Navy

Medical Services to the Marine Corps in Desert Shield and Desert Storm

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A detailed description of the organization and the structures of the Medical Services in the Marine Corps, followed by the most common medical and logistical problems encountered in the provision of medical care to the Marines in SWA. This is followed by a summary of the lessons learned.

When Vice Admiral James Zimble took the helm as Surgeon General of the Navy in 1987, he recognized that "Navy Medicine is hemorrhaging" and initiated heroic resuscitative measures on several fronts. Recruiting, Quality Assurance, Continuing Medical Education and large hospitals seemed to receive the most press attention; not surprising, because these are elements of medical care the lay public can understand. However, operational readiness and contingency planning also became subjects of major revival. The Fleet Hospital program and hospital ships are two examples. Probably less apparent throughout the Navy, but just as vigorous, doctrine, equipment and staffing of the medical units attached to the Marines also were being reviewed, updated and changed. Many of these efforts were new, and some were still ongoing, when they were all slammed into the test crucible by Operation Desert Shield. As the Marine Corps is traditionally the "tip of the spear," Navy Medicine assigned to the Fleet Marine Force (FMF) found itself at the tip of the same spear.

The Marine Corps is the nation's expeditionary force in readiness. Most people recognize that the unique embodiment of air-land-sea combat capabilities in one expeditionary force — an independent, lean and self-sustaining strike force — sets the Marine Corps apart from any other service in the world. What is less apparent is how much an independent force depends upon a completely self-contained support system, including medical support all the way through resuscitative and life-saving surgical service. To describe Navy medical services in the Corps, it is useful to first outline the system they serve. The **Marine Air Ground Task Forces** (MAGTFs) are the combined arms forces—the fighting teams—of the FMF. Sized and composed according to the mission, a MAGTF always includes a Ground Combat Element (GCE), Air Combat Element (ACE), Combat Service Support Element (CSSE) and a command element. Each of these elements has organic medical components tailored to the mission. The "hospital" functions, surgical care and medical regulating are part of the CSSE. The largest possible MAGTF is the Marine Expeditionary Force (MEF), an entire Division as the GCE; an entire Marine Aircraft Wing with tactical jets, transports and heavy, medium and attack helicopter squadrons as the ACE; a Force Service Support Group (FSSG) as the CSSE, including Transport, Supply, Engineer Support and Medical Battalions with other CSSE functions, involving nearly 13,000 people in the FSSG alone. A somewhat smaller MAGTF, capable of more rapid reaction, and supportable by a Maritime Prepositioned Squadron, is the Marine Expeditionary Brigade (MEB) — 12,000 to 15,000 Marines, built around a Reg-imental Landing Team as the GCE, and usually including composite Marine Aircraft Groups and composite Brigade Service Support Groups (BSSGs) as CSSE.

The Marine Forces, Central Command (MARCENT) resided in the First Marine Expeditionary Force (I MEF), from California, including the 1st MEB from Hawaii and 7th MEB from Twenty Nine Palms, Calif. It was augmented by more than 20,000 Marines from II MEF in North Carolina, including the 2nd Marine Division, 2nd FSSG, and several squadrons from 2nd MAW. Remaining afloat under NAVCENT operational command for most of Desert Storm were the 4th and 5th MEBs, complete MAGTFs in their own right. Altogether, Marine Forces in SWA totalled more than 70,000 men and women. Organic medical forces, all Navy, included more than 2000 corpsmen and 700 officers, including more than 300 physicians.

Medical Structure

There is not a central medical command in the Marine Corps. Each component command has its own medical section, reporting to the respective unit commander. In the GCE, there are two medical officers and several corpsmen at each BAS (Battalion Aid Station) and 11 Corpsmen with each rifle company. In the ACE, flight surgeons and corpsmen are assigned to each aircraft squadron, and in addition, the Marine Wing Support Squadron has a larger aid station with limited x-ray and laboratory capability.

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Within the FSSG there are two or three Group Aid Stations with one or two doctors and several corpsmen. These organic medical units in each organization are responsible for the first echelon of care, minor or routine needs in garrison and immediate basic life saving or first aid care in combat. The Commanding Generals of the Wing, Division and FSSG have senior Navy Medical Officers who assist in training and readiness of all medical functions throughout the command and serve as Special Staff Officers to the General, but have no direct command relationship with battalion or squadron medical sections.

