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Report to the Chairman, Subcommittee
on Military Forces and Personnel,
Committee on Armed Services, House of
Representatives

July 1993

OPERATION DESERT STORM

Improvements Required in the Navy's Wartime Medical Care Program



93-18698



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National Security and
International Affairs Division

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July 28, 1993

The Honorable Ike Skelton
Chairman, Subcommittee on Military
Forces and Personnel
Committee on Armed Services
House of Representatives

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Dear Mr. Chairman:

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At the request of the former Chairman, we reviewed the capabilities of Navy medical units that supported Operations Desert Shield and Desert Storm. Specifically, we determined whether the Navy's medical units (1) were prepared to perform their assigned missions, (2) experienced problems in identifying and deploying medical personnel, (3) were staffed with trained personnel, and (4) had their required equipment and supplies. In addition, we examined the Navy's efforts to change medical operations based on lessons learned from the Persian Gulf War. We issued a report on the Army's medical units¹ and will issue a report on the Air Force's medical units at a later date.

Results in Brief

Navy medical units were assigned wartime missions they were not prepared to fulfill. They were neither staffed nor equipped to care for the numbers of casualties they were told to expect, provide noncombat medical care, support the evacuation of casualties out of theater, or receive large numbers of chemically contaminated casualties.

The personnel information systems used to assign individuals to Navy medical units contained incomplete and outdated information. Many physicians and nurses who were scheduled to deploy did not do so for a variety of reasons. In addition, medical personnel had not trained during peacetime to perform their wartime mission. Personnel also raised concerns about the ability to obtain equipment and supplies necessary to treat mass casualties and to perform other missions. Fortunately, the 6-month period between deployment and the start of the ground war allowed individuals and units to prepare for their wartime responsibilities.

By most accounts, medical units supplied by the Navy were able to provide adequate care for those in need. However, had the Navy incurred

¹Operation Desert Storm: Full Army Medical Capability Not Achieved (GAO/NSIAD-92-176, Aug. 18, 1992).

the predicted number of casualties, or had the ground war started earlier or lasted longer, these units may not have been able to provide adequate care.

The Navy has reviewed its lessons-learned reports and directed specific offices to fix identified problems, but it did not establish time frames to correct these problems. According to Navy officials, time frames are now being set.

Background

The Navy deployed almost 12,000 medical personnel to support Operations Desert Shield and Desert Storm. Over two-thirds of these personnel deployed to units comprising the second and third echelons of the Navy's five echelon system of care for war casualties. These units included two hospital ships, three combat zone fleet hospitals, three Marine Corps medical battalions, and seven casualty receiving and treatment ships. A general description of the Navy's medical care system is provided in appendix I.

Naval medical support to echelons II and III was deployed in two phases. Phase 1 began in early August 1990, and by the first week of November, over 4,200 active-duty personnel had deployed to Southwest Asia. In anticipation of the air war, phase 2 began in December 1990 and extended into January 1991. During this phase about 4,300 personnel—a majority of them reservists—deployed to staff echelon II and III medical units.

According to Navy officials, their deployment actions were based on the theater command's medical requirements. These requirements considered factors such as the nature and duration of the operation planned, expected combat intensity, casualty rates, estimates of disease and non-battle injuries, evacuation policy, and types and capabilities of medical units available. As a result, the Navy was tasked to provide specific medical units in support of Operations Desert Shield and Desert Storm.

Medical Units Were Assigned Missions They Were Not Prepared to Fulfill

The Navy demonstrated its ability to rapidly provide significant medical capabilities in-theater. Within 5 days of activation, the hospital ships were deployed and en route to the Persian Gulf, where they arrived prepared to treat casualties. The deployment of the fleet hospitals showed that pre-positioned deployable medical systems could be assembled and fully operational within a combat zone in about 2 weeks. However, Navy medical units were given missions by the theater command that they were

neither designed, staffed, nor equipped to perform. These missions included handling more casualties than they were designed for, providing noncombat medical care, supporting the evacuation of casualties out of theater, and receiving large numbers of chemically contaminated casualties.

Although the Navy provided all the medical units that were requested by the theater command, casualty predictions were about twice as high as these units were designed to handle. For example, although hospital ships were designed to receive up to 100 casualties per day over a sustained period of time, medical personnel were told to expect between 200 to 300 casualties per day. Similarly, combat zone fleet hospitals that were designed to receive 80 casualties per day were expected to receive up to 200 casualties per day.

