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The Influence of Medicine on Strategy

Captain Arthur M. Smith, MC, U.S. Naval Reserve

Any military expeditionary force, whether deployed for offensive or defensive purposes, must be prepared to manage the major and expected by-products of military action—wounded and diseased personnel. It is only sensible that medical combat service support should assume its position as one of the critical planning factors in preparations for any military operation in support of our national policies. The priceless commodity at risk is the combat Marine or sailor and his military effectiveness. From an even more pragmatic standpoint, the poorer our logistically integrated in-theater medical support, the greater our need for long-haul strategic casualty evacuation. Thus, preparation for in-theater combat casualty care is essential to the combat line officer, as such care increases the return of combat-wise men to duty and improves the combat soldiers' morale and willingness to take necessary risks. Inferentially, on a larger scale, a successful, comprehensive naval strategy is equally contingent upon an effective medical support capability.

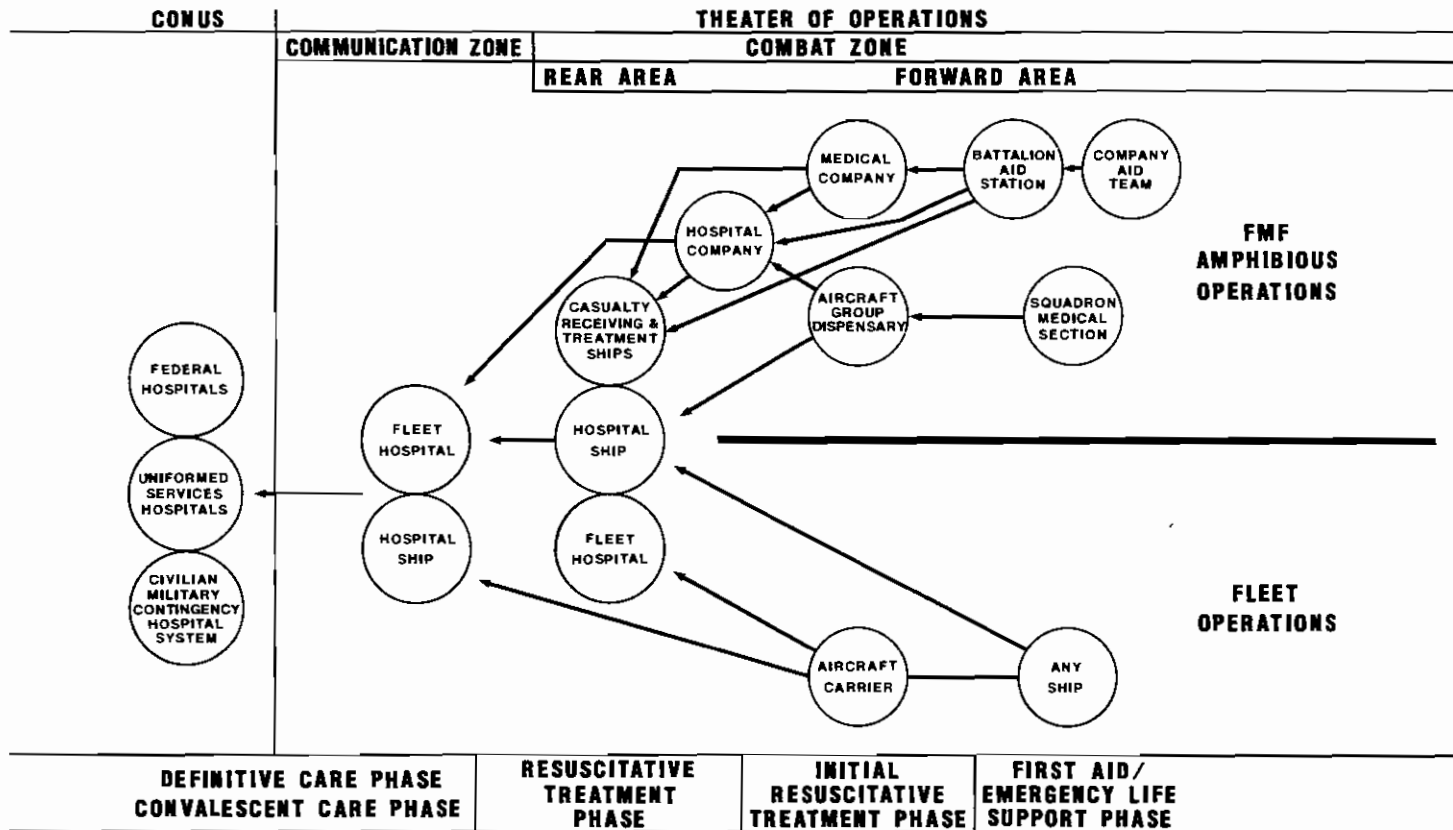
From a military perspective, establishing and maintaining an infrastructure to support overseas deployments and access to areas of conflict requires great flexibility, creativity, and assiduous prior planning. Logistics, of which medical support is a key element, is integral to the sustainability, and therefore to the success of any strategy. It is especially vital to one such as ours, which demands aggressive, sustained forward operations. A diverse array of potential geographic settings, along with an equally diverse number of potential combat scenarios encompassing wide variations in distance, terrain, and climate, requires a well-prepared and flexible medical support system that is fully integrated into overall operational planning. In general, this necessitates: a means for extraction of casualties; various echelons of immediate and urgent care for resuscitation and stabilization; an evacuation system; and a definitive treatment support base—supplemented, where necessary, by the use of forward located advanced logistics support bases.

