



U. S.
NAVY

Medicine



July 1975

UNITED STATES NAVY MEDICINE

Vol. 66

July 1975

No. 1

Vice Admiral D. L. Custis MC USN
Surgeon General

Rear Admiral D. P. Osborne MC USN
Deputy Surgeon General

CAPT C. M. Herman, MC, USN, **Contributing Editor-in-Chief**

Sylvia W. Shaffer, **Editor**

Mrs. Virginia M. Novinski, **Assistant Editor**

Mrs. S. B. Hannan, **Graphic Arts**

Contributing Editors

Nephrology . . . CDR J.D. Wallin MC USN

Nurse Corps . . . CAPT B.G. Nagy NC USN

Psychiatry . . . CAPT R.E. Strange MC USN

Legal . . . CDR J.W. Kercheval II, JAGC USN

Fleet Support . . . CAPT J.W. Johnson MC USN

Dental Corps . . . CAPT E.E. McDonald DC USN

Naval Reserve . . . CAPT N.V. Cooley MC USNR

Head and Neck . . . CAPT R.W. Cantrell MC USN

Gastroenterology . . . CAPT D.O. Castell MC USN

Submarine Medicine . . . CAPT J.H. Baker MC USN

Research Medicine . . . CAPT C.E. Brodine MC USN

Education . . . CAPT W.M. McDermott, Jr. MC USN

Radiation Medicine . . . CAPT J.H. Dowling MSC USN

Marine Corps Medicine . . . CAPT D.R. Hauler MC USN

Preventive Medicine . . . CAPT C.E. Alexander MC USN

Medical Service Corps . . . LCDR J.T. Dalton MSC USN

Aerospace Medicine . . . CAPT F.H. Austin, Jr. MC USN

Occupational Medicine . . . CAPT G.M. Lawton MC USN

POLICY

U.S. NAVY MEDICINE is basically an official Medical Department publication inviting the attention of officers of the Medical Department of the Regular Navy and Naval Reserve to timely up-to-date items of official and professional interest relative to medicine, dentistry and allied sciences. The items used are neither intended to be, nor are they, susceptible to use by any officer as a substitute for any item or article, in its original form. The opinions and conclusions expressed in the articles or items included herein are those of the respective authors and do not necessarily represent the views of the Department of the Navy, the Bureau of Medicine and Surgery or any other governmental department or agency thereof.

DISTRIBUTION

U.S. NAVY MEDICINE is distributed to active duty Medical Dept. officers via the Standard Navy Distribution List (SNDL) vice personal addresses. Requests to increase/decrease the number of allotted copies are forwarded via the local command to *U.S. NAVY MEDICINE*, Code 0010, Bureau of Medicine and Surgery, Washington, D.C. 20372.

Retired and Reserve officers on inactive duty may subscribe by forwarding request with full name, rank, corps, status, address and zip code.

Notification of address changes should be forwarded together with a recent mailing label.

See inside back cover for additional information.

The issuance of this publication approved in accordance with NAVEXOS P-35.

NAVMED P-5088

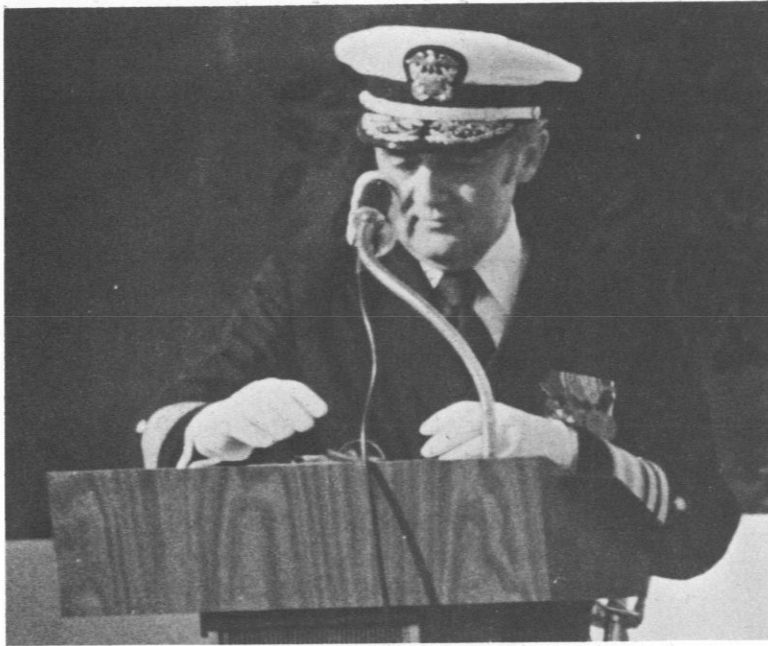
C O N T E N T S

<p>FROM THE CHIEF 2</p> <p>SCHOLARS' SCUTTLEBUTT 25</p> <p>BUMED SITREP 40</p> <p style="text-align: center;">PROFESSIONAL PAPERS</p> <p>Medicolegal Aspects of Rape Investigation 4 <i>B.W. Given</i></p> <p>The Crush Syndrome 13 <i>LCDR P.J. Kovalcik, MC, USNR</i></p> <p>Moulage Fabrication 16 <i>CAPT D.N. Firtell, DC, USN</i> <i>CDR G.R. Pedrick, DC, USN</i></p> <p style="text-align: center;">FEATURE ARTICLE</p> <p>Life Cost Cycle of Medical Equipment 20 <i>LTCOL D.M. Keith, USA</i> <i>L. Keith, M.D.</i> <i>C.A. McCarthy</i></p>	<p>LETTERS TO THE EDITOR 26</p> <p style="text-align: center;">NOTES AND ANNOUNCEMENTS</p> <p>Length of Patient Stay in Navy Medical Facilities 28</p> <p>Gorgas Memorial Lab Offers Course in Tropical Medicine 29</p> <p>LCDR Randolph Receives First R.E. Luehrs Memorial Award 29</p> <p>Dental Corps Management Seminar 30</p> <p>MSC Officers to Command Hospitals 31</p> <p>Navy's First Black Female Physician Welcomed Aboard 32</p> <p>Corpsmen Participate in Shore Sailor of the Year Competition 32</p> <p>New Dispensary/Dental Clinic at Yorktown Naval Weapons Station 34</p> <p>Medical Reserve Unit Organized at San Diego 34</p> <p>Official Instructions and Directives 35</p>
---	--

Credits: All pictures are Official Navy Photographs unless otherwise indicated.

COVER: Donna P. Davis, M.D., takes the oath of office, becoming the first black woman doctor to join the Navy. LT Boykin Jordan administers the oath during the April ceremony. For more on Dr. Davis, one of 31 woman physicians now on active duty in the Medical Department, see page 32.

The continued support of the Media Division, Educational Programs Development Dept., Health Sciences Education & Training Command (HSETC), NNMC, Bethesda, Md., is gratefully acknowledged.



from the Chief

The following remarks are excerpted from the Surgeon General's address at Change of Command ceremonies held at the National Naval Medical Center on 25 June 1975. They are particularly appropriate since ground breaking ceremonies for the Uniformed Services University of the Health Sciences were conducted this month:

As you know, far more than a Change of Command is happening at Bethesda. We are also embarking on a five-year program to radically alter the facilities, the appearance, the mission, and the importance of this already renowned National Naval Medical Center.

Even Franklin Delano Roosevelt would approve.

By 1980 there will have been completed here the most modern of new generation hospitals, closely linked with the new Walter Reed, Malcolm Grow, and the National Institutes of Health, in support of what can only become one of the outstanding health science universities in the world—an academy to heighten the entire calibre of tomorrow's military medicine.

Adjacent to this Center stands the most prestigious medical facility of its kind in the world: the National Library of Medicine. During the twenty years since its inception it has become the reference source

par excellence, serving academicians, clinicians, allied health scientists, and medical research experts at home and abroad. If the NLM did not exist today, it would be mandatory to create it, for it has no peer.

Yet few will remember the story of its near abortion at the hands of many prominent detractors. Its need and cost effectiveness, even its location, were roundly challenged. The press was recruited to assist in its defeat.

The National Library's birth under adversity provides an object lesson for those who are struggling today to make a similar vision come true—the Uniformed Services University of Health Sciences. The issues are comparable, the scenario the same—only the players have changed. Substitute David Packard for Herbert Hoover, Congressman Hebert for Senator Hill, Malcolm Todd for Michael DeBakey, and Tony Curreri for Frank Baggers, the Library's first director.

A strong supporter and co-sponsor of the NLM legislation was the then Senator John F. Kennedy, while in opposition stood the General Counsel to the Hoover Commission, Robert F. Kennedy. Joseph P. Kennedy was a member of the Commission.

Now, as time repeats itself, the ultimate decision on the birth of the Uniformed Services University will soon be rendered by the members of Congress. I for one expect a normal delivery, if for no other reason than my own confidence in the team and the merits of their cause.

The advantages are clear for those who wish to understand that this University, at costs comparable to the civilian sector, will create new models of health education tailored to the global needs of military medicine, with all the multiplicity and uniqueness of its missions. It was never intended to serve as the primary source of medical officer accession, but rather to create a hard core, dedicated cadre of all health professionals to elevate the quality, career opportunity, and prestige of of military medicine.



Medicolegal Aspects of Rape Investigation

By Bruce W. Given

In the United States a forcible rape is reported once every 11 minutes; yet it is thought that only one out of every ten acts of rape is brought to the attention of authorities. The frequency of this crime, not only violent to the body but traumatizing to the psyche, provokes great concern. Even more disturbing is the rate at which this crime is escalating. According to Federal Bureau of Investigation statistics, the offense of rape increased 70% from 1967 to 1972. A yearly increase exceeding 10% has been reported since then (1).

For the investigator to cope effectively with this rapidly increasing act of violence and reflect true professionalism in his pursuit of the investigation, a well-founded knowledge of the parameters of rape is essential. But although general investigative techniques are part of the experienced agent's expertise, little formal training is given in the medicolegal aspects of rape investigation.

Perhaps no other case category within the jurisdiction of the Naval Investigative Service (NIS) requires so close an alliance between investigator and physician for the successful resolution of a crime. If founded on mutual respect, this alliance is advantageous to both.

From the Armed Forces Institute of Pathology (AFIP), Washington, D.C.

Mr. Given is a Special Agent with the Naval Investigative Service Headquarters, Alexandria, Virginia. Currently an AFIP Fellow, he is enrolled in the AFIP-George Washington University master's degree program in forensic sciences.

For proper resolution of a case, the agent's counsel to the physician is needed: (1) to interpret investigative facts, with the investigator providing a concise, accurate, and detailed summary of the circumstances surrounding the offense; (2) to advise the physician regarding the particular services desired; and (3) to teach techniques of establishing and maintaining a proper chain of custody for all medical evidence.

On the other hand, the physician serves as the agent's adviser in the following provinces of investigation: (1) as a collector of clinical medicolegal information, such as findings of physical trauma, foreign fluids or objects, or salient psychiatric innuendo; (2) as an interpreter of clinical findings; and (3) as a potential expert witness should the investigation culminate in court action.

NIS involvement in a case is initiated by a variety of reactions on the part of the rape victim. Figure 1 attempts to represent schematically some of these reactions and the subsequent sequence of events. Unfortunately, cases do not always progress so neatly. The vicissitudes of practical events can confound progress at any point: cases are not always referred to NIS as they should be, victims recant their statements, and crime scenes do not always reveal the culprit's dropped identification card.

And there is another, more serious vexation. The folklore of investigators is rich in stories of frustration over the examining physician's reluctance to provide full support for fear of

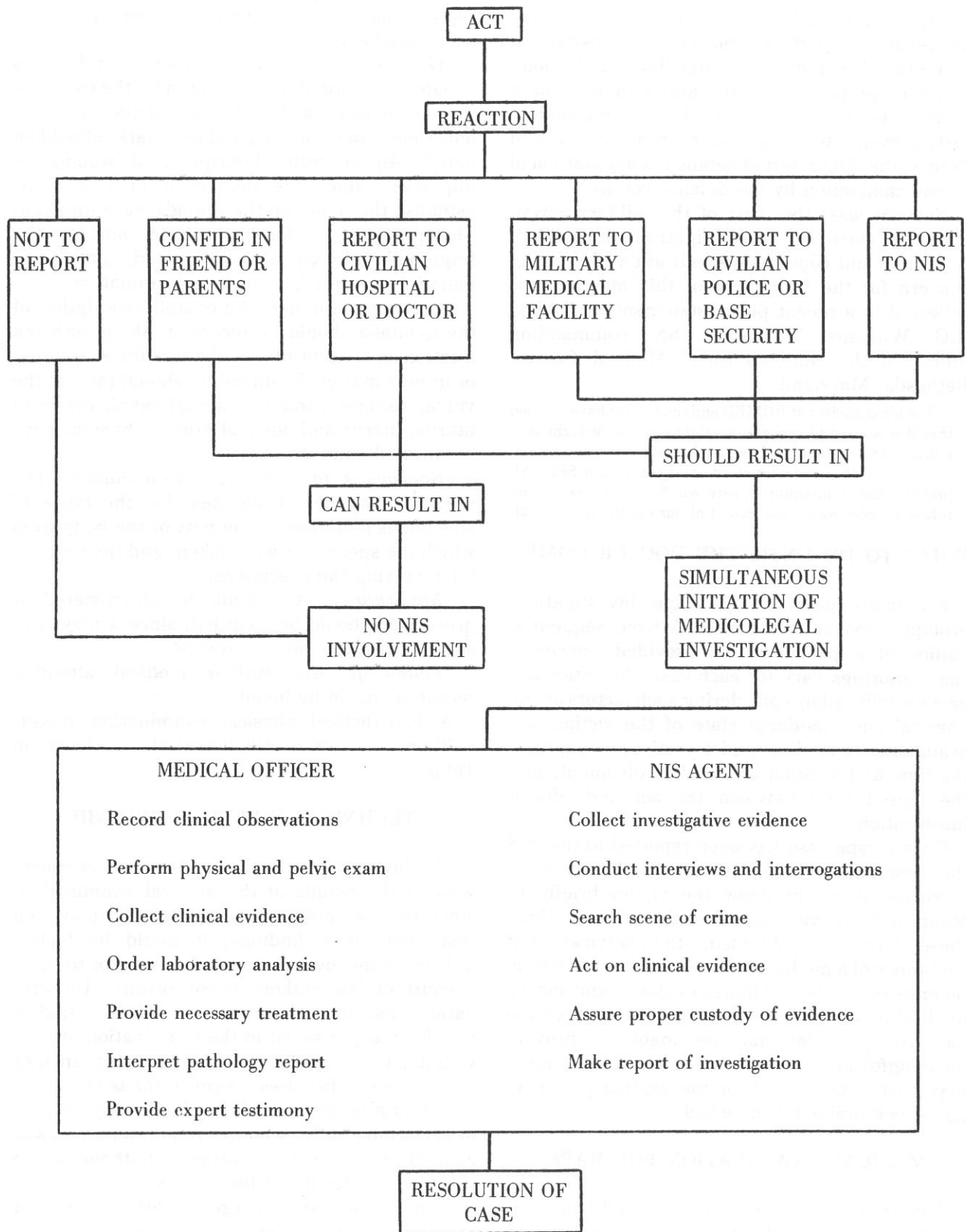


Figure 1—Schematic representation of chain of events leading to resolution of a rape case.

"getting involved." But the possible consequences of participation in an investigation make this reluctance more understandable: long hours of preparation and waiting in a witness room to testify, the chance of being recalled to testify even after separation from the Armed Forces, the discomfort of detailed, sometimes acid cross-examination by the defense counsel.

Nevertheless, this part of the military physician's responsibility cannot rightfully be avoided. A healthy and constructive indication of growing concern for the fulfillment of this obligation is reflected in a recent policy statement by RADM R.G. Williams, Jr., MC, USN, commanding officer of the National Naval Medical Center, Bethesda, Maryland:

The legal adviser at BUMED and the Center have advised that if a woman is sexually assaulted and is brought to a military reservation, she cannot be refused examination. Sexual assault is considered an emergency, and SECNAV provides that humanitarian care will be given; we cannot refuse to treat within the extent of our capabilities. . . (2).

WHAT TO DO UNTIL THE DOCTOR COMES

For many parts of the rape investigation, prompt response is essential. A fixed sequential outline of steps cannot be provided, however, since priorities vary for each case. Priorities are best established by considering such factors as the physical and emotional state of the victim, the availability of medical and investigative support, the time and location of initial involvement, and the lapsed time between the act and official intervention.