Given the number of casualties projected, Navy medical personnel were concerned that there would have been staff shortages, even though Navy medical units were staffed to their authorized levels. Identified critical shortages would have included general and orthopedic surgeons; anesthesiologists; operating room nurses and nurse anesthetists; and nonmedical personnel for security, supply, administration, and food service duties. For example, one fleet hospital had a combined total of 11 anesthesiologists and nurse anesthetists to support 24 surgeons. According to personnel we spoke with, at least 16 anesthesia providers are needed to support 24 surgeons.

A hospital ship's ability to receive and treat the number of expected casualties would have been exacerbated by difficulties in transporting patients to the ships. All patients brought to the hospital ships had to be transported by helicopter because access to the hospital ships by sea was not considered a reliable option. Due to rough sea conditions, ship-to-ship patient transfers were deemed unsafe. Helicopter transport to the hospital ships was also problematic because (1) each ship had only one landing pad; (2) helicopters' capacities were limited; and (3) the ships had to stay out of harm's way, and as a result, the distance and travel time to transport patients from the battle area increased. Under these circumstances, the hospital ships would not have been fully used to treat mass casualties.

Fleet hospitals and hospital ships are designed to provide combat-related, surgically intensive medical care. Fortunately, these types of assets did not have to be used because the United States and its allies had so few casualties. Nonetheless, medical units—particularly the fleet

hospitals—experienced shortages of equipment and supplies needed to support the vast majority of medical care that these units provided during Operations Desert Shield and Desert Storm. Noncombat medical needs placed a large demand on medical services, including orthopedic, dental, and gynecological services in support of a continuous flow of patients on sick call. For example, females comprised about 6 percent of the forces deployed to Southwest Asia, yet only one gynecologist was assigned to deployed hospitals, and no space or examination table was allocated in the fleet hospitals for gynecologic examinations. While medical units had some sick call items, the quantities on hand could not accommodate patients' demands. In the absence of appropriate equipment and supplies, patients that could have been treated in-theater had to be evacuated to other facilities and were away from their operational units for significant periods of time.

The Air Force was responsible for evacuating casualties out of Southwest Asia. During Operations Desert Shield and Desert Storm, the Air Force required all services' medical units to have on hand equipment and supplies to last 5 days for each patient being evacuated from the area, as well as personnel to monitor patients on respirators and cardiac monitors. In addition, two of the fleet hospitals were directed to provide care for patients assembled at an evacuation staging site. These requirements were not anticipated by Navy medical units; consequently, equipment and staffing to support patient evacuations were not included in the fleet hospital and hospital ship authorization levels. According to medical personnel assigned to these units, ventilators, intravenous fluids, medications, blankets, litters, and a host of other equipment and supplies would have been rapidly exhausted if casualty rates had approached predicted levels.

According to military doctrine, casualties are evaluated for chemical, biological, and radiological contamination and, if necessary, decontaminated by combat forces prior to evacuation for medical treatment. However, all medical units were required to be prepared to receive contaminated casualties. Prior to the start of the ground war, the theater command told medical personnel assigned to the hospital ships and fleet hospitals to expect that up to 15 percent of the casualties they received would be contaminated. While the ability of these medical units to operate in a contaminated environment was not tested, officials we interviewed indicated that these units were not designed or staffed to handle large numbers of contaminated casualties for the following reasons:

- The hospital ship's collective protection systems were inadequate. A wash-down system was improvised to reduce the concentration of airborne contaminants; however, coverage would have been spotty and undependable. There was no reliable plumbing system to remove water from the decontamination stations. Contaminated water would have collected in pools and spilled onto lower decks, potentially spreading contamination. Decontamination station exhaust vents were located near the ship's air intake vents, posing the risk of airborne contamination to the entire ship.
- Fleet hospitals did not contain decontamination stations. Consequently, they had to establish makeshift stations. One of the fleet hospitals had not completed its station when the ground war started and therefore, could not have handled contaminated casualties.
- Prior to deployment, very few fleet hospital and hospital ship personnel were trained in either patient decontamination or in the treatment of chemically contaminated casualties. Navy officials estimated that very few of the Navy physicians (less than 10 percent) who deployed to Southwest Asia were trained to treat chemically contaminated casualties, in spite of Navy guidance that medical personnel must be trained to overcome difficulties imposed by a chemical environment.

