soil.

As with most missions, the crew will be so busy that the sixteen days will be over before they know it. And if you think such a schedule is difficult to fit together, you're right. A great deal of the preparation time is spent coordinating and deconflicting the many events that occur simultaneously while on orbit.

The delay itself is essentially a domino effect arising from several factors, and serves as a beautiful example of the complexity of space flight operations. The orbiter *Columbia*, being older than *Discovery* or *Endeavor*, is somewhat heavier than they are – prototypes usually are – and therefore has a maximum payload that is a few thousand pounds less than they have. Right now, the International Space Station has priority for the heavier lift "birds," and so STS-107 was assigned to *Columbia*. Unfortunately, her recent overhaul at the Boeing facility in Palmdale, CA, took longer than expected. Another mission, intended to install an upgrade package in the Hubble telescope, was to follow STS-107, but because of Hubble's finite lifespan, cannot absorb the delay, and so NASA inserted that mission ahead of STS-107.

Not surprisingly, what every astronaut wants to do is walk in space. While no EVA is scheduled in STS-107, Dave is assigned as one of the contingency EVA crewmembers. As the name implies, he only gets to do it if something breaks – like the mechanism for closing the cargo bay doors. Since the orbiter is not stressed to withstand reentry with the doors open, they can't come home if the doors won't close. Dave's EVA training includes backup procedures to make the doors close, and he would work closely with Laurel Clark in her role as space-walk coordinator inside the shuttle.

As of this writing, the 01 March deadline for submission of applications to the biennial Navy astronaut candidate selection board, which convenes on 30 April, has passed. However, questions concerning the program may be directed to CDR Rick Smith, AEDO detailee, PERS-446B, at (901) 874-4108/DSN: 882. My-dog-ate-my-paper sob stories will doubtless find that tender empathy for which Navy test pilots are famous.

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Safety Center

Flight Surgeons Improving Aircrew Aeromedical Threat Awareness

Focus your goals on Mishap Prevention not Mishap Investigation

One of my many roles as the Safety Center Assistant Command Surgeon involves Aviation Command Safety Surveys throughout the fleet. Part of my inspection involves looking at aircrew training and the role that the Flight Surgeon plays within a squadron to improve aircrew awareness of the multiple aeromedical threats present in the aviation environment. I have found that very few Flight Surgeons play an active role in teaching the required aircrew training. The CNO through OPNAVINST 3710.7R section 8.4 has provided guidance for aeromedical threat training. Flight surgeons along with other members of the aviation medicine team are tasked to provide such training.

8.4 TRAINING

Numerous training requirements are covered in this section. Commanding officers shall ensure that all of the requirements are met and that all training is documented in the NATOPS flight personnel training and qualifications jacket (OPNAV 3760/32).

a. Adjunctive Aviation Physiology Training/ Physiological Threat Briefs - Adjunctive training will be provided by flight surgeons, aerospace physiologists, aeromedical safety officers (AMSOS), aerospace experimental psychologists, aviation physiology technicians, and/or aircrew survival equipment men (PRs) assigned with aerospace physiologists. The training shall be relevant to the operational threat and/or the training mission. It is designed to be conducted in squadron spaces on a more informal basis and in much greater depth than initial or refresher training. It shall not be considered a replacement for initial or refresher NAPTP/NAWSTP training. Adjunctive lectures/threat briefs typically available are listed in Appendix E, Figure E-2.

I have reviewed a number of mishaps in my years as a Flight Surgeon, where a lapse in education has been a contributing factor to a mishap. As aerospace medicine professionals, we need to be acutely aware that our primary purpose for existence is to provide preventive health and safety practices to our squadrons/patients/friends. Our role as professional educators must never be forgotten. We are much better off spending a few hours preparing and educating aviators on the hazards of spatial disorientation than we are spending many hundreds of hours investigating the loss of a close friend who flies into the water while experiencing a somatogravic illusion.

The Flight Surgeon is the squadron expert on the multitude of aeromedical threats and should be working with the Squadron Safety Officer, Training Officer and local Aerospace Physiologists/ AMSOs (and in some cases aerospace psychologists) to ensure squadron training is conducted on recommended topics as required. NAMI, for the past few years, has been teaching 3710 requirements to Student Naval Flight Surgeons and Physiologists who subsequently must prepare and present lectures on topics from Appendix-E of 3710. Similarly, Aerospace Physiologists have traditionally provided Physiology Enhancement Program (PEP) briefs. Unfortunately, the Navy does not yet have a central repository or peer-reviewed set of aeromedical-threat lectures despite this being one of the strategic goals for Naval Aerospace Medicine. Fortunately, NAMI has been working on creating these peer-reviewed PowerPoint lectures with a lesson plan and in-depth references that are easily accessed over the web or distributed via CD-ROM. Until the time when Flight Surgeons and other Aerospace Medicine Professionals have access to this repository, they must share with one another their individual aeromedical threat briefs. We can never stress enough that the knowledge and understanding of aeromedical threats will lead to the prevention of aviation mishaps and the preservation of the lives of patients and friends.

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OPNAV 3710.7R 15 JANUARY 1997

A. Physiology Topics

1. Aviation Physiology
2. Noise and Vibration
3. G-Induced Loss of Consciousness and
4. G-Tolerance Improvement
5. Chemical Warfare
6. Biological Warfare
7. Radiological Warfare
8. Exercise
9. Cardiovascular Fitness
10. Strength Training
11. Nutrition/Weight Control
12. Hypothermia
13. Heat Stress
14. Self-imposed Stress
15. Drugs
 - a. Self Medication
 - b. "Illegal" Drugs
 - c. Performance Enhancement
 - d. Stimulants
16. Alcohol
17. Fatigue
18. Survival/Combat First-Aid
19. 3710.7 (Chapter 8)

B. Sensory Physiology

1. Vision
2. Disorientation/Misorientation (Types)
3. Visual Illusions/Problems
4. Vestibular Illusions
5. Night Vision Environment
6. Night Vision Goggles
7. Lasers/Laser Protection
8. Midair Collision Avoidance (Aeromedical Factors)
9. Motion Sickness
10. Simulator Sickness
11. Visual Scanning/Blindspots
12. Target Fixation .
13. Induced Myopia (Night and Empty Field)
14. Visual Overload

C. Psychology/Stress

1. Stress
2. Stress Management
3. Human Factors found in Low-Level Flight
 - a. Nap of the Earth (NOE)
 - b. Terrain Following (TERF)
4. Temporal Distortion/Time Distortion
5. Situational Awareness
6. Anomalies of Attention/Complacency
7. Self Hypnosis (Performance Awareness)
8. Crew Coordination
9. Cockpit Resource Management
10. Task Saturation
11. Learning
12. Memory Improvement
13. Circadian Rhythms/Long-Duration Flights
Fatigue
14. Human Factors (General)

D. Emergency Egress/Survival/Survival Equipment

1. Aeromedical Aspects of Ejection
2. Psychology of Delayed Ejection
3. Emergency Egress/Ground Egress
4. Search/Rescue/Survival
5. Aviation Life Support Systems (ALSS)
6. Parachuting Techniques
7. Ditching/Crash Landing
8. Land Survival
9. Water Survival
10. Impact/Acceleration/Survivability
11. Escape and Evasion

E. Specialized/Deployment Briefs

1. Surge Op/Combat Stress
2. Motor Vehicle Human Factors
3. AMSO/Flight Surgeon Roles
4. Predeployment Syndrome
5. Jungle Survival
6. Mountain Survival
7. Desert Survival
8. Arctic Survival

NOTES:

1. Many of the above topics are interrelated and hence could have been listed in more than one area.
2. This list is not exhaustive. Aviation physiologists, aeromedical safety officers, aviation psychologists, aviation optometrists, and flight surgeons may be able to speak on any number of other topics.