Once a rape case has been reported to the NIS the first logical step, unless the victim is *in extremis*, is to interview the victim briefly to obtain a narrative account of the offense. Once these facts are obtained, the services and assistance of a medical officer should immediately be enlisted to obtain clinical evidence and insure medical protection for the victim. If consulted too late, the physician may be unable to provide meaningful help: physical indications of trauma may have disappeared, or the vaginal pool may have been drained or douched.

MEDICAL EXAMINATION FOR RAPE

Medical examination for rape should include:

Presenting complaint. The physician should provide a brief physical description of the patient and a statement of her complaint, along with the

reported date of her last menstrual period and last consensual coitus.

General physical examination. Vital signs should be recorded, as warranted by the extent of trauma. Injuries such as ligature marks, bruises, abrasions, open wounds, and bite marks should be noted. An accurate description of wounds is important, since the degree of healing helps establish the time that the wounds were inflicted. The presence of foreign matter beneath the fingernails should also be noted, and such material preserved for further examination.

Pelvic examination. An overall description of the genitalia should be recorded, along with the location and extent of any abnormalities, trauma, or foreign matter. Examination should include the vulva, vaginal introitus, vaginal canal, cervix of uterus, uterus and adnexal organs, hymen, perineum, and anus.

Specimens for laboratory examination. The medical examiner should describe the types of specimens he removes, the part of the body from which the specimens were taken, and the purpose for removing the specimens.

Medications. Any medicine administered or prescribed should be recorded, since it may later assume medicolegal importance.

Follow-up. Any further medical attention required should be noted.

A hypothetical physical examination report, neither long nor overly technical, is shown in Table 1.

TECHNICAL INVESTIGATIVE AID

The investigation of a rape is never complete without the results of the medical examination, since the resolution of the entire case may well rest upon these findings; it would be foolish indeed for the investigator and prosecutor to enter a court of law without these results. Unfortunately, the investigator cannot always find a physician experienced in the examination of rape victims; this is particularly true at the smaller naval medical facilities. Even rarer is the availability of a properly equipped laboratory capable of performing the procedures required for cases of alleged rape, and a forensic pathologist to interpret the results of these tests.

Some dispensary emergency rooms may not even have the proper material to collect necessary specimens. However, the Technical Services Division of NIS will soon be able to provide resident

TABLE 1. Hypothetical Examination Report

This 21-year-old, gravida 0, para 0, Caucasian female was brought to the emergency room by Special Agents _____ and _____ at 2345 hours this date. Patient lying on bed, crying and upset. Clothing (coat) covered with mud and debris. States that approximately 2230 this date she was going into her barracks, was stopped by an unknown male, pulled behind the building by assailant, where another male held her. She was then assaulted (sexual intercourse) by the first male. Event occurred outside on ground. Patient states she was not struck in face or about her body.

PHYSICAL EXAMINATION

Blood pressure 118/70; respiration 20; reflexes normal.

Ecchymosis, right neck and breast, recently caused.

PELVIC EXAMINATION

Last normal menstrual period 20 November 1974.

Last consensual coitus 10 November 1974.

Vulva: Intact. No lacerations or evidence of trauma.

Vagina: No vault lesions; gross semen present in postvaginal pool.

Cervix: No gross lesions.

Adnexa: Within normal limits.

Perineum and anus: Normal.

PLANNED PROCEDURES

VDRL.

Blood group and type.

Gynecologic cultures of cervix and rectum.

Smears for acid phosphatase.

Smears for sperm staining.

Microscopic examination of postvaginal pool fluids shows presence of motile spermatozoa.

MEDICATIONS

(1) 4.8 million units aqueous penicillin by intramuscular injection.

(2) Valium, 10 mg every day as needed.

(3) Stilbestrol, 25 mg by mouth, twice a day, for five days.

DISPOSITION

Patient to return to Gyn clinic in one week for follow-up.

agencies with a kit for rape investigation. This kit can be given to medical facilities under the resident agency's jurisdiction, or kept at the office for use as needed. Included in the kit will be an instruction sheet and proper materials to help the less experienced physician collect specimens.*

MEDICOLEGAL EVIDENCE: WHAT AND WHY

The collection of specimens for medicolegal evidence should be done before disturbing or manipulating the various anatomic sites. This will lessen the opportunity for the examiner to inadvertently transfer material from one location to another, either on his gloved hand or by causing fluids to flow in unnatural paths.

Specimens and laboratory procedures of primary interest to the medicolegal investigating team include:

Spermatozoa. The classic and irrefutable indicator of recent coitus is the presence of male reproductive cells within the vaginal cavity. Each milliliter of ejaculate will normally contain from 28 million to 225 million sperm cells. Investigatory procedures regarding sperm fall into two categories:

(1) *Motility studies.* This technique must be carried out immediately by the facility conducting the physical examination. The only equipment required is a microscope. One drop of vaginal or other appropriate fluid is mixed with one drop of normal saline solution, placed on a microscope slide, and examined for motile sperm. Although there is no absolute period of time spermatozoa will remain motile after leaving the male, the longest period reported by one investigator was eight hours (3). This time may be considerably shortened depending on the conditions of the post-ejaculation environment (temperature, acidity, bacterial activity).

The presence of motile sperm not only shows evidence of coitus but also yields an approximate time frame for the act. The NIS kit will include microscope slides for this examination.

(2) *Fixed smears for sperm staining.* For this examination, the physician should provide a

*The rape investigation kit should be ready for distribution sometime this summer. For further information, write: Naval Investigative Service Headquarters, Attn: Code 26, Hoffman Bldg. #1, 2461 Eisenhower Ave., Alexandria, Va. 22331.

microscope slide with an air-dried smear from each area of interest, e.g., vaginal pool, vulva, mouth, etc. The slide can then be examined at a properly equipped laboratory. These smears are usually stained according to the Papanicolaou procedure, and examined for the presence of sperm cells. Again, no absolute values can be given. Rupp (3) reported no sperm 14 hours after coitus. Davies and Wilson (4) obtained no negative results before 30 hours, and very few negative results up to 48 hours post coitus. Even after six days their research produced one positive finding.

If the examining laboratory is staffed by experienced and conscientious technicians, smear reports may differentiate between sperm with and without attached tails. This is a meaningful finding, since it provides yet another indicator of elapsed time. Davies and Wilson report:

Tails are not frequently found attached to spermatozoa on swabs taken within one hour of intercourse. They are commonly found up to 16 hours; thereafter spermatozoa with tails occur rarely but have been found as late as 72 hours.

All the data support the desirability of conducting examinations as soon as possible.

Prostatic acid phosphatase. The products of the testes constitute less than 5% of the volume of seminal fluid; the prostate gland produces most of the ejaculate. For several reasons it is to this latter portion of the seminal fluid that current research is turning for accurate indicia of coitus.

The last decade has seen an overwhelming acceptance of the vasectomy as a simple, safe, and inexpensive method of nearly 100% effective birth control. It is estimated that since 1970 well over three million American men have undergone this procedure. Medical conditions such as oligospermia and aspermia also confound the search for rape evidence based solely on the presence of spermatozoa. However, prostatic acid phosphatase, an enzyme unique to the prostate gland, will be found in ejaculate with or without the presence of sperm.

To collect this enzyme the physician saturates a cotton swab in the vaginal pool or other appropriate area, places this swab in a dry, stoppered tube, and stores the tube in a freezer until testing. Collection equipment is supplied in the NIS kit. The testing procedure itself, however, is too complex and varied to describe here. Different methods of determining prostatic acid phosphatase yield differing numerical indices and varying time periods of validity. Using one

method, Rupp has detected this enzyme for periods well in excess of 24 hours; using another system, Baxter (5) reports detecting semen in the vagina up to four days after intercourse. Enos et al (6) use a method yielding negative results after a postcoital period of over 12 hours. Reports may indicate findings in Bodansky units, international units, or King-Armstrong units.

Bacteriology. Culture of smears taken from appropriate areas to detect the presence of *Neisseria gonorrhoea* is done primarily to protect the victim. However, the culture may also have evidentiary value, especially if a suspect is found to have the same type of venereal disease. Supplies for obtaining this smear are found in the NIS kit.

Serology. Blood is drawn for blood grouping and serologic tests for syphilis (STS). Blood grouping is of obvious evidentiary value when blood stains are found at the scene of the crime. STS will probably be repeated 6 to 12 weeks after the incident.

Secretor status. In addition to the blood-group substances found in blood, some 80% to 85% of the population (known as secretors) also have these substances in other body fluids, such as sputum, tears, perspiration, and semen. Two or three milliliters of the victim's saliva should be collected on a piece of dense filter paper, air dried, and placed in a plastic bag. Although this specimen may not prove to have any evidentiary value, it should be retained for comparative purposes in the event other evidence at the scene of the crime or on the suspect is developed. A separate air-dried slide with a smear of seminal fluid found on the victim should also be retained for possible comparison with fluid from suspects. Dried semen can be scraped into a plastic bag. Again, the NIS kit will provide necessary materials.

Pubic hair combings and specimens. Using the comb provided in the NIS kit, the medical examiner should comb all the victim's pubic hair, depositing in a plastic bag both the comb and all retrieved hairs. He should then pluck 10 or 12 pubic hairs from the victim and place them in a separate bag. If the victim objects to this procedure, the hairs may be cut at skin level.

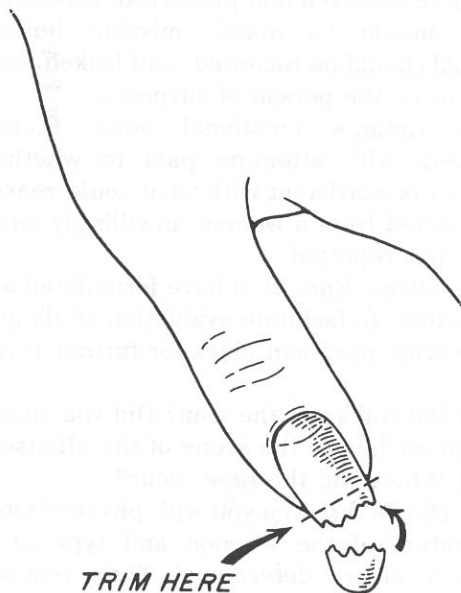
Fingernail scrapings. Scrapings are taken from under all the nails of one hand, and placed in a plastic bag along with the scraper; scrapings from under the nails of the other hand should be placed in a separate bag. If the victim lost a portion of a nail during the attack, the remainder of the nail's

distal end should be trimmed and retained (Figure 2). On investigating a rape when the victim is dead, all fingernails should be trimmed, instead of scraped, at the time of the autopsy, and the parings should be retained. A fingernail trimmer and scrapers are supplied in the kit.

Additional specimens. The above procedures should be routinely considered in all cases. Each incident is unique, however, and may require the investigator to request additional support from the examining physician. Three such possible requirements are:

(1) *Blood alcohol and other toxicologic studies.* If the victim shows symptoms of intoxication or suspects that she has been drugged, appropriate studies should be conducted. These findings may bear on the legal question of invalid consent caused by mental impairment or drug intoxication.

(2) *Clothing.* Any articles of clothing carrying suspected blood or seminal stains should be air dried and retained in plastic bags for evidence. The victim should be given a receipt for any personal property retained.



Retain for possible matching with nail portions found at scene or on person of suspect

Figure 2—The victim's nail should be trimmed to provide a matching pattern with the torn portion.

(3) *Pregnancy test.* As a protective measure for the victim, an early-morning, first-voided urine sample may be requested to test for pregnancy.

HANDLING OF EVIDENCE

The investigator must insure that all evidence collected is properly and completely identified. Each specimen should reflect the victim's name and hospital number, the date and time the evidence is taken, the nature and origin of the specimen (e.g., "fingernail scrapings from left hand"), and the initials of the examiner.

Maintaining a proper chain of custody for each specimen is also critical. Several instances are documented in the legal literature in which medical testimony was held inadmissible by the court because of a break in the chain of custody between procurement of the specimen and its examination by the pathologist. The agent is responsible for assuring that the appropriate documentation is prepared for each specimen (NIS Form 5520/119), and that the evidence custody document and chain of custody (NIS Form 5520/118) is properly initiated.

The agent can help obtain needed photographic coverage if a medical photographer is not available. NIS offices can provide easily operated Instamatic type evidence cameras for use by the physician or other appropriate emergency room personnel.

Regardless of whether the victim is active duty military, a dependent, or a civilian, written consent should be obtained for all photography. In fact, if the victim is a military dependent or a civilian treated on a humanitarian basis, it is prudent to obtain written consent for all medicolegal procedures (there is little legal concern over examination of an active-duty member of the military). Appropriate written consent forms for photography and medicolegal examinations are being standardized and will be made available to NIS agents.

PATHOLOGY REPORTS AND POSTMORTEM EXAMINATIONS

The laboratory or pathology report is an essential document in the case file. In addition to technical information, the report should contain a summary paragraph in which the examiner's impressions are recorded in language a layman can understand. An example of such a report is provided in Table 2.

TABLE 2. Hypothetical Pathology Report

The materials on HR Sally Jones, USN, SSN 123-45-6789, were received by me in good condition on 6 December 1974. The chain of custody accompanied the following material: two microscope slides, a red-topped tube containing mucoid material, and a red-topped tube of blood. The microscope slides were stained according to the Papanicolaou technique, and spermatozoa were identified. The vaginal aspirate was tested for acid phosphatase, which was found to be markedly elevated, having a value of 240.95 I.U./ml. Serologic tests for syphilis were negative. Cultures were taken, and *Neisseria gonorrhoea* was not present.

IMPRESSION: ELEVATED ACID PHOSPHATASE. VAGINAL POOL WITH ASSOCIATED SPERMATOZOA SEEN ON VAGINAL SMEAR CONSISTENT WITH RECENT SEXUAL ACTIVITY.

Neither the pathology report nor the medical report should contain an opinion concerning whether or not the victim was raped. As is pointed out in Technical Bulletin #14 of the American College of Obstetricians and Gynecologists, "Whether rape occurred is a legal matter for court decision and is not a medical diagnosis" (7).

When a case of suspected rape involves the death of the victim, it is essential that the agent be present at the autopsy to insure complete collection of necessary medicolegal evidence, and to inform the pathologist of known investigative details of the death.

A few years ago the Armed Forces Institute of Pathology reviewed a number of autopsy reports which contained erroneous interpretation of pathologic findings. These reports also failed to provide a medical opinion concerning cause and manner of death, or to attain special evidentiary objectives of the autopsy. Analysis of these cases

revealed that the most common cause of the shortcomings was "a failure to exchange medical and investigative information prior to, during, and upon completion of the autopsy." Based on these findings appropriate changes were made in the *Manual of the Medical Department* (8) and the *JAG Manual* (9).

INTERVIEWING THE VICTIM

In addition to the usual techniques of interrogation, medicolegal investigation of rape demands special skills from the investigator. An in-depth interview with the victim can be equally as important as the examinations carried out in the hospital emergency room. The interview should be conducted as soon as possible after the incident, in a private setting conducive to discussion. The following techniques can be useful:

Observations. What is the physical condition of the victim and her clothes? Assuming the victim did not wash and change clothes prior to reporting the crime (many do; if not certain about this, ask), a great deal can be gained from noting these details. Any debris in the hair or on the clothing should be collected and preserved. Blood or other stains should be noted; missing buttons or material should be recorded, and looked for at the scene or on the person of suspects.

The victim's emotional state should be observed, with attention paid to whether her behavior is consistent with what could reasonably be expected from a woman unwillingly subjected to the acts reported.

Questions. Enos et al have formulated a series of questions to facilitate evaluation of alleged acts and provide pertinent clues for further investigation:

(1) Did you know the man? Did you voluntarily accompany him to the scene of the offense?

(2) Where did the rape occur?

(3) Did he threaten you with physical violence? The nature of the weapon and type of threat should be clearly determined. The threat of force is one element in the crime of rape.

(4) Did he use restraints? This can include a partner to the offense, or ligatures. If ligatures were used, any ligature marks found on the body should be photographed.

(5) Did he attempt fellatio, buggery, or cunnilingus, or try to insert a foreign body into your vagina? A sadomasochistic rapist may attempt

any or all of these acts in addition to vaginal intercourse. Embarrassment, confusion, or remorse may inhibit the voluntary description of such acts, so response must be elicited. One approach suggested for use with overly sensitive or inhibited women is: "Very often women tell us other things happened to them, too; things they consider unnatural or find hard to talk about. Did anything like this happen to you?" (10). A similar approach to children is encouraged: "Can you think of anything else the man did that you didn't like or didn't understand?"

(6) Did he use a condom? The importance of this information to the interpretation of negative laboratory findings is obvious.

(7) Have you ever been raped before? As Enos points out, "A history of previous rape does not strengthen the evidence for prosecution should the case come to trial."