Deployment and Assignment of Medical Personnel are Not Efficiently Managed

The Medical Personnel Unit Augmentation System monitors the staffing requirements of deploying medical units. For a deployment, previously identified active duty personnel are drawn from medical facilities in the continental United States to augment deployed medical units to specified staffing levels. Many revisions were made to the rosters of personnel who were to deploy during the first phase of the operations. An official at one unit estimated that between one-third and one-half of the assigned personnel were replaced in the 3 days between the posting of the original roster and the deployment to Southwest Asia. In another unit, over 20 percent of the personnel identified through the augmentation system did not deploy. Although these problems did not ultimately delay the activation of medical units in-theater, they did result in the deployment of some unqualified personnel. In some cases, personnel deployed and had to be returned to the United States for medical, administrative, and humanitarian reasons.

Deployment rosters were modified for two principal reasons. First, full mobilization did not occur. For a full mobilization, requirements to maintain comprehensive health care for military personnel and their dependents and medical residency programs cease. Consequently, medical

personnel needed to support beneficiary care in Navy medical facilities, medical residents, and graduate education instructors were considered nondeployable and had to be replaced on the rosters. A methodology to staff the hospital facilities at less than full operating status did not exist.

Second, staff selection was often based on outdated, inaccurate information. Medical facilities are responsible for maintaining an up-to-date readiness checklist for each individual assigned to a deploying medical unit. This checklist documents an individual's ability—or readiness—to deploy. Readiness checklists dating back to 1990 were destroyed prior to our audit and thus were not available for review. However, according to Navy officials, some individuals on the rosters were found to be nondeployable for reasons that should have been documented, including illnesses and injuries, pregnancies, and ongoing legal issues. In some cases these individuals were no longer assigned to their medical facility of record.² Contrary to policy, medical personnel indicated that many of the individuals assigned to deploying medical units were unaware of their wartime assignments. This was particularly true among the junior-level officers and enlisted personnel. As a result, personnel were less prepared to deploy than they should have been. In some instances, individuals reported for deployment without service, health, and pay records; documentation of security clearances; and uniforms. One unit, for example, indicated that almost no one had powers of attorney or wills on record prior to deployment. (Administrative support personnel were able to assist in solving these problems and contributed to the rapid deployment of Navy medical units.)

During the second deployment phase, about 95 percent of the medical personnel who mobilized to serve in fleet hospitals and on hospital ships were reserve personnel. Naval Reserve commands received advance notice to designate personnel to deploy. Therefore, when the official notification was issued, they had already completed comprehensive reviews and corrected deployment rosters. Matching the qualifications of reservists to unit requirements was a problem, however, because the reserve personnel data bases did not identify physicians and nurses by their areas of expertise. Further, the decision to assign reservists to the two hospital ships, until then an unassigned mission, meant that they had not satisfied training requirements specific to the hospital ships.

²Medical facilities are required to verify the readiness checklists at least annually. In addition, medical facilities are required to track events that reduce an individual's readiness, including reassignment.

Personnel Arrived In-Theater Without Adequate Training

Many personnel assigned to hospital ships and fleet hospitals arrived in-theater without completing necessary operational training. People assigned to hospital ships are required to complete instruction in fire fighting; shipboard orientation; damage control; and chemical, biological, and radiological defense. Yet prior to deployment, less than half of those assigned to the ships were trained in these areas, and over 75 percent had no prior shipboard experience.

Operational training shortfalls were also reported for personnel assigned to the fleet hospitals. The Navy expects at least 40 percent of the personnel to be trained in constructing and operating a fleet hospital. While this level was achieved for the reserve personnel assigned to fleet hospitals, less than 20 percent of the active duty personnel who deployed with the first fleet hospital had received this training. Medical personnel said that fleet hospital training was instructive but should be broadened to offer participants an opportunity to practice medicine under field conditions.

Unlike the hospital ships, which contained state-of-the-art medical equipment, the fleet hospitals were equipped with technology from the 1970s and early 1980s. Because of the equipment's age, most of the personnel assigned to the fleet hospitals had not trained with several pieces of equipment before they arrived in-theater. This factor contributed to a lack of confidence in the quality of the equipment and supplies available and a belief among the medical staff with whom we spoke that they would have provided less than adequate care based on present day standards.