Echelon II medical services—resuscitative or emergency first line surgical intervention—is provided by the FSSG through companies of the Medical Battalion. These supply the Marine Corps "field hospital" services, although they are not doctrinally hospitals so much as sophisticated emergency treatment and temporary holding facilities. Each FSSG has a Medical Battalion with two Surgical Support companies and four Collecting and Clearing (C&C) Companies. The Surgical Support Companies are roughly twice as large, and hence less mobile, than the C&C companies. Both types of companies are modularized, and especially C&C companies can be sequentially transported to follow as close as possible in support of a maneuvering Ground Combat Element. Each C&C company is capable of providing two operating rooms and about 60 cots. The Clearing Station Sections of the C&C company are designed to go forward to triage and transport casualties from forward areas back to the C&C company. The modularized quality of both types of company allow for combinations, shifting and parcellation to give flexibility in size, mobility and functions. The 1st and 2nd Medical Battalions, from First and Second FSSG respectively, provided a combined capacity for 1170 patients in a "flow-through" Echelon II role, and 32 operating rooms. Depending on how the companies were configured, this could allow as many as four Surgical Support companies and eight Collecting and Clearing companies. Because some companies can be either in transit or crated in preparation for movement, they may not all be accessible at any given time. Each Medical Battalion doctrinally also has a Stress Mangement Section, but as described below, further augmentation was incorporated in special units to provide for Combat Stress Casualties ("battle fatigue" or "shell shock").

Medical supply functions are conducted by the Medical Logistics Company, commanded by a Navy Medical Service Corps officer, and manned primarily by Navy corpsmen. The MedLogCo is a subordinate command of the Supply Battalion in FSSG.

Call Up and Augmentation

During peacetime, the medical organizations are manned far below authorized wartime strength. This is especially true in the Medical Battalion, where there are no doctors or nurses at all in garrison, and dozens fewer corpsmen than required in combat. The ACE and GCE are not as short as the Medical Battalion, but peacetime training and staffing still do not require as many personnel as combat and the peacetime complement, especially of corpsmen, is 15% to 20% below authorized manning for combat.

The Medical Personnel Unit Augmentation System (MPUAS) had been devised in the mid-1980s to fill specific medical manpower needs of operating forces for rapid contingency response. This system allowed overtaxed medical treatment facilities (MTFs) to keep necessary providers functioning, allowed clinicians to remain active in their medical specialties and provided a means to rapidly access those providers when needed for mobilization. Directed from the Bureau of Medicine and Surgery with cooperation throughout Naval Military Personnel Command (now, Bureau of Naval Personnel) and all Medical Treatment Facilities, augmentation of literally hundreds of medical personnel proceeded rapidly. Considering that the system had never been fully exercised, and never utilized at all in actual operations, it proceeded with gratifying efficiency. Within time limits as brief as 48 to 72 hours, corpsmen, doctors, nurses and MSC officers were identified and sent to embarkation points, first to fill units for the rapidly-deploying MEBs, and then within two months for the rest of I MEF forces. Many of the naval reservists activated for Desert Shield joined USMC units. Among them were more than 100 corpsmen, four flight surgeons and four orthopedic surgeons—one who had served in Vietnam and volunteered to be commissioned again for the first time in over 20 years for the operation.

Within two weeks of the occupation of Kuwait three MEBs, the 1st, 4th and 7th, had deployed. Because of the Maritime Prepositioning Squadrons (MPS) designed during the 1980s, the 1st and 7th MEB were able to fly into Saudi Arabia with all materiel, including medical supplies, arriving promptly from ships preloaded and stationed outside CONUS for rapid deployments.

Sequence

The first Marine Corps units to arrive were the 7th and 1st MEBs. Initial staging and assembling areas for Marine forces were in the port of Al Jubail. The Medical Logistics Detachment from Brigade Service Support Group 1 (BSSG 1) set up the Medical Logistics company in a warehouse at the port. Echo Collecting and Clearing Company, of First Medical Battalion, was the first Echelon II medical organization to arrive, several weeks before Fleet Hospital 5 arrived in country. They discovered that the Al Huwaylet Hospital north of the city of Al Jubail was not in current use because of some architectural problems identified several years before. Recognizing the need for hospital capabilities, this company restored the facility and, although only initially a Collecting and Clearing company, offered the only American surgical and second level services in the

Jubail area until Fleet Hospital 5 was opened. This Echelon II facility remained until late January 1991. As the Marine Forces began to prepare for conflict, all elements moved from staging and training areas which had been mostly in the Jubail area, and began moving north or northwest. The members of First Medical Battalion left the former hospital and moved forward to support the troops.