(8) When was the last time you had intercourse prior to this event? Again, this information is essential for valid interpretation of laboratory findings.

(9) Did he steal anything? The robbery-rape combination is common. An inventory of stolen items is valuable when searching for incriminating evidence held by a suspect. This list might also help develop a psychiatric profile of the rapist.

(10) What did he say before, during, and after the attack? The rapist's comments may help identify him, or may contribute to the construction of a psychiatric profile.

(11) What did he do after the rape? These acts may fit with the *modus operandi* of prior rapes investigated and may help identify the rapist.

(12) Was there more than one man involved? When there are multiple offenders in a rape, the validity of the complaint is generally enhanced.

During this interview as much detail as possible should be gathered about unique characteristics such as unusual body features ("He had a wart on his penis"), manner of dress ("He was wearing lace panties"), and manner of speech ("He had a New England accent").

In all proceedings the victim should be afforded no reason whatever to question the investigator's or physician's open-mindedness or discretion. If at all possible, both the agent and the physician should arrange for the presence of a neutral but understanding female witness. Unless there is good reason to believe that the victim's statement is fraudulent, it is critical to avoid an aggressive, authoritarian (as opposed to authoritative) ap-

proach. In an exhaustive study by Schiff (11) of 100 reports of rape, the data suggest that at least 68% of these reports were valid complaints of some form of sexual assault. This figure is far too high to justify any tendency to prejudge the victim or become casual in approach.

EVALUATING SUSPECTS

In evaluating suspects, time is perhaps the investigator's greatest adversary, since recovering damning but evanescent biological evidence from the body of the culprit becomes more unlikely with every tick of the clock. The less time the rapist has to wash away, repair, heal, or conceal indicia of his act, the easier will be his indictment. Areas of potential value in obtaining evidence against a rapist include:

Clothing. The garments worn during the commission of a rape are a potential gold mine. If fibers are recovered from the fingernails or clothing of the victim, matching material should be sought on the suspect. The use of ultraviolet light should be considered when searching for blood or semen stains. In *U.S. vs Morse* it was ruled, "It does not constitute an unlawful search to look at outer garments worn by an accused, nor does it trespass upon his privacy to view such outer clothing with the aid of a particular light" (12).

Pubic hairs. If a suspect is apprehended within a few hours of the rape, chances are good for the recovery of the victim's pubic hair commingled with the suspect's. The same technique should be used as employed to obtain pubic hair from the victim. Military law has held that seizure of pubic hair samples from a suspect's body can be justified as incident to his arrest. Even the forcible taking of samples, over the objection of the suspect's attorney, does not violate the standard of reasonableness prescribed by the Fourth Amendment.

In *U.S. vs Pyburn* the court held:

Generally, the privilege against self-incrimination applies only to testimonial utterances or "verbal acts" which involve the active use of a person's mind and will. But, the compulsory obtaining of passive exhibits from a person's body may be constitutionally impermissible *if* [italics added] the means used to obtain the specimen is in itself a shocking and offensive intrusion into individual privacy or the sanctity of the body . . . however, the exposure of private parts by an Air Force member to a military physician is hardly a shocking intrusion into privacy (13).

Fingernail scrapings. If scratch marks are found on the victim's body, the accused may very likely still have epithelial cells from the victim impacted under his fingernails. Fibers from the victim's clothing may also be present. To collect this evidence, procedures previously outlined for the victim should be followed.

The Supreme Court of the United States recently reviewed a case in which, over the respondent's protest, without a warrant, and in the course of station-house questioning in connection with a murder, police took samples from the respondent's fingernails that were later used as evidence to convict him (14). There was prior probable cause to believe that he had committed the murder. The Court held that in view of the station-house detention upon probable cause, the very limited intrusion undertaken to preserve highly evanescent evidence did not violate the Fourth and Fourteenth Amendments. Justice Stewart opined that at the time the suspect was being detained at the station-house, he was obviously aware of the detectives' suspicions. The suspect did not have the full warning of official suspicion provided by a formal arrest; however, he was sufficiently apprised of his suspected role in the crime to motivate him to attempt to destroy evidence. Justice Marshall supported this opinion, stating, "There was no way to preserve the status quo while a warrant was sought."

These findings bear directly on the collection of biological evidence in cases of rape. If time permits, it is always advisable to seek legal opinion on any seizure or search. When legal opinion is not available, the following information should be considered in determining proper action: Is there reasonable cause to believe that the suspect committed the offense? Can this reasonable cause be clearly described? Is the desired search likely to develop the evidence being sought? Is the search limited to such evidence? (The law of the Fourth Amendment requires that the scope of a search be strictly limited to only such evidence as needed to justify the search.)

Evidence of injuries. All signs of injuries inflicted by the victim should be noted. According to *U.S. vs Morse*, "Visual inspection of the person of the accused does not violate any constitutional right or any provision of UCMJ, Art. 31" (12).

Secretor status. If the pathology report on the victim indicates a need to determine the secretor status of the suspect, 2 or 3 milliliters of saliva should be collected.

Penis washings. Squamous epithelium cells exfoliated from the surface of the cervix and vagina are identifiable by their morphologic features. If the rapist is apprehended soon after the act, the presence of such cells can be detected, and would serve as valuable evidence. Research is currently being accomplished to facilitate the recovery of such cells for evidence, and to determine how long after the act such cells can reasonably be expected to be found.

SUMMARY

A close alliance between examining physician and investigator is essential for the successful medicolegal investigation of alleged rape. Regardless of the peculiarities of an individual case, both members of the medicolegal team have specific areas of responsibility that are best accomplished through cooperation, candor, and mutual respect. A suggested protocol of medical examination for the victim is presented, with a detailed discussion of how and why potentially valuable forensic evidence is collected. The medicolegal aspects of collecting evidence from the suspected rapist are also considered.

REFERENCES

1. *Crime in the United States (Uniform Crime Reports for the United States)*. Department of Justice/Federal Bureau of Investigation, 1974.
2. National Naval Medical Center Regional Executive Committee minutes of 3 Sep 1974.
3. Rupp JC: Sperm survival and prostatic acid phosphatase activity in victims of sexual assault. *J Forensic Sci* 14:177-183, 1969.
4. Davies A, Wilson E: The persistence of seminal constituents in the human vagina. *Forensic Sci* 3:45-55, 1974.
5. Baxter SJ: Immunological identification of human semen. *Med Sci Law* 13:155-165, 1973.
6. Enos WF, Beyer JC, Mann GT: The medical examination of cases of rape. *J Forensic Sci* 17:50-56, 1972.
7. "Suspected Rape." American College of Obstetricians and Gynecologists Technical Bulletin #14, 1970 (revised 1972).
8. *Manual of the Medical Department*. U.S. Navy, NAVMED P-117, Chap. 17-2, 17 Dec 1971.
9. *Manual of the Judge Advocate General*. JAGINST 5800.7A, Section 0810, 1 Oct 1970.
10. Bard M, Ellison K: Crisis intervention and investigation of forcible rape. *The Police Chief* 41:68-74, 1974.
11. Schiff AF: A statistical evaluation of rape. *Forensic Sci* 2:339-349, 1973.
12. *U.S. vs Morse*, 27 CMR 67.
13. *U.S. vs Pyburn*, 47 CMR 896.
14. *Cupp vs Murphy*, 412 U.S. 291, 1973. 🍀

THE CRUSH SYNDROME

By LCDR Paul J. Kovalcik, MC, USNR

Limb compression and renal impairment associated with myoglobinuria ("crush syndrome," "Bywaters' Syndrome") was first described in 1941 among victims trapped in bombing debris during the Battle of Britain (1). Similar post-traumatic anuria was described in American soldiers who, during World War II, were crushed within stone houses in the Italian countryside (2). A significant number of Vietnam casualties who required dialysis for posttraumatic renal failure had crush injuries (4), as had most of the patients treated following the last earthquake disaster in Nicaragua (5).

The crush syndrome provided an early stimulus for understanding acute renal failure, leading to improvements in the management of postoperative oliguria. The myoglobinuria associated with this syndrome is closely related to the problem of hemoglobinuria produced by incompatible blood transfusions. Myoglobinuria can also be seen in patients with sepsis (6), electrical burns (7), exercise induced muscle injury (8,9), prolonged surgery, and arterial occlusion of a limb (10). Most recently myoglobinuria has been described as a

complication of drug abuse (11). This paper will describe the clinical features and pathophysiology of the crush syndrome, in order to increase awareness of this problem and encourage early detection and treatment.

The earliest observations of this syndrome, described in 1941, are still valid (1,12). The crush syndrome begins when a heavy object, usually part of a collapsed building, falls on an individual, with resultant occlusion of the arterial supply to an extremity. When after several hours the weight is removed and blood flow restored, the limb becomes gradually edematous, although the skin appearance commonly gives no indication of the ischemic changes in the underlying muscle. On admission to the hospital the patient appears in good condition except for some swelling of the limb, some local anesthesia, and whealing.

Within a few hours, however, loss of plasma into the area of injury causes hypotension and extreme hemoconcentration. (In some cases a hematocrit as high as 70% is recorded.) The subsequent shock is usually well compensated by the patient's own physiologic vasoconstriction, and early treatment with intravenous fluids. The patient still looks deceptively well.

The urinary output, already small because of the initial hypotensive episode, diminishes further, even though shock has been corrected; the patient begins to void small amounts of red urine by the end of the first day. Kidney swelling often causes back pain. He then begins a progressive

LCDR Kovalcik is completing a Navy-sponsored fellowship in colon and rectal surgery at the Lahey Clinic, Boston, Mass.

This paper was first presented at the Army-sponsored "Current Management of Trauma" symposium held in March 1974 at Brooke Army Hospital, San Antonio, Texas, while LCDR Kovalcik was a resident in General Surgery at NRMIC Portsmouth, Va.

downhill course, remaining oliguric while serum potassium and blood urea nitrogen levels continue to rise. (All four of Bywaters' original patients died on about the seventh day in acute renal failure.) Death usually results from cardiac arrhythmia or pulmonary edema.

Autopsy shows the kidneys to be edematous; parenchyma bulges through the cut surface of the capsule. On microscopic examination, degenerative changes are seen in the distal convoluted tubule (thus, "lower nephron nephrosis"), and brown granular casts are seen within the tubular lumens.

Those who first described the crush syndrome felt that the acute renal failure was a result either of hypovolemic shock or release of toxic substances from the ischemic limb. The physiologic equivalent to this syndrome was provided as early as the 1930's by Blalock, who studied "tourniquet shock" in animals (13). The hind limbs of a dog are made ischemic by the application of tourniquets for 3 to 4 hours; when the tourniquets are released, a massive outpouring of plasma into the extremities causes edema of the limbs and hypovolemic shock. Laboratory animals have lost up to 5% of body weight (1/3 of blood volume) into the hind limbs after tourniquet release. These tourniquet shock experiments demonstrated that (13,14,15):

- The limb does not swell while tourniquets are in place, but only after tourniquets are released.
- The mass of ischemic tissue is important, since survival rates for four-limb tourniquet injury are lower than for two-limb injury.
- The duration of ischemic compression is critical, with the highest mortality seen after tourniquet pressure of 3 to 5 hours. Lesser periods of compression evidently do not produce adequate tissue anoxia, with resultant increased capillary permeability. Prolonged periods of occlusion, on the other hand, result in a dry necrotic limb essentially isolated from the general circulation. Heparin negates the beneficial effects of prolonged tourniquet application.
- In rabbits, whose muscles contain no myohemoglobin, tourniquet injury produces all the local effects described except myoglobinuria and renal failure. Renal failure in rabbits can be produced by making the urine acid and injecting human myoglobin (4).

Anoxia of a limb results in increased capillary permeability, and leads to hemoconcentration as plasma leaks through damaged capillary beds into

the limb. Anoxic damage to the muscle cell membrane, further aggravated by muscle edema within tight fascial compartments, liberates potassium and myoglobin into the circulation after the tourniquet is released. Myoglobin is one-quarter the size of hemoglobin, and is less well bound to plasma proteins; with a lower renal threshold than hemoglobin, it is filtered better into the urine. In acid urine, myoglobin precipitates as acid hematin. In addition to direct mechanical plugging of tubules, breakdown products of myoglobin may have toxic effects on tubular cells (15,16). Renal tubular anoxia, caused either by systemic hypotension or by intrarenal vasoconstriction and shunting, also contributes to renal failure.

Patients with certain metabolic muscle disease, such as McArdle's disease, may have recurrent episodes of myoglobinuria without renal damage. Also, the hemoglobinuria seen in transfusion reactions does not always lead to acute tubular necrosis. However, the combination of hypotension, dehydration, and acidosis seen in the crush syndrome fosters the precipitation of myoglobin in the distal tubule and causes renal failure.

The individual whose limb is trapped under a heavy object is, of course, easily identified as being at risk for myoglobinuria. Less commonly suspected causes of myoglobinuria include electrical burns (7), septicemia (6), dermatomyositis-polymyositis syndrome, severe exercise, major surgery of long duration, and arterial occlusion of an extremity (10,19). Recently, the crush syndrome has been reported in drug abusers who lie on a dependent limb for hours while intoxicated (11). These patients may present with only increased warmth and turgor over a muscle compartment; peripheral pulses do not have to be absent.

The discovery in one of these clinical settings of dark urine without microscopic hematuria points to the diagnosis of myoglobinuria. However, dark urine which produces a positive result on the benzidine dip-stick test can also be caused by hemoglobinuria. The simplest way to differentiate between these two conditions is to examine the patient's serum. Hemoglobin-haptoglobin complex causes serum to be pink tinged, whereas myoglobin is cleared rapidly enough to give a clear serum. Likewise, the serum haptoglobin is normal in patients with myoglobinuria, but decreased in patients with hemoglobinuria. Chemical methods and electrophoretic and spec-

trophometric analyses can also be used to differentiate between the two conditions; and an immunologic assay has recently been developed (10,19).

In describing his original series of patients, Bywaters said, "Therapy so far has been by trial and error" (1). In his efforts to restore urinary output in these patients, Bywaters used intravenous fluids, caffeine as a diuretic, and applied heat to the loins. Early authors described local measures to prevent edema of the limb (12), although today these measures are generally considered ineffective and dangerous. Blalock suggested the beneficial effect of applying a sleeve-like pneumatic cuff inflated to 40 mm Hg. A variety of compressive dressings and plaster casts have also been prescribed to decrease edema and prevent the rapid entry of toxins into the general circulation. In one plan, a tourniquet was applied to the crush site before the patient was transported from the scene of the injury; the tourniquet was removed only after the limb had been perfused at the hospital. Adequate debridement and early fasciotomies (20) have also been found useful in limiting muscle necrosis and myoglobinemia.

Several medical measures help combat hyperkalemia. Initially adequate hydration and the administration of bicarbonate should be tried; glucose and insulin and ion exchange resins may also be necessary. Calcium may be given as an antagonist to the peripheral effects of hyperkalemia.


The effects of myoglobin on the kidney can be minimized by adequate hydration and use of diuretics to promote a good tubular flow, along with bicarbonate to neutralize the acidotic urine which seems conducive to myoglobin precipitation. Ideally, administration of bicarbonate, fluids, and diuretics should begin at the accident site before the patient is extricated (16).

If these measures fail and acute renal failure ensues, water must be restricted and dialysis promptly considered. In uncomplicated renal failure the blood urea nitrogen rises 10 to 15 mg/day, and the potassium increases 0.3 to 0.5 mEq/day. Because patients with crush injuries experience marked catabolism from muscle necrosis, blood urea nitrogen and potassium increase two to four times their normal values when renal failure develops, arguing for the early institution of dialysis and adequate local measures, such as fasciotomy and debridement (3).

Experience with posttraumatic renal failure in Korea and Vietnam demonstrated approximately 60% mortality among patients requiring dialysis (3). Few patients today die because of hyperkalemia and pulmonary failure, as did Bywaters' patients. Gram negative sepsis is now the major cause of death in these individuals.

With increased awareness of the crush syndrome and greater understanding of its pathophysiology, the mortality has decreased from 90% in 1940 to a current level of 50% (16).