Another operational deficiency involved the lack of training and experience in treating trauma patients. Although the physicians and nurses who deployed were described as experienced and competent, many of them had never treated trauma patients—or not for a considerable period of time—and a majority of them had not completed training in combat casualty care. This lack of training was magnified for reserve corpsmen and nurses, many of whom held nonmedical civilian jobs and thus did not perform their medical duties during peacetime. Fortunately, the prolonged buildup of forces allowed fleet hospital personnel to familiarize themselves with the equipment and all Navy medical personnel to complete medical and operational training.

Lack of Inventory Controls Hampered the Flow of Equipment and Supplies

Control of medical equipment and supplies prior to and during Operations Desert Shield and Desert Storm was inadequate. Units reported that out-of-cycle calibration of equipment had to be completed, and some equipment was not kept in its required state of readiness. For example, over half of one unit's 40 ventilators did not work and needed repair after they arrived in-theater. Units also had unanticipated compatibility problems with supplies. For example, cartridges issued with surgical guns did not fit, and the film issued with x-ray machines did not match, necessitating a stronger dosage of radiation to be given to patients.

Medical units' equipment and supplies are required to be inventoried periodically; however, all of the units we visited reported discrepancies between the recorded and the actual inventories. Missing items ranged from patient care documentation forms, spare parts, and repair sets, to an array of diagnostic laboratory equipment and supplies. One unit had no written record of what supplies and equipment were present, in what quantities, and where they were stored. This necessitated taking a physical inventory and comparing what was in stock against what was authorized—a process not completed until after the medical unit had deployed. At the termination of hostilities, the unit still had not received its complete inventory.

Fleet hospital personnel reported that equipment and supplies often were not packed according to their manifests, making field assembly more time-consuming. Contrary to policy, materiel from different functional areas was packed together, and in one case, materiel that was supposed to be in 1 or 2 containers was dispersed among 30. When filled requisitions arrived in-theater, the supplies frequently were not received by the requisitioner due to the absence of inventory and distribution controls. Instead of being reserved for the requisitioner, equipment and supplies were stored at consolidated supply points, not inventoried, and issued on a first-come-first-served basis.

For the most part, shortages were alleviated by the time the ground war started, although Navy medical personnel repeatedly raised concerns about their ability to obtain enough equipment and supplies to treat mass casualties. This concern was compounded by a belief shared by many of the physicians—particularly those assigned to the fleet hospitals—that some of the equipment and supplies were of poor quality and did not incorporate technological advances. As a result, several physicians bypassed the official supply system and personally asked medical facilities

and private practices in the United States to send specific items directly to them.

Medical units reported that short shelf-life items such as intravenous fluids and sterile and pharmaceutical supplies had either expired or were in short supply when they arrived in-theater. According to Navy supply officials, these items were intentionally allowed to expire to avoid the expense of continually replacing them during peacetime. In the event of hostilities like Operations Desert Shield and Desert Storm, these items would be delivered to the medical units at their deployment sites. The majority of medical personnel we spoke with were unaware that this delayed supply of short shelf-life items was preplanned; thus, high-priority orders were submitted to replace the expired materiel.

All of the medical units we visited deployed with virtually no equipment or supplies for treating contaminated casualties. Materiel continued to arrive during the months before the war, but some items—including protective aprons, chemical agent casualty bags, and protective boots and gloves—remained in short supply. One unit reported that individual protective suits had dry-rotted beyond use.

To facilitate the resupplying of medical units in-theater, the Army was designated the single item manager (SIM) for medical supplies in November 1990. In this capacity, the Army was expected to support medical supply requirements of all the military services. However, supply support under the SIM concept was less than optimal for Navy medical units. Order and shipping times increased because of inadequate communications equipment and the incompatibility of the Navy's automated supply system with the Army system used by SIM. In addition, the hospital ships were equipped with many items not common to the other operational medical units and not included in the Army's supply system. Consequently, they were able to obtain only about half of their supplies from SIM.

Time Frames Have Not Been Established for Correcting Identified Problems

Since Operations Desert Shield and Desert Storm, the Navy has taken steps to improve its ability to provide in-theater medical support, but time frames have not been established to correct identified problems. The sooner actions are taken to remedy these problems, the sooner units will be prepared should they have to deploy in future contingencies.