Figure E-2.
Adjunctive Training/Physiological Threat Briefs

Safety Center

The Naval Safety Center at <http://safetycenter.navy.mil/aviation/> has released the February 2001 update to the **The Naval Flight Surgeon's Guide to Duties and Responsibilities**. It is 22 pages. Excerpts from the document are presented here:

THE NAVAL FLIGHT SURGEON'S GUIDE TO DUTIES AND RESPONSIBILITIES

SECOND EDITION

FORWARD

This guide was originally written in 1991 by CAPT Dave Yacavone, LCDR Charlie Barker and LCDR Andy Bellenkes. It was written because safety surveys, at that time, indicated a less than satisfactory aeromedical program at many squadrons. After a great deal of feedback from young Flight Surgeons concerning their wish for additional guidance in their operational duties, the Aeromedical Division of the Naval Safety Center (NSC) developed the original document. Unfortunately, ten years later not much has changed. Accordingly **The Naval Flight Surgeon's Guide to Duties and Responsibilities** has been updated by the current incumbents at the NSC.

This guide is primarily designed for the Flight Surgeon just entering operational naval aviation medicine. However, it can also serve as a general review for the more seasoned Flight Surgeon. This guide is written using conversational language in the same way we would discuss our recommendations at the time of a safety survey. We hope that you will find the guide both easy to read and informative. We solicit any suggestions you may have for improvement in future editions.

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THE NAVAL FLIGHT SURGEON'S GUIDE TO DUTIES AND RESPONSIBILITIES

INDEX

- 1 INDEX**
- 2 INTRODUCTION**
- 3 FLIGHT SURGEON AVAILABILITY:**
ARE YOU READILY AVAILABLE TO COMMAND PERSONNEL?
- 4 FLIGHT SURGEON PARTICIPATION:**
ARE YOU SUFFICIENTLY INVOLVED IN COMMAND ACTIVITIES?
- 5 ARE YOU APPROPRIATELY ASSIGNED TO COMMAND DUTIES?**
- 6 BOARDS AND MEETINGS**
 - 6.1 Standardization Boards
 - 6.2 The Planning Board for Training (PB4T)
 - 6.3 Safety Meetings
 - 6.4 Anymouse Program
 - 6.5 Aircrew Evaluation Meetings and Boards
- 7 AEROMEDICAL CLEARANCE PROCEDURES FOR TRACKING CLEARANCE STATUS**
- 8 WRITTEN COMMUNICATIONS:**
IS YOUR DISSEMINATION OF INFORMATION ADEQUATE?
- 9 COMMAND READINESS MONITORING:**
DO YOU ADEQUATELY MONITOR SQUADRON READINESS?
 - 9.1 Maximum Flight Hours
 - 9.2 Circadian Rhythm Disturbances
 - 9.3 Weight Control
 - 9.4 Physical Readiness
 - 9.5 Flight Simulator Programs
 - 9.6 Self Medication and Alcohol
 - 9.7 NAVOSH Programs
- 10 PREVENTIVE MEDICINE / HEALTH PROMOTION PROGRAMS:**
DOES YOUR COMMAND MAINTAIN ALL REQUIRED PROGRAMS AND DOCUMENTATION?
 - 10.1 Tobacco
 - 10.2 Alcohol abuse
 - 10.3 CPR training
 - 10.4 Suicide
- 11 ELECTRONIC SUPPORT**
- 12 HUMAN FACTORS SCREENING:**
DOES YOUR COMMAND HAVE PROCEDURES FOR CONDUCTING HUMAN FACTORS COUNCILS/HUMAN FACTORS BOARDS (HFCs/HFBs)?
 - 12.1 Human Factors Council (HFC)
 - 12.2 Human Factors Boards (HFB)
- 13 SAFETY PROGRAM ORGANIZATION:**
DOES THE COMMAND HAVE A DOCUMENTED AEROMEDICAL SAFETY PROGRAM?
- 14 SAFETY PROGRAM DOCUMENTATION:**
DOES THE COMMAND ADEQUATELY DOCUMENT YOUR PARTICIPATION IN SAFETY PROGRAM ACTIVITIES?
- 15 MISHAP RESPONSE PLANNING:**
ARE YOU ADEQUATELY PREPARED TO RESPOND TO AN AVIATION MISHAP?
- 16 SOME FINAL THOUGHTS**

Enclosure 1 Adjunctive Training/Physiological Threat Briefs

Enclosure 2 Marine Corps unit Annual Aeromedical Briefs

(continued on page 24)

(continued from page 23)

THE NAVAL FLIGHT SURGEON'S GUIDE TO DUTIES AND RESPONSIBILITIES

INTRODUCTION

You are a Flight Surgeon (FS), reporting on board a squadron for the first time. You may find yourself a bit overwhelmed by the nature and scope of your new responsibilities. You will find that you have to divide your time between the local clinic/hospital and the squadron(s) to which you are assigned. You will perform physicals and conduct sick-call for various military and dependent personnel, not just for the people assigned to your squadron. You will be required to sit as a member on numerous boards (including aircraft mishap boards), committees, and councils. You'll be asked to give lectures, demonstrations, safety stand-down briefs, and act as aeromedical consultant to the CO. You'll have to write reports and coordinate activities with the local Aviation Physiologist (AMSO), Aviation Experimental Psychologist (AEP) (not located on all bases), Aviation Safety Officer (ASO), and others. You'll fly with your folks, obtaining invaluable operational experience in various fleet aircraft. You'll perform squadron rounds, ensuring that your people are fit and ready for any contingency. Depending on the number and size of your squadrons, you could conceivably be the "Doc" for over 600 people.

So where do you start? If you are a "nugget", just beginning your first tour, there's much to be learned. You have gained a superb didactic education at Naval Aerospace Medical Institute (NAMI), and assume that you are now prepared to face the challenges of squadron life. Yet there are so many small, but vital details to be learned. You are already an aeromedical specialist, but you need to discover the practical "gouge" about how to run an aeromedical program. Even if you have had prior experience as a Flight Surgeon, you may not be aware of all your responsibilities in establishing and maintaining an aeromedical safety program. To be frank, safety surveys conducted by the Safety Center's Aeromedical Branch have revealed that many Flight Surgeons do not realize just what an effective aeromedical program should include.

These surveys originate as an invitation from your Squadron or Wing CO. They are designed primarily as a formal "technical assistance visit", a gouge session with Safety Center personnel that can help assess your squadron's operational, maintenance, and aeromedical safety programs. The survey is frank and somewhat formal, yet it is designed as a help session rather than a true inspection. The results are kept within the squadron and are confidential. The only people who see the aeromedical survey results are the FS, Safety Officer, and the CO. The Naval Safety Center retains a confidential copy for reference in the event the surveyed squadron commanding officer calls the Safety Center for clarification of the survey results.

This "guide sheet" comes from the need to inform you, the Flight Surgeon, about some of the more important lessons learned from the many (over 100) surveys conducted each year. It is meant to give you a "heads-up" about problems encountered by your fleet colleagues, and provide straightforward approaches for tackling your many responsibilities. It is a practical supplement to that which you have already learned. We trust it will help make your experiences in Navy/Marine Corps Aviation a bit easier (more rewarding) and more fun.