By the time the ground conflict began, there were a total of nine Echelon II companies assembled in northeast Saudi Arabia ready to take casualties. Combined units at Kibrit (due south of the eastern arm of Kuwait) and Khanjar (in the "elbow" southwest of Kuwait) provided reinforced Surgical Support Companies, especially at Khanjar, where the Marine Corps had an historic large forward logistic base. In late February and throughout March, the combined companies at Khanjar were prepared to accommodate more than 400 flow-through patients. The Khanjar staff included most surgical specialties in addition to full emergency physician and anesthesia staff. Four C&C companies from the medical battalions were forward of these positions, poised along the southwest Kuwait border and prepared to move forward to support the ground combat element through the breech of the Iraqi defenses. Collecting and Clearing companies were also in Manife Bay and Al Mishab, along the coast and south of Kuwait, with full operating room capability, surgical and anesthesia staff, and holding and ICU beds in the event of casualty flow directly south. With the Fourth MEB, afloat in the Persian Gulf, there was an embarked C&C company in readiness should the MEB have disembarked, for example, in an amphibious raid.

Primary care in the Marine Corps is at the squadron or battalion aid station level. This echelon of care continued throughout the deployment in Saudi Arabia. The company corpsmen and battalion surgeons of the 1st and 2nd Marine Divisions accompanied their rapidly maneuvering forces when they swept through Kuwait in two days.

Disease Surveillance—Preventive Medicine and Epidemiology

Preventive medicine technical corpsmen and environmental health officers are assigned to the Division, Wing and FSSG Surgeon's staffs as well as the Medical Battalions. Sanitation and food inspections, disease surveillance, vector control and medical intelligence are the responsibility of these professionals. Shortly after the I MEF (MARCENT) Surgeon, Captain Jerry Crim, arrived in early September, he established an environmental health section. One example of the cooperation between NAVCENT and MARCENT medical teams was the assignment of the NAVCENT preventive medicine officer, LCDR Kevin Hanson, to MARCENT. Disease occurrence and screening was initiated in August throughout the MARCENT forces, including the tracking of hospitalizations at Echelon II and III facilities. Attack rates were calculated for all major disease categories and trends were plotted. Feedback from surveillance data was given to Marine medical staff regularly, especially at the weekly meeting in Jubail for all the physicians who were able to attend. (Attendance at the weekly physicians' conference was excellent. Even in late February, a surprisingly large number of physicians or their representatives managed to find their way, sometimes long and arduous distances, to attend the medical conference.)

Disease prevalence and incidence rates remain classified, and will not be discussed here.

Surprisingly, there were very few people treated for heat exhaustion or dehydration, even in the severe heat of August and September 1990. The worst point was the week of Aug 26, when troops were new to Saudi and facilities and shade were minimal. Even in that week there were very few heat injuries; mainly cases of mild heat fatigue. Furthermore, a few minor dehydration cases may have been listed as heat injury, accounting for some of the cases reported. By Sept 23, the incidence of heat injury had been reduced by 75% and continued to fall until late November, when there were only very sporadic, mostly occupational, cases reported (eg, scullery workers, cooks).

Diarrhea

In the last week of September, there was an outbreak of diarrhea. Extensive stool collections revealed bacteral pathogene in 80% of cases: primarily *Shigella spp* (55%), and enterotoxic *E. coli* (35%). They were resistant to sulfasoxazole/trimethoprim, but responsive to ciprofloxacin 500mg twice daily within three to four days. Causes of the autumn outbreak were linked to ground-grown fresh vegetables, especially lettuce, produced in countries that use "night soil" (human waste) for fertilizer. Use of lettuce and other ground-grown vegetables were discontinued on September 25. Another contributor to that outbreak was overtasking of mess facilities, especially vat-can operations. Meal production rates were much higher than recommended by preventive medicine staffs, and heavy work loads together with short turn-around times did not permit adequate sanitation efforts. When the use of ground-grown vegetables was stopped and sanitation practices improved, diarrhea outbreaks were controlled until a minor outbreak in the week of Jan 27, 1991 caused some problems. Many cases of diarrhea were tracked to one field mess serving about 3000 Marines, from which *Bacillus cereus* and *C. perfringens* were identified. Inattention to storage conditions and cleanliness of pots and pans in a scullery was found to be responsible, and no cases were reported after correcting procedures in the scullery.