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The traditional Navy/Marine Corps medical support structure is outlined in the adjacent figure. From a technical standpoint, these support elements must be readily adaptable to a broad spectrum of possible conflict scenarios ranging from small brushfire wars to a major interchange of nuclear weapons. In addition, consideration must be given to specialized military environments such as armored warfare; combat in environmental extremes such as mountains, deserts, the tropics, and the Arctic; as well as chemical-biological warfare. Further planning must also include scenarios wherein base hospital facilities, afloat or ashore, have been either destroyed or are unavailable. The technology of modern warfare is so dynamic, and its effect upon combat casualty planning so crucial, that policy planning in this area must be shared between line and medical officers at every level. Understanding new weaponry and tactics, as well as the types and numbers of casualties expected, inevitably affects methods for casualty evacuation and care. This in turn dictates the details and prognosis of the injured fighting man's medical care.

Unfortunately, we do not always function in an organizationally ideal climate. A published overview of the Falklands campaign bears witness to this reality: "Surgeon Captain J.M. Young, RN was appointed Staff Medical Officer to the Task Force Commander with responsibility for medical advice to the Flag, for medical input to the overall planning, for coordination of medical support to the ships and for the general supervision of that support. In attempting to carry out his tasks he was faced with considerable difficulties. Embarked in *Fearless* rather than the Flagship, he was not in a position to contribute fully at a time when medical input to the operational plan seemed particularly important. When he subsequently joined the Flagship, the center of operations was shifting to the land. It became evident that modern communications have not made the work of a Staff Medical Officer any easier."¹

In peacetime, U.S. Navy medical personnel assigned to the Fleet Marine Force (FMF) are below mobilization allowance. In the event of military contingencies requiring employment of Marine Corps assets, FMF medical support requirements will increase significantly, and personnel assets drawn from Navy hospitals will be rapidly mobilized. Similarly, to accommodate the needs of other developing contingencies such as increased fleet operations, fleet medical and dental resources will also require augmentation from shore-based medical facilities. Augmentation of ships specifically dedicated to Marine Corps support is accomplished in two phases: (1) Rapidly responsive Mobile Medical Augmentation Readiness Time (MMART) surgical support units, drawn from Navy hospitals, are currently assigned routinely to deployed LHA and LPH units for short-term contingency support; (2) even further augmentation from Navy hospital assets is available for long-term service, when needed.



