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COVER: A diver descends into the "wet pot" at the Naval Medical Research Institute in Bethesda, MD, as scientists investigate the effects of warm water diving. What they learned directly influenced diving operations during the Gulf War. Story on page 23. Photo courtesy Naval Medical Research Institute.

Emphasis: Health Promotion

Last year a major focus for the Navy and the nation was on health promotion and healthy lifestyles. What we eat, whether or not we smoke or use tobacco products, how much we drink, and what we do for recreation—activities that have always been individual choices—are rapidly taking on more far-reaching implications. It is becoming increasingly apparent that our decisions in these areas affect our health and quality of life, and, as a result, also impact on the nation's health care crisis. More and more organizations, we among them, are looking toward health promotion and preventive medicine as one way to help curb escalating costs and demands on an already overburdened system.

The military has an advantage over our civilian counterparts, since our beneficiary population is mostly healthy. We must press this advantage and keep them that way. At the beginning of this year I signed out BUMED Instruction 6110.13 establishing our Health Promotion Program. The instruction presents the goal of health promotion as preventing avoidable illness and injury and its task as reducing the impact of disease and injury on the population by eliminating individuals' exposure to the risk factors for illness.

Our new instruction formalizes and requires what most of our facilities are already doing: providing beneficiaries with the information and resources they need to maintain a healthy lifestyle. This instruction tasks commanders, commanding officers, and officers in charge with appointing a health promotion program officer to coordinate and provide an integrated health promotion program designed to reduce morbidity, decrease disability, and decrease mortality due to specific disease or injury risks in defined populations.

Seven areas especially targeted for attention are: physical fitness and sports, tobacco use prevention and cessation, substance abuse prevention, back injury prevention, stress management, hypertension, and nutrition.

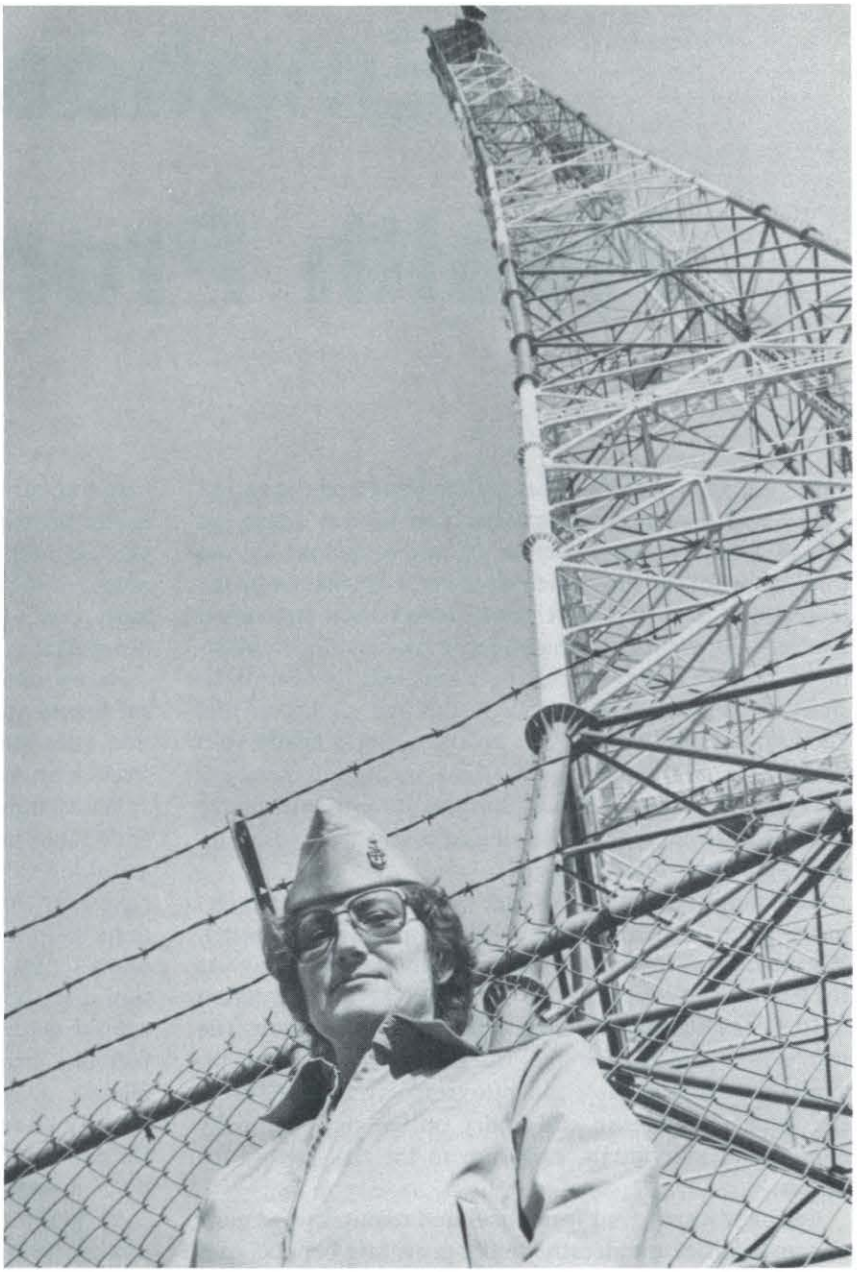
With many mandated programs and limited resources, commands need to know which areas to emphasize if they are going to maximize their health promotion efforts. We have been actively working to help each command determine its specific health promotion needs and will continue to do so. By giving health promotion programs the attention and support they deserve, we can fulfill our role as subject matter expert, guiding light, and role model as we facilitate health promotion programs within line commands.

Navy leadership is committed to continually improving the quality of life for its members and their families. Health plays a vital part in a person's quality of life, and Navy medicine must take an aggressive and active role in promoting health.

CHARLIE GOLF ONE.

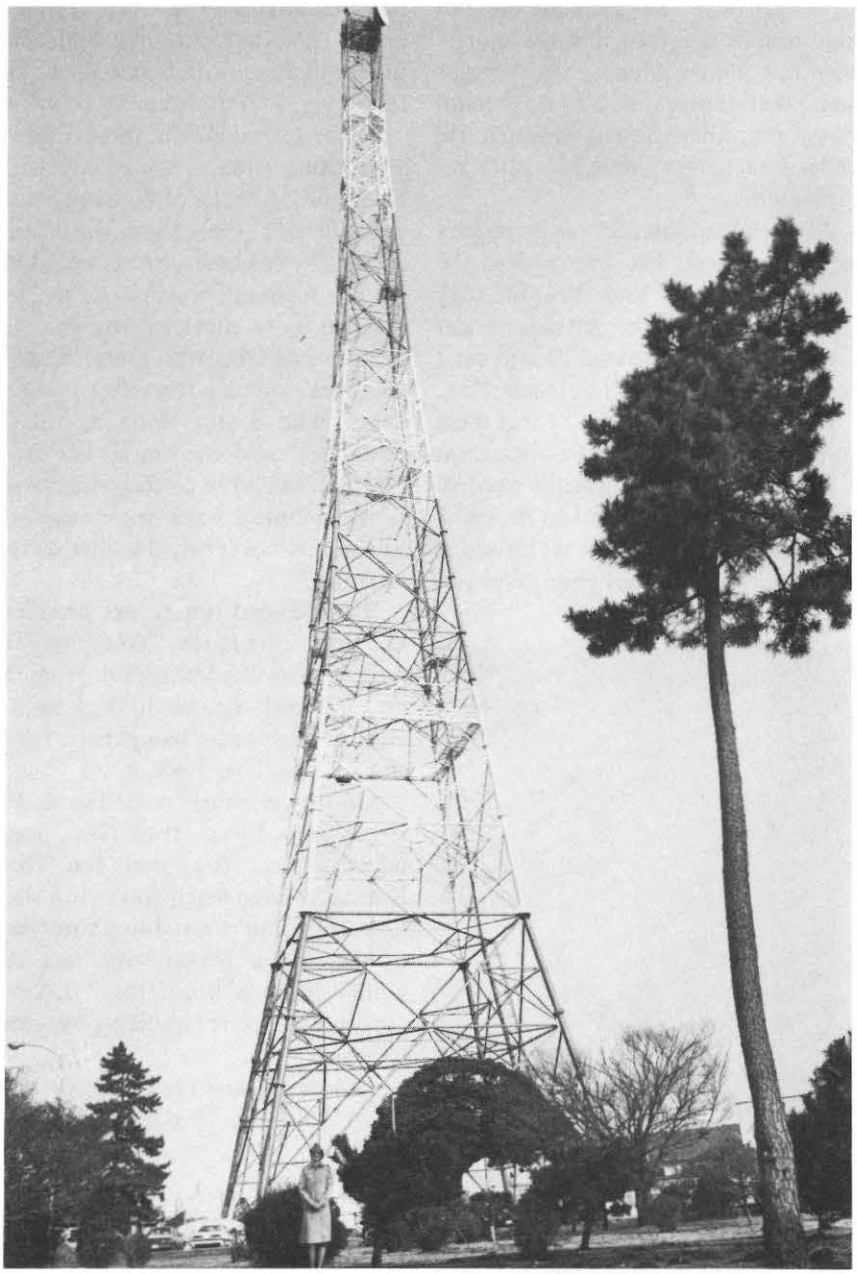
VADM Donald F. Hagen, MC

Corpsman Climbs 300 Feet in Daring Rescue



HMCS Lee and the radio tower she ascended.

Picture the Super Dome, or any pro football field: 100 yards long—300 feet. Now, imagine this distance straight up in the air. That is how far the independent duty corpsman of U.S. Naval Hospital Yokosuka, Japan, had to climb to



provide medical assessment and assistance to a member of the Air Force's 1849th Electrical Installation Squadron.

SGT Tracy D. Brown, leading his highly specialized team, was dismantling a microwave tower at the Naval Radio Transmitting Facility, Totsuka, Japan, on 22 Oct 1991, when the tactical crane rigging used for lowering sections of the tower collapsed. The broken section smashed into Brown, fracturing his shoulder, breaking one of his ribs, and inflicting numerous other bruises and abrasions.

HMCS Esther Lee was on duty at the one-person Totsuka Naval Branch Medical Clinic when the phone call came in: "Doc, we need you.... Somebody is hurt and trapped on the tower," said an excited voice. Lee grabbed the rescue bag and headed to the mammoth tower. "You just mentally start a checklist of things you need to know," said Lee. "Was he [the victim] knocked unconscious? Is he unconscious now? Is there active bleeding? Generally, is he 'safe?'"

When Lee got to the tower she used binoculars to see the patient, but was unable to make a good assessment from the ground. "That's when I made the decision to climb the tower."

Was she afraid of heights? "That's the first question [the command master chief] asked me. I didn't know, but that wasn't a consideration," she said. "Don't misunderstand, I did not want to climb the tower. But I was not comfortable staying on the ground, not knowing what kind of shape he was in."

Lee was fitted with a climbing belt and briefed on climbing the tower. At all times, safety was stressed. Indeed, because of the patient's harness and his coworkers' methodically careful procedures, further injury was prevented.

After the brief, she began her ascent. "I never looked up. Looking down was not a problem, but I never looked up because I didn't want to see how much farther I had to go," said Lee. She will

never forget the feel of the wind and the view, looking down on 10-story buildings. "You can see a long way from up there. You can see all over."

When she reached the platform near the patient, she quickly attached her safety strap and remained hooked up the whole time. She tried to keep the patient talking, making sure he was not too "shocky," and to establish his level of consciousness. As part of the assessment, she used a knife to cut open his shirt, checked for open fractures and active bleeding, and did as good and as thorough an evaluation as was possible.

"He was doing very well, maintaining his calm, but he was in extreme pain, and it would have been impossible for him to climb down," she said. Based on her assessment, Lee decided to bring up a Stokes litter (combat-style stretcher) by drawline and have the patient lowered by pulley.

Because the platform was so small, the litter was propped up and Brown was backed into it from a standing position. Lee immobilized him, strapping him in securely, and put a cervical collar on him. She started her descent to meet the patient and "basically, to get out of the way."

She and the ambulance crew from the Atsugi Naval Branch Medical Clinic made a thorough second assessment of Brown. The crew took his vital signs and determined that his injuries were not life threatening. Brown was then taken to the U.S. Naval Hospital Yokosuka, where he was admitted. He underwent surgery and has since recuperated.

After the ambulance was on its way to the hospital, Lee returned to the tower, looked up and thought, "My God, I was up there! Afterward was the shaky time," she said. "I still can't believe I climbed up that tower."

Lee said later, "I'm glad I was there and I'm glad I could be of assistance at a time when I was greatly needed. Every time you go through EMT (emergency medicine technician) training, in the back of your mind you think, 'I hope I never have to use this. I hope I never have to be in this kind of situation.'"