In March 1991, the Navy assembled a task force to collect, analyze, and publish information on shortcomings in medical operations during Operations Desert Shield and Desert Storm. In March 1992, 98 lessons learned—many of which address problems discussed in this report—were assigned to offices within the Navy medical community for resolution. As of April 1993, action had been completed on 15, initiatives were in progress on 43, and no action had been taken on 40. Offices assigned to respond to these shortcomings were instructed to submit quarterly status reports; however, according to Navy officials, status reports have not been received on 41 percent of them in the 13 months since they were assigned. Nonetheless, in the past 2 months the Navy has made significant progress in resolving these lessons learned. As of June 1993, action had been completed on 58, initiatives were in progress on 27, and no action had been taken on 13.

Nine of the Navy's lessons learned address the need to (1) modify the hospital ships to facilitate ship-to-ship patient transfers, (2) reevaluate the mission of Navy medical units to determine whether it should be expanded to encompass a routine health care function, (3) modify the medical evacuation policy to minimize disruption to in-theater medical units, and (4) improve the ability of medical units to treat contaminated casualties. Action has been completed on four of these lessons learned. The Navy believes that, collectively, these actions will clarify policies and procedures for patient decontamination and improve the quality of routine health care in a combat environment, including gynecological care.

Eleven of the Navy's lessons learned address policies—existing and new—to improve the response time to deploy. According to Navy officials, action has been completed on eight issues that will make the verification of dental records easier, reinforce the importance of keeping individual readiness checklists current, coordinate administrative support for reservists scheduled to deploy, and require reservists to be identified by medical sub-specialty, as are their active duty counterparts. The Navy expects this last action to result in a more precise match between a reservist's qualifications and a unit's requirements.

Thirteen of the Navy's lessons learned address the staffing of deploying medical units and training requirements for personnel assigned to those units. Suggested staffing changes included adding social workers and administrative support to medical units and nurses to Marine Corps units. Training was recommended on combat medical operations, the treatment of contaminated casualties, field safety, damage control, and sanitation

measures. Action has been completed on three of these lessons learned. The Navy believes that these actions will ensure that personnel assigned to operational medical units have completed all required training before deploying.

Seven of the Navy's lessons learned concern medical logistics support covering the availability of equipment and supplies in-theater, the adequacy of medical supplies for operating in a contaminated environment, and medical resupply under the SIM concept. Action has been completed on three lessons learned. Methods for detecting chemical, biological, and radiological contamination have been reviewed by the Navy for development of more reliable detection equipment.

In addition to the lessons learned pertaining to the issues discussed in this report, the Navy is also studying 58 lessons learned on a broad range of issues, including in-theater blood supplies; the operation of medical facilities in the United States during a war; and ancillary support to medical units such as food, pay, and security.

commendation

We recommend that the Secretary of the Navy set and enforce time frames to correct the shortcomings identified from lessons learned about medical operations during Operations Desert Shield and Desert Storm.

Agency Comments

In commenting on a draft of this report, the Department of Defense (DOD) agreed with our findings and the recommendation. However, DOD disagreed with our overall conclusion that adequate care may not have been provided had the predicted number of casualties occurred or had the ground war started earlier or lasted longer. We believe the problems noted from the beginning of the deployment of Navy medical units up through the ground war phase of Operation Desert Storm support our conclusion.

According to Navy officials, the Navy is now establishing time frames for each of the unresolved problems cited in the lessons learned report, and the Deputy Surgeon General is directly involved in ensuring that they are expeditiously resolved.

Scope and Methodology

We focused our review on Navy medical units that deployed to Southwest Asia to support Operations Desert Shield and Desert Storm. We limited our review for the most part to units capable of providing definitive medical

care of seriously injured personnel. These units included two active-duty hospital ships, one active-duty fleet hospital, and two reserve fleet hospitals.

During our review we interviewed over 100 Navy active-duty and reserve personnel, including command staff, physicians, nurses, corpsmen, and logisticians who deployed to Southwest Asia. We did not select units statistically; however, our sample encompassed a majority of the hospital units that were deployed in-theater. The lessons learned and after-action reports we obtained from these units and from the units we did not visit indicate that our findings are systemic throughout the Navy medical community. A complete list of locations we visited is contained in appendix II.

We conducted our review from April 1992 through April 1993 in accordance with generally accepted government auditing standards.

We are sending copies of this report to the Chairmen and the Ranking Minority Members of the Senate and House Committees on Armed Services and on Appropriations, the Senate Committee on Governmental Affairs, and the House Committee on Government Operations and to the Secretaries of Defense and the Navy. We will also make copies available to other interested parties upon request.