NAVY/MARINE CORPS MEDICAL SUPPORT STRUCTURE

Medical Support Systems Planning

In broad terms, the specific missions assigned to the fleet and FMF by the National Command Authority determine wartime medical care requirements. The medical planners on a major staff must examine many issues and decide the medical responses to them. These vary from requirements for several thousand beds in support of a major war to requirements for little more than the organic capability of established units needed for supporting a limited contingency. Similarly, optimal locations for medical facilities are determined by the missions, tactics, and geographic locations of the operating forces.

From a broad systems planning perspective, the medical planners' methodology for determining bed requirements to support the operating forces is a structured process with planning factors provided from a variety of sources: the Defense Guidance, which specifies a global scenario and evacuation policies; the DoD Wartime Manpower Planning System, which provides the estimated population at risk and casualty estimates; the Navy Capabilities and Mobilization Plan, which provides estimates of casualty rates; casualty estimates from Headquarters, U.S. Marine Corps; and the Maritime Strategy, which provides the naval strategy for the Defense Guidance global scenario.

Medical planners must develop requirements, including personnel and medical facilities for each theater, using the Medical Planning Module (MPM) of the Joint Chiefs of Staff Joint Operations Planning System (JOPS). They then use data from the Medical Planning Module to determine medical support requirements and to identify shortfalls. They use resupply estimates to schedule time-phased lift of medical materials to the theater of operations. The MPM, based on in-theater casualty rates, also provides them with an objective method for comparing medical demands with existing medical capabilities in order to identify shortfalls in beds, physicians, blood, intravenous fluids, medical supplies, and evacuation requirements. They then evaluate the impact of these shortfalls and attempt to provide additional capabilities through the DoD planning, programming, and budgeting system.

During the opening phases of war there predictably will be an acute bed shortage, and evacuation time will be dictated by military, not medical, considerations. Regardless of the high priority assigned to the Medical Corps, any casualty loads approaching the likes of the initial phases of the Somme, the Kursk salient on the "Russian Front" in 1943, or the Antietam conflicts will overwhelm even the most extravagant medical logistic investment.

Other unpredictable realities must also be anticipated. For example, although the recapture of the Falklands was originally conceived as a maritime operation, intensive air attacks on the British ships made evacuation of casualties back to the task force uncertain. This reality eventually

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prompted the creation, ashore, of an advanced, forward-located surgical center—the main field hospital—at Ajax Bay. (This facility eventually processed 725 patients and provided surgical care under anesthesia for 210 casualties, 40 percent of whom were Argentine.)

Geopolitical Influences upon Medical Support Capabilities

Medical support services do not exist in a vacuum. They are determined by the nature and scope of geopolitical realities. One such reality, with major impact upon the exercise of naval power, is the inextricable relationship between events on land and those at sea. Land will frequently determine whether the U.S. Navy has the “overseas infrastructure,” including medical logistic support bases, to undergird its deployments. As an example, at times, British shipboard casualties during the Falkland Islands war exceeded those ashore. Large numbers of serious shipboard casualties required transfer to the combat zone hospital ashore for stabilization prior to evacuation from the theater. In addition, the British used a neutral staging point in Montevideo, Uruguay to transfer 593 casualties who were then flown by the Royal Air Force (RAF) to the United Kingdom via Ascension Island in the South Atlantic. This allowed medical facilities afloat to prepare for new casualties.

An illustration of the impact upon medical facilities afloat was the Argentine bombing of a single British amphibious ship, the *Sir Galahad*. Immediately there were 179 casualties which included 83 burns, many lung problems from acrid smoke inhalation, and large numbers of extensive tissue and bone injuries. This was a major disaster, even for a well-equipped and well-staffed medical center ashore. Could an underway battle group continue to function, yet be able to deal with sudden casualties of such magnitude? Fortunately, many of the casualties aboard the *Sir Galahad* could be transferred quickly to medical facilities ashore for initial care prior to their transfer to the hospital ship *Uganda*.