Mystery Case

You are once again enjoying the beautiful sunny day aboard the Navy's newest aircraft carrier now hanging out in the Persian Gulf. The accolades of your last brilliant save are still ringing in your ears. Having that one-in-a-million phenomenon so earlier in your deployment ensures the rest of the cruise will be uneventful. Except, there is that corpsman knocking again. Two guys are in sickbay after an explosion not looking good.

Expecting terrible trauma you arrive to find the capable GMO dealing with two soaking wet folks acting strange with confused behavior, difficulty breathing, twitching, and pinpoint pupils. Before any history is received, one of them goes into convulsions. As the medical area becomes a flurry of activity, the 5MC goes off stating medical emergency in the hangar bay.

While the first two patients are being manhandled by the anesthetist and surgeon, you and the corpsman head to the hangar. What awaits you is ten to fifteen sailors with varying degrees of runny nose, drooling, constricted pupils.

You are thinking cholinesterase problem, and having gone through the impressive NEHC Chemical/Biological/Radiation/Environmental (CBRE) Warfare threat course, you are worried. The corpsman beats you to the punch, though, and voices to all that this looks like the Sarin gas attack in Tokyo in 1995. Soon the ship rumor mill has spread the word about an explosion and nerve agent.

Decontamination and isolation plans are started, medical is desperately trying to deal with the casualties but the anesthetist and surgeon are now also symptomatic. CO wants to know if this was a nerve agent attack and should the MARK 1's be used.

Are you ready to make the call? CDR Jay Dudley will show that this isn't a completely unrealistic scenario. Prior thorough drilling is your best hope.

(continued on page 26)

Hyperbaric Medicine

Decompression Sickness: An Unusual Presentation

A patient presenting with symptoms of joint pain, paralysis, numbness, or tingling would quickly be diagnosed with decompression sickness (DCS) after a flight or dive. However, like any other disease process, DCS does not always present itself in the textbook fashion. Many times DCS will make personality changes not noticeable to a physician unless s/he had prior knowledge of the patient. Flat affect is one example of this phenomenon. The patient may seem "flat" to the physician, but it is often difficult to determine if this is the patient's baseline or if it represents a change in personality. It is, therefore, important to explore this area by questioning friends and coworkers of the patient to try to determine if there has been any change in the patient's affect. The following case is one example we have pulled from our files to demonstrate this finding:

"DW" is a 25 y/o female Navy E4 who presented 25 hours after exposure to a Type IIA Low Pressure Chamber flight. The flight lasted a total of forty minutes with an ascent to 35,000 feet at 5000 feet per minute and immediate return to 25,000 feet at 10,000 feet per minute. She was at 25,000 feet for thirteen minutes and then began a descent to 18,000 feet at 5,000 feet per minute. Per protocol, the descent was slowed to 2,500 feet per minute to the surface. The patient was on oxygen throughout the flight and had pre-oxygenated for 34 minutes prior. She was asymptomatic during the flight, but began to experience left arm "heaviness" and a general feeling of malaise immediately after the flight. She came to the Hyperbaric Medicine Department with these symptoms at the encouragement of a friend who noted increasing emotional lability. On exam, the patient stated her hands felt heavy and she found it hard to type. She also stated that the previous evening she had thrown her laundry in the garbage can instead of the washing machine. She vacillated between a tearful and a somewhat flat affect. She seemed overly concerned about the possibility that any treatment might interfere with an upcoming special liberty. The medical history was significant for monthly headaches. The physical and neuro exams were nor-

(continued on page 27)

(continued from page 25)

Another Mystery Case, cont.

The following is a true scenario that demonstrates that CBR training and continual MRT drills will prepare your CVN medical department for potential mass casualties.

At approximately 2130 a high-pressure hydraulic valve on the number 2 deck edge elevator ruptured aerosolizing 300 gallons of a particular type of hydraulic oil called *Fyrquel* at 3000 psi. This hydraulic oil is a water-soluble lubricant that has phosphate additives. Do any of our readers remember where else you may run into a phosphate ester problems? You guessed it - Chemical Warfare Nerve agents or insecticide exposure.

Our initial medical involvement began when 2 sailors presented in dungarees saturated with oil from head to toe, and another Chief Petty Officer who donned an EEBD to extract these individuals from the compartment where the leak occurred. While performing a simultaneous primary assessment for traumatic injuries and obtaining an occupational/medical history the 5MC (the ship's public address system) alerted to an "incident" in the hanger bay. As I ordered 2 corpsmen to begin Decon procedures in the Ward showers for decontamination I also called for my Preventive Medicine Tech to pull up the MSDS for this "*Fyrquel*" material the sailors said was in the deck edge elevator.

I left with the primary response team of the day to the hanger bay to assess the situation. When we arrived, the hanger bay divisional doors were being closed to isolate a thick white/gray vapor cloud, which was engulfing the entire bay. While trying to access the casualty possibility, I was called on the "Brick" (Walkie-Talkie) from my Preventive Medicine Tech that informed me that *Fyrquel* was "a phosphate-ester compound, which could possibly exert cholinesterase activity" Great!!! A huge vapor cloud wafting through the hangar bay exposing more than 45 sailors to an organophosphate-like vapor of undetermined concentration. We began the "herding process" of getting all these potential patients headed toward Main Medical for evaluation, Decon, and

possible treatment if necessary. Out of this entire herd two patients (who were the closest to the valve when the oil was vaporized) developed symptoms of blurred vision, excessive salivation, nausea, abdominal pain and bradycardia. Patient number 1 was quickly treated with 1 mg of Atropine with immediate symptom improvement. Patient number 2 presented with all of these signs and symptoms requiring the use of both Atropine and 2-PAM Chloride auto injectors prior to symptom improvement.

During their ICU admission a total of 4 mg's of Atropine was used on Patient #1. Patient #2 received a total of 2mg's of Atropine and the single dose of 2-PAM.

This real-life exercise proved intellectually stimulating as well as satisfying by showing that our medical staff could handle a "mass casualty" situation with composed skill and quality patient care. It just goes to show you that you never know in which student Flight Surgeon class you can get away with falling asleep!

CDR Jay S. Dudley MC, USN (FS)

Director, Medical Corps Program



(continued from page 25)

mal including the mini mental status exam. Strength, sensation, and dexterity were completely intact. No other symptoms were found except the patient's feeling that something wasn't quite right and the friend's insistence that this was not the way the patient normally acted.

It would have been very easy for the physician in this case to chalk the symptoms up to anxiety about the possibility of treatment and a missed out-of-town trip. Instead he chose to treat the patient in the hyperbaric chamber despite the fact that her symptoms did not provide for a more typical presentation of DCS. In this case, it was the right thing to do. During the second O2 period the patient "brightened up" and all of her subjective symptoms disappeared. She became more cheerful, optimistic, and much more responsive to the chamber crew. Her friend considered this change a re-emergence of the patient's true personality.

Of course, it is easy for us to treat someone because we have a chamber on site. The decision to treat a patient with this type of presentation becomes much more difficult in a deployed situation where the treatment would require an emergency MEDEVAC and loss of limited personnel assets. However, such a patient is just as needful of treatment as one who displays more classic symptoms, and must be managed accordingly.

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RAM Corner

Post-Exposure Prophylaxis for HCWs Exposed to HIV

Introduction

Health care workers (HCWs) with occupational exposures to blood and certain other infectious body fluids of a patient with HIV infection are at a small but definite risk of contracting HIV infection. The Centers for Disease Control (CDC) has studied 52 US HCWs with documented HIV seroconversion through June 1997 [1]. Also, the CDC has documented 114 episodes in US HCWs with possible occupational HIV transmission in which workers reported no other risk for HIV occupational transmission but a specific exposure was not documented [1].