Please contact me at (202) 512-5140 if you or your staff have any questions concerning this report. Other major contributors to this report are listed in appendix III.

Sincerely yours,



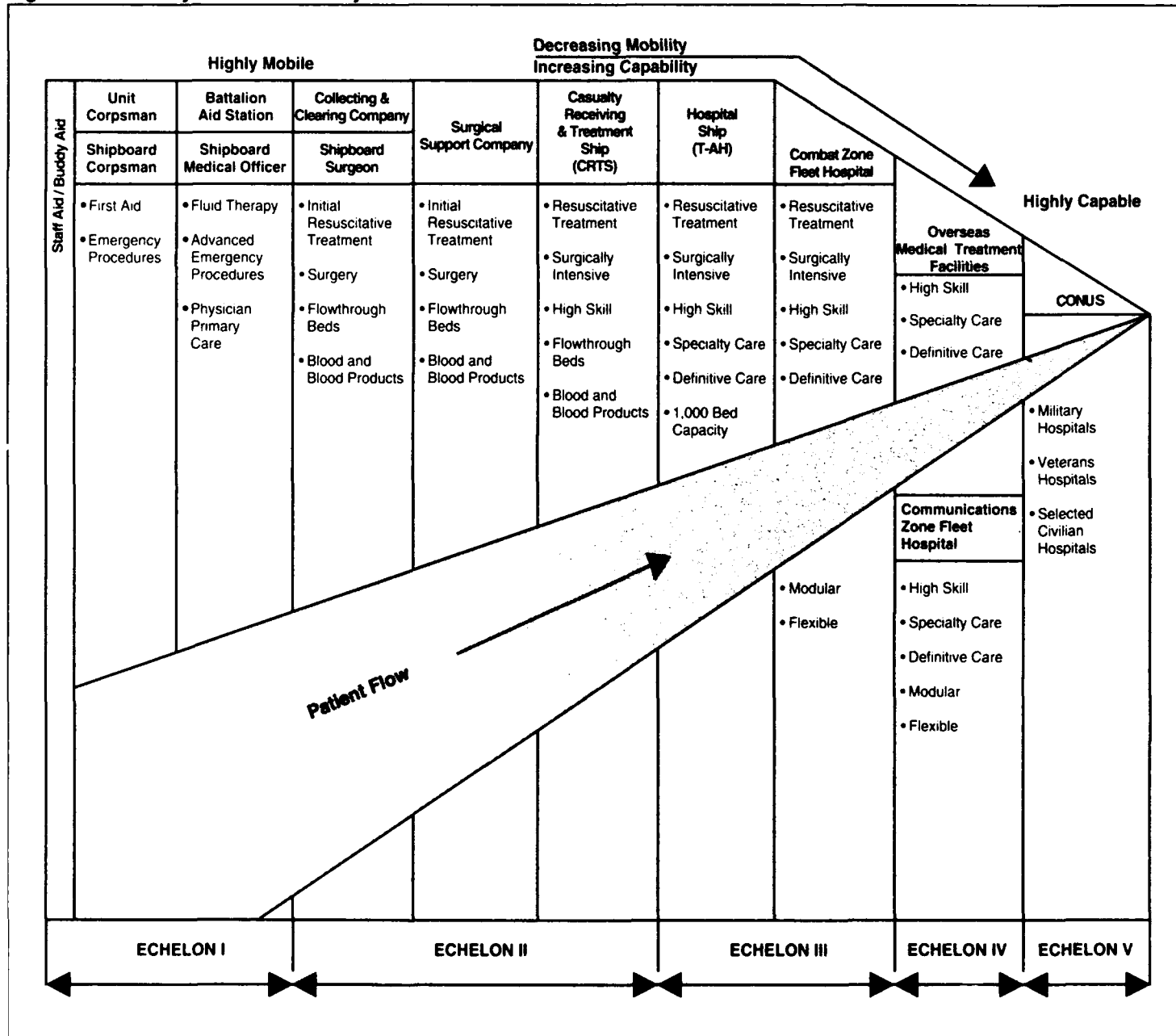
Mark E. Gebicke
Director, Military Operations
and Capabilities Issues

Navy's Medical Care System

During a conflict, a system of medical care is established for treating casualties. In Operations Desert Shield and Desert Storm, this system of care comprised five echelons, or levels, extending from the forward edge of the battle area to the continental United States. Each level provides services equal to the preceding level, plus additional capabilities, for incrementally progressive treatment. Generally speaking, the more sophisticated the medical capability, the less mobile the medical unit. The goal of the medical care system is to treat casualties at the lowest level possible and return them to duty within a prescribed time frame. If this cannot be achieved, patients are evacuated to a higher level of care. Figure I.1 diagrams the Navy's medical care system.