She tells junior corpsmen, "If you're lucky, you'll spend your whole time in the Navy without rendering life-saving support to anyone, but you must be prepared . . . and, I would add, maintain personal physical readiness." She credits her daily running and active fitness regimen with helping her climb the tower with a minimum of effort.

"After I came down, three different guys came over to shake my hand. They said, 'Jeez, Doc! We can't believe you did it.'" That night she headed down to Yokosuka to bowl in the weekly hospital bowling league and stopped by to check on Brown.

Lee visited Brown several times in the week immediately after the accident. "She didn't think about the obstacles," said Brown, as Lee stood by. "She has more courage than some of the people I work with, especially since she is not certified to do that type of work."

"I've decided not to get certified," Lee said with a laugh. "You're certified now," Brown commented from his hospital bed. Brown looked up and added, "Thanks for being there. I don't think I would've made it. . . ."

Military members—Air Force, Marine, Army, Navy—trust Navy hospital corpsmen. They trust the "Doc." Lee said, "Even when you're in a situation when you're not doing something overtly for a person, the fact that you're there is a comfort." Like all corpsmen, Lee is "standing by, ready to assist." □

—Story and photos by Bill Doughty, Public Affairs Officer, U.S. Naval Hospital Yokosuka, Japan.

HMCS Lee visits SGT Brown at U.S. Naval Hospital Yokosuka.

Personnel control and monitor conditions inside the hyperbaric chamber.

NAMI Saves Bends Victim

"After the first treatment, I literally felt we saved his life," said HMCM(DV) Wayne Shurtz, Naval Aerospace Medical Institute's (NAMI's) senior diving medical technician. HMCM(DV) Shurtz was referring to a recent case of decompression sickness (DCS), or the "bends" that had been successfully treated in NAMI's recompression chamber.

DCS is caused by the formation of inert gas bubbles, usually nitrogen, within the body's tissues. Rapid lowering of ambient pressure, such as during ascent in flying or diving, leads to an increase in dissolved nitrogen reaching a threshold level and appearing as bubbles. A recompression chamber is a steel vessel where the internal pressure can be increased in equivalent feet of sea water (FSW) or pounds per square inch causing the bubbles to be recompressed.

The patient, a retired Navy lieutenant commander, was brought to NAMI on a Saturday afternoon after he had been doing a series of recreational dives in the Gulf. "Immediately after his last dive, he noticed he had difficulty with balance," said HMC(DV) Don Ortiz, a NAMI diving medical technician. "He was standing in the back of the boat, and fell unconscious into the water," continued HMC(DV) Ortiz. His companions, one of whom is a practicing Pensacola physician, quickly pulled him out. Recognizing the seriousness of his condition, they contacted the Coast Guard by radio and under the guidance of the Coast Guard they sailed for shore. Upon reaching shore, a patrol craft and medical personnel administered medical treatment. Simultaneously, NAMI was contacted and after an on scene evaluation by Dr. Stephen O'Connell, NAMI's Duty Hyperbarics Medicine Advisor, the patient received treatment in the NAMI's recompression chamber.

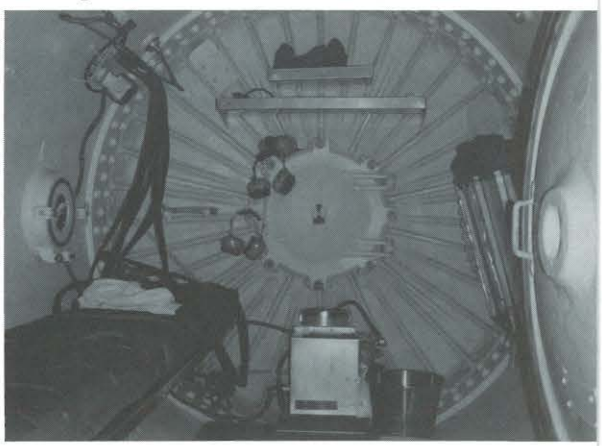
"It was an actual case of life or death," said HMCM(DV) Shurtz. "If he hadn't gotten to us in time, he could have died. The first treatment was done to squeeze or recompress 'the bubbles,'" added HMCM(DV) Shurtz. Squeezing the bubbles is accomplished by bringing the patient to 165 FSW for 30 minutes in the chamber, and then by putting him on 100 percent oxygen at 60 FSW for 4 or more hours. "Some significant progress was made after the first treatment," HMCM(DV) Shurtz replied, "but the patient still had a great deal of leg weakness and numbness, indicating extensive spinal nerve damage," he continued. To treat the nerve damage, the NAMI hyperbaric medical team, with the assistance of divers from both the Naval Air Station Port Operations and the Naval Aviation School Command Training Tank One, conducted 10 additional similar treatments, exposing the patient to higher concentrations of oxygen than would be possible breathing 100 percent at sea level. Following nearly 10 days of treatment, HMCM(DV) Shurtz said the patient was functioning at about "99 percent capability."

This is truly a success story for NAMI, which trains thousands of aviators and air crew personnel each year. NAMI's primary mission regarding the hyperbaric system is to support physiology training, operational flying, and Navy diving operations. However, military members, their dependents, and retirees suffering from DCS and air gas embolism as a result of sport diving may be brought to the recompression chamber for treatment also. In life- and limb-threatening situations, other members of the public sector may receive treatment. Before receiving treatment, potential civilian patients are evaluated to determine the bona fide nature of the emergency.

Qualified Navy divers and diving medical personnel comprise the staff for the recompression chamber. Geographically, the NAMI recompression chamber is the only such facility from Mobile, AL, to Panama City, FL, capable of treating DCS or embolism resulting from diving. □

—Story by Claudia Lee, Naval Aerospace Medical Institute, Pensacola, FL 32508.

A view inside the chamber following a treatment session shows the built-in breathing system hoses and masks, hearing protection, and fire retardant bedding.



Features

What's a NAMRID?

CDR Richard L. Buck, MC, USN
LCDR James T. Need, MSC, USN

Eight years have elapsed since the establishment of the Naval Medical Research Institute Detachment (NAMRID) in Lima, Peru. (See *Navy Medicine,* July-August 1984.) NAMRID, a component of Naval Medical Research Institute, Bethesda, MD, functions under the auspices of the Naval Medical Research and Development Command and is the only U.S. Navy research facility operating in South America. The result of an outstanding cooperative relationship between the U.S. Navy and the Peruvian Navy, NAMRID has also established itself as an important asset to the U.S. Embassy in Peru, and the Peruvian Armed Forces and civilian community. Dedicated to conducting research to assess the medical threats posed by infectious disease to military and civilian personnel in Peru, NAMRID was born into and is still serving a unique role.

When first established, NAMRID consisted of a single room in the major Peruvian Navy Hospital, "Centro Medico Naval," and was manned by five U.S. Navy personnel. NAMRID now consists of two separate laboratories: the main facility in Lima consisting of two modern structures of 32,938 square feet and a supporting laboratory in Iquitos, at the headwaters of the Amazon River. Presently, the staff includes 11 U.S. Navy scientists and administrative staff and more than 50 Peruvian scientists, military physicians, and technicians.

Peru is an ideal location to carry out infectious disease research since jun-

Top left: **NAMRID's microbiology lab.**
Left: **Mr. Irving Phillips, virologist discusses retroviruses in NAMRID's virology lab.**

NAMRID Publications 1984-1991

(Grouped According to Subject Area)

Medical Entomology

Effectiveness of permethrin-treated military uniform fabric against human body lice. Sholdt et al. *Milit Med.* 1989;154(2):90-93.

Lyme disease in South America? Need & Escamilla. *J Infect Dis.* 1991;163(3):681-682.

Annotated list of ticks (Acari: Ixodidae, Argasidae) reported in Peru: distribution, hosts, and bibliography. Need et al. *J Med Entomol.* 1991;28(5):590-597.

Microbiology

Spurious sulfamethoxazole-trimethoprim resistance of *Salmonella typhi.* Escamilla et al. *J Clin Microbiol.* 1986;23(1):205-206.

Evaluation of blood clot cultures for isolation of *Salmonella typhi, S. paratyphi-A,* and *Brucella melitensis.* Escamilla et al. *J Clin Microbiol.* 1986;24(3):388-390.

Urine and Faecal IgA response during natural acquired infection with *Campylobacter jejuni.* Lane et al. *Lancet.* 1987:1141.

Penicillinase-producing *Neisseria gonorrhoeae* in various seaport cities of Latin America. Escamilla et al. *Sex Transm Dis.* 1988;15(3):141-143.

Nontoxigenic 01 *Vibrio cholerae* in Peru: a report of two cases associated with diarrhea. Batchelor & Wignall. *Diag Microbiol Infect Dis.* 1988;10:135-138.

Estudio sobre portadores cronicos de salmonellas en manipuladores de alimentos de la ciudad de Iquitos. Rojas Garcia et al., 1988.

Alkaline phosphatase-conjugated oligonucleotide probes for enterotoxigenic *Escherichia coli* in travelers to South America and West Africa. Oprandy et al. *J Clin Microbiol.* 1988;26(1):92-95.

Aeromonas: studies of invasiveness in the modified removable intestinal tie adult rabbit diarrhea (Ritard) model. Pazzaglia et al. *Adv Res Cholera Rel Dis.* In press.

Diarrhea and intestinal invasiveness of *Aeromonas* strains in the removeable intestinal tie rabbit model. Pazzaglia et al. *Infect Immun.* 1990;58(6)1924-1931.

Campylobacter jejuni versus *E. coli* in developing countries: How accurate are prevalence estimates? Pazzaglia et al. *J Infect Dis.* 1990;162:570.

Transient intestinal colonization by multiple phenotypes of *Aeromonas* species during the first week of life. Pazzaglia et al. *J Clin Microbiol.* 1990;28(8):1842-1846.

Etiology of diarrhea among American adults living in Peru. Pazzaglia et al. *Milit Med.* 1991;156(9):484-487.

Etiology of childhood diarrhea in northern coastal Peru. Pazzaglia et al. *Milit Med.* In press.

Hospital case-control study of *Aeromonas*-associated diarrhea in Peruvian infants: high frequency of co-infecting enteropathogens. Pazzaglia et al. *J Clin Microbiol.* 1991;29(6)1151-1156.

Paratyphoid fever outbreak in Peruvian Navy personnel. Pazzaglia et al. *PAHO Bull.* In press.

Parasitology

Parasitosis intestinales identificadas mediante examen de heces en tres grupos de poblacion del Peru. Kilpatrick et al. *Bol Sanit Panam.* 1986;100(4):412-416.

An epidemic of oroya fever in the Peruvian Andes. Gray et al. *Am J Trop Med Hyg.* 1990;42(3):215-221.

Diffuse cutaneous leishmaniasis acquired in Peru. Franke et al. *Am J Trop Med Hyg.* 1990;43(3):260-264.

Efficacy and Toxicity of sodium stibogluconate (pentostam) in the treatment of Peruvian mucosal leishmaniasis. Franke et al. *Ann Intern Med.* 1990;113(12):934-940.

Dermatobia hominis en caruncula ocular: reporte de un caso en Iquitos, Peru. Seminario & Colan. *Diagnostico.* 1991;26(6-5):95-96.

Global distribution of a variant of the circumsporozoite gene of *Plasmodium vivax.* Kain et al. *J Infect Dis.* 1991;99(7):208-210.

Antibody response of humans to the circumsporozoite protein of *Plasmodium vivax.* Franke et al. *Infect Immun.* 1991;59(8):2836-2838.

Malaria por *P. falciparum* en madre de dios. Gonzales et al. *Diagnostico.* In press.

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Prevalence of antibody to the variant repeat of the circumsporozoite protein of *Plasmodium vivax* in Peru. Franke et al. *Am J Trop Med Hyg.* In press.

Virology

Hepatitis A in children. Kilpatrick & Escamilla. *Am J Epidemiol.* 1984;124(1):111-113.

Marcadores serologicos de hepatitis viral B en pacientes drogadictos del hospital Hermilio Valdizan. Faran et al. *Psicoactiva.* 1989;3(1):61-74.

Factores de riesgo para infeccion por virus de hepatitis B en personal hospitalario. Llanos et al. *Rev Gastroent Peru.* 1990;9:24-28.

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HTLV-1 coinfection in a HIV-1-infected Peruvian population. Phillips et al. *J Acquired Immune Def Syndromes.* 1991;4(3):301-302.

Dengue epidemic: Peru, 1990. Colan et al. *Morb Mort Wkly Rep.* 1991;40(9):145-147.

Investigacion operacional de prevencion del SIDA en prostitutas del Callao, Lima-Peru, 1988-89. Alarcon et al. *Rev Peru Epidemiol.* 1991;4(1):16-25.