REFERENCES

1. Bywaters EGL: Crush injuries with impairment of renal function. *Br Med J* 1:427, 1941.
2. Simeone FA: The crush syndrome in battle casualties. *Surgery* 27:300, 1950.
3. Lord RE, Burton JR: Post-traumatic renal failure in military personnel. *Am J Med* 53:137, 1972.
4. Fitts CT, et al: Crush injury. *J Trauma* 6:507, 1966.
5. Wittaker R, et al: Earthquake disaster in Nicaragua. *J Trauma* 14:37, 1974.
6. Soule TI, Cunningham GR: *Herbicola lathyri*, septicemia, myoglobinuria, and acute renal failure. *JAMA* 223:1265, 1973.
7. Artz C: Electrical injury simulates crush injury. *Surg Gynecol Obstet* 125:1316, 1967.
8. Smith RF: Exertional rhabdomyolysis in naval officer candidates. *Arch Intern Med* 121:313, 1968.
9. Hamilton RW, et al: Acute tubular necrosis caused by exercise-induced myoglobinuria. *Ann Intern Med* 77:77, 1972.
10. Kogen LJ: Immunofluorescent demonstration of myoglobin in the kidney. *Am J Med* 48:649, 1970.
11. Schreiber SN, et al: Limb compression and renal impairment (crush syndrome) complicating narcotic overdose. *N Engl J Med* 284:368, 1971.
12. Patey DH, Robertson JD: Compression treatment of crush injuries of limbs. *Lancet* 240:780, 1941.
13. Duncan GW, Blalock A: The uniform production of shock by crush injury: possible relationship to clinical crush syndrome. *Ann Surg* 115:684, 1942.
14. Thompson WW, Campbell GS: Studies of myoglobin and hemoglobin in experimental crush syndrome in dogs. *Ann Surg* 149:235, 1959.
15. Van der Meer C: Cause of death in tourniquet shock in rats. *Am J Physiol* 210:513, 1966.
16. Weeiss RS: The crush syndrome. *Surg Gynecol Obstet* 127:369, 1968.
17. Litwin MS, et al: Experimental production of acute tubular necrosis. *Ann Surg* 152:1010, 1960.
18. Braun SR, et al: Evaluation of the renal toxicity of heme proteins and their derivatives. *J Exp Med* 131:443, 1970.
19. Rowland LP, et al: Myoglobinuria. *Arch Neurol* 10:537, 1964.
20. Patmon RD, Thompson JE: Fasciotomy in peripheral vascular surgery. *Arch Surg* 101:663, 1970. 

MOULAGE FABRICATION

By CAPT David N. Firtell, DC, USN
CDR George R. Pedrick, DC, USN

Plaster of paris or dental stone moulages of various anatomic structures have been used in the fabrication of customized implants, prosthetic devices, tissue stents, preoperative and post-operative records, surgical aids, and forensic records. Preparing a moulage involves two simple steps: (1) forming a negative mold or impression of the area of concern, and (2) pouring plaster or other suitable material into the mold to obtain the positive moulage. A moulage can be fabricated wherever the materials are available, as in a surgical atmosphere (1) where ethylene oxide gas is used to sterilize materials.

This article describes the fabrication of a full-face moulage. Although this procedure may seem awkward to the patient since an airway must be maintained, the difficulty can be easily overcome with adequate patient management and preparation.

MATERIAL AND METHODS

The following materials are required to fabricate a facial moulage:

Patient drapes
Petrolatum

CAPT Firtell is chairman, Department of Dentistry, and CDR Pedrick is head of the Prosthodontics Branch at NRMC San Diego, California 92134.

Gauze or cotton
Irreversible hydrocolloid (common name "Alginate") (Federal Supply Number 6520-826-1300)
Measuring devices for irreversible hydrocolloid
Two large mixing bowls (FSN 6520-526-1602)
Two stiff spatulas
Paper clips
Fast setting plaster
Soft wax
Dental stone (FSN 6520-557-7015) or dental plaster (FSN 6520-203-7235)

Patient preparation

The procedure should be explained to the patient prior to commencement in order to dispel fears and uncertainties, especially when patients are claustrophobic or afraid to be in small, closed areas. An explanation of what is about to happen as each step progresses helps to reassure the patient and may prevent problems during the procedure.

The patient is then placed in a sitting or reclining position, depending upon the presence of adipose tissues. Abundant adipose tissue such as heavy jowls or unusually large female breasts will sag or change contours as the body position changes. Careful consideration should therefore be given to proper positioning of the patient in

order to achieve the desired relationships of the tissue in the finished moulage. Whenever possible, an upright position should be used.

Areas adjacent to but not included in the mold should be draped. Hair in the impression area, including eyebrows and eyelashes, should be lightly coated with petrolatum, to permit the mold to be removed easily without removing the hair.

Areas which have been subject to surgery may have severe undercuts caused by loss of tissue. Severe undercuts, as in a ball and socket arrangement, may prevent easy removal of the mold. Areas where anatomic structures have been removed may also have direct communication with the airway. Therefore, areas which are undercut or communicate with airways, and which are not vital to the continuity of the moulage, should be blocked out with the use of wet or petrolatum-coated gauze or cotton.

Establishing an airway

Since the patient's entire face must be covered for five to ten minutes to obtain a full-face impression, an airway is required. However, insertion or retention of the airway can distort the tissues in the area. If the major area of concern is around the nose, an oral airway should be used. If the mouth is most important, a nasal airway should be used. When using an oral airway, small balls of cotton coated with vaseline should be inserted just into the external nasal aperture, without distorting its contours. The lubricated cotton will prevent the impression material from entering the nose.

The airway consists of two large lumen straws approximately 10 centimeters long, which are inserted into the mouth or nose and allowed to protude through the impression material. Since it extends beyond the field of operation, the airway has less chance of being inadvertently blocked when impression materials are applied.

Inserting an oral airway usually presents little difficulty as the patient may hold the straws either between the teeth or by pursing the lips. The patient should not bite the straws or apply pressure that will occlude the airway.

Straws inserted into the nose should be cut on the bias and lubricated (Figure 1). The nasal cavity is located above the oral cavity and extends back to the pharynx; the straws should therefore be slanted in the direction of the pharynx rather than up into the nose. The patient should also be



Figure 1—A nasal airway is obtained using straws cut on the bias and lubricated.

warned that he may feel the urge to sneeze, which could dislodge the airway. If controlled, however, the desire to sneeze will pass rapidly, and the patient will be comfortable once more.

Impression procedure

Irreversible hydrocolloid, commonly referred to as "alginate," is preferred for a facial moulage because this material manipulates easily and requires little special equipment when used. It can also be gas sterilized and is relatively inexpensive.

When using irreversible hydrocolloid the manufacturer's directions should be followed, with one exception: in order to increase the flow of the material during application, one-tenth more water by volume should be added to the amount suggested by the manufacturer. Using cool water to mix the material will increase the gelation or setting time, thereby extending the time available for application of the material. Excessive working time, however, can create problems in controlling the material until it has set.

Using large bowls and spatulas, combine into a workable mixture 10 scoops of irreversible hydrocolloid powder and 11 measures of water per bowl. For large areas, two bowls can be used at the same time, one being applied by an assistant. As an alternative, make one mixture and add a second mixture before the first can gel. This double mixture allows large areas to be built up and covered progressively.

After thoroughly mixing the powder and water, pour the material from the bowl onto the highest part of the area to be covered. The flow of the

material can then be assisted and controlled with the mixing spatula. Care should be taken to avoid trapping air beneath the irreversible hydrocolloid. In areas where this is likely to happen thin layers of the mixture can be applied with a spatula, in much the same manner as butter is applied to bread (Figure 2). The flow of the material then continues, with all air bubbles eliminated from the impression.

The entire area should be covered with approximately 5 mm of irreversible hydrocolloid. Under-cut areas present special problems, as the impression can be locked and difficult to remove. The ears should be bound flat before making a facial impression. Sectioning the impression to remove it can be both dangerous and painful to the patient.

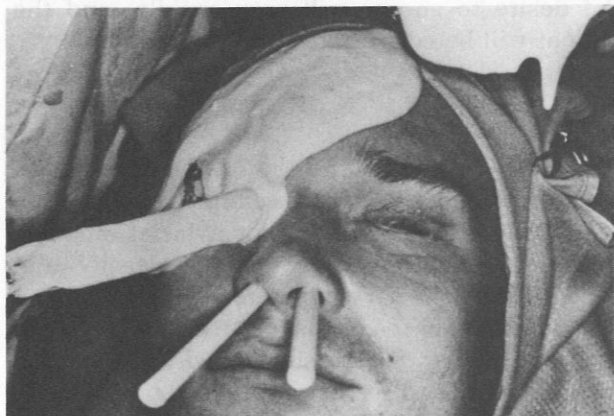


Figure 2—The flow of the irreversible hydrocolloid is assisted and controlled with a spatula. Care is taken to avoid trapping air beneath the impression material.



Figure 3—Paper clips bent into the shape of a cross are imbedded in the irreversible hydrocolloid before the mixture gels.

Before the irreversible hydrocolloid has gelled, paper clips, bent into a cross, are partly embedded in the material (Figure 3). The protruding portions of the paper clips lock the impression material to a 1 centimeter reinforcing layer of quick-setting plaster which is applied over the impression after the irreversible hydrocolloid has gelled (Figure 4). The plaster remains in place until an exothermic reaction is manifested, or until it becomes hard enough to manipulate. It helps to maintain the shape of irreversible hydrocolloid after the impression is removed.

The nasal airway, if used, must be withdrawn first. Then the entire impression and plaster reinforcement can be removed in one piece. To remove the impression, first separate any drapes that may be adhering to the irreversible hydrocolloid.

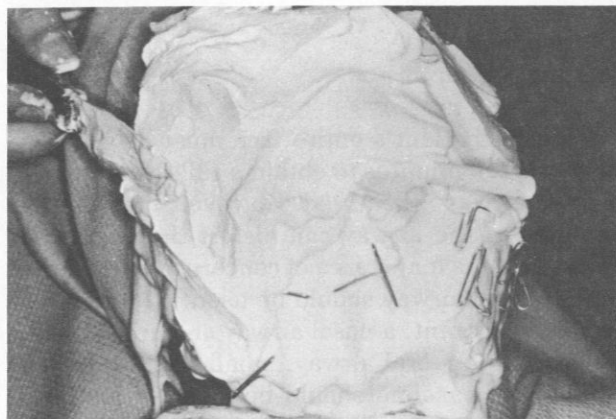


Figure 4—After the irreversible hydrocolloid gels, a layer of plaster is applied to reinforce the form.



Figure 5—The impression is removed and checked for accuracy.

loid or plaster. Then, grasping the edges of the impression, depress the surrounding tissue and ask the patient to tense and relax his muscles. The loosened impression may be removed intact. The negative mold or impression should then be checked for accuracy (Figure 5).

Pouring the moulage

To avoid distorting the irreversible hydrocolloid, use soft wax to plug the airway hole in the plaster. Then mix dental stone or plaster as directed by the manufacturer, and pour it into the negative impression (Figure 6). Pouring should be accomplished as soon as possible to prevent distortions in the irreversible hydrocolloid caused by atmospheric changes.

Dental stone is preferable for record purposes, as it is stronger and harder when set. Dental plaster or plaster of paris may be used if the impression is subsequently to be carved or modified in any way. Plaster is softer and more easily contoured than dental stone.

The plaster coat of the impression should be lubricated with petrolatum around its edges to prevent adhesion to the moulage material. A moulage can then be formed by pouring molten wax into the impression, and allowing the wax to cool. With a wax moulage some accuracy will be lost because of the contraction of the wax as it cools and hardens. Acrylics and other plastics can also be used to form a positive moulage; however, these materials should be tested to insure that they are compatible with the impression materials, and that any resulting distortions are within tolerable limits.

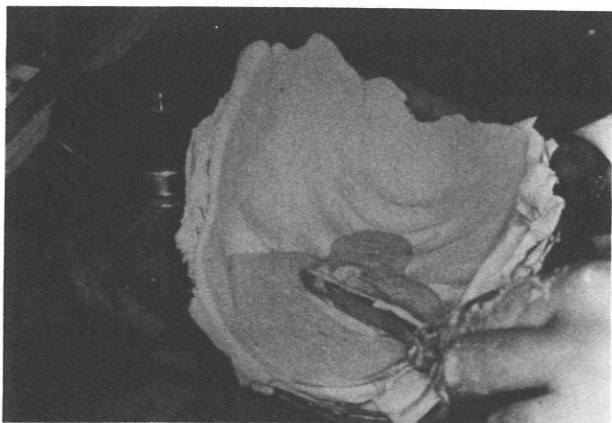


Figure 6—Dental stone or plaster is poured into the form to create a moulage.



Figure 7—The completed moulage.

Once the moulage material has hardened the impression can be removed, leaving a positive moulage (Figure 7). Additional moulages can sometimes be made if the original moulage is carefully separated from the mold, however the clarity and accuracy of the moulage decreases with each pour. Irreversible hydrocolloid dehydrates or distorts if allowed to stand even for as short a time as two minutes.

SUMMARY

A method of making a negative mold or impression and fabricating a positive moulage has been presented. This method uses irreversible hydrocolloid and quick setting plaster to form the mold. A variety of materials, such as plaster, dental stone, wax, and plastics, may be used for the moulage. Physical and psychological preparation of the patient, establishment and maintenance of an airway, and sterilization of material were described. ❧

Life Cost Cycle of Medical Equipment

By LTCOL Donald M. Keith, USA
Louis Keith, M.D.
Charles A. McCarthy

Caveat emptor . . . Let the buyer beware!

These words are especially true when applied to the purchase of medical equipment. This truth can also be expressed as: "The costs you see are not the costs you pay."

Actual expenditures for medical equipment are not confined to an initial cash outlay (C_{io}), plus a number of monthly expenditures (C_{mp}).^{1,2} True life cycle costs typically include four major categories of expense: acquisition costs; initialization costs to "start up" the new acquisition; operation and maintenance costs, often more than ten times the purchase price; and disposal costs, paid when equipment has outlived its usefulness.³⁻⁵

The last three costs, often hidden, are commonly referred to as *logistic support costs*. The Society of Logistic Engineers and the Department of Defense recognize nine discrete elements as being the major elements of logistic support:⁵⁻⁹

- 1) A maintenance plan for the equipment being acquired.
- 2) Special support and test equipment.
- 3) Supply support (items consumed in operating the equipment, as well as spare and repair parts).
- 4) Transportation and handling of the equipment.
- 5) Technical data.

LTCOL D.M. Keith is director, National Maintenance Point, U.S. Army Security Agency, Vint Hill Farms Station, Warrenton, Va. 22186.

Dr. L. Keith is medical director, Illinois Family Planning Council, 600 S. Michigan, Chicago, Ill. 60605.

Mr. McCarthy is assistant deputy director, Logistics Management Directorate, Joint Tactical Communications Office, 197 Hance Ave., New Shrewsbury, N.J. 07724.

The opinions or assertions expressed herein are those of the authors and are not to be construed as official or necessarily reflecting the views of the Department of Defense, the Department of the Army, the Department of the Navy, the Navy Medical Department, or the naval service at large.

- 6) Facilities to house and operate the equipment.
- 7) Personnel and training required to operate and maintain the equipment.
- 8) Funds to acquire the equipment and its requisite logistic support.
- 9) Logistic Support Management Information System.

The physician who is responsible for medical equipment acquisition must be aware of the total cost of ownership (Figure 1); he must therefore understand all the component expenses which will occur over each instrument's life cycle. Unless adequate funding is assured, these expenses can be an unexpected source of financial drain and embarrassment.¹⁰

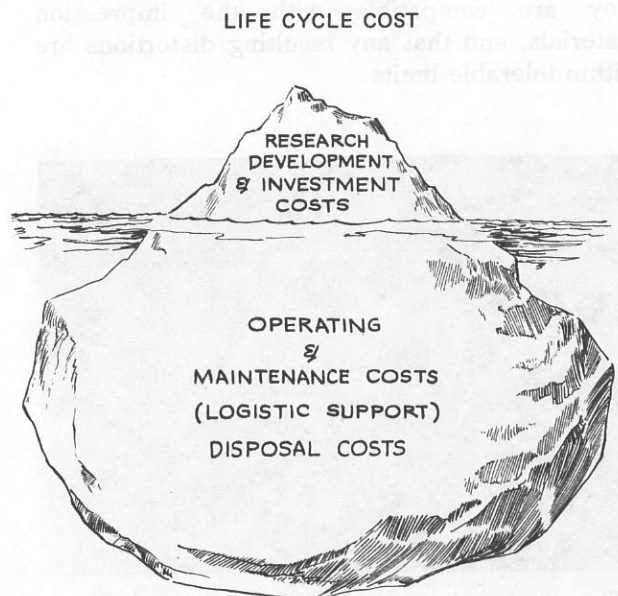


FIGURE 1—Total Cost of Ownership

The medical practitioner must have equipment to accomplish his work. However, this equipment is often inoperative or unavailable because of the failure to recognize the need for logistic support resources. Figure 2 shows the many functions necessary to insure that medical equipment is available and serviceable when it is needed.⁵

LIFE CYCLE COSTING

Both the complexity of modern medical equipment and the rising cost of medical services dictate that a rational and cost effective approach be taken toward equipment acquisition. Life cycle costing (LCC) is such an approach,^{3,4} since it insures that all costs of equipment ownership, including related support, are considered before the contract to buy is signed. Thus, all else being equal, equipment that is most cost effective over its life cycle can be acquired.