In support of surface combatants deployed to distant, isolated areas, previously negotiated medical evacuation agreements may allow for either the establishment of U.S. facilities ashore in foreign territories, or the inclusion of casualties into host nation medical support systems. However, the latter will not guarantee adequate medical care, nor can we be assured that we will have MEDEVAC overflight rights over territories adjacent to those nations who welcome our bases on their land.

In the extrapolation of standard Navy-Marine Corps casualty management schemata, it would be useful to use the Maritime Strategy as a case study to examine Soviet threat axes that will involve our naval forces. In a European scenario, U.S. Army and other NATO forces would absorb the initial waves of conflict. The U.S. Navy would be deployed forward in defense of NATO's

flanks in northern and southern Europe, and perhaps offensively within the Norwegian Sea. Established relationships with NATO allies and existing triservice medical networks should allow implementation of casualty evacuation schemata into U.S. or host nations' military and civilian health care systems. If these arrangements were to collapse, our initial casualty care and strategic evacuation plans would be seriously injured. This issue raised some concern in the 1984 Department of Defense Medical Readiness Review Group study (the "Zimble Report") on medical readiness planning in the U.S. European command. It stated, "Aeromedical evacuation resources are inadequate to meet wartime requirements." The report also declared, "Combat-zone host nation medical assets would be unavailable in wartime. Our allies' estimated wartime casualties would saturate their medical systems. . . . Even non-medical Host Nation Support for our hospitals is wanting. . . . The wartime operations of existing fixed treatment facilities could be interrupted by the cessation of essential services now provided under contract by host-nation sources."

The Navy has generally held to the proposition that to be effective, naval forces must be capable and ready to operate in "high threat areas." In those areas, such as the Norwegian Sea—close to Soviet air, surface, and submarine forces—three or four carrier battle groups are considered to be the minimum requirement to ensure successful and sustainable operations. Whether the task force's medical resources can deal with major casualty rates, without advanced logistics support bases and properly equipped and supplied sealift capability for casualty evacuation support, is a critical question. A major fire accompanied by explosions on the U.S.S. *Forrestal*, while on Yankee Station in the Gulf of Tonkin, claimed the lives of 134 men and injured 162. Could the volumes of burn, blast, and smoke inhalation injuries aboard a single aircraft carrier, struck by one Exocet missile, so consume the resources of the affected carrier and its sister task force vessels as to severely compromise a strategic plan?

Similarly, any Far Eastern power projection by the Soviets, which would threaten Japan and Korea, would activate a triservice U.S. military medical network whose components are already in place in locations such as the Philippines, Japan, and Korea. However, the vulnerability of South Korea to military attack and the liability of both Korea and the Philippines to political upheaval could alter their international allegiances and inflict major injury to our theater medical casualty treatment and evacuation networks. The availability of U.S. military medical facilities in Japan and its territories would also depend heavily upon both the political and military-strategic situation.

Defense of sea lines of communication through various chokepoints bounded by the Indian Ocean would create considerable difficulties and require perhaps the greatest degree of flexibility, imagination, and planning.

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How, for instance, could we manage large volumes of casualties sustained by a missile attack on one of our ships sailing through the Mozambique Channel? Are we prepared to implement rapidly an extended, *ad hoc*, logistical chain similar to that developed by the United Kingdom in the Falkland Islands campaign? One must consider the reality that burns are not only an expected by-product of modern naval warfare but require large numbers of medical personnel for proper management. (In the Falklands, burns affected 34 percent of those injured aboard ships, and 14 percent overall, as opposed to less than 2 percent of injuries in World War II.)

Similarly, Soviet or client-state aggressive moves in the Persian Gulf region or direct land movement to the Indian Ocean would create a more complicated and dangerous planning sequence. Increased tensions in that area in the last few months have sharpened this focus. Future crises there may require rapid U.S. response and the capability to project and sustain Central Command's (CENTCOM) Rapid Deployment Force troops 8,000 miles away. The military may be called upon to deploy, in a matter of days, as many forces as were deployed on D day for the Normandy invasion, an assault that took extraordinary advanced planning.