**Appendix I
Navy's Medical Care System**

Figure I.1: The Navy's Medical Care System



Source: Navy Bureau of Medicine and Surgery.

Level I care consists of basic first aid to return the person to duty or emergency life-saving procedures sufficient to stabilize a patient for evacuation to the next level of treatment. Procedures performed at this level include intravenous fluid therapy, antibiotic treatments, airway preservation, and the application of splints and bandages. The Navy gave level I care aboard Navy ships and in Marine Corps units positioned as close to the battle area as the tactical situation permitted. Nonmedical personnel (characterized as Staff Aid/Buddy Aid in figure I.1) provided first aid until medical personnel arrived to administer emergency life support.

Level II care consists of general medical and surgical intervention and temporary hospitalization. Blood and blood products are available, as are general and orthopedic surgeons, anesthesiologists, psychologists, and other medical specialists. The Navy provided level II care aboard aircraft carriers and amphibious assault ships and within Marine Corps medical battalions. Aircraft carriers provided medical care for personnel assigned to their carrier battle groups. Amphibious assault ships had a secondary mission to receive and treat casualties, providing medical support to the Marine Corps landing force until casualties could be transported to other facilities. A Marine Corps medical battalion comprises four collecting and clearing companies and two surgical support companies. Each collecting and clearing company is outfitted with 2 operating rooms and 60 cots, and each surgical support company consists of 5 operating rooms and 150 cots. Like other Navy level II units, casualties are not usually held at a medical battalion for longer than 72 hours.

In preparation for the ground war, elements of three medical battalions were combined to form a trauma center in Al Khanjar, Saudi Arabia. The trauma center consisted of 270 beds and 12 operating rooms and established substantial medical capability close to the forward edge of the battle area.

Level III care consists of resuscitative and definitive health services. At this level injured personnel are given extended evaluation and treatment in-theater. The Navy gave level III care on the two hospital ships and in the three combat-zone fleet hospitals. Each hospital ship has 12 operating rooms, 100 beds for intensive care, and associated medical support to care for 1,000 patients. When not deployed, these hospital ships remain at a reduced level of readiness with a requirement to achieve full operating status within 5 days. Combat-zone fleet hospitals are stored in shipping containers and pre-positioned in various locations worldwide for rapid

Appendix I
Navy's Medical Care System

deployment and assembly in the field. Each fleet hospital has 3 operating rooms and is designed to provide medical care for up to 500 patients. Each also includes berthing, food service, and maintenance operations that allow it to function with minimal area command support.

At levels IV and V, longer-term, comprehensive therapy and convalescent care are given to patients who do not require acute medical support but are not expected to return to duty for an extended period of time. Facilities that offer these levels of care are located outside of the area of operations. During Operations Desert Shield and Desert Storm, levels IV and V care was to be provided in Europe and the continental United States, respectively. No level IV Navy medical facilities were used during the war, and about 150 casualties were treated at level V facilities.

Locations Visited

The following is a list of organizations we visited during our review of the capabilities of Navy medical units in Operations Desert Shield and Desert Storm:

- U.S. Central Command and U.S. Navy Central Command, MacDill Air Force Base, Florida;
- Chief of Naval Operations, Washington, D.C.;
- Navy Bureau of Medicine and Surgery, Washington, D.C.;
- Naval Supply Systems Command, Crystal City, Virginia;
- Defense General Supply Center, Richmond, Virginia;
- Defense Personnel Supply Center, Philadelphia, Pennsylvania;
- Naval Medical Doctrine Center, Quantico, Virginia;
- National Naval Medical Center, Bethesda, Maryland;
- Portsmouth Naval Hospital, Portsmouth, Virginia;
- Naval Reserve Fleet Hospital 20, Philadelphia, Pennsylvania;
- USNS Comfort (Hospital Ship), Baltimore, Maryland;
- USS Nassau (Amphibious Assault Ship), Norfolk, Virginia;
- 2nd Medical Battalion, Camp Lejeune, North Carolina; and
- Navy Medical Logistics Command and Defense Medical Standardization Board, Fort Detrick, Maryland.

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