Post-exposure prophylaxis (PEP) with zidovudine (ZDV, AZT) after a significant HIV exposure reduces the risk of occupational HIV seroconversion by 80% [2]. The CDC has published guidelines for HIV PEP that are considered to be standard of care. Hospitals are required to post-exposure plans that include PEP with antiretroviral agents by OSHA. A representative Navy instruction is used at Naval Hospital Pensacola, NAVHOSP PNCLAINST 6220.10D: "20. f. The employee will be offered post exposure prophylaxis in accordance with the current recommendations of the U.S. Public Health Service and CDC guidelines."

Objectives

Therefore, it is felt that Senior Medical Officers (SMOs) afloat (CVN, CV, LHA, LHD, etc.) should be able to develop, implement, and supervise an HIV post-exposure prophylaxis program. Members of medical department should be able to : counsel health-care workers (HCWs) about the risk of HIV infection from exposures to needlestick injuries, skin exposures, and mucous membrane exposures; assess the HIV risk of an exposure to a HCW and plan appropriate post-exposure prophylaxis (PEP); and understand the use of antiretroviral drugs and monitoring for adverse effects during PEP in HCWs.

(continued on page 28)

(continued from page 27)

Definitions

A health care worker is any person whose activities involve contact with patients, blood, or other body fluids. Medical department personnel, public safety workers, and volunteers are all considered to be HCWs. On ships, every sailor or marine is in effect a HCW when he or she provides first aid to injured shipmates.

An exposure is any incident that places a HCW at risk for HIV infection. Exposures include percutaneous injury, contact of mucous membrane or nonintact skin, contact with intact skin of prolonged duration or extensive area of infectious blood, tissue, or body fluids.

Body fluids implicated in transmission of HIV are blood, semen, vaginal secretions, and other body fluids with visible blood. Fluids with undetermined risk for HIV transmission are CSF, synovial, pleural, peritoneal, pericardial, amniotic fluids.

Risk Factors

Risk factors for HIV transmission are large quantities of blood. Examples include devices visibly contaminated with blood, needles placed directly in vein or artery, and deep injuries. The source patient risk factors are terminal illness and higher viral loads. Persons with primary HIV infection, or acute retroviral syndrome, have very high viral loads during the first six to 12 months of infection. Hollow bore needles are more likely to transmit HIV than solid needles or sharps because of the higher volumes of blood contained in the lumen of hollow needles. In the 52 documented episodes of HCW seroconversion, 47 episodes involved exposure to HIV-infected blood and 45 involved percutaneous exposures.

Effectiveness of HIV PEP

A retrospective case-control study by the CDC and British and French health authorities demonstrated that ZDV post-exposure prophylaxis reduces the risk of HIV infection in occupationally exposed

HCWs by 79% [2]. Without PEP, the risk of HIV infection following percutaneous exposure is 0.3%. Therefore, the risk of HIV infection with PEP would be approximately 0.06%. The risk of HIV infection following mucous membrane exposure is 0.09% without PEP with presumably an 80% reduction in risk with PEP.

Failure of PEP with ZDV has been reported in at least 14 cases. The reasons for failure of PEP are ZDV treatment in the source patient, high titer and/or high inoculum exposure, and delayed initiation or short duration of PEP.

Management of Exposed HCWs

Health care facilities should have written protocols for reporting, evaluation, counseling, treatment and follow-up of exposures. Key components are exposure-control plans, access to clinicians during all working hours, and access to PEP.

The exposure report should include enough information to determine the need for PEP and then document management. The components are: date and time of exposure; details of procedure being performed; details of exposure; details about exposure source; and details about counseling; post-exposure management; and follow-up.

Immediate treatment of the exposure site consists of soap and water cleansing of the skin and flushing mucous membranes with water. Laboratory evaluation includes HIV antibody at baseline, three months, and six months. Pregnancy testing is required if the status is unknown.

Determination of the Need for Chemoprophylaxis



The three steps in determination of the need for chemoprophylaxis follow:

Step 1- Determine the Exposure Code (EC)

EC 1	Small	Few drops, short duration
EC 2	Large or Less Severe	Several drops, splash, or long duration Solid needle, superficial scratch
EC 3	More Severe	Hollow needle, deep puncture, visible blood, IV

Step 2- Determine the HIV Status Code (HIV SC)

HIV negative		
HIV SC 1	Lower titer exposure	Asymptomatic, high CD4
HIV SC 2	Higher titer exposure	AIDS, primary HIV, high viral load, low CD4 count
HIV SC Unknown		

Step 3- Determine the PEP Recommendation

	HIV SC 1	HIV SC 2
EC 1	No recommendation	Consider basic regimen
EC 2	Recommend basic regimen	Recommend expanded regimen
EC 3	Recommend expanded regimen	Recommend expanded regimen

The basic regimen consists of two nucleoside reverse transcriptase inhibitors (R-RTIs), zidovudine (ZDV) 300-mg PO bid and lamivudine (3TC) 150 mg PO bid for four weeks. The combination drug, Combivir (ZDV 300 mg/3TC 150 mg), is frequently used for convenience. The expanded regimen consists of the basic regimen plus a protease inhibitor (PI), either indinavir 800-mg PO tid on an empty stomach or nelfinavir 750-mg PO tid with food, for four weeks. If PEP is recommended, it should be initiated within two to four hours after the exposure.

The most significant side effect of ZDV is bone marrow suppression occurring about four weeks after initiation of therapy. The anemia and neutropenia will quickly recover after removal of ZDV. All of these drugs may cause hepatitis. Nelfinavir may cause diarrhea. Indinavir can cause nephrolithiasis with chronic usage. Protease inhibitors as a class can exacerbate diabetes mellitus and cause hyperlipidemia.

Laboratory tests should be monitored at baseline and every one to two weeks. CBC, differential, platelet count, serum AST or ALT, and creatinine are routinely monitored. Glucose and serum lipids are monitored if there are significant risks for diabetes and hyperlipidemia respectively.

HIV Antibody Testing of Source Person

HIV antibody testing of the source person should be performed as soon as possible in order to determine the need for PEP and to avoid the administration of unnecessary chemoprophylaxis. Rapid HIV-antibody tests are increasingly being used by civilian hospitals. The SUDS® Rapid HIV Test (Single Use Diagnostic System for HIV) by Murex Corporation (Norcross, GA) provides results in 15-30 minutes, has sensitivity and specificity similar to EIA, and costs \$6-10 per test kit. The SUDS® Rapid HIV Test is performed on venous serum or plasma and requires a lab with a centrifuge.

Conclusions

HCWs have a small but definite risk for HIV seroconversion through occupational exposure. Four occupational exposures to HIV in the Navy were reported in 1999 [3]. Antiretrovirals are effective in preventing HIV infection after exposure. Even though all sailors and marines are required to have a negative HIV antibody test prior to deployment, sailors and marines place themselves at risk for new HIV infections. There were 71



(continued on page 30)

(continued from page 29)

new HIV infections in sailors and marines in 1999 [4]. If a new HIV infection occurs during a deployment, the recent seroconverter would have a high viral load during the primary HIV syndrome resulting in an increased risk of transmission via occupational exposure and other routes.