Could the casualties generated by such a deployment be managed beyond the most spartan initial stages of treatment? Medical support requirements as well as other logistics requirements would be enormous. The distances involved are considerable; the strains imposed upon equipment because of such enormous distances, as well as harsh climate, terrain, and lack of infrastructure would be severe; and the toll on personnel would be dramatic. Tactics, as well, would be defined by medical and other logistical needs of ground forces in a conflict. Much to the consternation of tactical planners, reality teaches that these "support" considerations determine the order of battle and tactics, as well as the sustainability of forces employed. The Marines who landed in Lebanon in 1957 provide an example. Enteric disorders claimed many victims because their commanders did not plan for adequate medical support. No question, you can go to war without medical support, but you cannot stay.

Logistics requirements for Southwest Asia have grown as contingency planning for the area increases. In contrast to its position in Europe, the United States did not, until recently, maintain a large military presence there, nor has it pre-positioned a substantial amount of supplies. Distances are great (Diego Garcia, the location of many of our forward deployed supplies in the Maritime Pre-positioned Ship Squadrons, is 2,300 miles from the Strait of Hormuz, about 5 sailing days away). The climate and terrain vary greatly, and in many cases the logistics infrastructure—ports, roads, airfields, and railroads—if it exists at all, is primitive. Furthermore, many Gulf States are suspicious of, if not directly hostile toward, the United States. Medical support requirements ashore, as well, will be vastly more complex than they were in Vietnam should operations be projected inland from the coast

Vulnerabilities of Medical Support—External Influences

The projection of troops into the chokepoint regions along the Indian Ocean or an amphibious landing along the littoral of the Norwegian Sea requires detailed preparation and analysis for defining the nature of medical support. Since modern, relocatable fleet hospitals ashore will not be fully operational until 1992, doctrine calls for the use of one or more hospital ships if numerous casualties are expected. We now have one such vessel in operation and another under construction. (During World War II the United States deployed 12 hospital ships and 3 hospital transports. During the Okinawa invasion alone, 6 hospital ships were used to evacuate the mounting shipboard casualties to hospitals in Guam.)

The Vietnam war provided an ideal geographical setting and combat scenario for hospital ships: intermittent low-level warfare with the combat zone adjacent to the sea, in a long, narrow country with a substantial length of coastline. In addition, because of the air superiority which U.S. forces enjoyed, the helicopter could be used extensively—the ideal medical evacuation system for hospital ships. The enemy lacked, or refrained from using, artillery or rockets to interdict our Red Cross-marked hospital ships that sailed freely, immediately offshore, immune from hostile activity.

In the Falklands conflict, in accordance with the Geneva convention, the converted hospital ship *Uganda* was not only required to travel to the combat area alone without direct radio links with other units of the task force, but remained on station in a “total exclusion zone,” a navigational box about 40 miles north of the Falklands. Within this box, *Uganda* steamed back and forth, entering Falkland Sound to receive casualties by helicopter. She steamed on courses known and agreed to by both sides and with all lights on. She had no cryptographic equipment aboard and communicated in the clear. Along with the *Uganda* were three “ambulance” ships, converted from Royal Navy ocean survey vessels. It was this trio of small ships, designated by red crosses, which ferried 593 patients in groups of 60-100 on a 4-day voyage to a neutral Red Cross-supervised staging base in Montevideo, Uruguay. Transfer of prisoner-of-war patients to an Argentine hospital ship, the *Bahia Paraiso*, was also accomplished by Red Cross helicopters within the total exclusion zone, under the supervision of the International Red Cross.

There may be, however, distinct limits upon this mode of combat casualty support. Regardless of whether the Red Cross is officially respected in a future war, the easy availability of long-range shoulder-mounted homing weapons to individuals and small units may tempt the harassed individual enemy soldier to “take a shot” at an enemy ship slowly cruising offshore, regardless of the official military posture of his government concerning the Geneva convention. Moreover, weapons of any sort, fired on the strength of any sensor except the human eye, are blind to the color of a ship’s paint or the

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brightness of her lights. So, hospital ships—the epitome of seaborne medical concentration—may have to yield to the safety of a less medically efficient yet mandatory dispersal of platforms.