Comportamiento sexual y seroprevalencia del virus de la immunodeficiencia humana tipo 1 en varones homosexuales peruanos. Caceres et al. *PAHO Bull.* 1991;111(3):218-230.

gle, desertlike coastal plains, and highland populations and climates can be surveyed. Consequently, nearly every tropical disease known to affect man can be studied somewhere in Peru. Research involving the following subject areas is presently being conducted: epidemiology, microbiology, parasitology, virology, and medical entomology. Specific projects include different aspects of malaria, leishmaniasis, dengue, hepatitis, human immunodeficiency virus (HIV), human t-cell lymphotrophic virus, diarrheas, bartonellosis, Lyme borreliosis, and rickettsioses.

When one measures the success or failure of a research facility, the bottom line is quality publications. Over the past 8 years, 36 journal articles have been published or accepted for publication and an additional 11 manuscripts are presently under journal review. The subjects of these articles are varied (see box) and the publications have been accepted by such prestigious journals as the *Annals of Internal Medicine, Journal of Infectious Diseases, Journal of Clinical Microbiology,* and *Infection and Immunity*. Most importantly, the articles are very military relevant. They include the first published account that the World Health Organization's recommended treatment for severe mucosal leishmaniasis is ineffective, and an article on clinical and laboratory aspects of Peru's first dengue outbreak estimated to have affected more than 150,000 people in one city alone.

NAMRID's collaborative and training role in the Peruvian medical community is also extensive. During 1990, NAMRID staff made 25 formal presentations of their work at scientific conferences and meetings in Peru and the United States, reaching a total audience of over 2,300 persons; 52 Peruvians received technical laboratory training for periods of 1-6 months; NAMRID staff actively collaborated with more than 20 Peruvian scientists; and NAMRID sponsored a 2-day tropical medicine conference attended by over 100 Peruvian medical personnel in the city of Piura.

With the encouragement of the Peruvian Navy, each branch of the Peruvian Armed Forces has physicians and technicians assigned for periods of 1-3 years. Another important area has been providing assistance in their HIV screening program. Last year, NAMRID tested over 7,700 samples for HIV from the Peruvian Armed Forces, of which over two-thirds were for their blood bank screening program. NAMRID is also the reference center for all of Peru for confirmatory testing for HIV. By providing this essential assistance in the national HIV program, NAMRID has become rapidly integrated into the Peruvian medical community.

NAMRID has also been active in direct "fleet" support activities. The detachment has lent its expertise to U.S. cooperative efforts with Peru at the Santa Lucia Peruvian Police Base in the Upper Huallaga Valley. This base, in the heart of the coca producing area, is a major focus of the U.S. antinarcotics effort in Peru as the Upper Huallaga Valley produces over 60 percent of the coca product that enters the United States. NAMRID teams have been sent to Santa Lucia five times in support of U.S. efforts, most recently in December 1990, at the direct request of the Deputy Chief of Mission (U.S. Embassy Lima) to investigate the threat of dengue fever and in April 1991, to investigate the potential of a cholera outbreak.

NAMRID personnel have also developed a proposal, presently under consideration by the U.S. Embassy Lima, to conduct a complete disease threat assessment in the Upper Huallaga Valley. NAMRID also recommended and subsequently coordinated a preventive medicine assist visit by the Navy Environmental Health Center, Norfolk, VA. This close collaboration between a Navy medical research facility and Navy preventive medicine has benefited both groups and has been most appreciated by the U.S. Embassy Lima.

Other "fleet" activities include support of UNITAS efforts, an annual exercise between United States and Latin American naval forces. In August 1990, the UNITAS-sponsored Humanitarian and Civic Assistance Program in Peru had to be canceled at the last moment due to security concerns. NAMRID willingly offered to work with the Peruvian Navy to reschedule the project. The project was successfully carried out by NAMRID staff (Peruvians and Americans) and Peruvian Navy personnel in March 1991, in numerous small villages in the Iquitos area.

All that NAMRID has accomplished is even more impressive when considered against the backdrop of extreme political and economic turmoil which have plagued Peru in the last decade. Politically, while the country made a transition from one democratically elected civilian government to another last year, the increase in terrorism and its associated violence have been marked. Nonetheless, NAMRID has continued its collaborative efforts in Lima and other areas of the country while complying with necessary security recommendations.

Economically, several years of hyperinflation have wreaked havoc on the local economy (inflation in 1990 was over 7,500 percent—the highest in Peru's history). There is great fluctuation in prices both in services and goods. This has meant extraordinary difficulties in projecting local costs for more than 1 month at a time. The 99+ percent of obligation rate NAMRID achieved in FY90 is truly remarkable given this economic chaos.

Considering the political and economic conditions in Peru much has been accomplished in the first years of NAMRID's development. Yet, because of these problems, even more remains to be done. With the continued cooperative relationship of the Peruvian Navy, NAMRID will proceed to carry out its mission. □

Dr. Buck was Officer-in-Charge of U.S. NAMRID, Lima, Peru, until July 1991 and is now at the Navy Environmental Health Center, Naval Station, Norfolk, VA 23511. Dr. Need is Head of the Entomology Department, U.S. NAMRID.

NEPMU-7 Supports Operation Provide Comfort

LCDR Trueman W. Sharp, MC, USNR

Following the Gulf War, Navy preventive medicine personnel had a unique opportunity to assist in refugee relief during Operation Provide Comfort, the U.S. military's effort to deliver emergency aid to Iraqi Kurds fleeing the Iraqi army.

In early April 1991, the U.S. European Command (EUCOM), ordered to provide emergency relief to Kurds along the Turkey-Iraq border, asked U.S. Navy Environmental and Preventive Medicine Unit No. 7, Naples, Italy, (NEPMU-7) to provide two members for a nine-person assessment team. The team was to spend 10-14 days assessing medical needs of the Kurds.

NEPMU-7 assigned CDR Don Thurston, MSC, USNR, an environmental health officer (EHO), and LCDR Trueman Sharp, MC, USNR, an epidemiologist, to the team which also included logistics personnel, another epidemiologist, an EUCOM physician assistant, and the U.S. Army Seventh Medical Command.

Shortly after convening at the Combined Task Force (CTF) headquarters for Operation Provide Comfort in Incirlik, Turkey, the team became the CTF medical staff. Its mission was threefold: first, to carry out the assessment of the refugee situation as initially planned, then to implement medical relief efforts for the refugees and finally, to establish a medical system for troops involved in the operation.

By this point, the plight of the Kurdish people along the Turkey-Iraq border was desperate. Of the estimated 1.5 million Kurds who fled northern Iraq, approximately 500,000 escaped into the high mountains along the Turkish-Iraqi border. Mostly city dwellers, they drove north as far as they could along the few poor roads, abandoned their vehicles and walked on, some for as long as 4 days. The Kurds eventually encountered Turkish troops and ended up "camping" in large conglomerations of people along the Iraqi side of the border in obscure areas like Isikverin, Cukurga, Yekmal, Princikin, and Yesolova.

This region, much like parts of the southwestern United States, is very beautiful but remote, rugged, and harsh. In April, snow still lay on the ground, and the temperature dropped below freezing at night. Many Kurds were trapped on steep mountainsides with little water or food. Few had adequate clothing or shelter. Diarrheal disease was rampant and often complicated by dehydration, malnutrition, and exposure, particularly in the very young and old. Measles, usually the main killer in refugee situations, threatened.

The CTF medical staff clearly had much to do, particularly in preventive medicine, which is the basis for acute refugee relief along with public health. It consists of performing rapid epidemiologic field evaluations and setting up surveillance systems; providing proper food, water, shelter, and clothing; establishing decent sanitation systems; administering appropriate vaccinations; and instituting suitable basic medical care.

Troops involved in Operation Provide Comfort were in areas with numerous disease threats. For example, malaria is indigenous to much of the region, and diarrhea and hepatitis are highly endemic.

CDR Thurston and LCDR Sharp spent 2 weeks in Incirlik setting up refugee relief and establishing preventive medicine policies for the troops.

CARE photo by Nancy Blum

A Turkish relief worker for CARE, the international relief and development organization, pauses in the midst of Isikverin, a camp in Turkey where 160,000 Kurds camped after their flight from Iraq in April 1991.

This was a demanding and hectic task, but the Navy specialists were well prepared. NEPMU-7's many firsthand experiences in Africa and the Middle East proved to be vital in understanding the health threats the region presented for both the refugees and the troops.

The Navy Environmental Health Center's "Refugee Medicine Library," a comprehensive collection of articles and books on refugee medicine compiled for Operation Desert Storm and brought along by the NEPMU-7 team, proved to be invaluable. Many of the refugee relief policies established were based on these references. The Navy Preventive Medicine Information system (i.e., Disease Risk Assessment Profiles [DISRAPs]) was used to assess health risks to personnel in the area. This information, particularly related to malaria prevention, was accurate and useful.

The CTF subdivided into two task forces: Joint Task Force Alpha (JTF-A) and JTF-Bravo. JTF-A, headquartered in Silopi, Turkey, had cognizance over southern Turkey, including the mountainous border areas. JTF-B, headquartered in Zahku, Iraq, had cognizance over the rest of northern Iraq. CDR Thurston served as the preventive medicine officer (PMO) for JTF-B, and LCDR Sharp served as PMO for JTF-A.

Refugee relief operations centered first on the border areas of the JTF-A zone. LCDR Sharp worked with a team from the Centers for Disease Control (CDC) on a number of public health programs for the mountain refugee camps, such as vaccination campaigns, nutrition programs, surveillance systems, basic sanitation, and treatment protocols for diarrhea and respiratory infection. Subsequently, efforts shifted into the JTF-B region as the refugees returned from the mountains. CDR Thurston then assisted military and international agencies in planning refugee camp sites in northern Iraq and then in delivering public health in these camps.

Although there were outbreaks of cholera and measles, and an unexplained syndrome of fever, rash, and

Kurdish refugees at Camp Cukurga

Photos by the author

eventually death occurring in young children, diarrhea and its complications remained the main health problem for refugees. Both CDR Thurston and LCDR Sharp worked on outbreak investigation and control.(*1*)

Several military and volunteer medical groups participated in Operation Provide Comfort. Among those were Navy medical personnel from the Navy Mobile Construction Battalion 133 and the 24th Marine Expeditionary Unit. Two Navy preventive medicine technicians (PMTs) from NEPMU-7, HM1 Jerry Walker and HM2 Brian Savageau, also joined the CTF staff, and medical administrative support personnel arrived from Naval Hospital Naples, Italy, and Rota, Spain.

Security was a major concern throughout the operation, particularly in JTF-B. Ultimately, a combined force (including international military units) of more than 10,000 troops joined the effort. The troops had a multitude of field preventive medicine concerns. As in Operation Desert Storm, providing potable water was a constant challenge, field sanitation was rudimentary, flies and mosquitoes were prevalent, and local commanders wanted to provide fresh fruits and vegetables from unsafe local sources. The rapid deployment to this remote area presented food handling and waste disposal issues. Gastroenteritis was an ever-present problem, and during a 6-week period in Silopi an average of 100-200 persons with the illness were seen at sick call each week. HM1 Walker and HM2 Savageau worked extensively with the U.S. Marines and Army and various international military personnel on such field issues.

Despite all these problems, there were a number of positive aspects of the mission. For one, morale was high and an esprit-de-corps developed among the participants. Operation Provide Comfort demonstrated that the military, with its organization, equipment, training, and manpower, could effectively provide acute relief in refugee or disaster situations that international relief agencies may not be able to.

The efforts of U.S. military personnel are unquestionable and saved many lives. Preventive medicine efforts impeded disease in troops, heat illness was minimal, and no cases of hepatitis were reported. Malaria chemoprophylaxis discipline was good and in the end there were only a few suspect cases. Unfortunately, there were some traffic and mine accidents, but probably fewer or no more than would be expected in any operation of this complexity. Aside from the gastroenteritis, there were no other disease occurrences.

Navy PMTs proved to be excellent assets in the field. Because of their extensive training, they were flexible and able to adapt to unique and unpredictable tasks that arose. They solved unusual problems in the refugee arena as well as in the field for troops.

Although the overall mission could be deemed quite successful, some problems surfaced and important lessons were learned. For one, those attempting to do refugee relief often lacked the necessary supplies and resources. As a result, the measles vaccination program was delayed, food relief supplies were unsuitable, and air drops were inappropriate. The lack of resources to perform field evaluations and disease surveillance meant that it was frequently unclear exactly what the health problems were in the various camps. Thus, grossly exaggerated and ill-informed press reports of cholera and other epidemic diseases fre-

quently disrupted relief operations. A nutritional emergency resulting from the rampant diarrhea and dehydration was not readily recognized, and critical feeding programs for malnourished children were never satisfactorily implemented. Most military personnel sent to treat refugees had not been briefed on important refugee medical issues, such as the proper use of oral rehydration salts, the appropriate use of antibiotics to treat diarrhea, and the identification and treatment of upper respiratory infections.