Respiratory

At the outset of the deployment, respiratory symptoms affected a large number of Marines, apparently a reflection of initial crowding in billeting areas. Rates dropped by 60% as

crowding was reduced and immunity developed. In late November, as weather cooled and tents began to close at night, rates increased very slightly. However, there was a sharp rise overall in December, apparently related to the large influx of personnel from highly endemic winter conditions on the East Coast of the United States and dissemination of symptoms among the troops who had been in the Jubail area for several months. It is likely that respiratory symptoms were somewhat under-reported. Furthermore, even though the rates seemed to be decreasing sharply, by the third week in January the level of activity and concentration attendant to the beginning of the air campaign probably diminished the number of patients seeking medical attention for respiratory symptoms. The low incidence of respiratory complaints at this time of year and within the living conditions of most troops underscores the value and effectiveness of the mandatory flu vaccine program.

Dermatological and Musculoskeletal

In August, there was a moderate number of minor heat rash cases and fungal infections, but these fell to one-third in September and had virtually disappeared by October. Two cases of cutaneous leishmaniasis were identified. Musculoskeletal injuries remained relatively steady throughout the operation, at rates comparable to those in garrison in CONUS. No discernible patterns were evident, although sports injuries were predominant. Training injuries appear to have been low, and although motor vehicle accidents were striking, they did not constitute numerically a large threat.

Psychiatry

Early in January, psychiatrists and psychologists in Navy and Marine organizations grew concerned about the prospect of large numbers of combat stress casualties. It was recommended by these specialists that the Stress Management Sections of the Medical Battalions were not sufficiently sized nor equipped to handle the potential number of casualties. Historically, the number of such casualties have accounted for a large percentage of casualties evacuated from theater. Yet, with relatively simple principles involving rest, maintaining support and identification with the unit, at least half—often more—of such members should be able to return to their units in combat within just a few days. A double-pronged approach to the problem was arranged within three weeks. Combat-stress units with 50 beds each and staffed with psychiatrists, psychologists and psychiatric technicians were quickly organized and located near Surgical Support Companies in forward positions. In addition, a vigorous training program with lectures and teaching sessions was organized throughout MARCENT forces discussing the importance of sleep hygiene, the roots of combat stress and support systems within commands. Additional teams of psychiatrists, psychologists and psych corpsmen were readied and prepared for deployment to Saudi Arabia, but most were not sent because the ground campaign ended more rapidly than anticipated. Primarily due to the paucity of injuries and brevity of the campaign, there were no classical cases of combat stress. Presumably the preparation of the classes and training in advance of conflict played a significant role in reducing these casualties as well.

Medical Equipment and Supplies

In the months of preparation before combat, many units discovered that some medical supplies were either not included in traditional medical allowances (AMALs) or were needed in larger quantities. These included external fixation devices for orthopedic injuries, staples for repair of bowel injuries, pulse oximeters and several types of suture material. Also, new Watergel blankets, recently available for first aid care of burns, were perceived to be valuable, not so much by surgeons but for corpsman or buddy care at the point of injury before transporting a burned patient. Additionally, the medical battalions now included ophthalmologists, and in one case a neurological surgeon, but prior expectation and doctrine did not anticipate high-level eye or neurosurgical care at Echelon II facilities, so these surgeons did not have the tools of their trades available. In some cases, physicians communicated with their commands in CONUS and arranged to have particular materials shipped or carried directly to them. In the case of external fixators, oximeters, portable ventilators, Watergel blankets and bowel staplers, large orders were expedited, procured and rapidly shipped to Saudi Arabia during January and February. Special ophthalmology AMALs, including slit lamps and other tools, had not been previously considered, so they were hastily assembled and shipped to Jubail in less than a month. Some of these materials did not arrive until mid-February, but were distributed for the most part before the ground campaign began.

In order to shorten a long logistic trail to forward units, most frequently required medications (such as antibiotics) and surgical consumables were prepositioned in forward Combat Support Detachments, especially near Kibrit, to enable rapid line item resupply to C&C and Surgical Support companies and Battalion Aid Stations.