There are ships in the task force that can function as primary casualty receiving ships, such as the passenger liner *Canberra* in the Falklands or our LHAs and LPHs. Although equipped to provide extensive medical care, their role as assault ships precludes them from the protection of the Geneva convention. However, a hospital facility on a troopship has a major advantage over a specifically designated hospital ship; troops received as casualties can be returned to the front, whereas the Geneva convention prohibits hospital ship casualties from directly returning to the field.

For medical evacuation, the helicopter has been an ideal vehicle, but future guided munition's may limit its effectiveness. Instead of medical extractions in minutes, we may have to return to the hand litter, wheeled vehicles, or "walking" casualties. It may take hours or even days for casualties to reach forward hospitals for primary surgical care, resulting in higher fatality rates among those with head, chest, and abdominal injuries. Delayed treatment of tissue wounds will generally expose them to some degree of bacterial contamination and infection, which drastically alters the surgeon's approach as well as the patient's chances for complete, rapid, uncomplicated recovery.

Although dealing with injuries resulting from enemy action is the main objective of combat casualty planning, infectious diseases through World War II took far more soldiers from the line than did enemy bullets. Commenting upon the lessons learned from such experiences, Navy physician Vice Admiral James Zimble stated, "The mosquito is still a far greater threat than the mortar round." The influence of geographic and environmental factors upon the forces of the United Kingdom in the Persian Gulf region, an area of continuing interest to our own defense planners, bears witness to additional realities of such expeditionary deployments. "The campaign in Mesopotamia, the area around the Tigris and Euphrates, lasted from 1915 until 1918 . . . the total British casualties were 28,621 dead, with a high proportion of deaths from disease. Of the 15,000 evacuated to the UK, only 2,650 were wounded. The outbreaks of Dysentery, Cholera, Malaria, and Smallpox took a terrible toll, and the high incidence of heat casualties, at times, almost became a decisive factor against the British Army."² Even today, consultation with the Armed Forces Medical Intelligence Center publication, "Health Alert Threat Summary," describes in detailed terms the very real risks from numerous other diseases spread by mosquitoes, flies, lice, ticks, fleas, and microscopic parasites in both the Middle East and Africa, including typhus, dengue, and phlebotomous fevers. Some produce severe fevers, diarrhea, weakness, dehydration, and even shock. Some cause short-term illness; others can persist within the liver, intestinal tract, and urinary system for years,

such as *Schistosoma haematobium* and *mansoni* infections, all highly uncommon in our domestic environment. The latter diseases can eventually lead to the development of cancer or permanent disability unless subjected to long-term drug treatment.

The issues involved in sending troops to environs where they are exposed to the "exotic" native diseases are illustrated by the recent Marine Corps operations in Lebanon. Considerable administrative effort was necessary to include preventive medicine (PREVMED) specialists in the landing force in order to prohibit outbreaks of intestinal disorders similar to those encountered in the 1957 Lebanon landing by U.S. Marine Corps personnel. Once a consensus acknowledged the need, the PREVMED personnel worked long, arduous hours spraying and decontaminating to prevent our troops from succumbing to disabling intestinal diseases.

Vulnerabilities of Medical Support—Internal Factors

Amidst the large battles and massive casualties of the Napoleonic wars, primary amputation within a few hours of injury became the most important surgical operation. In the face of limited transport and filthy conditions in rear hospitals, prompt amputation on or near the battlefield was performed for all compound (open) fractures of the extremities and all gunshot wounds of the thighs. In contemporary terms, the purpose of a casualty evacuation system is to place the wounded in the hands of properly equipped and qualified surgeons as quickly as possible in order to preserve limbs and lives. Once the wounded arrive it is expected that the surgeon who directs the team will employ the best preoperative and operative care possible.