Medical managers should understand this approach to equipment acquisition, and use it for a comparative analysis of alternative equipment or methods. Although not representing the acquisition policy of any particular

Government agency, this article will present some techniques of LCC that are used by the Government and which may be useful to individual physicians.

The elements of LCC are diverse, varying with different equipment and methods of procurement. For our purposes, four broad categories are defined as the major components of medical LCC:

Acquisition costs (C_a) are the sum of the unit prices of the items being procured, and may include hardware, data, and services as well as research and development costs.^{3,4}

Initial logistics costs (C_{il}) are one-time, identifiable expenses incurred for the item being procured, such as initial training of personnel, renovation of physical plant, addition of special test or support equipment, and transportation.^{3,4}

Recurring operation and maintenance costs ($C_{o\&m}$) are disbursements incurred in connection with operation, maintenance, and management of the item being procured. These costs determine how large the *total* cost of ownership will be; included are costs for preventive and corrective maintenance, recurring file maintenance of technical literature, inventory management,

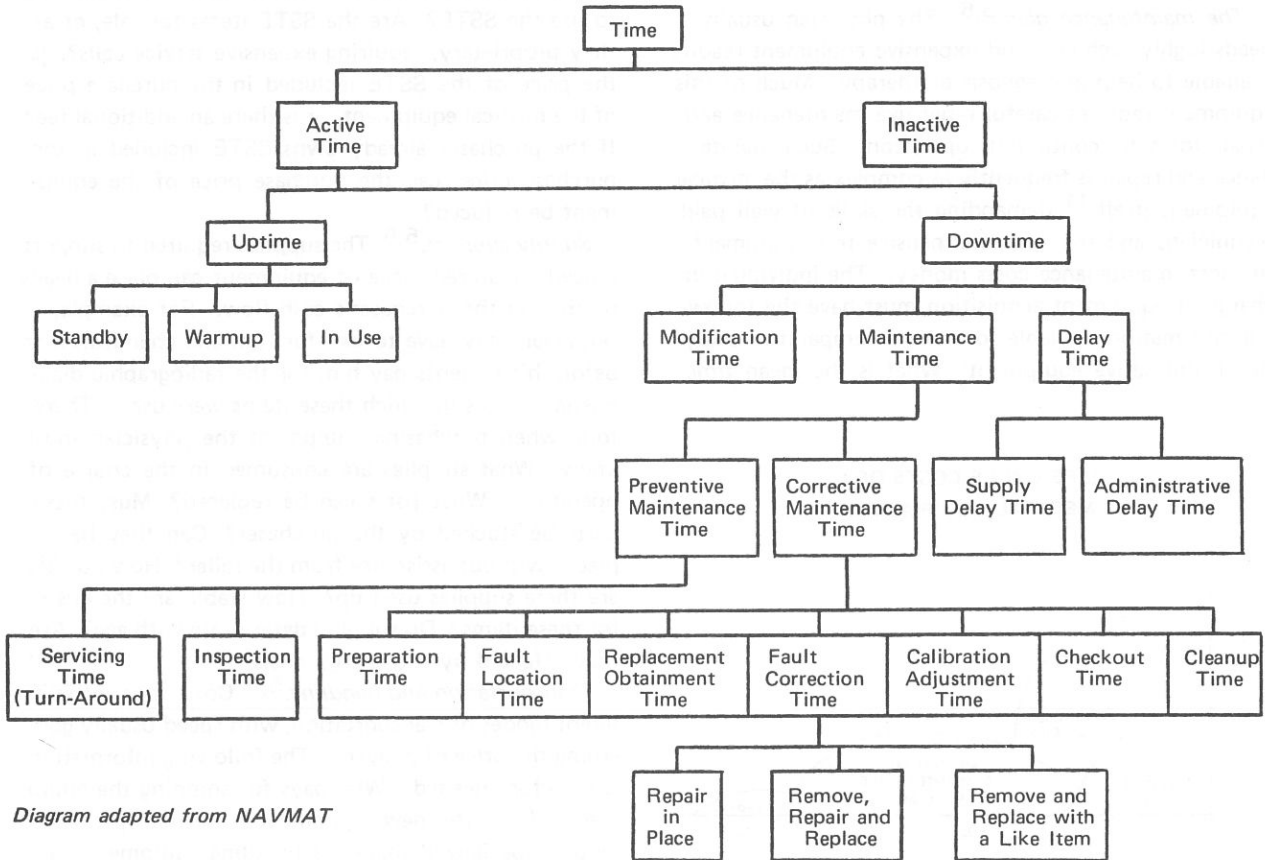


Diagram adapted from NAVMAT

FIGURE 2—Equipment Availability and Serviceability

training, operating materials, and energy consumption.^{3,4}

Disposal costs (C_d) represent final ownership costs. Disposal of medical equipment often requires a large cash outlay for disassembling equipment, renovating or restoring the physical plant, and for transportation.^{3,4}

Medical life cycle costs can therefore be expressed mathematically as:

$$MLCC = C_a + C_{il} + C_{o\&m} + C_d.$$

These four components are shown compared to each other and related to time in Figure 3.

Common sense dictates that not all purchases need be subjected to the same detailed analysis before purchase. But the true costs of ownership must be recognized as more than a monthly cash outlay after a "low, low" down payment.

LOGISTIC SUPPORT

The nine discrete elements of logistic support usually associated with operating and maintenance costs each contribute to the true cost of equipment ownership. The following examples are not meant to be inclusive. Costs for logistics support vary with differing circumstances.

The maintenance plan.^{5,6} The physician usually needs highly technical and expensive equipment readily available to help in diagnosis or therapy. Much of this equipment requires careful repetitive maintenance and repair for safe, continuous operation. Such maintenance and repair is frequently as complex as the medical equipment itself,¹¹ demanding the skills of well paid technicians and the use of expensive test equipment. In short, maintenance costs money. The individual in charge of equipment acquisition must have the following information available to make a comparative analysis of alternative equipment: What is the mean time

between failure? What is the mean time for repair? How frequently is maintenance required? What skills or additional equipment is required for maintenance?

When equipment is being considered for purchase, the manufacturer's representative should be asked if a maintenance engineering analysis has been performed. If it has, answers to the above questions will be available; better still, they will be quantifiable in terms of cost. Of course, there will be many "I don't know" answers. Each one means that future cost estimates are uncertain.

Special support and test equipment (SSTE). The availability of medical equipment often depends on SSTE, much of which requires its own maintenance and repair. SSTE runs the gamut from small, simple hand tools to complex computers.

The costs of acquiring and keeping the SSTE operational are often surprisingly high. Since this expense must be identified and planned for, information must again be elicited from the manufacturers of alternate systems or equipment before a rational decision can be made: Are the SSTE items peculiar to only one type of medical equipment or are they common items that medical maintenance personnel already have? Do medical maintenance personnel require additional training to use the SSTE? Are the SSTE items for sale, or are they proprietary, requiring expensive service calls? Is the price of the SSTE included in the purchase price of the medical equipment, or is there an additional fee? If the purchaser already owns SSTE included in the purchase price, can the purchase price of the equipment be reduced?

Supply support.^{5,6} The supplies required to support a newly acquired piece of equipment can place a heavy burden on the purchaser's cash flow. For example, a physician may have to pay for film and chemicals long before his patients pay him for the radiographic diagnostic services in which these items were used. Therefore, when purchasing equipment the physician must know: What supplies are consumed in the course of operation? What parts can be replaced? Must these parts be stocked by the purchaser? Can they be replaced without assistance from the seller? How quickly are these supplies used up? How stable are the costs for these items? Do supplies deteriorate with age? Are they affected by the energy crisis?

Transportation and handling.^{5,6} Costs vary with different modes of transportation, with speed usually governing the price of delivery. The following information is therefore needed: Who pays for shipping the equipment? Does the new equipment's routine operation require specialized materials handling equipment? If so, is it included in the acquisition price?

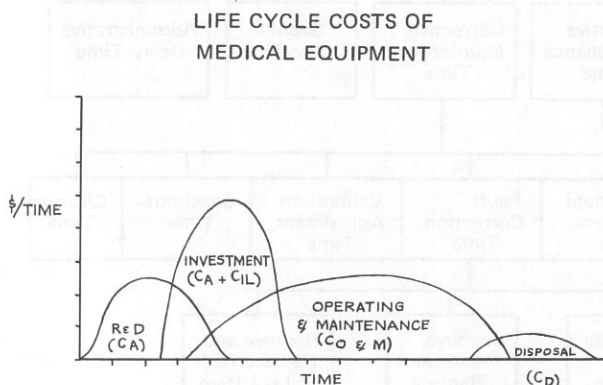


FIGURE 3—The Components of LCC Compared to Each Other

Technical data.^{5,6,12} Technical data includes all of the recorded documentation and literature required to support a piece of medical equipment: installation, operation and repair manuals; training courses; engineering drawings; tape cassettes; repair parts lists, and so forth. This technical data is expensive, and should only be purchased if it meets the unique needs of the practitioner.

The following types of information aid in a comparative analysis of costs: What specific technical data is included in the purchase price? What additional technical data is required? Has this data been prepared previously, or is it unique for this application? How is data updated, at what price, and who pays the costs?

Facilities.^{5,6} The most often overlooked element of logistic support is facilities. It is not uncommon for a newly purchased piece of equipment to be delivered only to have the purchaser discover that the equipment does not fit on the freight elevator, or will not pass through doors and passageways, or that the floor will not support the weight of the unit. Perhaps no one has determined if power sources are adequate, or if special cabling is needed to install the equipment in the proposed location. Real problems exist in facilities planning which, if not properly considered, can be expensive to resolve. Considerations include: What are the crated and uncrated physical characteristics of the equipment? What are the internal and external power requirements? Has the equipment been designed to consume low amounts of energy? What safety requirements (such as radioactive shielding) does this equipment impose upon the existing structure?

Personnel and training.^{5,6} The single most expensive element in any life cycle cost equation is personnel. The people who install, operate, and maintain equipment often need lengthy and expensive training. Specific information the purchaser must determine includes: Does the acquisition price include an initial training package for installers, operators, and maintenance personnel? What is the cost of training a replacement? What is the average turnover time for operators or maintenance personnel? What type of training is required—classroom, on-the-job, preceptorship? Will the seller train the personnel, or must an in-house training program be set up?

Logistics funds.^{5,6} This subject is thoroughly treated throughout this discussion and will not be addressed separately.

Logistics Management Information System.^{5,6,13} Although this element of logistic support is not applicable in all cases, it can have serious cost and operational implications. The information that such systems provide enables managers to make rational, cost-effective choices.

A logistic management information system may often be used, but rarely in great detail. As the size, complexity, and cost of the acquisition goes up, the information system becomes more important. For example, in a large medical complex, radiographic equipment is often placed in many different locations. If spare parts, tools, and test equipment can be interchanged, the total cost of operating and maintaining this equipment can be more easily controlled.

A logistic management information system can provide: functional and maintenance analyses, quantifiable reliability and availability data, in-commission rates, maintainability and interchangeability information, measurement parameters, spare parts requirements, quantifiable data on logistics, personnel subsystems, and other support data.

When all elements of logistic support have been examined, we see that $C_{O\&M}$ can be expressed as:

$$C_{O\&M} = C_{mp} + C_{sste} + C_{ss} + C_{th} + C_{td} + C_f + C_{pt} + C_{lf} + C_{lsmis}$$

OTHER EXPENSES

In most cases, other elements of the medical life cost cycle, that is, C_a , C_{ij} , and C_d , do not begin to equal the cost of $C_{O\&M}$.^{3,4} Nevertheless, these expenses must be considered. The acquisition cost of medical equipment is comparable to the price of the family car. There is a sticker price, which may or may not be discounted. There may be quantity discounts. Certain equipment and accessories are standard, while others are optional extras. If the purchaser announces that he is actively shopping and comparing alternative systems and equipment, the seller may throw in many expensive optional extras, including elements of logistic support not normally included in the base price.

The most important single fact that the purchaser needs to know, therefore, is: What does the acquisition price include? (It could include equipment, data, or services, either singly or in combination.) Once this is ascertained, the purchaser's bargaining position is much stronger. Much of the logistic support has already been developed and paid for by other customers; the only costs involved may be for copies of items previously developed.

Initial logistic support costs. These one-time expenses are required to start using the new equipment. Frequently these costs are neither discussed nor recognized before the purchase commitment is signed. The manager is then taken aback when an unfavorable cost variance surfaces during installation of the new equipment. Pertinent facts which must be determined prior to purchase are: What initial training is required? What

is the initial cost of an adequate store of supplies? Is renovation of the physical plant required? What transportation or handling costs are involved? What new support and test equipment is required? What is the cost to remove the packing material, crating, and dunnage? Are these costs included in vendor service and installation?

Disposal costs. It is also easy to overlook, underestimate, or completely disregard disposal costs. Although many disposal costs are covered in the overhead, they can legitimately be charged against the total cost of ownership for a given piece of equipment. The manager should therefore determine the scrap value of the piece of equipment, or its worth on the used equipment market. This information determines the removal procedures that will be followed. The following additional information is also required: What handling costs are involved? How will the facility be used after the equipment is removed? Is assistance required from the seller? Are radioactive materials involved? Has the building been changed to accommodate the equipment? If so, are structural alterations necessary?

CONCLUSION

How can anyone assemble such a mass of information to make a cost-effective decision? The answer is that one individual cannot accomplish this task by himself. Team effort is required to tailor the application of life cycle costing techniques to the complexity of the acquisition. Under the leadership of the physician or manager, along with the support of other specialists on the staff, the team can best evaluate alternate proposals, selecting the most cost effective.

Life cycle costing should not be the sole deciding factor when acquiring medical equipment. It is only one of many factors to be considered in arriving at a rational, satisfactory decision.

REFERENCES

1. DoD Directive 5000.1, *Acquisition of Major Defense Systems*, 13 July 1971. Establishes policy for major defense system acquisition in the Department of Defense.
2. DoD Directive 5000.3, *Test and Evaluation*, 19 Jan 1973. Establishes policy for conduct of test and evaluation by military departments and defense agencies, and codifies the responsibilities of the deputy director of defense research and engineering, test and evaluation.
3. DoD Publication LCC-1, *Life Cycle Costing Procurement Guide (Interim)*, July 1970. Presents guidelines for applying the life cycle costing concept in the procurement of material and hardware other than major weapon systems. (For life cycle costing application to seven equipment acquisitions, see LCC-2, July 1970.)
4. DoD Publication LCC-3, *Life Cycle Costing Guide for System Acquisitions*, Jan 1973. Presents guidelines, including representative detailed procedures, for applying the life cycle costing concept during the acquisition of complete defense systems.
5. DoD Publication 4100.35-G, *Integrated Logistics Support Planning Guide for DoD Systems and Equipment*, 1973. Comprehensive road-map of logistic activities throughout the life cycle. Can best be utilized as a checklist. Shows the relationship between support and other management functions.
6. DoD Directive 4100.35, *Development of Integrated Logistic Support for Systems and Equipments*, 1 Oct 1970. Defines integrated logistic support and establishes DoD policies and objectives governing development of ILS for systems and major equipments.
7. SECNAV Instruction 4000.29A, *Development of Integrated Logistic Support for Systems and Equipments*, 13 Jan 1971. Implements DoD Directive 4100.35, establishing policies and principles for planning, development, and acquisition of logistic resources for Navy and Marine Corps systems and equipments.
8. OPNAV Instruction 4100.3A, *Department of the Navy Integrated Logistic Support System*, 6 Nov 1972. Directs development and implementation of ILS system concept within the Department of the Navy, and establishes CNO policies governing ILS organization, responsibilities, and application.
9. NAVMAT Instruction 4000.20(A), *Integrated Logistic Support Planning Policy*, 18 Mar 1971. Establishes and promulgates Navy integrated logistic support planning activities and relationships for effective support of weapon systems and equipment.
10. NAVMAT P-4215, *Advance Procurement Planning Guide*, 1 June 1967. Detailed and highly useful guide concerning the application of eight major procurement techniques, including decision matrices, for the acquisition of weapon systems and equipments.
11. NAVMAT Instruction 3000.1, *Reliability and Maintainability (R&M) of Naval Material*, 29 May 1973. Provides CNM policy, guidelines, and specific directions in the implementation of the R&M Program specified in SECNAV Instruction 3900.36A.
12. DoD Instruction 5010.12, *Management of Technical Data*, 5 Dec 1968. Establishes the DoD Technical Data Management Program, defines its scope and objectives, and establishes uniform policies and procedures for management and administration (note Change 1).
13. DoD Instruction 7000.2, *Performance Measurement for Selected Acquisitions*, 25 Apr 1972. Sets forth objectives and criteria for contractor management control systems for major system acquisitions.