Experience of the Medical Battalions

After the beginning of hostilities, fewer than 100 Americans and approximately 450 Iraqis were admitted to C&C or Surgical Support facilities. Extremity injuries, mostly shrapnel wounds and fractures, predominated. The recently obtained external fixation devices were found to be helpful in a number of cases. Most serious burns were evacuated to Echelon III facilities immediately. No chemically contaminated casualties were encountered. Before and after hostilities, a number of acute procedures such as testicular torsions and appendectomies were performed as well.

Medical Evacuation

Fundamental Navy/Marine Corps doctrine calls for each echelon of medical care to go forward to bring patients for the next level of care. This is supplemented by lift of opportunity from Marine ground units or USMC helicopters when possible. Once patients are stabilized at Echelon II facilities, intratheater evacuation may proceed by fixed wing transport with Marine or Air Force aircraft. Although the Marine Corps does not have dedicated medical evacuation helicopter squadrons *per se*, medium (CH 46) and heavy (CH 53) crews extensively train for medical evacuation missions. In Desert Storm, the Third Marine Aircraft Wing provided eight CH 46s and crews dedicated exclusively to medical evacuation, plus the standard plan to utilize aircraft when required and available for additional evacuation. At various times during the operation more dedicated aircraft were on alert for medical evacuation as well. Medevac aircraft were kept near sites where operating Surgical Support companies were located to enable forward movement to retrieve casualties or be able to bring casualties back to Jubail or fixed wing airfields for evacuation within theater.

Altogether, approximately 50 patients were transported by helicopter from either site of injury or aid stations to Echelon II facilities, and from Echelon II facilities back to Fleet Hospitals 5 and 15. These included burns, nonbattle orthopedic injuries and respiratory disease as well as battle injuries. On a number of occasions, especially in coastal areas, Army UH-60 Blackhawk aircraft retrieved patients from Echelon II facilities to take them to Fleet Hospitals 5 and 15.

Lessons Learned

Since there were so few casualties, there is a lingering apprehension about whether we learned all we should have learned from Desert Shield and Desert Storm. However, we have identified several areas for review and reassessment. Probably foremost among these are medical equipment and supply issues. In general, it is desirable to continue to design more rapidly transportable surgical units. Although very capable, current operating room, ICU and other medical facilities demand heavy lift capability and great efforts to assemble. Continuing research and development for lighter and more mobile equipment that can still maintain capable resuscitation and emergency intervention within the "golden hour" is necessary. Authorized Medical Allowance List (AMAL) containers will be thoroughly relooked and recomputed, with input from medical specialty advisers, clinicians who participated in the operation and operational experts. AMALs need to be kept current and modern, and complete inventories are mandatory. The role of new surgical and anesthesia concepts may enable breakthroughs in combat surgical care, but only with proper equipment. Mechanisms are needed for very rapid procurement and battlefield delivery of newly identified medical needs with a minimum of paperwork. Those mechanisms are already being developed.

The structure of medical organizations in the FMF also require review and validation. The respective roles of physicians and Medical Service Corps officers are being studied, with a recognition that input from both professions are critical to maintain proper clinical excellence along with meeting the coordination demands in an increasingly complex environment. One immediate step is the establishment of a permanent role for a Director of Clinical Services in each company, but other considerations are still forthcoming. Integral to improving the role of physicians who are augmented only for combat is to increase familiarity with doctrine and training for all members of the unit. This will call for early (or standing) identification of hospital or reserve staff members who would augment the Medical Battalion during activation so that units can work together and be integrated even before mobilization. Beefing up a doctrinal role for Combat Stress Units is likely.

Communication improvements, from medical units to evacuation units, with medical regulators and with medical planners at higher headquarters, are also necessary. This is not a unique medical concern, though. Improving communication and command and control procedures is a constant and continuing effort throughout the military.

SUMMARY

In general, Navy Medicine can point to Operation Desert Shield and Desert Storm with pride. The attention to operational medicine over the last decade, and the revitalization of the Navy Medical Department in the last four years paid off. So did the flexibility and dedication of large numbers of reservists and augmentees from MTFs. The sailors assigned to the Fleet Marine Force were proud to be there and felt like critical members of the team. However, dozens of important lessons—some painful—have been learned, and at least as much effort will go into building on those lessons as went into the war. ●