Recommendations

The SMOs of aircraft carriers are in ideal positions to develop and implement comprehensive HIV post-exposure prophylaxis programs for their ships. Capabilities to rapidly test source patients with the SUDS® Rapid HIV Test would enhance a PEP program. Antiretrovirals for PEP should be available on the ships. One strategy would be to start a cruise with three 28-day courses of the expanded regimen. One course would include 56 Combivir tablets and 84 Nelfinavir 250-mg tablets or 56 400-mg Indinavir tablets. Arrangements with shore-based MTF pharmacies could be pursued to have the antiretrovirals packaged so that they could be returned to the source pharmacies for later use if the seals on the packages were not broken.

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- 3) Naval Medical Surveillance Report, Vol. 2, No. 4 / Oct - Dec 1999.
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Morbidity Mortality Weekly Report

March 16, 2001 / 50(10);189-190

Notice to Readers: Update on the Supply of Tetanus and Diphtheria Toxoids and of Diphtheria and Tetanus Toxoids and Acellular Pertussis Vaccine

During the last quarter of 2000, the U.S. Public Health Service learned of a shortage of tetanus and diphtheria toxoids (Td) and tetanus toxoid (TT) resulting from decreased production of these vaccines by the two U.S. manufacturers. Previously published recommendations outlined priorities for use of the limited supply of Td and TT (1). The shortage was expected to be resolved by early 2001; however, on January 10, 2001, Wyeth Lederle (Pearl River, New York)* announced it had stopped production of tetanus toxoid-containing products. Although a small amount of Td is produced by the University of Massachusetts for local distribution, Aventis Pasteur (Swiftwater, Pennsylvania) is now the sole nationwide distributor of Td and TT. Aventis Pasteur is shipping limited quantities of vaccine to assure a wide distribution of available doses.

In accordance with previous recommendations, priority will be given to clinics and hospitals that treat acute wounds; continuing to prioritize Td and TT use will be necessary until supplies are restored. Clinics and hospitals in need of vaccine for wound care should call Aventis Pasteur, telephone (800) 822-2463. Aventis Pasteur is increasing the amount of Td production. However, because of the long production time required, the shortage is not expected to be resolved for 12—18 months.

In addition to Wyeth Lederle discontinuing production of its tetanus and diphtheria toxoids and acellular pertussis vaccine (DTaP; ACEL-IMUNE®), Baxter Hyland Immuno Vaccines (formerly North American Vaccine, Inc.) (Baltimore, Maryland) is not producing its DTaP vaccine (Certiva™). Aventis Pasteur and Glaxo SmithKline (Philadelphia, Pennsylvania), producers of Tripedia® and Infanrix™, respectively, are the remaining suppliers of DTaP. On March 7, 2001, the Food and Drug Administration approved a newly formulated version of Tripedia® in one-dose vials without preservative and with only a trace amount of thimerosal. Approval of this vaccine should improve the supply of DTaP.

DTaP vaccine is recommended as a five-dose series: three doses given to infants at ages 2, 4, and 6 months, followed by two booster doses at age 15—18 months and at age 4—6 years. Some vaccine providers may have difficulties obtaining sufficient supplies of DTaP to vaccinate all children in their practices. If providers have insufficient quantities of DTaP, priorities should be given to vaccinating infants with the initial three DTaP doses and, if necessary, to defer the fourth DTaP dose. However, children should be vaccinated with all other recommended vaccines according to the Childhood Immunization Schedule (3)†. When adequate DTaP supplies are available, providers should recall for vaccination all children who did not receive the fourth dose of DTaP. If supplies are sufficient, children aged 4—6 years should be vaccinated in accordance with existing ACIP recommendations to assure immunity to pertussis, diphtheria, and tetanus during the elementary school years. CDC is evaluating the situation, and more guidance will be provided should substantial supply problems occur.

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* Use of trade names and commercial sources is for identification only and does not imply endorsement by CDC or the U.S. Department of Health and Human Services.

† Children traveling to a country where the risk for diphtheria is high should be vaccinated according to the Childhood Immunization Schedule. Travelers may be at substantial risk for exposure to toxigenic strains of *Corynebacterium diphtheriae*, especially with prolonged travel, extensive contact with children, or exposure to poor hygiene. High-risk countries include the following: Africa—Algeria, Egypt, and sub-Saharan Africa; Americas—Brazil, Dominican Republic, Ecuador, and Haiti; Asia/Oceania—Afghanistan, Bangladesh, Cambodia, China, India, Indonesia, Iran, Iraq, Laos, Mongolia, Myanmar, Nepal, Pakistan, Philippines, Syria, Thailand, Turkey, Vietnam, and Yemen; and Europe—Albania and all countries of the former Soviet Union.

ALTERNATIVE MEDICINE: Dietary Supplements & Drug Testing

Use of dietary supplements is not authorized in Naval flight personnel. This information is provided for educational purposes only. For additional information on the risks of dietary supplements, see "Dietary Supplements", The SUSNFS Newsletter, October 2000. Vol XXIV, Number 4, pp. 25-26. Additional information can also be found at <http://www.med1.com>

Thank you for the many email questions and comments that I received after my previous articles regarding dietary supplements. In this issue I will address one of the most common questions that I have received.

Q: Can "legal" supplements cause a sailor to "pop positive" on urinalysis?

A: The short answer is unlikely, but "possible." To my knowledge, routine squadron urinalysis drug screening does not test for dietary supplement use. There have been anecdotal reports of individuals popping positive for amphetamine use after using stimulant-based supplements. These supplements usually contain ephedra alkaloids. (Some popular brands of ephedrine containing supplements include Ripped Fuel, Ultimate Orange, and Metabolife.)

Users of the Nutiva line of supplements (www.nutiva.com) may also test positive on urinalysis. The Nutiva products are manufactured from hempseed and may cause users to "pop positive" for marijuana use.

Since supplements are not regulated like pharmaceuticals, it is hard to know whether a particular batch of a supplement could be contaminated with an illegal substance or an individual was using both an illegal substance and a legal supplement. The command

ing officer must decide how adjudication of sailors who "pop positive" and only claim use of legal supplements should be handled.

One practical approach to handling this at the squadron level is to work with your urinalysis coordinator and ask them to have members report all supplement/vitamin use on the urinalysis sample sheet. Most urinalysis reporting sheets have a place for reporting prescription drugs. Just use the same space to have the sailor document any supplements or vitamins they are using.

This will achieve two things:

1. It can potentially help protect the member if they "pop positive". Since the member could be re-tested with and without the use of the reported supplements to see if the supplement or a possible contaminant caused the positive test.
2. It provides a useful informal snapshot of supplement use and trends in your squadron.

I have found that stimulant supplement use is often high among younger fitness-oriented ground personnel and amongst personnel trying to reduce their weight around the time of PRT weigh-ins. Supplement use is not authorized in naval aircrew, so one would not expect to see many supplements listed by personnel in a flight status. But don't be surprised to find aircrew listing supplements when they pee that they neglected to mention at their last flight physical. There remains widespread confusion about what is and what is not a supplement and what is "banned" for naval aircrew.

I generally tell sailors that if they are not sure whether what they are taking is a supplement or not, they are better off just listing it. It won't hurt to list it (except aircrew, since it is not authorized).



As a personal example, when I don't have time to eat a balanced meal, I will occasionally drink Slim-Fast as a meal replacement. I noticed that after drinking Cappuccino flavor Slim-Fast, my urine smells like coffee. (I'm not joking... you can try it yourself!) So I will write Slim-Fast in the drug space on the urinalysis reporting sheet. Slim-Fast also contains small amounts of zinc, selenium, chromium, manganese, and other minerals and is not regulated like a pharmaceutical, so it could have potential contaminants.