Some problems are attributable to the difficulties inherent in an evolving, unplanned triservice field operation. In addition, relief operations, whether military or not, can be quite disorganized.

Operation Provide Comfort was a very interesting and successful mission, and the Navy was fortunate to participate. Many of the lessons learned will be discussed at presentations and workshops on refugee relief at the next Navy Occupational Health and Preventive Medicine Conference, to be held in the spring of 1992. The recently formed Navy Epidemiology Board will focus on the overall question of how best to use Navy preventive medicine teams.

Now that many realize that the military can perform emergency relief commendably, it is incumbent upon Navy medicine to learn from this experience and prepare even better for future relief efforts.

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Dr. Sharp is stationed with the Navy Environmental Preventive Medicine Unit No. 7, Naples, Italy, FPO New York 09521.

A refugee child is vaccinated against measles in the Yesolova camp.

Pacific Duty on the Troopship MS *Sommelsdijk*

CAPT Paul M. Ellwood, MC, USNR (Ret.)
Edited by Dean L. Mawdsley, M.D.

The inspiration for this account came as my wife Mary Lou, Dr. Paul M. Ellwood's daughter, and I went through a 25-year-old accumulation of household items as Dr. Ellwood prepared to move to a retirement community. Among the contents was a long forgotten manuscript on time-toned paper. With difficulty we commenced reading what turned out to be a series of essays written by Dr. Ellwood during his eight voyages on MS Sommelsdijk *between 1942 and 1944. Although the essays were neither dated nor titled, it was possible to put them in chronological order. Taken together as a single document, the account may resemble a diary, but it is not; the keeping of diaries was forbidden by wartime regulations. But for a minimum of editorial notes in brackets, Dr. Ellwood's account is in his own words.*

Paul Murdock Ellwood was born in Elkhart, IN, on 6 Mar 1900, the son of an architect. He attended local public schools and the University of Chicago. He received his medical education at Rush Medical College in Chicago, where he graduated in 1924. He then went west to San Francisco, CA, for his medical internship at Stanford-Lane Hospital in 1924-25.

After completing his education, Dr. Ellwood worked on tropical diseases in Montgomery, AL, for the Rockefeller Foundation. Completing this assignment, he returned to California where he worked for the California State Department of Health in Berkeley from 1926 to 1929.

Dr. Ellwood opened his first office in Oakland, CA, in 1929, and continued in this general practice during the depression years of the 1930's. As he became established, the Japanese attack on Pearl Harbor changed everything.

In August 1942, Ellwood enlisted in the U.S. Navy and was appointed lieutenant commander. He entered active service on 8 Oct 1942 and reported for duty at Mare Island Naval Hospital, where he remained until assigned as assistant medical officer to MS Sommelsdijk *on 15 Dec 1942. He soon became the vessel's senior medical officer and made nine voyages on the troopship before being relieved at Leyte for return to California in March 1945. Following are excerpts from Ellwood's "essays."*

Saipan, ca. August 1944*

On Sunday afternoon I was delegated to take the boys (30 American crewmen aboard the *Sommelsdijk*) to the Marine baseball diamond for a game. This particular diamond was selected because the trip there was through some areas of unusual interest. First we began to notice cement fireplaces standing alone beside charcoal and debris, mute evidences of burned out cottages. Considerable vegetation, however, was growing and almost obliterating these signs. Gradually there appeared more and more piles of concrete and stone and irregularly shaped blocks of masonry without roofs and with much less vegetation. "Yes," somebody said, "this was formerly the town of G [Garapan]." Now not a building with a roof and not a soul living there, but here a shrine, there some old rusty machinery, and there a block away, the tower of a former temple or church, and here a well-constructed building of blue stucco on a corner, appearing to be the

*It was not until 10 August that ADM Raymond A. Spruance announced the capture and occupation of the island to be completed.

home of some well-to-do person, quite near the center of town. And then we came to that famous mill—now a mass of tangled pipes, machine shop lathes and presses, rusted and knee deep in rubble; walls and stacks with thousands of piercing wounds, large and small; huge tanks and boilers with the same evidences of systematic, complete, ruthless destruction. The whole plant must have covered nearly a city block.

Out of town we came upon those hundreds of amphibious tanks, most of them lined up in neat rows with the paint in fairly good shape—some with turrets, some without. Here and there, however, one would see completely rusted or with tracks off and laying very much a victim askew in the break water half submerged, and there in one plot were perhaps a dozen similarly irrevocably wrecked tanks. Soon we came to a set of tents and crude shops, evidences of reconstruction and rehabilitation, work progressing on this huge mass of American first-line beach taking weapons. . . .

Soon we were at the diamond, a nice level spot, with a substantial backstop . . . . On one side was a group of Gen. Grants [tanks] most of them apparently intact. Some of the boys explored and found shells and guns, etc., left just as if the operators had gone to lunch, though actually they no doubt had stood for several months. Dense foliage almost hid them.

As the game went on, a truckload of brown people, some with red tags passed. Later, two two-wheeled carts drawn by oxen and driven by the brown people jogged along. Then two squat brown men came up, crunched behind the backstop and watched the game. Both had red tags. They were unwatched and unguarded.

A heavy rainstorm came but the boys continued to play in wet and slippery mud. Finally the game ended. As we returned the same sights passed in review. Two others of significance were noted, one a large level plot with many, many white wooden crosses, the Marines were buried there. Another sign fronted another large level space where already square platforms were emerging. This one said "Housing Unit Number One." Near this was another more prominent one in Japanese, no doubt saying the same thing.

Unknown Location, 13 Oct 1944

The other day I hitchhiked up to a Marine camp. The road was muddy from the recent rain and I carried an overnight bag. I was picked up by an Army colonel who was soon stopped by a junior officer in another jeep who complained that some other colonel had ordered an activity placed at the exact site where some other officer had ordered another activity. My driver colonel complained that, "We have so many bosses here we hardly know where we're at." We rode about 2 miles over a well-surfaced dirt road where considerable traffic was coming and going. The area was alive with activity with numerous areas of permanent and semipermanent camps and structures being built. Soon the colonel said, "I turn off here" and I hopped out.

I started walking and sliding along the road and began to see many things I should very much liked to have investigated further but remembered the warnings about booby traps, unexploded missiles, and wandering Japs and decided to continue on my way. Some of these were sharp pointed projectiles about 5 inches in diameter scattered about the ground, empty casings approximately 2½ feet long, and some old wrecked trucks. Two boys in a jeep soon appeared and very courteously picked me up. They looked to be marines but didn't exactly know where the place was I wanted. . . .

Soon we were through the mountainous section and could see the ocean on the other side of the island and groups of green tents here and there spread out over the landscape for miles. We stopped and asked a sentry where so and so was. He didn't know but could direct us to the hospital. As we passed several camps we noted cooking areas with what appeared to be rows of stove pipes on top of 10 gallon cans with a sort of valve gadget between. These appeared to be cooking or dishwashing devices burning diesel. The tents had dirt floors and cots and were not very commodious. Few had platforms. The road was very muddy and slippery; an approaching heavy truck almost slid down on top of us as we passed. I knew these boys were going out of their way but they were very kindly and soon deposited me at the OD tent of the hospital.

The hospital also consisted entirely of tents for the most part without wooden floors. The patients had cots but were without sheets, pillows, or mattresses. The tent floors were covered with fairly firm coral, a rather recently acquired luxury, replacing the mud. Yes, the orderly knew where the camp was I was looking for and soon showed me a nice new terrain map. An officer very graciously indicated that

Photos courtesy Dr. Dean Mawdsley

LCDR Paul M. Ellwood, MC, USNR

Motorship *Sommelsdijk*

MS *Sommelsdijk* was 492 feet 7 inches long with a 62-foot beam. Her net tonnage was 5,517 and deadweight tonnage 11,887. The vessel's two diesel engines developed 8,400 horsepower, giving her a top speed of 16 knots. With a fuel oil capacity of 1,768 tons, *Sommelsdijk* had a range of 23,040 miles. Manned by a crew of 53, as originally designed, she carried 12 passengers. *Sommelsdijk* had accommodations for 1,493 troops in her wartime configuration as a troop transport.

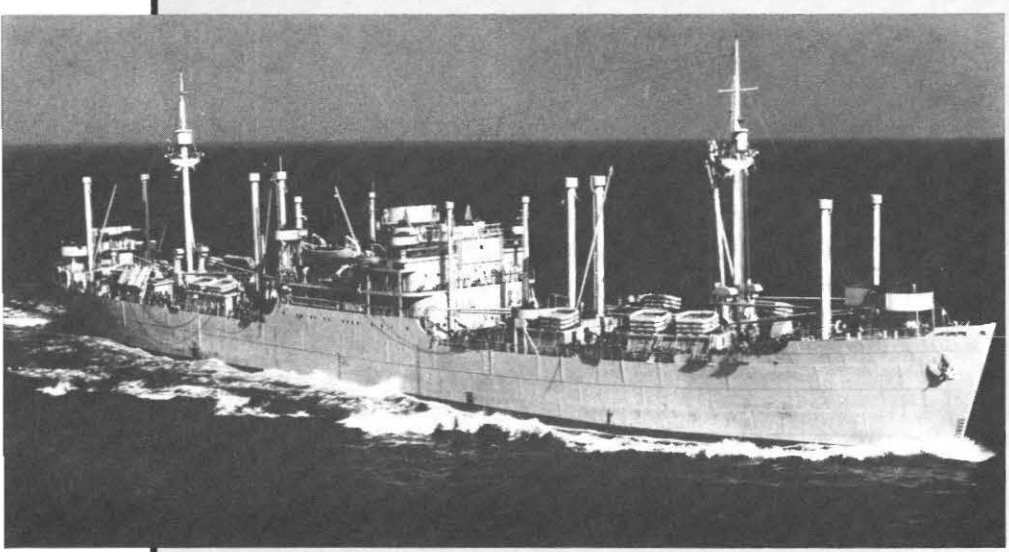
Sommelsdijk was built in Odense, Denmark in 1939 for the Holland-Amerika line for its passenger and freight trade between New York and the Dutch East Indies. In May 1940, as the Nazis overran Holland, *Sommelsdijk* and another Dutch freighter, *Noordam,* were in Singapore. In order to avoid the Japanese juggernaut, these ships departed Singapore and took a long, devious course around Sumatra, Australia, New Zealand, and Pitcairn Island, returning through the Panama Canal to Baltimore in early February 1942.

Sommelsdijk, like Dr. Ellwood, had a new and more important calling, defending the Free World from Axis tyranny. In pursuit of this cause, the Dutch government in exile leased the ship to the United States for the duration of hostilities. In August 1942, *Sommelsdijk* arrived at the Moore Drydock Company in Oakland, CA, for conversion to a troop transport.

As a troopship *Sommelsdijk* sailed for the first time in May 1943. During its stay in the Pacific Theater, San Francisco, CA, remained its home base. Although she transported a variety of military units, Seabees frequently dominated her passenger list. *Sommelsdijk* made nine voyages to the Pacific before returning to New York for repairs. After leaving the yard, the ship made three voyages to Europe to return victorious troops to the United States.

In 1946, *Sommelsdijk* was released from further service as a troop carrier and 5 months later the Dutch government returned her to the Holland-Amerika Line which reconverted the vessel to her original state.

Following nearly 20 years of postwar service, *Sommelsdijk* was scrapped in La Plana, Spain.



he would help. His name was Dr. Gardner. He explained that a few weeks previously there had been some 200 dengue cases in their hospital (500 beds) and at present there were some 25 diphtherias. He insisted that it would be impractical for me to try to walk to the other camp and so called a jeep ambulance to take me over. The latter was an ingenious affair, a jeep with the right side fixed with a frame to support two stretchers double deck style. The driver sat in front in the usual way on the left and the longitudinal seat behind him was sufficient for two attendants. We jogged along, I in one of the places for the attendants. It must be pretty rough ridin' for patients, but nevertheless they must get there.

We stopped abruptly and the driver inquired, "Where is the 2nd Regimental Aid Station?" "Right there," a voice said. We looked up and there stood an open tent canopy affair with a little sign in front which said "Sick Call 0830 and 1800."

I jumped out and half stumbled up the incline and inquired for Dr. McInnes. In an adjoining tent a little further back I met Dr. Mc and introduced myself as one of the doctors of the *Sommelsdijk* which had taken him to New Zealand. He remembered and was very cordial. I showed him my bag and immediately indicated that the purpose of my visit was social and in the interest of trading. Did they have anything? Yes, they might have something. Nearly all the stuff had previously been traded for food. One of the fellows had a flag and they had some Japanese money and some Japanese medical supplies. Dr. Mc had to attend an officers school himself, but he would turn me over to his assistant, Dr. Richardson. And could I stay to chow? Yes, I would be glad to, but would they not like to come to the ship and have some real chow for a change. No, they couldn't do that tonight. All right, I would stay if transportation could be arranged for my return to the ship. It could be arranged.