SCHOLARS' SCUTTLEBUTT



Three important things have occurred since our last column appeared. First, this column has celebrated its first birthday. For one year we have tried to provide timely information that we considered important to your medical careers within the Navy family.

That brings us to the second event. Several months ago, at the direction of the Surgeon General, RADM E.J. Rupnik (BUMED Code 3) established a working committee to review all publications supported by the Navy Medical Department. The committee discovered that only half of our medical students were receiving *US NAVY MEDICINE*. Beginning with this issue, *US NAVY MEDICINE* will be sent directly to each student in our medical student programs, rather than being distributed to students through school libraries, or dean's offices. We believe that the information contained in the entire journal, as well as in this column, is important to you in gaining an overall understanding and appreciation of the Navy Medical Department. *US NAVY MEDICINE* will be sent to you at your most current address. Keep us up to date.

The third event is the transfer of the management function of Navy scholarship programs to the Naval Health Sciences Education and

Training Command, located at the National Naval Medical Center, Bethesda, Maryland. Prior to the establishment of this command in July 1974, the responsibility for Navy Medical Department education and training was scattered throughout many Bureau codes, individual centers, and detachments. Under such a fragmented system, it was impossible adequately to design and develop coordinated training programs.

Applications for our scholarship programs will continue to be processed at the Bureau of Medicine and Surgery (Code 314). However, all other management functions pertaining to scholarship programs will be handled at the Health Sciences Education and Training Command (Subsidy Programs Division, Code 14). For your convenience, the telephone number and address of the chief of the Subsidy Programs Division is:

LT M.E. Prigmore, MSC, USN
Naval Health Sciences Education and
Training Command (Code 14)
National Naval Medical Center
Bethesda, Maryland 20014

Phone: Area Code 301-295-0251
295-0218
295-0407

For this year only, applications from medical students for first-year positions in Navy graduate medical education programs (1976-1977 training year) will be processed, as in the past, at BUMED (Code 314). Information on application procedures for the 1977-78 training year, and subsequent years, will be promulgated as it becomes available. ⚓

• CAPTAIN •

This naval officer receives his title from the old word CAPUT (meaning Chief), a name of great honor among the ancient Thanes.



© C.W. WINDAS, 1954





To the Editor: I read with considerable interest "From the Chief" in the March 1975 issue of *U.S. Navy Medicine* relative to obtaining authorized flag rank for our Medical Service Corps. The argument for the cause is logically and succinctly presented and needs no further support. I agree that such rank is long overdue.

The article, however, did stimulate further thought on the entire subject of the Medical Service Corps and the Medical Department. I believe that the Medical Service Corps is at the crossroads. Since its inception in 1947 the Medical Service Corps has progressed—unobtrusively filling voids and vacuums—and developed a cadre of health professionals: a relatively quiet group, choosing (or being forced) to execute its collective and individual responsibilities in a matter-of-fact manner without fanfare—until recently.

Because of recent changes in our society, especially the rising costs of defense and health care, the spotlight of public attention focused on the Navy Medical Department. Then came the inquisitors asking the Navy Medical Department to justify the utilization of their military officers corps. Since that time the Navy Medical Department has been in turmoil. People by nature are resistant to change, especially change that usurps traditional prerogatives. Sides are being formed, individuals are taking personal stands, issues are being handled on a crisis basis. All these actions are detracting from the orderly progression of the restructuring of the Medical Department.

That it needs restructuring is not at issue. Positive steps are being taken to insure that the Medical Department remains a responsive entity and that the most highly qualified individuals are placed in responsible positions. Seniority and traditional prerogatives are now only factors in overall evaluations in determining total qualifica-

tions. The Command Screening Board concept recently instituted utilizes additional parameters in the selection process.

There are those, however, who will not, or cannot, see or understand the slow-moving wheels of progress. These are the forecasters of doom on one hand, and the impatient rebels who cry for change *now* on the other.

What we are witnessing is history repeating itself. This evolution is reminiscent of the discrimination issue this country was faced with in the not-too-distant past. All that remains to be seen is whether the evolution in the Navy Medical Department will take place in a programmed and orderly manner, or whether it will be a violent and traumatic transition to satisfy the impatient ones and the obstructionists. Perhaps trauma, even though painful, is necessary to spotlight the inadequacies (and in some cases injustices) that are recognized within the system. The point is that they *are* being recognized.

We recognize the injustice that has been taking place relative to the awarding of flag rank to the Medical Service Corps. This may, however, be just one of a recurring number of discriminating acts perpetrated upon members of the Medical Service Corps. But is the injustice limited to members of the Medical Service Corps? Those of us who are MSC officers sometime tend to view our specific roles within the Medical Department without consideration for the big picture. The view from the Headquarters level is often quite different when all aspects of a particular problem are considered. It then becomes a question of what should be done in the best interest of the Medical Department as a whole.

Medical Service Corps officers are taking part in vital decisions which will affect the future of the Navy Medical Department. The role of the MSC officer in the field is to provide these

decision-makers with the necessary information to allow them to do an effective job. It is our collective responsibility to "tell it like it is," to question, to provide information, positive or negative, which can contribute to making appropriate decisions. Headquarters has the responsibility of cultivating communication.

Change is taking place. It is not affecting the Medical Service Corps alone, but the entire Navy Medical Department. All we can ask is that we be honest. Are we, in fact, opposing these changes? Are we, by our individual actions, defeating our own purpose? Are we overly preoccupied with our prerogatives? Are we adequately supporting the concept of change? Do we recognize that each officer in the Medical Department has a specific role to play and that that role is best determined by the individuals who have the necessary information at hand?

We of the Medical Service Corps have contributed to the accomplishment of the mission of the Medical Department, but the nature of our Corps dictates that our mission is only part of the overall Medical Department effort. We can do our own individual thing, but unless it positively contributes to a defined end product, we are defeating our own purpose.

The future is now, and in every coming day. Our performance in this critical time will have far-reaching consequences for each MSC officer, and for the future of the Medical Department.

CDR T.F. Levandowski, MSC, USN
Naval Aerospace Medical Institute
Pensacola, Florida 32512

To the Editor: Bravo to CAPT N. Ronis for his letter regarding the use of the metric system (*US NAV MED* 65[3]:33). However, I would like to point out one measurement in which he is behind the times. Blood pressure is no longer reported in millimeters of mercury, but in TORR. In fact, all pressures which formerly were in millimeters of mercury are reported as TORR. This measurement is named after Evangelist Torricelli, an Italian physicist who lived a couple of centuries ago. Mercifully, the scientists have shortened his name and made it more practical.

Also I would like to recommend that you add

another classification to your board certifications. I was certified by the American Board of Internal Medicine 35 years ago, and I think I was the first one in the Navy certified by written examination. This year I took the recertification examination and passed it with a considerable number of points to spare, so you now need a new classification—American Board Recertifications.

I received all of my residency training at naval hospitals and the Naval Medical School. I am writing this letter to let current regular Navy medical officers know that you can have a full career in the Navy and still hold your own, if not do even a little better than your civilian contemporaries.

CAPT Julian Love, MC, USN (Ret.)
1108 South Baldwin Avenue
Arcadia, California 91006

Thanks to Dr. Love for bringing me up to date. I thought I was being very contemporary knowing about Hertz and Celsius. It's a pleasure to learn something new. Dr. Love's letter didn't raise my blood pressure by as much as a TORR. —CAPT N. Ronis, MC, USN, BUMED Code 332.

To the Editor: I was recently assigned active duty to the University of Wisconsin NROTC unit under the Armed Forces Health Professions Scholarship program. I had not previously visited the NROTC building on campus and was in for a pleasant surprise. The personnel, particularly CDR Strange and Petty Officer Willeford, were most helpful and were able to arrange an ACDUTRA physical locally. Other services provided included processing of orders and pay papers, measurement for a uniform, and answers to questions on Navy protocol.

I wish that I had visited the NROTC unit earlier, for I feel one can't beat its congeniality and convenience. My colleagues in the scholarship program would be well advised to drop in at their campus NROTC unit and get acquainted, if they haven't done so already.

Chuck Frinak
1805 University Avenue
Madison, Wisconsin 53705



LENGTH OF PATIENT STAY IN NAVY MEDICAL FACILITIES

Recent comparisons of active-duty Army, Navy, Air Force, and civilian length of stay (LOS) figures indicate that our average length of stay (ALOS) is 20.1 days as opposed to 10.9 days for Army, 8.4 for Air Force, and 6.4 days in the civilian sector. A recent program-budget decision by the Department of Defense reduced our funded ALOS for active-duty personnel from 20.1 days to 15 days.

While these comparisons do not reflect the unique problems of the Navy, better management and continued emphasis on new methods to minimize periods of hospitalization will help the Navy achieve a 15-day average patient stay. These are some of the plans currently being pursued to reach this goal.

The Joint Commission on the Accreditation of Hospitals (JCAH) has made compliance with standards for medical care evaluation a specific requirement for continued accreditation. Compliance with the JCAH audit requirements will require establishment of norms for the LOS by diagnosis, and utilization review will provide for concurrent monitoring of LOS during hospitalization. Continued attention to this important program is urged.

In consonance with implementation of medical care evaluation requirements, a medical tri-service committee has completed a study with a plan which will compare service policies and procedures relative to patient admissions and discharges. The three medical services have developed a proposed tri-service directive which will standardize a system of inpatient care accountability. An LOS data base will be

developed and maintained on which to compare length of stay statistics, and to serve as criteria to measure progress in utilization review. The directive provides that the three services will meet at least annually to develop length of stay reports, which will serve to monitor the programs and our compliance with medical care evaluation standards of JCAH.

In addition, BUMED Instruction 1306.1 of 29 April 1975, issued jointly with BUPERS, authorizes medical holding companies to be established at medical centers and hospitals. The objective of this new program is to expand the use of medical holding companies as a means for better meeting the total health care needs of the Navy community, and for better accommodating extended care in a more appropriate setting. Extended care has been delivered too long in the acute care setting. It is now imperative that extended care be recognized as a distinct and necessary element of the Navy's health delivery system.

A medical holding company established at a medical activity will not necessarily result in the physical relocation of personnel assigned to it. Separate wards such as those assigned for rehabilitation patients may be desirable, but are not considered essential. Holding companies should be viewed as a means for creating extended care status for patients to assure continuity in care without an accumulation of occupied bed days. Personnel assigned to medical holding companies should be active-duty patients whose condition is such that they cannot be returned to limited or full

duty but who meet the criteria for extended care in what is effectively an outpatient basis.

Medical holding companies should not be used as a substitute for limited duty, or timely referral to the Physical Evaluation Board and early transfer to separation activities or to VA hospitals when appropriate. In various policy statements, BUMED has urged Medical Department facilities to insure that patients are not kept on the sick list or placed on protracted convalescent leave or rehabilitation periods when they can, within the criteria of good and safe medical practice, be sent to limited duty. Continued and increased use of limited duty based on medical board action is the most appropriate method of disposition when patients cannot be returned to a full duty status.

Proper use of medical holding companies will be a most immediate and significant factor in reducing LOS for active duty personnel.

In addition to the above methods, improvements in administrative procedures for disposition of patients must be considered. In this regard, it is imperative that chiefs of service and medical officers understand the importance of expeditious discharge and disposition of patients. Criteria established for reviewing LOS should not be limited to considerations of recorded length of stay in comparison with a "norm" for any particular condition, but should also include such factors as maximum hospital benefits, delays in requests for and completion of consultations, diagnostic tests, inappropriate use of leave and passes, subsisting out, failure to anticipate and schedule boards, and failure to initiate action for transfer to a VA hospital and the Temporary Disability Retired List at the earliest possible date. Provisions must be made for effective surveillance of both hospitalized long-term patients and personnel in medical holding companies to insure timely and proper disposition. Since prolonged definitive medical care is not provided for active-duty patients who are unlikely to return to duty, patients requiring long-term care should be reviewed at least monthly to determine the appropriateness of medical as well as administrative management.

Each Medical Department activity should attempt to reduce ALOS for active-duty personnel by 25%. By 1 August 1975 a plan of action and milestone (POA&M) chart indicating the efforts being taken to reduce ALOS for active-duty personnel should be forwarded to BUMED, Code 00. POA&Ms with a goal in excess of 25% should be submitted, if feasible, especially from activities

with an exceedingly long ALOS. Activities with an ALOS below eight days are exempted from this requirement but are encouraged to provide suggestions which might be used by other activities in reducing LOS.

By working together, sharing ideas, and through diligent effort, a 25% reduction in ALOS can be achieved without detriment to the quality of patient care.—BUMED, Code 00.☛

GORGAS MEMORIAL LAB OFFERS COURSE IN TROPICAL MEDICINE

A six-week course, "Clinical and Research Aspects of Dermatology, Pathology, and Pediatrics in the Tropics," will be offered during the coming year at the Gorgas Memorial Laboratory, Panama City, Canal Zone. Limited openings are available in sessions to be conducted from 19 September to 31 October 1975, 23 January to 5 March 1976, and 23 April to 4 June 1976.

Navy Medical Corps officers interested in attending this course should apply to: Commanding Officer, Naval Health Sciences Education and Training Command (Code 4), National Naval Medical Center, Bethesda, Maryland 20014.—BUMED Code 0011.☛

LCDR RANDOLPH RECEIVES FIRST R.E. LUEHRS MEMORIAL AWARD

LCDR Robert P. Randolph, flight surgeon for the Navy's flight demonstration squadron, the Blue Angels, is the first recipient of the Richard E. Luehrs Memorial Award, and has been named Operational Flight Surgeon of the Year for 1975.

Established this year, the award honors CAPT Richard E. Luehrs (MC), whose 32-year career as Navy flight surgeon was devoted to assuring the highest professional level of operational aeromedical support to the naval aviation community. It was presented to LCDR Randolph at the Naval Aerospace Medical Luncheon, held during the Aerospace Medical Association meeting in April.

LCDR Randolph, who represented the Naval Air Training Command, was one of six Navy physicians honored during the luncheon as "Command Flight Surgeons of the Year." Members from other commands who also received letters of appreciation during the luncheon were:



LCDR R.P. Randolph has been named first recipient of the Richard E. Luehrs Memorial Award as Operational Flight Surgeon of the Year for 1975.

<i>Command</i>	<i>Flight Surgeon</i>
COMNAVAIRLANT	LT Lowery L. Thompson, MC, USNR Carrier Air Wing Six NAS Cecil Field, Florida
COMNAVAIRPAC	LT Donald F. Lynch, Jr., MC, USNR VQ Squadron, Guam
3rd Marine Air Wing	LT Timothy J. Peterson, MC, USNR 3rd Marine Air Wing El Toro, California
1st Marine Air Wing	LT Wayne I. Judson, MC, USNR Currently assigned aboard an LPH in the Far East
2nd Marine Air Wing	LCDR Roland H. Myers, MC, USN Marine Squadron Cherry Point, North Carolina —BUMED, Code 51 🍀

DENTAL CORPS MANAGEMENT SEMINAR

Sixty-five officers of the Navy Dental Corps recently participated in a management seminar at the Naval Graduate Dental School, National Naval Medical Center, Bethesda, Maryland. The annual seminar, held this year from 28 April through 2 May, is sponsored by the Dental Division of the Bureau of Medicine and Surgery, and is designed to improve the Navy's dental health care delivery

system by providing basic management training to dental officers who are assuming positions that require this knowledge.

On the first day of the seminar the participants visited BUMED, where they were welcomed on behalf of the Surgeon General by RADM Charles L. Waite, assistant chief for operational medical support. In the keynote address, RADM Robert W. Elliott, Jr., assistant chief for dentistry, and chief of the Dental Division, presented an overview of BUMED projects for improving the management of dental facilities, discussing in particular the impact of regionalization and the development of a computerized dental management information system.

During the afternoon, LCDR Kirby L. Brimmage, head of the Officer Fitness Reports Branch at the Bureau of Naval Personnel, discussed the preparation of fitness reports. Participants were also briefed by staff members of the Dental Division, who later answered questions about the Division's responsibilities and goals.

The remaining sessions of the seminar were held at the Naval Graduate Dental School, with a discussion of regionalization leading off the second day. RADM George D. Selfridge, commanding officer of the Naval Graduate Dental School, and LCDR Carl A. Wesolowski (MSC) discussed the inception and development of the regionalization concept at the Navy's first regional dental center in Norfolk, Virginia. RADM Selfridge discussed the problems encountered in determining the geographical boundaries of the region and in developing planning milestones to insure that all dental facilities were actually incorporated into the region by the target date. LCDR Wesolowski described the procedures involved in developing tables of organization for NRDC Norfolk, and for the various clinics included in the region.