During peacetime, both military and civilian surgeons are largely concerned with elective operations that do not involve severe trauma. It is unrealistic to assume that a surgeon will automatically become an expert in the management of combat injuries merely by putting on a uniform. The question is: How can optimal patient care be best supervised and controlled during a war? With a regular medical corps at peacetime levels, the overwhelming majority of physicians who will render combat casualty care will be from the civilian medical pool, as they were in Vietnam. Consequently, the military surgeon is indoctrinated during his first weeks in a combat zone through on-the-job training.

A retired Naval Reserve medical flag officer wrote, "In the comparative luxury of the Vietnam war, many medical officers were shocked by the occasional need to change the pattern of patient care from that practiced in civilian life. Physicians are generally a rigid, compulsive group, and in many cases the cultural, professional, and emotional shock of having to compromise or modify patient care actually immobilized or rendered unfit the physician suddenly placed in the combat zone."³

Historically, clinical policy guidance relative to casualty care in the U.S. military services' medical departments has varied enormously with the managerial style of each surgeon general. On occasion there has been tight quality control, technical clinical policy guidance, and careful gathering of hard data. Most, however, have adopted a *laissez-faire* approach, assuming that qualified surgeons, given the correct equipment and supplies, would somehow perform the correct procedures. This is a fallacious and extremely dangerous assumption.

It is important that updated clinical guidance for care of the combat wounded, in keeping with current progress in the discipline of surgery, be continuously operative for proper combat casualty planning. This axiom is highlighted by a press comment on aspects of the medical care given during the Falklands conflict. ". . . the Falklands conflict was remarkable because of the sharp differences in the two nations' medical services and in their relative preparedness for war. Argentina had not fought a war for 130 years, and her doctors were accustomed to peacetime medicine. Some who served with forward line units were ignorant of basic bullet wound treatment techniques developed more than a century ago by Napoleon's surgeon, Dominique-Jean Larrey. Working from a horse-drawn ambulance, Larrey had found that bullet wounds fester when closed immediately and that they must be left open to heal properly. Although Larrey's techniques now are standard in military medicine, inexperienced Argentine field medics clamped bullet wounds shut, relying on antibiotics to combat infection. Argentine casualties whose wounds were closed before all contaminated tissue had been removed often suffered from gas gangrene or tetanus by the time they reached Ajax Bay or the hospital ships where advanced medical care was available. Horrified doctors spent much of their time reopening and cleaning mishandled wounds . . . British military medical personnel had some experience in dealing with bullet wounds—an ironic dividend of the strife in Northern Ireland."⁴

The physicians of the Argentine military were not unique, however. For background, one must understand that the factors contributing to the development of gas gangrene in a wound are well-known—extensive injury to muscle and its blood supply, and contamination of the wound with foreign matter. In the past, gas gangrene was considered a far more common complication of war wounds than of civilian injuries, and during World War I at least 100,000 German soldiers were known to have died from this complication. As opposed to peacetime civilian conditions, factors favorable to its development are often present in wartime: high velocity missiles and military explosives cause more extensive damage to tissue than civilian assaults with "Saturday night specials" or vehicular, industrial, and residential accidents; the soldier's wound is generally more extensively contaminated—with dirt, debris, and clothing particles forcibly introduced

by shell fragments or bullets—and his wounds are often incurred on terrain where human and animal excrement are mingled with the soil. Nevertheless, the incidence of gas gangrene in the U.S. Army in Vietnam was low and declined progressively between 1970 and 1974—only 22 cases were recorded during the entire 8 years of combat in Vietnam. Paradoxically, between 1964 and 1974 in the city of Miami, Florida, 27 cases of gas gangrene were recorded, including 10 cases among the survivors of a single airplane crash near Miami.⁵ The difference between the Vietnam experience and that in Miami is clearcut. Whereas almost all the wounds in Vietnam were left open and were closed only when it appeared safe to do so, the wounds of all the cases detected in Miami, similar to those treated by the Argentine military surgeons, were closed at the time of initial treatment. This suggests that our civilian surgeons today are not aware of the necessary modifications for management of wounds acquired in a heavily contaminated setting, and it is these civilian surgeons who will go to war in the future.