Dr. Richardson, in green fatigue clothes, took me immediately to the

supply tent. Low and behold, there were almost as many cases of Japanese medical supplies as there were American. The doctor started showing captured bandages, ampules, splints, instruments, lab supplies, and then pharmaceuticals and scales, etc. A small autoclave and filter affair with a crank had not been figured out but it appeared to be an apparatus for either just filtering water through porcelain (hardened staylike material) or for filtering and heating—a combined operation. Not only did Dr. R keep showing me this stuff but constantly kept giving me samples of everything. I was sure intrigued and came away with a real collection.

We then went to their hospital tent, the front portion of which housed a field operating table. "This," he said, is Japanese and is superior to ours because it has this small attached instrument table which makes the whole table much more stable. I could see it was an ingenious affair. . . .

We walked into a crude screened building with long crude tables and benches, sat down, and as the officers came in, I was introduced. The meal consisted of canned bully beef made into patties, canned white beans, canned cold tomatoes, bread, butter substitute, peanut butter, jam, coffee, water, and cake with a canned berry topping. There was catsup for the beans and meat. There was very little grumbling about the food although it was mentioned that fresh meat had not been served for several weeks.

The colonel sat at the head of the table and seemed quite interested in our ship. He spoke of another ship on which the troop commander insisted on cleanliness and he told how enthusiastically he cooperated as the ship "scarcely had a fly or cockroach aboard. . . ."

After dinner we walked over to Dr. Mc's tent where we met four or five other doctors and dentists. . . .

The tent appeared fairly comfortable with platform floor, army cots with nets, table in center and small stools or boxes to sit on, regular gasoline camp lantern for light, field telephone hanging on the center post. One of the first points of conversation concerned the lack of mosquitoes and insects which was directly the result of some very tricky aeroplane distribution of DDT. It was a big plane, a C-47, and it came over at treetop or less and scared plenty of people. Dr. Mc told of the amphibious tanks which bore the brunt of the entire landing, the turret type coming ahead, protecting the plain type carrying personnel, 35-40 to a tank or carrying vehicles. The tensions could be readily felt as the tanks were fairly vulnerable. "Some outfits came ashore D-1 day," said Dr. Mc, "What did they do?" "Prepared the way and reconnoitered." "Some fun I bet."

Sommelsdijk trades with the natives, P.I., December 1944.

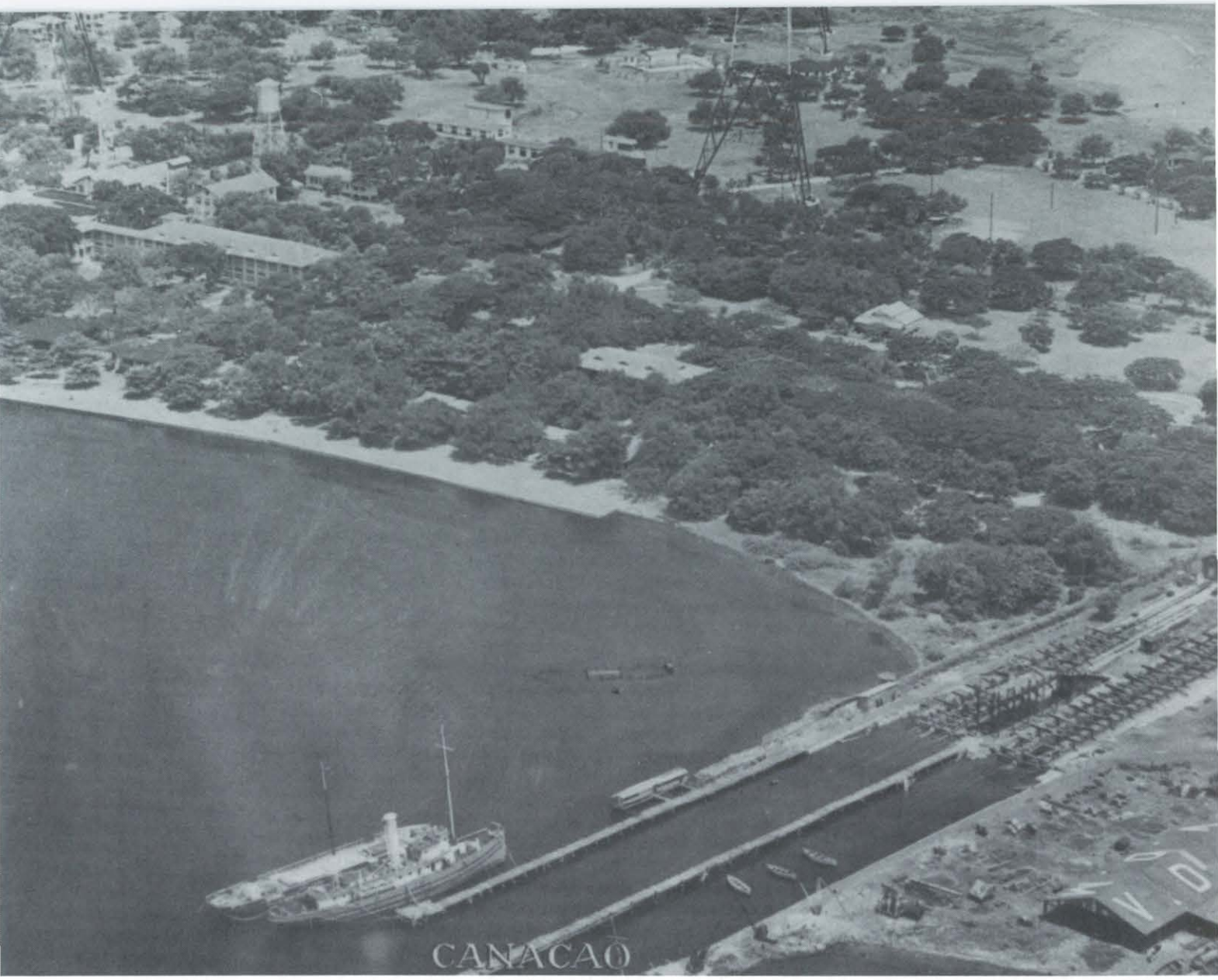
It was beginning to rain and arrangements were made for me to leave. . . .

The doctor gave me some Japanese stuff and so did a corpsman. In turn I doled out the stuff I had brought in the bag to trade—a box of cigars, a 1 pound and a 2 pound box of fancy candy, an Evans cigarette lighter and a bottle of fluid, and a fairly decent pipe. The latter I gave to the corpsman. The boy with the flag decided he didn't wish to trade.

When I was fitted into a poncho, we climbed into the jeep (another ambulance). The driver had a rifle and the boy by the tailgate a 45 pistol. I sat between. It was rugged going and the fellows said, "They got one of our lieutenants and a couple of men the other night, they were on patrol." After bouncing and sliding around about ½ hour the driver said, "I always feel better after I get past that banana grove." A little further on we came on to the main road, but the driver had a chunk of mud fly up and hit him in the eye. We had to turn off and let some of this wash out with tears before we could go further. It was still raining. We came to one entrance but the driver said, "I can't go in there or we'll get shot, that's the seaplane base." We backed out and started the other way. Soon we were at the dock. Fortunately, we were permitted to drive on to the dock and I finally clambered up the gangway with my "fortunes of war." Joe at the top yelled, "Almost got you a Japanese rifle today. Had the fellow down to 20 but he wouldn't come down any further."

(To be continued in the March-April issue.)

Dr. Mawdsley, Dr. Ellwood's son-in-law, resides in Hillsborough, CA.

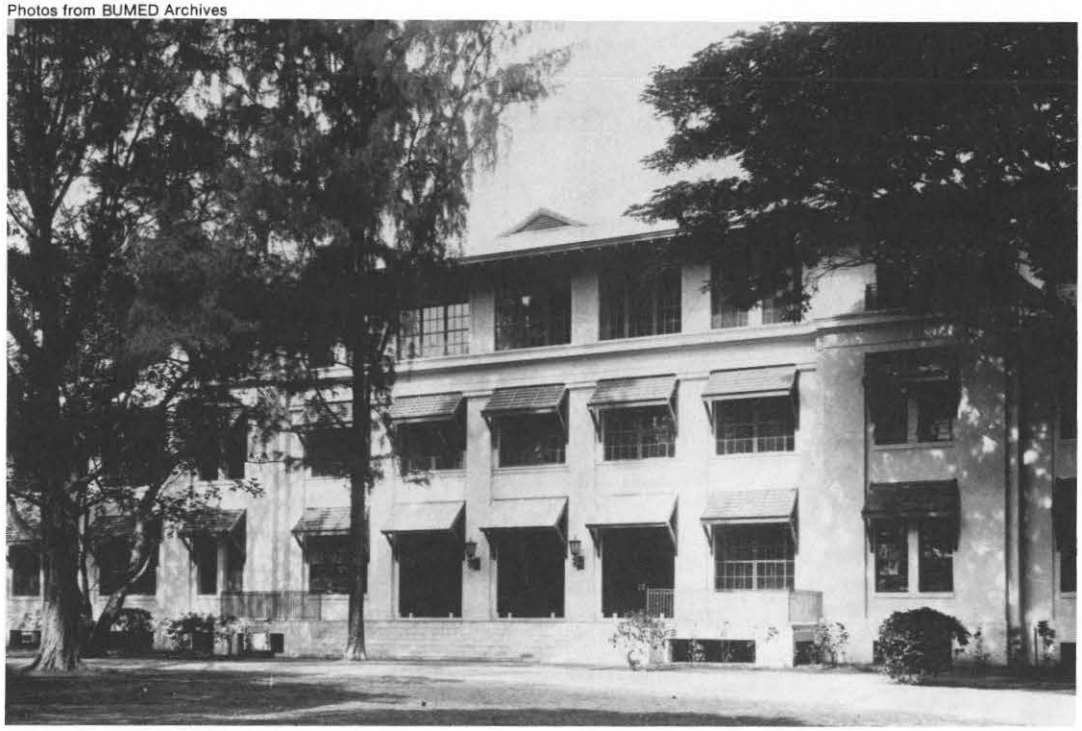


Chronology

Navy Medicine January-February 1942

Jennifer Mitchum

Photos from BUMED Archives



Just across the bay from the Cavite Navy Yard, Naval Hospital Canacao, P.I., was the largest Navy medical facility west of Pearl Harbor when the Japanese closed it down and imprisoned its staff in January 1942.

Flames still raged at Pearl Harbor when Japanese fighters and bombers swarmed over the Philippine Islands, Wake, Guam, and the British possessions of Hong Kong and Singapore devastating Allied air and sea forces. In the Philippines, Army airfields were pulverized as Japanese bombers caught American fighters and B-17 bombers "wingtip to wingtip" on the ground. When they were through, more than half the U.S. Army Air Force had been destroyed. Outgunned U.S. military personnel did their best to counter the Japanese attack and, although our forces could not stop the enemy onslaught, their efforts slowed them down, prolonging the surrender of the islands.

On Wake, marine and naval personnel totaling slightly over 500, performed admirably, holding the islands until 23 Dec 1941 with scarcely any air power. During the first raid alone, all but 4 of 12 Grumman Wildcat fighters were destroyed. Subsequently, two more planes were lost in missions. A medical facility near the airfield was badly hit and several corpsmen were among the fatalities. By the surrender 2 days before Christmas, a new medical station was operating in two underground magazines.

Similarly, the small garrison on Guam, consisting of about 400 Navy, 155 marines, and 308 Guamanians, fought hard but were outnumbered and lacked the weaponry needed to suppress the Japanese force.(*1*) Following several air raids, Japanese troops landed at 0330 on 10 Dec and headed for the government headquarters at Agana.