CAPT Franklin R. Ruliffson (DC) then discussed the current status of regionalization, noting that with the completion of Phase II there were 19 dental regions with 75 branch facilities. During the next 12 months BUMED will develop Phase III of dental regionalization, including a plan to achieve total primary command and support by BUMED of all nonoperational dental facilities in the Navy.

The morning session concluded with two presentations by representatives of the BUMED Materiel Resources Division. CDR Lloyd B. Nichols (MSC) detailed plans for the modernization of dental facilities, while CDR Charles R.

Brown (MSC) discussed dental program planning and budgeting.

The entire afternoon session of the second day was devoted to a discussion of legal issues in executive dentistry. LCDR William J. Landen, JAGC, USN and LT Daniel W. Coyne, JAGC, USNR explored the relationship between individual responsibility, institutional liability, and dental malpractice; they also explained the legal responsibilities of a commanding officer or officer-in-charge.

On the third day, CAPT Edwin E. McDonald, head of the Professional Branch, Dental Division, explained the Navy Dental Management Information System, emphasizing its relevance and timeliness and the importance of accuracy in reporting procedures.

Throughout the week, seminar sessions were conducted by faculty members from the Naval School of Health Care Administration, who developed such topics as current issues in health care management, personnel motivation and productivity, the use of administrative assistants, decision-making, and organizational theory.

One of the highlights of the seminar was the informal question and answer session with RADM Elliott held on the evening of the third day. The seminar ended with a critique panel moderated by CAPT George B. Crossmire, assistant deputy chief of the Dental Division. CAPT McDonald, CAPT Robert G. Thompson, director of education at the Naval Graduate Dental School, and CDR Donald J. Brideau (MSC), who served as the seminar director, helped respond to the questions and comments of the attendees.—BUMED, Code 6. 🍀

MSC OFFICERS TO COMMAND HOSPITALS

In early July, for the first time, the command of two naval hospitals will be turned over to Medical Service Corps officers. CAPT Edwin B. Miller, director of administrative services at NRMC Oakland for the past 1-1/2 years, will assume command of NH Lemoore, California, on 10 July. The next day, CDR M.F. "Jack" Tanner, formerly director of administrative services at NRMC Long Beach, will assume command of NH Port Hueneme, California.

Several more branch dispensaries (soon to be renamed "clinics") are being converted to MSC officer-in-charge status, in keeping with Depart-

ment of Defense policy of freeing physicians for patient care. When regionalization of naval medical facilities is complete, it is expected that satellite facilities of regional centers will be managed by MSC officers or other qualified health care executives.

A native of New York City, CAPT Miller enlisted in the Navy as an apprentice seaman in September 1939, and trained at the Basic Hospital Corps School in San Diego. During World War II he participated in the Battle of Midway, later acting as medical escort for 34 Japanese prisoner-of-war survivors of the aircraft carrier, *Hiryu*. In March 1945 he participated in the assault and occupation of Okinawa while serving with the U.S. Navy Special Augmented Hospital, No. 6, then part of the Tenth Army.

His appointment as an ensign in the Medical Service Corps in October 1950 was followed by assignments as personnel officer and medical administrative assistant in Barstow and Oakland, California; aboard the USS *Essex*; and at medical facilities at Chelsea, Massachusetts, and New London, Connecticut. He served as administrative officer at NH Key West, Florida, until 1967, when he reported to BUMED as executive assistant to the assistant chief for personnel and professional operations. CAPT Miller later served as administrative officer of Naval Dispensary, San Francisco, and NH Oakland.

A graduate of the Naval School of Health Care Administration, CAPT Miller also attended the Army Management School and many other service schools and courses. His decorations include the Navy Commendation Medal (Gold Star in lieu of second award) for professional achievement while serving at BUMED, and a second award while on special assignment to the Commandant, Twelfth Naval District, during *Operation Homecoming*.



CAPT Miller



CDR Tanner

CDR Tanner, a native of Weatherford, Texas, enlisted in the Navy in January 1943, and completed Basic Hospital Corps School in San Diego. He was appointed an ensign in the Medical Service Corps in September 1955, and subsequently attended the Naval School of Health Care Administration. A one-year administrative internship at NH Philadelphia was followed by assignments as military personnel officer at that facility and at the Naval Medical School, Bethesda, Maryland. He also served as administrative officer at NH Subic Bay, Republic of the Philippines; Naval Air Station/Pacific Missile Range Point Mugu, California; NH Lemoore, California; in the USS *Repose*; and as medical administrative assistant, Staff, ComNavAirPac, Chief, Military Personnel Service, NRMC San Diego.

His awards and decorations include the Navy Commendation Medal, Good Conduct Medal (four awards), American Campaign Medal, Asiatic Pacific Campaign Medal (Okinawan Campaign), WWII Victory Medal, American Defense Service Medal, Vietnam Service Medal (two awards), and the Republic of Vietnam Campaign Ribbon.—BUMED, Code 71. ☛

NAVY'S FIRST BLACK FEMALE PHYSICIAN WELCOMED ABOARD

The first black woman physician to enter the Navy Medical Corps was commissioned 25 April 1975 at the headquarters of Navy Recruiting District Jacksonville, Florida.

LT Donna P. Davis, 27, says a number of factors influenced her decision to join the Navy.

Both she and her husband love to travel. "I've been looking for a position with structure," she said after her commissioning ceremony. "I wanted constancy, but I also wanted travel."

LT Davis added that the Navy's attractive benefits, including opportunities for advancement, fixed vacation, and retirement are not found in private practice.

Originally from New York City, she received her bachelor of arts degree from Cornell University and earned her medical degree in 1973 from Meharry Medical College in Nashville, Tenn. Later, as a recipient of an American Association of Medical Colleges fellowship, Dr. Davis studied in Haifa, Israel. During her internship with Harlem Hospital in New York City she received training in



LT Donna P. Davis, the first black woman to be commissioned in the Navy Medical Corps, signs her certificate of appointment at Navy Recruiting District Jacksonville, Florida. Looking on are Chief Navy Counselor William Brown and LT Boykin Jordon.

physical and psychiatric care, as well as in hospital administration.

Other awards received by Dr. Davis include the Bache Scholarship, the Leopold Schapp Foundation Award, and the C.V. Mosby Award in Medicine.

LT Davis will serve her initial tour of duty as a staff medical officer at NRMC Oakland, assigned to the Branch Dispensary, Naval Support Activity, Mare Island, California.—PAO, Navy Recruiting Command, Arlington, Va. ☛

CORPSMEN PARTICIPATE IN SHORE SAILOR OF THE YEAR COMPETITION

Two hospital corpsmen recently competed for the honor of being named FY 75 Shore Sailor of the Year. The names and histories of HM1 William Scott Smith, Jr. and HM1 Ronald B. Littlejohn were submitted to the Chief of Naval Personnel for consideration. Though not selected for the top honor, the two petty officers continue to exemplify the tradition of excellence for which hospital corpsmen are famous.



HM1 William S. Smith, Jr.: BUMED nominee for FY 75 Shore Sailor of the Year.

HM1 Smith, the nominee of the Bureau of Medicine and Surgery, was selected from corpsmen nominated from all BUMED-managed activities. He is procurement petty officer for supplies and equipment, Laboratory Service, at NRMC Portsmouth, Virginia, where his performance as a professional technician has been consistently outstanding. He has been instrumental in refining the laboratory's quality control program, developing an effective inspection format, and developing and implementing a laboratory orientation program for new nursing personnel. His efforts also helped to insure that budget allotments were not exceeded despite increasing workload and costs.

In addition to an associate of arts in general studies certificate from George Washington University, Washington, D.C., HM1 Smith has completed 72 semester hours toward a bachelor of science degree in business administration. He has assumed personal responsibility for counseling junior members of the Command concerning self-development in the Navy, and is deeply involved in civilian community work with young people. He is also a member of the Command's Recreation Committee and Enlisted Club Advisory Group.

HM1 Smith holds the Combat Action Ribbon, Vietnam Campaign Medal, Vietnam Service Medal with 5 Stars, Republic of Vietnam Meritorious Unit Citation, Presidential Unit Citation, National Defense Service Medal, and Good Conduct Medal.

Nominated from Naval District Washington, HM1 Littlejohn currently is one of three Navy members serving with the Armed Services

Medical Regulating Office (ASMRO) in the Pentagon. He has the reputation of being "superbly knowledgeable" about every aspect of medical regulating.

The function of medical regulating is to control the flow of patients to and between medical treatment facilities, to insure the proper degree of medical care for each patient and full use of military medical treatment facilities. Each of the nearly 3,000 patients regulated by ASMRO every month must be handled individually, with great care.

HM1 Littlejohn has detailed knowledge of more than 60 medical specialties at each of over 80 military medical facilities in the United States. He has made a special effort to locate and maintain a file of facilities where special medical tests and procedures such as fiberoptic bronchoscopy, electromyography, and vitreous infusions are available. In addition, he has helped to develop procedures for the movement of drug and alcohol patients to Navy rehabilitation centers, and has been personally responsible for controlling the scheduled movement of all patients to the Navy's two drug and five alcohol rehabilitation centers. He has accomplished this task successfully despite heavy backlogs of patients and long waiting lists at the alcohol rehabilitation centers.

A native of Philadelphia, HM1 Littlejohn joined the Navy in 1964, and has served at Camp Lejeune, North Carolina, as well as in Vietnam



HM1 Ronald B. Littlejohn: Naval District Washington nominee for FY 75 Shore Sailor of the Year.

with the 3rd Medical Battalion, 3rd Marine Division, and 4th Marines, 2nd Battalion. He has had sea duty in the USS *Wasp*, USS *Paricutin*, and USS *Kilauea*, and completed a 2-1/2 year tour at NH Patuxent River, Maryland. This summer he is scheduled to report to Naval Air Facility, Sigonella, Italy.

HM1 Littlejohn has completed a number of courses towards a bachelor's degree in behavioral sciences. He also participates in various church-related educational activities, primarily as a Sunday School teacher.

He holds the Good Conduct Medal with one Star, Navy Achievement Medal, Combat Action Ribbon, Republic of Vietnam Campaign Medal with device, Vietnam Service Medal, Armed Forces Expeditionary Medal (Korea), National Defense Service Medal, and Army Meritorious Unit Commendation.

The 1974 Shore Sailor of the Year was HM1 (now HMC) John R. Hewitt, now training to become a physician assistant. ☘

NEW DISPENSARY/DENTAL CLINIC AT YORKTOWN NAVAL WEAPONS STATION

VADM D.L. Custis, Navy Surgeon General, cautioned against premature expectation of the end of the doctor shortage as he helped dedicate a \$1 million dispensary and dental clinic at Naval Weapons Station, Yorktown, Virginia, on 18 April 1975.

While praising the new facility as "one more landmark towards our goal of total replacement of obsolescence," VADM Custis said the effects of Medical Department programs to ease the doctor shortage would not be fully felt for two or three years.

He also advised the audience not to expect a return to the same kind of medical care that was available when the military could draft doctors. "In our all-volunteer environment, the general medical officer will never again be available in large numbers," VADM Custis said.

The 17,000 square foot facility houses the Navy Regional Medical Center Dispensary and the Naval Regional Dental Center Yorktown Branch. The dispensary contains emergency treatment and examining rooms, beds for emergency care, and capabilities for X-ray, laboratory, pharmacy, preventive medicine, physical therapy, and eye

and ear examination services. The dental clinic contains a prosthetic laboratory, preventive dentistry and X-ray facilities, four dental operating rooms, and an oral hygiene treatment room.—PAO, Naval Weapons Station, Yorktown, Virginia. ☘



This \$1 million dispensary and dental clinic was dedicated 18 April 1975 at Naval Weapons Station, Yorktown, Virginia.

MEDICAL RESERVE UNIT ORGANIZED AT SAN DIEGO

Restructured Ready Reserve Naval Regional Medical Center 5621 became operational in March 1975, with CAPT H.G. Kellogg, a San Diego pediatrician, serving as first commanding officer.

The new organization drilled as a unit for the first time at Naval Regional Medical Center San Diego. "Everyone was working in his area of specialty training. The members felt their assignments made the best use of their time to maintain and improve patient care," said Chief Petty Officer of the Command Harry Penny.

The Ready Reservists have set up an evening optometry clinic, with Wednesday evenings devoted to eye care for military dependents. Sophisticated visual evoked response screening equipment is available in this evening clinic to determine the extent of lost or diminished visual response.

Most members of NRMC 5621 work in their Navy specialty in civilian life. The average length of active duty for all members is four years, nine months.—PAO, NRMC 5621, San Diego. ☘

OFFICIAL INSTRUCTIONS AND DIRECTIVES

SECNAVINST 7220.61C of 17 Mar 1975

Subj: Continuation pay for Medical Corps and Dental Corps officers

The Continuation Pay Program provides an incentive for Navy Medical Corps and Dental Corps officers to remain on active duty, and helps to alleviate the shortage of Navy physicians and dentists in critical specialties.

To be eligible for continuation pay, officers must have completed their initial active duty obligation, have more than one year remaining before mandatory retirement, be serving in a designated critical specialty, and be deemed fully qualified in this specialty by a board of medical or dental officers.

Candidates for continuation pay must have completed five years of service, which may include:

- Periods of active duty as a medical or dental officer.
- Time spent undergoing approved postgraduate medical and dental training beyond the basic medical or dental degree.
- Time spent, while not on active duty, qualifying to take the certifying examination of the American Board of Family Practice.

Medical Corps officers in pay grades 0-7, 0-8, or 0-9 are eligible for continuation pay, as are medical officers in pay grades 0-4 and 0-5 who were on active duty on 1 June 1974 and are currently participating in initial residency training.

Dental Corps officers in pay grades 0-4, 0-5, 0-6, 0-7, and 0-8 are eligible for continuation pay.

The Chief, BUMED shall convene continuation pay selection boards at least annually. The boards shall consider all Medical Corps and Dental Corps officers on active duty who will become eligible for continuation pay within the next 12 months, and any Medical Corps or Dental Corps officer previously selected. Reports and recommendations on each officer considered shall be forwarded to CHBUMED, who will notify each selected officer, indicating the critical specialty category in which the officer is designated.

The amount of continuation pay received is based on the applicable rate of basic pay under

Title 37, USC 203(a) (pay entry base date) on the date the agreement is executed. Selected officers shall be offered an active duty agreement for one year. For serving that one additional year from the date of the agreement or from the date of completion of initial active duty obligation, officers will be paid an amount equal to the number of months of their basic pay as specified below:

<i>Pay Grades</i>	<i>Amount</i>
0-9	2 months
0-8	2 months
0-7	3 months
0-6	4 months
0-5	4 months
0-4	4 months

Continuation pay shall be paid in a single installment on the effective date of the contract.

Medical officers who are later selected to receive variable incentive pay (VIP) may become immediately eligible for VIP by repaying the pro-rated unearned amount of continuation pay.

Officers currently serving under a multiyear continuation pay contract which was authorized by SECNAVINST 7220.61B and who are not reselected for continuation pay shall be so notified by CHBUMED, and their contract shall be cancelled on the next anniversary date.

Officers do not incur any additional active duty obligation beyond the terms of their continuation pay contract.

Officers who do not serve the entire obligated period must return their continuation pay for the unfilled portion of their contract. This requirement does not give officers the option voluntarily to terminate their active duty agreements, however. Any such separation is governed by other appropriate regulations and policies.

CHBUMED shall administer the continuation pay program for Medical Corps and Dental Corps officers. The Chief of Naval Personnel shall budget for continuation pay, annually measure the effectiveness of the program, and help CHBUMED administer the program. The Comptroller of the Navy shall publish directives providing guidance for payments, maintain necessary data to identify expenditures, and help evaluate the effectiveness of the program.

For further information about continuation pay, contact the following Bureau codes:

Medical officers: BUMED Code 311A
Autovon 29-44166

Dental officers: BUMED Code 6A
Autovon 29-44182

BUMEDINST 6550.4 of 17 Mar 1975

*Subj: Utilization of nurse practitioners
in the Navy*

Navy nurse practitioners serve in the areas of pediatrics, obstetrics and gynecology, and family practice, and may function in diagnostic, preventive, and therapeutic areas of medicine as set forth in the enclosures to this instruction.

Nurse practitioners are assigned to the commanding officer of a naval medical facility in a specialty coded billet. It is imperative that they not be assigned independent duty; rather, they must work in an area covered by a physician qualified in the same specialty.

There should also be direct lines of communication between the nurse practitioner and the Nursing Service of the facility.