I will try to answer other commonly asked questions in upcoming issues. So keep sending your emails to: paulantony@usa.net

Many of your emails were regarding the Navy aeromedical supplement policy. Some thought the current policy was too restrictive, others not restrictive enough. Although I welcome your comments, aeromedical policy decisions are formulated by the NAMI Aeromedical Advisory Council (AAC). NAMI Code 42 (CDR Jeff Brinker, code428@nomi.med.navy.mil) serves as chair of the AAC and I would encourage you to copy him on any comments regarding aeromedical policy.

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More Alternative Medicine

Causal or Coincidence?

Dietary Supplement Use and Bleeding in Two Patients

"Dietary Supplement" use has been on the rise in the US since Congress passed the Dietary Supplement Health and Education Act (DSHEA) of 1994. That Act restricted the Food and Drug Administration (FDA) from regulating these products (hereafter called supplements) as long the manufacturer labeled and marketed them as such, and made no claims that the product would treat or cure any disease or illness. These products include vitamins, minerals, herbals, hormones, proteins, ergogenic aids, and products that contain combinations of these.

Supplements do not have to be proved safe or efficacious nor do they have to meet set quality control standards before they are marketed as long as manufacturers avoid making the previously stated claims. Manufacturers can state that an herb affects a body structure or function, however. For example, product promotional material and packaging cannot make the claim to treat or prevent benign prostatic hypertrophy, but it can assert promotion of urinary tract health.

In school health professionals receive training in pharmacology and toxicology. Hence, flight surgeons and other physicians are aware that when the intake of a substance results in a physiological effect in the body that is beneficial or therapeutic, that effect isn't necessarily generated in isolation. Other consequential effects of the same or other physiological actions that are also mediated by that substance have potential to be adverse. Like the primary effect, whether these "side" effects manifest clinically depends on such variables as dosage, absorption, metabolism, excretion, interactions, timing and/or factors unique to the individual. These basic principles are characteristic of all substances whether prescription drug, OTC drug, or supplement. If a supplement acts in the body to create a physiological effect, then there are potential adverse consequences to the use of these products, including direct adverse/side effects and physiological interactions with other substances such as other supplements and/or prescription medications. Realistically, the best drug is a substance that exerts a clinically therapeutic effect and subclinical additional effects.

The term “natural” is virtually meaningless, except as a marketing term, when referring to agents that are to be taken internally. There is nothing inherently safe or superior about a substance merely because it was synthesized by a botanical’s manufacturing infrastructure vice a man-made facility. Teleologically speaking, plants and herbs did not evolve for the purpose of providing humans with therapeutic agents to fight disease, though in some well-known, fortunate cases, e.g., digitalis products used in CHF, we have had good fortune.

In many cases, western scientific scrutiny is providing a culturally legitimate reason to look further into the claims of benefit of some herbals and other substances that are categorized under the “supplement” umbrella. But like many prescription and OTC drugs, many of these supplements could prove double-edged swords if not used with appropriate care, that being quite undefined for many of these products.

The following cases illustrate why Flight Surgeons should be aware of the use of supplements by their patients and must consider the possible role of a supplement in their patients’ pathology.

Case Reports:

Case (1): A 37 year old male jet mechanic diagnosed with hypertension and hypertriglyceridemia was started on lisinopril 10mg PO QD. At follow up one month later, the patient exhibited good blood pressure control and reported tolerating the medication well. However, he also reported that he had experienced three episodes of spontaneous epistaxis since starting the medication. Each episode occurred unrelated to physical activity or trauma. In fact, onset had occurred in two instances while he was sitting on his sofa in the evening watching TV. On further questioning he reported that at the same time he started the blood pressure medication he had also started taking a concentrated garlic extract tablet daily to reduce his serum triglyceride level, having been told that it was effective for that purpose by a friend. No other reason for these episodes was uncovered. The patient was instructed to stop taking the garlic extract and follow-up with the flight surgeon right away if the bleeding episodes persisted, otherwise to return for blood pressure follow-up in one month. The patient either chose not, or neglected, to follow up and was lost to follow up due to his transfer to another duty station.

Case (2): A 46yo male civilian contractor aircrewman reported on his annual flight physical in May, a recent diagnosis and successful treatment of ulcerative colitis (UC) by a civilian gastroenterologist. He stated that he started having episodes of abdominal pain and bloody diarrhea the previous Thanksgiving holiday weekend and these episodes led him to seek the medical attention that ultimately resulted in the UC diagnosis. He stated that he had never previously had bloody diarrhea and the only prior abdominal pain he had experienced was associated with consuming dairy products and resolved when he limited his diet of these. The diagnosis of UC was made with a barium enema showing the classic “cobblestone” appearance characteristic of the condition and colonoscopy. He was started on mesalamine in January and by early February his abdominal pain and bloody diarrhea had completely resolved.

Having diligently listened to a safety standdown presentation on Dietary Supplements by the author the day prior to his flight physical, the patient reported that he had started taking a daily combination regimen of garlic, vitamin E and ginkgo biloba in August or September preceding the Thanksgiving onset of bloody diarrhea. Coincident with his January UC diagnosis and initiation of mesalamine treatment, he had stopped taking the supplements. He had not resumed taking the supplements up to the time of the exam and had had no recurrence.



Discussion:

A search of 'the literature' reveals that garlic, ginkgo biloba and vitamin E have each been reported to reduce the effectiveness of the coagulation cascade under certain conditions. Most of the concern has been directed toward those individuals who have coagulation deficiencies, chronic illness or are on anticoagulation therapy. Consider the following excerpts:

"Since garlic reduces blood-clotting time, persons taking aspirin or other anticoagulant drugs should avoid eating large amounts."⁽¹⁾

"Vitamin E prolongs bleeding time and should not be used by anyone on anticoagulant medication or with bleeding problems. Those taking aspirin should consult their physician before taking large dosages of vitamin E."⁽²⁾ And, "people using large doses of vitamin E, aspirin or blood thinning medication should inform their physician before using ginkgo because of possible prolonged bleeding time and increased risk of hemorrhage."⁽³⁾

In a study of mice treated with ginkgo to investigate its possible neuroprotective effects in treating ischemic stroke the authors said of the herbal, "Ginkgo biloba reduced stroke infarct volume by 35%, but very high doses appeared to be associated with greater risk of intracerebral hemorrhage."⁽⁴⁾ Other authors have stated, "Ginkgo ... inhibits platelet aggregation, increases prostacyclin synthesis, and antagonizes platelet-activating factor (PAF). This results in prolonged bleeding time. There have been case reports of spontaneous subarachnoid hemorrhages in persons using ginkgo. Patients on blood thinners of any kind (Coumadin or ASA) should not use ginkgo biloba."⁽⁵⁾

The effects of a standardized *Ginkgo biloba* extract (GBE) center on its active constituents: ginkgo flavone glycosides (bioflavonoids) and the terpene lactones (ginkgolides and bilobalide). The bioflavonoids are primarily responsible for GBE's antioxidant activity and its ability to inhibit platelet aggregation. The terpene lactones improve circulation and also inhibit platelet-activating factors. The 3 primary actions of GBE on the cardiovascular system include: (a) anti-ischemic action and relief of arteriolar spasm; (b) counteracting platelet and erythrocyte hyperaggregability; and (c) allowing for better glucose and oxygen uptake under ischemic conditions, thereby stimulating aerobic glycolysis and promoting lactate clearance.⁽¹⁾

Do these cases suggest that garlic in the first instance, and the combination of garlic, vitamin E and ginkgo biloba in the second, caused the bleeding experienced by these two patients? It would certainly be a stretch to say that in either of these cases the dietary supplements in question 'caused' the medical condition. Spontaneous epistaxis does occur even in individuals with apparently normal coagulation systems, and the diagnosis of UC seemed well supported by the radiological and endoscopic findings. The pathophysiology of UC, however, remains largely undefined, and while not unheard of, initial onset of the condition would be unusual by the 5th decade, especially given the chronic nature of the disease.⁽⁷⁾

Both of these cases demonstrate a temporal association between the initiation of use of a supplement, or combination of supplements, and bleeding. In case (1), the fact that the patient did not return to the Flight Surgeon for follow up suggests, but does not demonstrate





that cessation of the supplement (garlic) resulted in resolution of the bleeding. In case (2), cessation of supplement use (garlic, vitamin E and ginkgo biloba) was temporally associated with resolution of the symptoms, but the concomitant treatment with mesalamine confounds attributing resolution of the symptoms to discontinuing the supplements.