The firing ceased by dawn and by 0830, the Japanese had seized USNH Guam. "I think the bitterest moment of my life came at sunrise when, standing in the door of the hospital library, I saw the Rising Sun ascend the flagpole where the day before the Stars and Stripes had proudly flown," said Leona Jackson, one of five Navy nurses stationed at USNH Guam and captured when the island fell.(*2*) The enemy then set up a headquarters in the hospital. "They thought that if the Americans came over to retaliate they wouldn't fire on the hospital," added Jackson.(*3*)

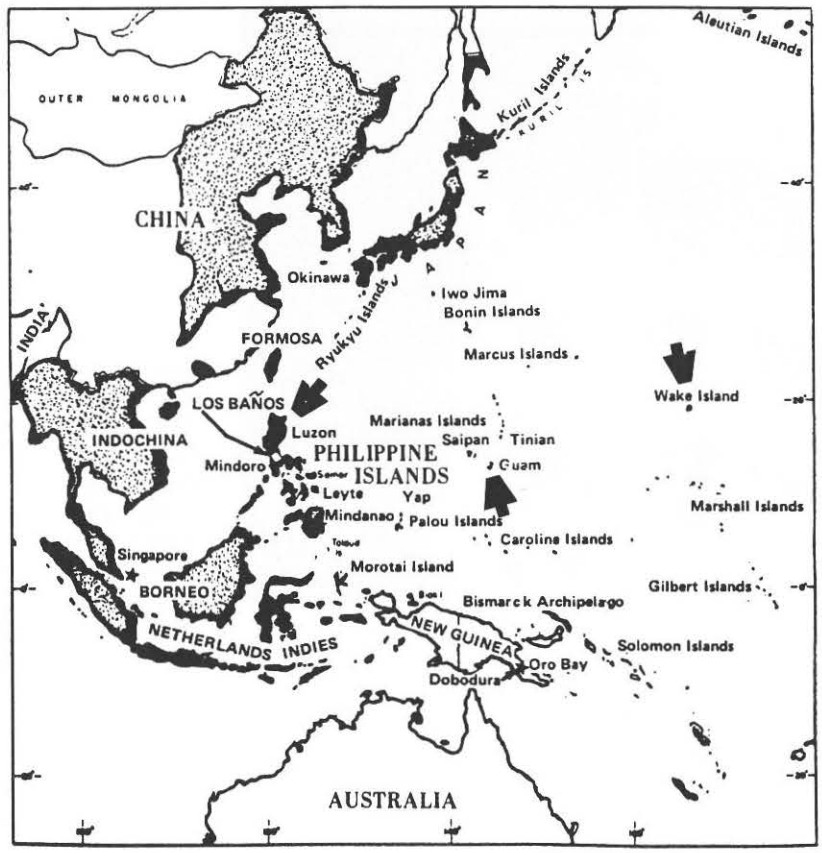
Shortly after the landings, casualties began pouring into the hospital. Navy medical personnel were allotted one ward for tending patients as the Japanese utilized the rest of the hospital facility. "It was probably the most amazing ward I'll ever see," declared nurse Jackson adding, "we had war casualties there, and native men, women, and children; "we even had a Caesarean section by way of variety."(*4*)

On 15 Jan 1942 the nurses and other prisoners boarded the *Argentina Maru,* a merchant ship, that would take them to Japan. Not allowed to take additional clothing, the group arrived in Japan shivering in the frigid temperature.

No Rescue for the Philippines

The main assault on the Philippines came 2 days after the initial attacks on 8 Dec. Approaching Clark Field from the north, Japanese air power returned unopposed a little after noon on 10 Dec. The force divided north of Manila. Part of it took Nielson and Nichols Fields and Camp Murphy, the other attacked the Cavite Navy Yard. For over 2 hours, more than 50 planes flew back and forth over Cavite "at leisurely tempo and in graceful curves, at 20,000 feet elevation beyond range of the 3-inch antiaircraft guns, the bombers releasing at will."(*5*)

In way of medical treatment, several station hospitals and dispensaries existed throughout the islands as did two main military medical facilities: the Sternberg Army Hospital in Manila and USNH Canacao, located on the south rim of Manila Bay, adja-



The American possessions of Wake, Guam, and the Philippines were early targets of Japanese aggression.

cent to the Cavite Navy Yard. Several missiles fell within the navy yard destroying the dispensary but sparing the hospital. As Cavite burned uncontrollably, personnel that had been assigned to the dispensary relocated to other medical posts throughout the yard. Some joined the Canacao staff while others worked in various field and dressing stations.

Medical personnel in the field with the Marines not only cared for wounded but also took up arms. "We counted 80 bombers go right over us. We couldn't reach them but we kept them from getting down too low. They said we got two of them," recalled PhM2c Ernest J. Irvin, USN, who was serving with "C" Battery of the Third Battalion Fourth Marines across Bacoor Bay, a mile south of the Cavite Navy Yard.(*6*)

One facility best shielded from the aerial attack was a medical station beneath the naval prison at the yard. Most medical supplies were moved from the dispensary to this location. Casualties began streaming into the station shortly after the first wave of enemy bombers had passed. The station was hit in the midst of the bombing. Personnel then loaded patients into trucks and headed for USNH Canacao.

"We came out from under the building and there was the navy yard, all flattened out, black smoke coming up everywhere," recalled Dorothy Still Danner, one of 11 Navy nurses assigned to USNH Canacao and eventually captured in Manila.(*7*) She and other nurses had taken refuge under the nurses quarters at the onset of the raids. As the sound of enemy bombers receded, Danner and her colleagues rushed back to the hospital to find it inundated with patients. "They were on the floor. There were Filipino women and children and some men and our own people from the navy yard. It was really a shocking scene."(*8*)

Within that time, medical personnel received and treated approximately 500 casualties of which 100 were treated in the surgical ward with merely a 50 kw unit lighting the operating rooms, halls, and part of the ward.(*9*) Many of the injured civilians received emergency treatment and were sent to the Caridad School building where Philippine Public Health doctors had set up a hospital.

Personnel transferred patients to the Sternberg Army Hospital in Manila as the Japanese pushed inland. In addition, a small team of doctors, nurses, and hospital corpsmen assumed temporary duty at Sternberg to help care for the patients.

As the enemy continued to gain ground, the hospital relocated several times, the first time to the Sternberg Army Hospital. "It was not until around midnight or after when some of the PT boats, which were new out there, came to take us to Manila," said nurse Danner about the transfer.(*10*)

From there, the hospital moved to the Estado Mayor, a group of old wooden buildings about a block from Sternberg that once housed an infantry battalion. Within days, it moved again, this time to the Philippine Union College at Balintawak on the northeastern outskirts of Manila, and then finally to the Santa Scholastica College in Manila after General MacArthur declared Manila an open city on 26 Dec.

Upon arriving at Santa Scholastica College, Navy medical personnel found Navy, civilian, and a few Army patients that had been left behind by the previous occupant, the Army Medical Center. Those few patients were added to the Navy medical rosters. In an attempt to consolidate all bluejackets and marines in one place, hospital personnel searched area Manila medical facilities for Navy and Marine Corps patients that may have been brought there during the series of air raids.

By New Year's Day 1942, 27 doctors, 11 nurses, and 104 hospital corps-

men at USNH Canacao, awaited occupation of the city by Japanese expeditionary forces. The following day, the enemy occupied Manila and seized the hospital. They questioned CAPT Robert G. Davis, MC, commanding officer, about the storage of firearms on the hospital compound and then searched his safe. By 7 Jan, the Japanese occupied the entire hospital and posted guards at the gate. Throughout January and February they returned to "inspect" the hospital, confiscating hospital supplies on almost every visit. They took the hospital's stock of quinine and several other items including iron beds and mattresses, pillows, linen, mosquito nets, pajamas, and hospital vehicles.

Following Japanese orders, medical personnel began transferring patients in pairs to a hospital the Japanese had set up in an elementary school. This transfer went on almost daily. On a few occasions larger numbers of patients were transferred as well as members of the hospital staff. In addition, the Japanese requested medical histories on all patients and ordered patients and staff members to fill out questionnaires disclosing name, rate, age, religion, next of kin, birthplace, and education.

Navy Medicine at Sea

Medical personnel also served within the fleet aboard noteworthy vessels including USS *Canopus,* USS *Houston,* USS *Marblehead,* USS *Pecos,* and USS *Oahu.* As part of the fleet, Navy medical personnel displayed bravery and skill as they attempted to save as many lives as possible during heightened moments of battle. When *Canopus* was hit the second time on 5 Jan, stretcher parties began boarding the ship "almost before the dust had settled" and carried 15 wounded men to dressing stations ashore.(*11*) Similarly, the 18 corpsmen aboard *Houston,* which later received a Presidential Unit Citation for its service, were occupied with routine or emergency medical functions.

CONUS

In CONUS, the Navy Medical Department was busy finding ways of increasing patient capacity at hospitals and organizing security and emergency measures in case the mainland came under fire. To meet the demand for more hospital beds, new buildings were going up and a plan of expansion and/or renovation was underway at existing facilities. Some sites such as USNH Bainbridge, MD, and USNH Bethesda, MD, were ready for commissioning and opened on 4 Feb and 5 Feb, respectively.

USNH Bethesda, MD, opened as part of the National Naval Medical Center, Bethesda, replacing the aging facility at 23rd and E Streets in Northwest Washington, DC. In addition to the hospital, the new medical center housed the U.S. Naval Medical and Dental Schools.

Training was also a major concern. The Surgeon General directed that all Dental Corps officers become proficient in administering first aid—treating burns, shock, and hemorrhage; disposing of the dead; and performing other duties customary to the Medical Department.

To provide training for hospital corpsmen, construction began on a site west of USNH Great Lakes in September 1941 for a Hospital Corps school. The school officially opened on 14 Feb.

KIA

As medical personnel aimed to preserve lives during battle, several gave up their own. At sea, in the Atlantic theater, two doctors were killed in action (KIA), one aboard USS *Truxton* and the other aboard USS *Jacob Jones.* Three pharmacist mates also died, one each on USS *Truxton,* USS *Pollux,* and USS *Jacob Jones.* Three pharmacist mates were also killed as part of the fleet in the Pacific theater aboard USS *Pope,* USS *Shark,* and USS *Peary.* Additionally, four medical personnel were killed during the 10 Dec raid on the Philippines. One, a pharmacist mate, died at Cavite Navy Yard and the other three at USNH Canacao.

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Naval Medical Research and Development Command Highlights

Bethesda, MD

• New Labeling Technique for Stem Cell Replacement Therapy

Stem cell therapy is the mainstay of successful bone marrow transplantation. However, it has been difficult to grow stem cells in culture and to prove that functional blood cells collected from patients actually derived from therapeutically infused stem cells. Researchers from the Immune Cell Biology Department at the Naval Medical Research Institute, Bethesda, MD, developed a new method that combines the use of two bone marrow growth factors, stem cell factor and G-CSF (granulocyte colony stimulating factor), and interleukin-3, a cytokin, to stimulate the division of isolated stem cells from rhesus monkeys. Cell labeling was done with a retrovirus containing a gene for resistance to the antibiotic, neomycin. Studies showed that the lethally irradiated rhesus monkeys recovered with culture grown labeled stem cells (CD34 + cells). The normal levels of new red blood cells, white blood cells, and platelets occurred as early as 2 weeks postirradiation/therapeutic transfusion with CD34 + cells. All cells were derived from CD34 + cells because all white blood cells were resistant to neomycin. Human stem cell replacement therapy trials will commence shortly at NIH. This therapy has the potential to save the lives of countless military casualties if future conflicts include the use of chemical or radiological weapons. In the civilian sector, this new technique for manipulating stem cells will help advance blood cell reconstitution therapies for cancer patients. The novel method of growing stem cells in culture will allow the therapeutic replacement of the patient's own stem cells, decreasing the risk of transplantation rejection as well as the risk of infection from nonself stem cell donors.

* * *

• Assessment of High Intensity Laser Exposures

NMRDC-sponsored researchers at the Naval Air Development Center, Warminster, PA, designed and fabricated an enlarged (X14), scaled artificial eye to assess the effects of high intensity glare on visual performance. The artificial eye which is interfaced with a high resolution color image processor, is comprised of a dual lens system, variable aperture, and scaled anterior and posterior chambers. The artificial eye allows researchers to vary, with known degrees of freedom, parameters of the human eye such as the refractive power of the cornea and lens, lenticular and corneal transmittance, pupil size, as well as the fluids filling the chambers. Current research is calibrating and validating the artificial eye against human data over a safe range of glare intensities. Studies to date demonstrate that the glare spread function in the artificial eye closely approximates the human glare spread function observed with emmetropic and ametropic observers. Future studies will assess the transient effects associated with damaging glare intensities in addition to evaluating high risk agile laser eye protection.

* * *

• Trypsin Detection and Quantitation Using the BAPNA-in-Agar-Gel

Researchers at the Naval Dental Research Institute, Great Lakes, IL, developed a quantitative assay for measuring trypsin and trypsinlike enzyme activities using N-a-benzoyl-DL-arginine-p-nitroanilide (BAPNA). Both cultured oral microorganisms and human subgingival plaque can be screened and evaluated for trypsin activity. Thus far, use of the BAPNA-in-Agar system has revealed positive reaction by trypsin and several gram-negative oral microorganisms associated with adult periodontal diseases. Applied clinically, the test will help identify patients undergoing changes in disease status and will be useful in monitoring the success of therapeutic measures. Exploratory tests with subgingival plaque samples indicate the BAPNA-in-Agar system can serve as a rapid, simple method for detecting microbial trypsinlike activity.

For additional information on these or other medical R&D projects, contact NMRDC Code 04 at Commercial (301) 295-1468 or Autovon 295-1468.