Nurse practitioners may initiate consultations to other services for problems found in their patients. With the exception of controlled substances, they may write prescriptions for such items as are approved by the CO and the Pharmacy and Therapeutics Committee. Further restrictions may be imposed at the discretion of the chief of service.

Randomly selected records of patients seen by nurse practitioners will be reviewed according to accepted standards. Peer review committees should include nurse practitioners.

Nurse practitioners are also expected to attend departmental teaching conferences and rounds, and to participate in community educational offerings. They should attend at least one professional meeting each year, and are encouraged to participate in professional organizations.

The uniform for nurse practitioners will be prescribed by the local command. In general, the uniform will be service dress blue or service dress light blue with laboratory coat and a name tag identifying the officer as a nurse practitioner. Other options are the indoor white uniform or pants suit.

BUMEDINST 6320.52 of 21 Mar 1975

Subj: Medical support services to Military Sealift Command by naval regional medical centers, naval hospitals, and regional medical clinics

Naval regional medical centers, naval hospitals, and regional medical clinics shall provide medical support services to personnel and ships of the Military Sealift Command.

Military personnel assigned to the Military Sealift Command shall be provided all medical services on a nonreimbursable basis.

Civilian crewmembers of the Military Sealift Command shall be provided annual examinations; pre-employment, pre-placement, and pre-termination physical examinations; and examinations and evaluations related to radiation health, to the Nuclear Weapons Personnel Reliability Program, and to occupations and exposures designated for health monitoring. These services shall be provided on a nonreimbursable basis.

Treatment of occupational illnesses and injuries, and emergency treatment of nonoccupational conditions occurring at work, shall be provided civilian crewmembers on a reimbursable basis. Subject to availability of staff and space, treatment of nonoccupational illnesses and injuries shall also be provided if U.S. Public Health Service medical facilities are not reasonably available. The Military Sealift Command shall be charged for these services.

Immunizations required by civilian crewmembers because of their service with the Military Sealift Command shall be provided on a nonreimbursable basis. Other immunizations may be provided on a reimbursable basis, for which the Military Sealift Command shall be charged. For the purposes of this instruction, chemoprophylaxis for the prevention of communicable disease is considered similar to immunization.

Military Sealift Command ships shall be provided sanitation, industrial hygiene, radiation health, and communicable disease and disease vector control services. Services related to health aspects of air and water pollution shall also be provided.

Military Sealift Command ships have no medical department representative. Therefore, the medical activity providing service must, on occasion, offer advice concerning medical matters

which may affect the mission of Command elements or require line action. This is particularly important in the case of medical information affecting the reliability of personnel in the Nuclear Weapons Personnel Reliability Program.

BUMEDNOTE 5040 of 28 Mar 1975

Subj: Schedule of command inspections and professional/technical visits to be conducted by the Inspector General, Medical

This notice promulgates the tentative schedule of command inspections and professional/technical visits to be conducted by the Inspector General, Medical through July 1976. Activities will be contacted approximately two months in advance of the scheduled inspection concerning more specific dates.

BUMEDINST 6710.60 of 8 Apr 1975

Subj: Manufacturers' credit plans

Several manufacturers offer credits, in merchandise, to medical facilities that purchase specified products. Credits earned are paid into a dividend account which may be used to purchase merchandise from the manufacturer.

Naval medical facilities may participate in the approved plans listed in this instruction provided that no competitive advantage is afforded to a company because of the plan, that all items obtained as dividends are listed in the hospital formulary or approved by the hospital Pharmacy and Therapeutics Committee, and that no item is obtained under such a plan when the same or equivalent item is available through the Defense Supply System.

Orders against dividend accounts will be issued by the supply officer, and all materiel will be received in the supply department. The supply officer will also maintain records sufficiently detailed to provide a complete audit trail of all transactions. Direct procurement negotiations with manufacturers will be made only by authorized purchasing/contracting officers.

The solicitation or acceptance of gifts, gratuities, favors, entertainment, or loans by persons who represent the Government in

business dealings from those who have or seek business dealings with the Department of the Navy is prohibited.

Information about manufacturers' credit plans offered locally and not listed in this instruction should be forwarded to the Naval Medical Materiel Support Command, 3500 South Broad Street, Philadelphia, Pa. 19145. The name of the manufacturer, products involved, method of computing credits, and a general explanation of the plan should be included. Naval medical facilities should not participate until approval of the plan is granted.

BUMEDINST 3900.5A of 14 Apr 1975

Subj: Neisseria Repository

The Neisseria Repository has been transferred from the recently disestablished Naval Medical Research Unit No. 1 to the Naval Biomedical Research Laboratory, Oakland, California.

Naval medical activities shall collect cultures and acute and convalescent sera from all patients with *Neisseria meningitidis*. Acute sera shall be collected 7, 14, 21, and 28 days post infection. The original specimens, with a copy of the case history, shall be shipped to:

Neisseria Repository
Naval Biomedical Research Laboratory
Bldg 844, Naval Supply Center
Oakland, California 94624

Strains of *Neisseria gonorrhoeae* that would be of interest to naval installations should be selected and sent to the Repository for confirmation and classification.

Isolates shall be grown on chocolate agar slants. Specimens shall be labeled clearly with the patient's name and date of isolation or bleeding, and shall be shipped via commercial airmail at ambient temperatures in accordance with Section III of SECNAVINST 6210.2. The Repository will supply shipping containers upon request.

BUMEDINST 5355.1 of 22 Apr 1975

Subj: Drug Abuse Urinalysis Program

Participation of military personnel in urinalysis screening for drug usage can be legally required. However, the results of the test may not be used

as evidence of a violation of the Uniform Code of Military Justice, nor may test results lead to administrative separation under conditions other than honorable.

It is also the policy of the Surgeon General of the Navy that no adverse administrative, nonjudicial, or judicial action may be taken solely on the basis of positive test results, and that subsequent medical evaluation is the only acceptable way to arrive at a diagnosis and classification of individuals as drug dependent, experimenters, users of legitimate drugs, or subjects of administrative error. Positive test reports and clinical evaluations thereof shall be recorded only in the individual's medical records, and shall be released only for official purposes.

The Drug Abuse Testing Program applies without exception to all active duty military personnel 25 years of age and under. Individuals 26 or older may be tested at the discretion of the commanding officer.

Individuals who fail to appear and provide a urine sample as directed shall be tested under direct supervision within 30 days. When commitments preclude testing on the prescribed day, the CO shall reschedule the testing on a random basis. Deviations from the program are authorized when severe stress would be placed on the command in order to comply, or when remote facilities would be required to store large quantities of urine specimens.

Individuals who yield a positive test specimen but deny the illegal use of dangerous drugs, and for whom the legal medical use of the identified drug cannot be established, will be enrolled in a urine surveillance program. Two tests will be done each week for four weeks. A second positive urine test will be sufficient cause to request entry for the subject into a treatment or rehabilitation program. COs may exercise any of the following options:

- Command counseling and rehabilitation, including a full explanation of the Navy Exemption Program.
- Referral to a counseling and assistance center.
- Transfer to a medical facility as an inpatient under observation in a drug free environment.

If additional medical or other evidence does not confirm drug abuse, the CO may release the individual from the surveillance program.

COs shall comply with the detailed procedures set forth in this instruction for the conduct of the urinalysis testing program. The monthly report required by enclosure (4) of OPNAVINST 5355.1

shall be submitted to BUMED Code 313 by the tenth of each month. A copy shall be forwarded to CO, Naval Medical Data Services Center, National Naval Medical Center, Bethesda, Md. 20014 (Chief, Statistics Division).

BUMEDINST 1306.1 of 29 Apr 1975

Subj: Medical holding companies; policy concerning

This instruction authorizes the establishment and prescribes the operation of medical holding companies to provide health care for active-duty enlisted personnel who need medical attention but are not so seriously ill as to require hospitalization on acute care wards. Medical holding companies are a viable means of saving medical funds by reducing the total days that patients are confined to inpatient care facilities. While use of medical holding companies must be expanded to meet the total health care needs of the Navy, their use must not be detrimental to the thorough treatment and return to the fleet of personnel fit for duty, or to the timely disposition of personnel not medically suited for further service.

One medical holding company will be established at each naval regional medical center (or hospital, where regionalization has not been effected). The commanding officer of the naval activity designated to establish the medical holding company shall operate and maintain the company as part of that command, using company personnel commensurate with their physical limitations and insuring that personnel transferred to the company are properly entered in the Manpower Management Information System as received for temporary duty. A liaison officer/officer-in-charge of the medical holding company shall be designated.

The CO of the medical center or hospital shall assure that only ambulatory patients who require minimal medical attention are assigned to the medical holding company. Qualified patients will be transferred, with records and accounts, to the designated medical holding company for temporary duty as outpatients. Personnel permanently assigned to shore duty in the local geographical area will be returned to their parent activities for outpatient treatment instead of being

transferred to the medical holding company, provided treatment was performed while they were in temporary additional duty status.

The CO shall insure that proper records are kept of personnel movement to and from the medical holding company, and that the liaison officer/officer-in-charge is informed of any changes in the status of company personnel. Personnel in the company shall be reevaluated at least every 30 days.

When the medical holding company is not co-located with a medical center or hospital, a Medical Department officer shall be designated to provide liaison between the company and the medical facility.

CHNAVPERS shall be informed when a patient will exceed sixty days in medical hold status. Monthly statistical data on the number of individuals in medical hold status will be provided BUMED Code 72 by the tenth of each month, following examples given in this instruction.

Copies of each directive pertaining to medical holding companies shall be sent to CHNAVPERS (Pers-503) and CHBUMED (Code 72).

BUMEDINST 5450.4C of 1 May 1975

Subj: Organization manual for naval regional medical centers and naval hospitals

This manual establishes a standard organization for naval regional medical centers, U.S. naval regional medical centers, naval hospitals, and U.S. naval hospitals. Naval regional medical clinics, naval clinics and branch clinics in establishing their clinical and administrative services will follow the same organization plan, with appropriate modifications and alignment with the assigned regional medical center or hospital. The manual provides commanding officers with an organization base aligned with the objectives of the naval regional health care system, yet contains sufficient flexibility to meet both local and regional requirements.

As an amplification of the nomenclature used in the organization manual, it should be noted that

although the standard title for the head of a professional service is "chief" (e.g., chief of orthopedic service), it is intended that a chief of service conducting an approved residency training program *may use an alternate title of "chairman"* (e.g., chairman, Department of Internal Medicine) *when communicating or corresponding with members of the civilian academic-teaching community. However, the title "chairman" should not appear in organization charts and functional statements of an activity's organizational manual.*

Naval regional medical centers and hospitals shall revise their organization manuals, with charts and functional statements, to conform with this instruction. A copy of the revised manual must be forwarded to BUMED Code 72 as soon as possible, but no later than 31 December 1975. Additionally, to keep the Bureau copy current, the following organization data must be submitted to BUMED Code 72:

New material. A copy of each new or revised organization chart and related functional statement when approved by the commanding officer.

Annual checklist. A listing of all organizational charts, with date of approval, in effect as of 31 December of each year; or a statement indicating the organization manual and charts are current. This information must reach the Bureau by 15 January of the following year.

BUMEDNOTE 5040 of 7 May 1975

Subj: Schedule of command inspections and professional/technical visits to be conducted by the Inspector General, Dental

This notice promulgates the tentative schedule of command inspections and professional/technical visits to be conducted by the Inspector General, Dental through August 1976. Activities will be contacted approximately two months in advance of the scheduled inspection concerning more specific dates. 🍀

GONZALEZ BILL WOULD GRANT IMMUNITY

A bill now being considered in the House of Representatives would extend to Medical Department personnel immunity from liability for negligent acts committed while rendering medical care to authorized beneficiaries.

Representative Henry B. Gonzalez of Texas introduced H.R. 3954 on 27 February 1975. If enacted, this bill would give members of the armed forces medical departments the same immunity presently enjoyed by physicians and supporting medical personnel of the Public Health Service and the Veterans Administration.

This same bill was introduced last year into the 93rd Congress by Representative Robert Sikes, but was never reported out by the Judiciary Committee.

On 5 June 1975, VADM D.L. Custis, Navy Surgeon General, testified in favor of H.R. 3954 before the Armed Services Committee (where the bill was assigned in the 94th Congress for consideration). Other supporting witnesses were: Mr. Gonzalez; John D. Laughin, Chief, Tort Section, Civil Defense, Department of Justice; BG Ernest J. Clark, MC, USAF, Director of Professional Services, Office of the Surgeon General, U.S. Air Force; BG Walter D. Reed, JA, USAF, Assistant Judge Advocate General, U.S. Air Force; and BG Charles C. Pixley, MC, USA, Director of Professional Services, Office of the Surgeon General, U.S. Army.

Hearings have not yet been scheduled on S. 1395, an identical bill introduced in the Senate by Senator Strom Thurmond. It is anticipated that the Senate will consider this bill if sufficient concern is expressed by members of the public.

MANAGEMENT BY OBJECTIVES

Strategy sessions are under way at BUMED to lay the foundation of a Management by Objectives Program for the Bureau. Early sessions will develop and recommend the framework within which the program will be established, implemented, and managed. Sessions are headed by RADM C.L. Waite, MC, USN, who is assisted by one member of each single digit code, representatives from Code 02, and a representative from the Naval Health Sciences Education and Training Command and the Medical Research and Development Command.

DENTAL SCHOLARSHIP PROGRAMS

Students have been selected for Fiscal Year 1975 dental scholarship programs. Two billets were available in the Navy Dental Scholarship Program, with two active-duty applicants being selected. For the Armed Forces Health Professions Scholarship Program (Dental), 146 selections were made.

LENGTH-OF-STAY HEADED DOWN

A concerted attack is being directed by BUMED toward reducing the average length of patient stay for active-duty personnel to a maximum of 15 days (see "Notes and Announcements" in this issue). COs of activities whose average LOS is more than 15 days will be required to justify this excess. Measures such as use of medical holding companies, limited duty, temporary disability retired list, transfer to a VA hospital, and readmission at a later time for elective procedures will help medical facilities reach and maintain a lower LOS. ☛

UNITED STATES NAVY MEDICINE

CORRESPONDENCE AND CONTRIBUTIONS from the field are welcomed and will be published as space permits, subject to editing and possible abridgment. All material should be submitted to the Editor, *U.S. NAVY MEDICINE*, Code 0010, Bureau of Medicine and Surgery, Washington, D.C. 20372.

NOTICES should be received not later than the third day of the month preceding the desired month of publication.

PROFESSIONAL PAPERS AND ARTICLES should be typewritten on one side of the paper, double spaced, with liberal margins. Original and one carbon copy are required. Generic names of drugs are preferred. If the author's present affiliation differs from that under which the reported work was done, both should be given. Unless otherwise indicated, it will be assumed that the article presented has not been previously printed or delivered elsewhere. Papers which have been delivered or printed elsewhere, covered by copyright, cannot be reprinted in *NAVY MEDICINE* without the written permission of the author(s) and copyright holder. It is the responsibility of the author(s) to inform *U.S. NAVY MEDICINE* when the material submitted has been previously used or copyrighted. In selecting manuscripts for publication in *NAVY MEDICINE*, preference is given to original articles.

ILLUSTRATIONS are acceptable when they substantially contribute to the understanding of the basic material. Only distinct, glossy, black and white **PHOTOGRAPHS** which are functional can be printed. Prints should not be mounted, stapled, clipped or otherwise deformed and can be marked lightly on the back with the figure number. Legends should be typed consecutively on a separate paper with the indicated figures; credits for the photography may also be included. Identities of patients should be masked. **DRAWINGS, TABLES AND GRAPHS** should be minimal in number and properly labeled. They should be neatly done in heavy black ink on white paper, one to a page.

SUGGESTIONS are invited concerning *U.S. NAVY MEDICINE*, its content and form.

U.S. NAVAL PUBLICATIONS and FORMS CENTER
ATTN: CODE 306
5801 Tabor Avenue
Philadelphia, Pa. 19120
Official Business

POSTAGE AND FEES PAID
DEPARTMENT OF THE NAVY
DoD-316



$$109.6 \div 10 = \$280.37$$

When the Navy Relief Society in Memphis wanted to get the wheels turning for its 1975 fund-raising campaign, who should roll up but HM2 Charles "J.R." Satterthwaite, Jr., and his ten-speed bicycle? One of the best athletes serving at NH Memphis, Satterthwaite began pedaling for Navy Relief early in the morning of 20 May. When he finally stepped on the brakes ten hours and 109.6 miles later, some \$280.37 had been donated by "sponsors" of his marathon ride.

Satterthwaite was last seen pedaling off into the sunset.



U.S. NAVY MEDICINE