How much do we attribute the associations seen here to a causal relationship? It seems a useful mental exercise to think of these cases in a framework of the Guidelines for Evaluating the Evidence of a Causal Relationship as set forth by Gordis.⁽⁶⁾ These guidelines apply to population-based statistical associations, and their use would not be supportable for the analysis of a single anecdotal case that arose in uncontrolled conditions with many possible unidentified confounding factors, but it raises food for thought. Not all guidelines will be addressed here.

Temporal relationship: Is there a temporal relationship of the exposure with the condition? Yes, in both cases.

Biological plausibility: one could certainly theorize a plausible physiologic mechanism for a component of the agent to interfere with components of coagulation.

Alternative explanations (confounding): There are many unknowns in both cases. Known confounders include the use of Lisinopril coincident with starting garlic extract in case (1), and the use of mesalamine coincident with discontinuing the garlic, vitamin E and ginkgo in case (2). Additionally confounding is the combination of supplements in case (2).

Dose-response relationship: Unknown, in these cases.

Strength of the association: (normally measured by relative risk or odds ratio, since there is no statistical analysis here, this cannot be addressed).

Cessation of exposure is associated with resolution of the condition: In case (1) suggested, but not confirmed. In case (2), yes (but don't forget confounding).

In case (1) the flight surgeon was aware of the reported anticoagulation effects of garlic and when a careful history revealed no other likely causes of the patient's nose bleeds it seemed reasonable to instruct the patient to stop the supplement and see whether the bleeds resolved. Unfortunately, the patient did not return for follow up and that bit of data was lost. In case (2) the revelation by the aircrewman that he had used the supplements listed above was facilitated by the flight surgeon's proactive approach to communicating the aeromedical issues inherent in the use of supplements with his patients.

The author has submitted these cases to generate further questions and discussion around the issue of dietary supplements and their potential to cause adverse results when used without well-supported guidance.





The definitional lines between that which comprises food, supplements and drugs are rapidly becoming blurred. By definition supplements are not drugs, but probably ought to be viewed as such when one seeks to use them under certain conditions.

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PRIMARY SPONTANEOUS PNEUMOTHORAX A Flight Surgeon Perspective

There is nothing like the experience of becoming a patient to get a flight surgeon back into the books. In the following paragraphs I will present spontaneous pneumothorax from the perspective of both the patient and the provider. My own experience and opinions are presented in italics.

Pneumothorax may be classified as spontaneous (absence of obvious precipitating factors), traumatic, or iatrogenic. Spontaneous pneumothorax may be further sub-divided into primary and secondary based on the absence or presence of preexisting lung disease, respectively. Iatrogenic pneumothorax is a complication of diagnostic or therapeutic interventions. Traumatic pneumothorax is a result of blunt or penetrating trauma to the chest with air entering the pleural space directly from the outside, through visceral pleural penetration, or by alveolar rupture. Due to the young age and overall good health of our population, this article will focus mainly on primary spontaneous pneumothorax.

EPIDEMIOLOGY

Primary spontaneous pneumothorax (PSP) is relatively common with an incidence of up to 18 cases per 100,000 population per year among men. The incidence is approximately one-third as high among women. The typical patient profile is a tall, thin male between the ages of 10 and 30. Over 90% of patients are under the age of 40 at first onset. Smoking is recognized as an independent risk factor for PSP. *At the time of diagnosis I was a 29 year old non-smoker without significant past medical history or family history. However at 6'5" and 220 lbs, if there had been a category in high school for "Most Likely to Get a Spontaneous Pneumothorax," I probably would have won it.*

PATHOPHYSIOLOGY

Although by definition patients with PSP do not have clinically apparent lung disease, subpleural apical bullae are found in 80-90% of patients on CT scan and in an even greater percentage of patients who go on to surgery. The mechanism of bulla formation remains unclear, though neutrophil and macrophage-mediated degradation of elastic fibers (as occurs commonly in smok-

ers) may be an important early event.

A significant pneumothorax will decrease vital capacity and increase the alveolar-arterial oxygen gradient resulting in a variable level of hypoxemia due to shunting. Since basic lung function is normal, hypercapnea does not develop in these patients.

PRESENTATION

It might seem intuitive that activity would precipitate PSP in a susceptible individual. However, approximately 90% of episodes of PSP occur while the patient is at rest. In the remaining 10%, there is no evidence that the activity had any relationship to the event. Virtually all patients complain of acute onset of ipsilateral pleuritic chest pain or dyspnea. Pain severity is highly variable but will usually resolve within 24 hours even without treatment.

Physical exam findings are also variable depending on the size of the pneumothorax, and patients with a small pneumothorax may have a normal exam. Tachycardia is the most common finding, though a large pneumothorax can be accompanied by decreased chest wall movement, hyperresonance to percussion, and decreased breath sounds on the affected side. Significant tachycardia, hypotension, or cyanosis should arouse suspicion for tension pneumothorax. ABG may show increased A-a gradient and respiratory alkalosis.

In my experience, the pain of PSP is a deep ache in the anterior chest centered just below the ipsilateral clavicle. As someone who had never felt "pleuritic" chest pain before, I initially thought I might be suffering from costochondritis. The discomfort began while I was at rest and was surprisingly mild and fleeting, lasting approximately five minutes. There was no concomitant dyspnea. The mild symptoms and probably a little denial delayed diagnosis for about 12 hours, and it was only in retrospect that I identified the time of onset of the symptoms. By the time I presented to the hospital I was virtually asymptomatic and still holding tickets for a flight to Central America the following day. (I did not end up going.)

DIAGNOSIS

The diagnosis of PSP is suggested by a consistent history coupled with the characteristic finding of

a thin pleural line displaced from the chest wall on a posterior-anterior chest radiograph. Standard chest radiographs are notoriously unreliable for estimating the size of a pneumothorax within the hemithorax and for identifying subpleural blebs. In the literature, the size of a pneumothorax has been described as the percentage of the hemithorax occupied by intrapleural air or by the distance from the thoracic cupola to the ipsilateral lung apex. A small pneumothorax may be defined as occupying 15 percent or less of the hemithorax or a distance of 3 centimeters or less from the thoracic cupola to lung apex, depending upon which system is used. If a pneumothorax is suspected but the chest x-ray is negative, ask the technician to perform an end-expiratory PA chest x-ray. This accentuates the relative volume of the pneumo relative to the size of the hemithorax and will often clearly demonstrate an occult pneumo that is not apparent on the standard chest film taken at full-inspiration.