Pyridostigmine Prophylaxis During Warm Water Diving Operations

CAPT J.W. Thorp, MC, USN
LT D.M. Stevens, MC, USN
CAPT A.J. Dutka, MC, USN
T.J. Doubt, Ph.D.
CAPT E.D. Thalmann, MC, USN

One important goal of scientists at the Naval Medical Research Institute (NMRI), Bethesda, MD, is to develop recommendations for guarding the health and safety of our troops, while improving their ability to complete their mission under a wide range of environmental conditions. Generally, operational planners can define the requirements that generate these research programs far enough in advance to allow several months or years to plan and execute each program. Occasionally, however, they need immediate information to deal with a hazardous situation. That type of situation arose last year with the deployment of troops for Operation Desert Shield. Investigators at NMRI were tasked to define how well divers could work in hot water while taking pyridostigmine as protection against exposure to chemical weapons. The information was required *"immediately."*

This report describes how that task was accomplished, and illustrates how NMRI responds quickly to meet the Navy's needs. The bibliography provides more detailed information about the research plan and the results of the study.

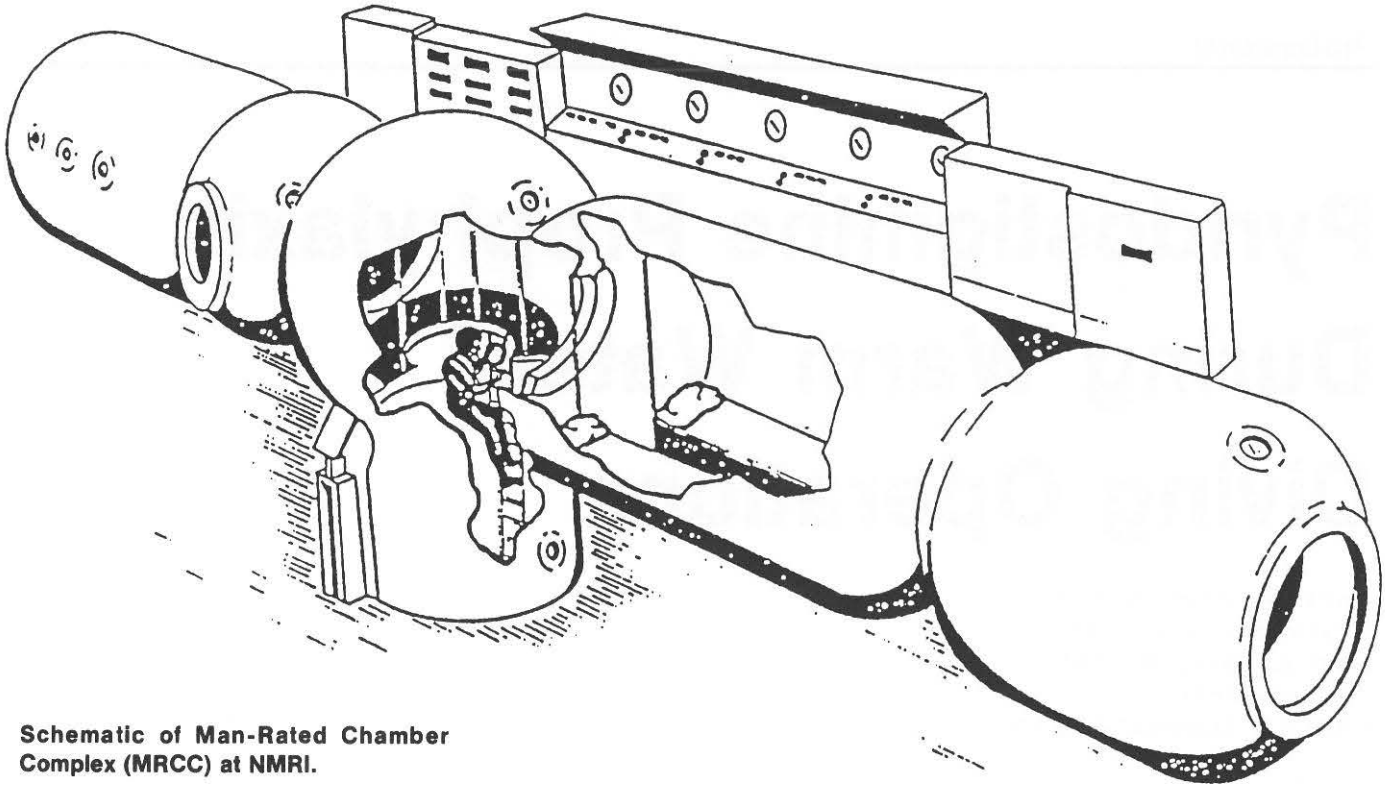
Background

Troops deployed to the Middle East were exposed to extremely high temperatures and to the risk of attack with chemical weapons. They carried pyridostigmine packets to use if prophylaxis was required against possible exposure to chemical warfare with nerve agents. The question from the fleet was, "Will the prophylactic use of pyridostigmine affect the diver's ability to complete his mission?"

Through its influence on the autonomic nervous system, pyridostigmine could have adverse effects upon thermoregulation, exercise tolerance, equilibrium, and cognitive performance. With the doses used for chemical warfare prophylaxis, these negative effects had not been experienced by pilots and others tested in hot, dry environments, nor by patients who receive the drug to treat myasthenia gravis. The diver, however, is exposed to a hot, *wet* environment where heat stress may differ substantially compared to *dry* environments. Additionally, some divers breathe 100 percent oxygen (O_2) and face the risk of seizures from oxygen toxicity. The bibliography contains a more detailed discussion and list of references about the effects of pyridostigmine.

At the time, research had not been done to study these problems, and the required information was not available in the literature. Fortunately, resources at NMRI were optimal for conducting this type of work with short notice. The original query arrived on 27 Aug 1990. NMRI's investigators provided their answer before 15 Oct 1990. Table 1 outlines the course of events from the time of the initial request until the report was completed. Of course, research on several other projects had to be suspended during the study.

To ensure that the study design would truly reflect operational situations, and to obtain supplies such as clothing and rations that would be used in the fleet setting, the investigators maintained close liaison with operational groups during the study. Within days of receiving the initial request, NMRI's investigators met with representatives of the Bureau of Medicine and Surgery and contacted Explosive Ordinance Disposal and Naval Special Warfare commands to obtain more information about the field conditions that might be encountered.



Schematic of Man-Rated Chamber Complex (MRCC) at NMRI.

TABLE 1
Background: Pyridostigmine and Diving

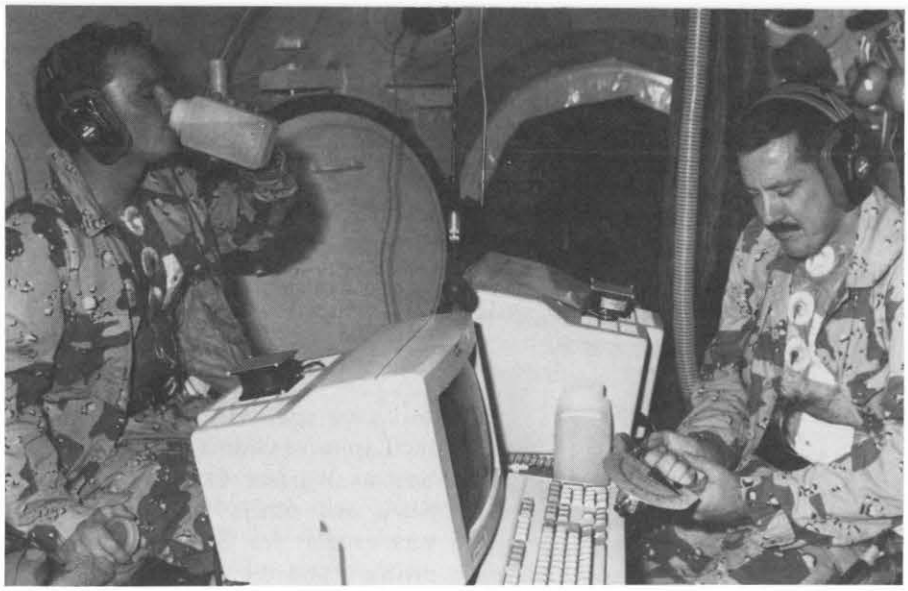
27 Aug	Message from CINCPACFLT
29 Aug	Phonecon CINCPACFLT and NMRCD Meeting at BUMED Phonecon NAVSPECWARCOM
31 Aug	Planning meeting at DMD, NMRI: Literature search Research plan Reply to message
5 Sept	Message CINCPACFLT: Define conditions Literature search completed
10 Sept	Research protocol approved
11 Sept	Reply to message sent
14 Sept	First research test conducted
12 Oct	Message to sponsors with answers to questions

The investigators would have preferred to study several different aspects of the problems described, such as the relative effects of breathing air vs. O_2, the effects of different temperatures from 90 to 110°F, and the effects of different levels of exertion. There was no time to accomplish all of those goals, however. They decided they could obtain the most useful information by comparing the effects of pyridostigmine vs. placebo upon the ability of divers to perform intermittent exercise in hot water (94°F) while breathing 100 percent O_2 at the depth of 20 feet of seawater (FSW). They would have to wait until some other time to design more elaborate studies to answer other questions.

Study Design

Ten Navy divers participated as subjects to measure changes in thermal and hydration status, exercise and cognitive performance, manual dexterity, and visual adaptation in changing ambient light.

Each subject completed two 7-hour exposures in NMRI's Man-Rated Chamber Complex (MRCC)—one after taking a 30 mg pyridostigmine



Divers during "dry phase" drank 1 liter of water per hour. Diver on right is demonstrating the grip strength test.

tablet three times daily for 2 days and the other after taking a placebo three times daily for 2 days. Drug and placebo were administered in balanced fashion and the study was performed double blind.

Before any exposures, each diver was heat-acclimated 90 minutes per day for 5 days in NMRI's environmental chamber. During the 90 minutes in the chamber, the temperature was kept at 100° F, while the diver pedaled a cycle ergometer at a moderate work load. During that period, the divers also learned how to complete the computer-assisted Performance Assessment Battery (PAB) used at NMRI to evaluate changes in cognitive function. Heat acclimation was maintained by spending alternate days in the environmental chamber between exposures.

Each diver ate Meal Ready to Eat rations for 2 days and wore desert camouflage attire during the exposure to simulate field conditions. Operational groups were generous in helping to obtain these items.

During each exposure, sensors were in place to monitor rectal and skin temperature, heat flux, and heart rate. Cognitive performance was measured by use of the PAB. Exercise performance was evaluated by measuring heart rate, ventilation, oxygen consumption, and indirect calorimetry while the diver worked on a cycle ergometer. Blood and urine samples were obtained to evaluate hydration status. Other functions were evaluated periodically during the exposure: (1) *manual dexterity*—measured by the time required to assemble nuts and washers on a bolt, (2) *visual adaptation to changes in ambient light*—measured by the ability to read letters when ambient lighting was increased or decreased, (3) *diver perception of heat stress and exertion*—measured with number scores, and (4) *hand grip strength*—measured with a hand dynamometer.

During the exposure, the divers were at rest for 4 hours breathing air in one chamber of the MRCC that was heated to a temperature of 100° F. Various tests were conducted as described above. For the next 3 hours, the divers were immersed in the wet pot of the MRCC, performing exercise on a cycle ergometer with the water temperature at 94° F. During immersion, the chamber was pressurized to the equivalent of 20 feet of seawater. During the first 2 hours of immersion, the ergometer work load was kept relatively low (oxygen consumption (V_{02}) = 1.0 L/min, or equivalent to fin swimming at 0.6 knot) with repeated periods of 30 minutes of light work followed by 10 minutes of rest. During the last hour of immersion the divers completed three periods with each period having 5 minutes of light work, 10 minutes of moderate work (V_{02} = 1.8 to 2.0 L/min, or equivalent to fin swimming at 1.0 knot), and 5 minutes of rest.

Divers during "dry phase." Note computer terminals for testing with the PAB. Divers are breathing into the spirometry circuit to measure respiratory volumes and oxygen consumption.