Although CT is excellent for defining pneumothorax margins as well as finding even small subpleural blebs, routine use is not yet supported for diagnosis or to stratify the patient according to recurrence risk. This will be discussed in more detail later. *On presentation in the emergency room I was essentially asymptomatic and had normal vital signs and peak flow. Pulse oximetry showed on oxygen saturation of 99% on room air. Chest radiograph showed a right-sided pneumothorax estimated to be approximately 30-40% of the hemithorax. According to the treating physicians, decreased breath sounds and hyperresonance were present on the affected side.*

RECURRENCE

Reports of recurrence rates following the initial episode of PSP vary widely from 5 to 60% with an average of 30%. The majority of recurrences fall within one year of the initial episode. The rate of recurrence decreases with time, and approximates that of the general population after 5 years. However, recurrence rates increase dramatically after the first recurrence, approaching 80% after the second recurrence. Aesthetic habitus, smoking, and young age of onset have all been identified as independent risk factors for recurrence. Surprisingly, the presence or absence of bullae on CT scan has not yet been shown to influence recurrence rates. However, this area is ripe for investigation and may affect treatment decisions in the future. The deci

sion to perform CT should therefore be individualized to the patient and institution.

TREATMENT

Pneumothorax management consists of evacuating air from the pleural space and recurrence prevention. Practices vary considerably, and may often have more

to do with the capabilities of the treatment facility or background of the treating physician (i.e. pulmonary specialist vs. thoracic surgeon) than on overwhelming scientific evidence. Therapeutic decisions must therefore be based upon the clinical situation, the capabilities of the treating physician and facility, patient preference, and operational considerations. Treatment options, from least invasive to most invasive, include observation with or without oxygen; aspiration with a catheter with subsequent removal; chest tube insertion; pleurodesis; single-port thoracoscopy; video-assisted thoracoscopic surgery (VATS); and limited thoracotomy. Selection of the appropriate option depends on pneumothorax size, symptom severity, and whether a persistent air leak is present.

REEXPANSION WITHOUT RECURRENCE PREVENTION

Reabsorption of air by the pleura occurs at a rate of up to 2% per day in patients breathing room air. Supplemental oxygen increases the rate of absorption by a factor of four. Stable, reliable patients with small pneumothoraces may be observed for 6 hours and discharged with follow-up within 48 hours if repeat chest radiograph excludes progression. Progressive pneumothoraces should be aspirated or treated with chest tube insertion. Older age and increased pneumothorax size both decrease the success rate of aspiration, which is around 70%.

Stable patients with large pneumothoraces should undergo a procedure to expand the lung with a small bore (<14F) or moderate bore (16-22F) chest tube attached to either a Heimlich valve or water seal with or without suction. Heimlich valves have the added benefit of allowing easy ambulation. Application of suction through a water seal device has not been shown to improve outcome, and may be reserved for patients in whom Heimlich valves fail or in those who would not

tolerate a recurrent pneumothorax well. Chest tube drainage has a high success rate (approximately 90%) but is also accompanied by increased pain and risk of pleural infection, hemorrhage, and reexpansion pulmonary edema. Patients with persistent air leak of 4 days or more usually require surgery.

INTERVENTIONS WITH RECURRENCE PREVENTION

Following chest tube insertion, sclerosing agents such as doxycycline and talc may be instilled to promote pleural adhesion, with a recurrence rate of approximately 8 to 25% following the procedure. Talc use has aroused concern due to reports of lung injury and respiratory failure. Other procedures allow direct visualization of the pleura. Thoracoscopy using a single port allows resection of small apical bullae and mechanical or chemical pleurodesis, and may be converted to a more extensive procedure as necessary. This procedure has a recurrence rate of approximately 5 to 9%. VATS and limited thoracotomy allow wider visualization of the pleural space and for greater detection of apical bullae. These procedures have recurrence rates of 2 to 14% and 0 to 7%, respectively. Hospital stay and post-operative pain are reported to be less with the VATS procedure than with thoracotomy, though thoracotomy is the standard for apical bulla detection and resection. Under normal circumstances, most physicians recommend interventions to prevent recurrence after the second episode.

Following a diagnosis of primary spontaneous pneumothorax occupying approximately 30% of the right hemithorax, a general surgeon placed a moderate bore chest tube attached to a water seal device. Prior to the procedure, I informed the surgeon that since this was by no means an emergency procure, there was no reason to spare the versed and fentanyl. Fortunately he agreed. I should mention that the procedure does not need to be an episode of unbridled writhing and screaming. Mild sedation combined with liberal use of local anesthetic (approximately 60cc) including, as the surgeon described, "lifting the parietal pleura off the chest wall with lidocaine," made the procedure quite tolerable. Suction was maintained for two days without a detectable air leak. The tube was maintained on water seal for additional day, and then clamped for

another 24 hours. With a good chest radiograph, the chest tube was removed on day four. Let me tell you that having a chest tube is no fun. It is extremely painful, making it difficult to sleep. The nausea associated with the narcotic pain medicines also made it difficult to eat. Having the tube attached to suction limits you to a small radius around your bed, decreasing morale and increasing the chance for venous stasis. For uncomplicated cases of PSP, I am definitely an advocate of the most conservative treatment possible at first. Larger bore chest tubes and wall suction should be reserved for unstable patients or those who do not respond to early measures.

AEROMEDICAL CONSIDERATIONS

Pneumothorax can result in dyspnea and acute chest pain, worsening with greater altitude and the concomitant decrease in ambient pressure. Tension pneumothorax can result in hypoxia and cardiovascular compromise. Spontaneous pneumothorax requires a waiver, while traumatic and procedure-related pneumothorax are not considered disqualifying one year after occurrence. Designated personnel treated with aspiration or chest tube reinflation only are eligible for waiver after one year with normal PFT and chest radiograph. Applicants are eligible for waiver after three years. Grounding periods are reduced to three and six months, respectively, following chemical or mechanical pleurodesis. More detailed information is available in the Waiver Guide.

The very nature of PSP makes it difficult psychologically for the patient, with an unpredictable onset and no apparent cause and effect relationship. Immediately following the event, every cough or sneeze is accompanied by feelings of dread. For this reason, early surgical intervention is attractive for the patient from the point of view of taking positive control of the situation. For aviators and divers, early surgical intervention may be necessary due to the high risk associated with pneumothorax while engaged in these activities. However, I opted for reinflation only without pleurodesis or surgery. For me, the average recurrence rate of 30% meant that there was a 70% chance that nothing more would ever have to be done. I assessed my personal risk for recurrence as relatively low with

a later age of onset and absence of bullae in either lung on CT scan. Despite the lack of definitive evidence that CT findings are useful for risk stratification, I was reassured that there were no bullae in either lung since PSP carries a 10% risk of PSP on the contralateral side.

Chemical pleurodesis through the chest tube was not an attractive option to me for two reasons. First, the recurrence rate can be up to 25% following the procedure. Second I felt that a surgical procedure, if required, would be technically more difficult following chemical pleurodesis. VATS is a relatively new procedure but appears to have relatively low associated recurrence rates and low morbidity. As noted above, early surgical intervention should be strongly considered for your jet jocks and divers after a first episode of PSP.

FUTURE DIRECTIONS

Much variation exists in therapeutic interventions for PSP. Improvements in surgical technique and identifying better chemical agents for pleurodesis will certainly modify practices in the future. Much work needs to be done to improve risk stratification of patients. CT scanning does offer promise and may have a role in selecting patients for early surgical intervention or bilateral procedures.

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