Results

For both the drug and placebo conditions, the divers were able to complete the work. At the end of exposure,

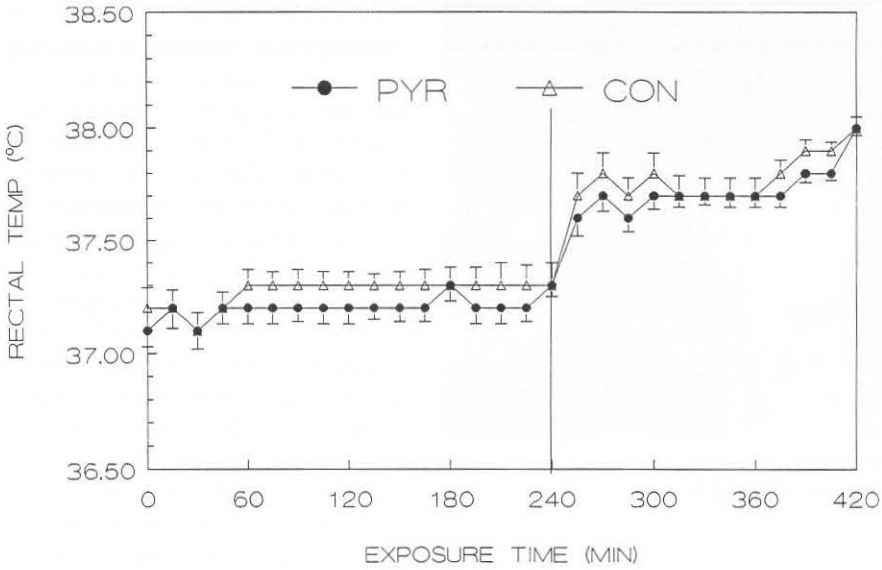


Figure 1. **Rectal temperature (mean ± SEM) measurements during dry exposure and immersion. Comparison of drug (PYR) vs. placebo (CON) for 10 subjects.**

rectal temperature was increased by 1°C with no difference between conditions (Figure 1). The increase in rectal temperature was similar to that experienced when running on a warm day; it never approached a level that would be considered dangerous to the individual. For all groups, the ability to complete the PAB was decreased by 20 to 40 percent after exposure to heat, with no difference between conditions. Hydration status was well maintained, but it should be noted that all divers were well hydrated before exposure started, and each diver consumed 4 liters of water during the first 4 hours of exposure. Visual acuity, grip strength, and motor coordination were unaffected by condition or by exposure to heat. Heart rate (Figure 2), ventilation, and oxygen consumption also were unaffected by condition. More detailed information is available in the bibliography.

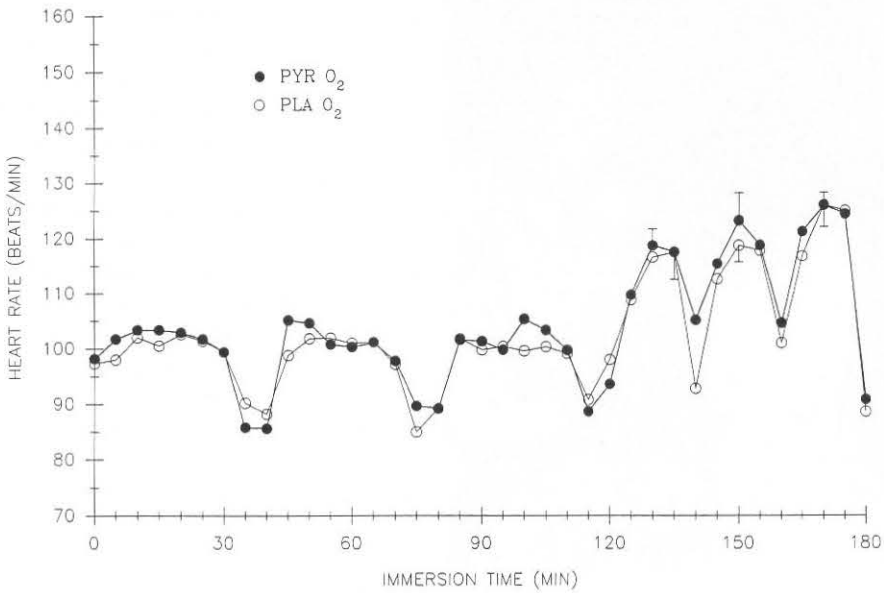


Figure 2. **Heart rate for PYR and PLA during immersion. Increases in heart rate correspond to work periods.**

Discussion

Accomplishment of the fleet tasking illustrates the flexibility and responsiveness required to provide useful information to NMRI's sponsors. A major reason that the project succeeded is that NMRI's investigators enjoy a close working relationship with their sponsors, e.g., personnel at the Explosive Ordinance Disposal and Special Warfare Commands, NAVSEA, and others. This relationship was crucial for understanding the problem and designing the best protocol to answer the question. It would have been impossible to conduct the research without this liaison, because much of the gear used had to be obtained with the help of the sponsors.

The experience of completing this task has had the additional benefit of helping NMRI's scientists become even more aware of the needs of the operational Navy. This understanding stimulated new ideas for research to learn more about the diver's ability to work in warm water.

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Drs. Thorp, Doubt, and Thalmann are on staff at the Naval Medical Research Institute, Bethesda, MD. Dr. Dutka is head of neurology at the National Naval Medical Center, Bethesda, and Dr. Stevens is an EENT resident at the same facility.

PTSD

I am writing a letter to you regarding the article by CDR Sampson, "Treating the Psychologically Wounded Warrior" which appeared in the July-August 1991 issue of *Navy Medicine*. I applaud CDR Sampson for presenting a concise and informative overview on the psychiatric disorder known as post-traumatic stress disorder (PTSD). The only area of his article which I think was inadequately presented was the section on medication. He seems to downplay the valuable role medications have in treating PTSD. He says they can be useful in treating certain serious symptoms. I feel this is misleading. Selective psychopharmacology can be effectively tailored to treat a wide variety of symptoms including sleep disturbances, refractory depression and anger, persistent flashbacks, persistent anger and hypervigilance, and/or significant distress on reexposure.

Mild or moderate PTSD symptoms can be debilitating to the patient's intrapsychic understanding of and coping with the world around him. Appropriately prescribed psychotropic medications—which reduce the severity or the presence of one or more of the spectrum PTSD symptoms—can contribute significantly to the patient's working through of the traumatic events and putting the past in its place while living a better present and hoping for a better future. I refer CDR Sampson and others to an excellent article entitled "New Approaches in the Pharmacotherapy of Post-Traumatic Stress Disorder" by J. Silver et al. in the October 1990 supplement to *Journal of Clinical Psychiatry* 51:10, pages 33-38.

CAPT M.L. Dembert, MC

Nursing Care of Iraqi POWs

The following information is in response to CDR Van Nest's article entitled "Nursing Care of Iraqi Prisoners of War" in the July-August 1991 issue of *Navy Medicine*.

The Navy-Marine Corps Trauma Center at Al Khanjar, Saudi Arabia, was a combination of BOTH 1st FSSG (Camp Pendleton) and 2d FSSG (Camp Lejuene) medical personnel. The garrison assets of both 1st and 2d FSSG were involved, as well as over 200 Navy Medical Department personnel who were TAD from Navy medical treatment facilities. The personnel who were TAD augmented the Medical Battalion of BOTH 1st and 2d FSSG in the Direct Service Command (DSC), which was the support unit for the forward Marine Divisions. CDR Brown, MSC, was the commanding officer for the Navy-Marine Corps Trauma Center, which was Medical Battalion for the DSC. Within the Navy-Marine Corps Trauma Center there were three letter companies, with all personnel under the Medical Battalion of the DSC.

I am a member of 2d FSSG (the only Navy female nurse forward) and was utilized by both Medical Battalion as well as Headquarters and Service Battalion (in the Group Aid Station) for the DSC. I moved forward to Al Khanjar to assist with the nursing care in the Navy-Marine Corps Trauma Center. I was assigned to the prisoner of war ward as the night nurse. During the 4 days of the ground war and 3 days following I was one of the nurses who provided direct care to the Iraqi prisoners of war. It was my observation that in working with the prisoners of war that they readily assisted one another, whether it was to refill water cups or to get the attention of one of the staff because a prisoner of war patient needed assistance.

The Nurse Corps officers assigned as charge nurses for the wards were all ENSs, LTJGs, or LTs. There were two nurses assigned to each 30-36 cot ward, one for the 12-hour-day shift and one for the 12-hour-night shift. The only exception was in the intensive care unit which staffed at least two nurses on each shift. There were approximately 5-6 corps staff on each shift for each ward. The corps staff was augmented by the Dental Corps on many wards. The majority of care rendered was by the Hospital and Dental Corps. The Nurse Corps officers' role was to supervise, teach, and assist the corps staff in the care of the prisoner of war patients. In my entire time covering 6 months, 10 moves, and working with a variety of personnel in Navy medicine, I never heard concerns from anyone about providing care to prisoners of war if the U.S./Allied troops were no longer among the incoming wounded.

Prior to my present tour with 2d FSSG, I was assigned as Flight Nurse/Nurse Corps Officer at Diego Garcia. In this position I managed, cared for, and interfaced with the U.S. Air Force in patient medevac movement. In any medevac the prisoners of war are moved after U.S./Allied casualties. At Al Khanjar the flight deck was dirt. Due to the rains during the ground war, the soil structure was subject to bog holes. This was somewhat like quicksand. The U.S. Air Force could not jeopardize a C-130 on the flight deck that potentially could be stuck in the mud. Due to the rain the prisoner of war patients could not be moved as quickly as many would have hoped. In a 36-hour period the prisoner of war patient census went to 150 before medevac movement could be reinstituted.

In closing, I would like to commend the Hospital Corps and Dental Corps staff. These men and women did a myriad of jobs from setting up tents, caring for patients, and standing watches. Their "can do" attitude and professionalism was instrumental in all aspects of the Navy-Marine Corps Trauma Center at Al Khanjar, Saudia Arabia.

LT S.M. Weibert, NC

In Memoriam

CAPT **Harold M. Braswell, Jr.,** MC (Ret.), died of pancreatic cancer on 21 Dec 1991 in Paradise Valley, AR.

Dr. Braswell was born on 17 Aug 1924 and was a native of Bonham, TX. He graduated from Louisiana State University and received his M.D. from the University of Arkansas. He completed his internship and residency at the University of Chicago clinics and at the Naval Aerospace Medical Institute, Pensacola, FL, respectively. In addition, he was conferred the Master of Public Health Degree by Tulane University.

Dr. Braswell began his military career during World War II in the Army Air Corps. He served in Europe with the 8th Air Force as a radio operator and gunner before joining the Navy.

During his naval career, Dr. Braswell served as senior medical officer and flight surgeon at sea on the aircraft carriers USS *Randolph* and USS *Saratoga.* During the Vietnam conflict, he saw action in the Gulf of Tonkin off the coasts of North and South Vietnam, while embarked on *Saratoga.* In addition, he served as senior medical officer and flight surgeon in both the Atlantic and Pacific Fleets, at Naval Air Squadrons ashore and afloat, and at shore-based naval medical activities.

In 1982, CAPT Braswell retired from the Navy and entered private medical practice in Paradise Valley, AR.

CAPT Braswell was awarded the Navy Commendation Medal; Navy Unit Commendation; Meritorious Unit Commendation; Army Good Conduct Medal; American, European, and Republic of Vietnam Campaign Medals; World War II Victory Medal; Army of Occupation (Europe) and National Defense Service Medals; and the Vietnam Service Medal with one campaign star.

RADM **Calvin B. Galloway,** MC (Ret.), died of heart failure 28 Jan 1992 after a lengthy illness.

Dr. Galloway was born in Wyandotte, MI, on 10 Jan 1903. He attended Michigan State College and the College of Detroit before receiving his B.A. and M.D. degrees from the University of Michigan.

Commissioned an ensign, he joined the Navy 3 June 1930 and completed his internship at the Norfolk Naval Hospital, Portsmouth, VA. He then returned to the University of Michigan for postgraduate work in syphilis before reporting as medical officer to USS *Panay* on China Station in October 1931.

Dr. Galloway served as liaison officer with Memorial Hospital at USNH New York. There, he completed graduate study in cancer and headed USNH New York's cancer service from 1935 to October 1938. He served as medical officer aboard USS *Badger,* USS *Dickerson,* and USS *Arkansas.* He also served as assistant naval attache and medical officer at the U.S. Embassy, Rio de Janeiro, Brazil, as well as medical officer of the U.S. naval operating base there.

Dr. Galloway studied at the Naval War College, Newport, RI, served as a staff medical officer to the Second Marine Division, and participated in the Saipan and Okinawa operations. Subsequently, he commanded the Medical Field Research Laboratory, Camp Lejeune, NC, and the Naval Medical Research Unit #3, Cairo, Egypt, respectively. He assumed duty as commanding officer of the Naval Medical School, National Naval Medical Center, Bethesda, MD, from August 1956 until December 1958, when he was assigned to BUMED as Assistant Chief for Research and Military Medical Specialties. In July 1963, he reported as commanding officer of the National Naval Medical Center, Bethesda, and served as such until he retired 1 Feb 1965.

RADM Galloway was awarded the Legion of Merit; Bronze Star Medal; Yangtze Service Medal; Marine Corps Expeditionary Medal; American Defense Service Medal, Fleet Clasp; American Campaign Medal; Asiatic-Pacific Campaign Medal; World War II Victory Medal; Navy Occupation Service Medal, Asia Clasp; National Defense, Korean, and United Nations Service Medals.

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