Training the Personnel within the Health Services System

While combat health care depends on a range of activities, its effectiveness in rendering “hands on” care to a wounded sailor depends upon trained personnel. People providing medical care must have not only traditional academic education, but must also be seasoned by experience; their own as well as that of others. Informational input from those with prior or ongoing experience in similar situations is critical. For this reason, a broadly sponsored educational effort in the form of a triservice armed forces medical war college, including a center for strategic military medical studies, would be a reasonable consideration on the part of military planners.

Administrative specialists within the Navy-Marine Corps who plan for, program, and coordinate the services of the health care delivery system—working with the people who actually deliver individual patient care—must be educated to manage formidable organizational complexities under varying combat scenarios and environmental conditions. They must be taught to integrate the realities of time-phasing the employment of medical assets into an objective area with the time-phasing of combat elements. Concepts of casualty density and the effects of casualty surge rates upon existing medical facilities must also be appreciated. The attendant problems of combat resource management—medical supply, resupply, numbers of available beds, blood requirements, and medical evacuation requirements—must all be blended together with the added recognition that further courses of action may be required as operational activity unfolds. The necessity for planning and practicing preventive medicine to control insect disease is critical and fundamental.

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Unfortunately, our Navy's formal training on medical staff planning for amphibious operations merely consists of a single 5-day course. When one considers the vast number of potential scenarios involved, and the level of operational flexibility required, curricula lasting for several months could easily be envisaged within the setting of an armed forces medical war college.

Because of the enmeshing of missions of the various services, the inevitability of joint or concurrent operational planning and staffing requires additional broad knowledge on the part of medical planners/managers. They must be familiar with the health care systems of *all* other services, including their own unique assets, missions, capabilities, limitations, and doctrinal employment. They must also understand the characteristics of the planning process that are unique to each service, and appreciate the complex requirements within each service for obtaining coordination among its own several communities. Provision for the training of a cadre of combat resource managers, professionally educated to function in the setting of a unified, broad array of medical assets spanning the various uniformed services, should be an important goal for an armed forces medical war college. Such an institution should serve as a focal point for collective integration of resource management expertise and produce the "implementers" of such interservice activity.

The faculty of such an institution should also delve into the study of military medical history, recent and classic; wars in which the United States was involved; and wars of other countries. The rush to learn the British medical experience in antiguerrilla warfare in the early days of the Vietnam war typifies what could have been available, with better planning, if continuing study in the area had been an element in our preparation. Surgeons, also, need to share their combat casualty management experience, both past and present, with their colleagues around the world. A directed academic facility, such as that proposed, could serve as a sponsor for a meaningful international dialogue on the subject.

Under the auspices of a triservice academic institution, a center for strategic military medical studies and a policy management advisory group within the faculty could be established to study and develop appropriate changes in combat casualty care to be reflected in contingency military plans. It should be staffed by representatives of all services, ranks, and professional expertise from both the line and medical services and should also include highly qualified civilian specialist consultants. Its members, some of whom should be acknowledged experts in medical sciences, must be kept current by advisers in the technology of warfare, since technological innovations might well affect the number of casualties generated, the types of casualties, their special evacuation requirements, and subsequent care. Foreign policy advisers should also be retained to relate feasibilities concerning international trouble spots, potential host nation support facilities, and evacuation issues relative to

overflight rights, sealift capabilities, etc. Such a group could then correlate advances in medicine with the changing technology of warfare and our current national foreign policy status. It could also provide advice concerning matters of public health and infectious diseases in geographic areas where the United States might become militarily involved, in addition to advising on the problems of surgical care of the combat wounded.

An integral part of long-range planning is research and development directed toward new methods for achieving better combat casualty care. Such a broad spectrum aggregate of technical expertise, as the faculty at a center for strategic military medical studies, should not only articulate critical research and development requirements, but also serve as an integral part of the investigational implementation.

The staff of a center for strategic military medical studies should also have access to, and constantly review, the changing medical plans and annexes for military operations in areas of high risk for U.S. military involvement. This would also provide the opportunity for greater dialogue between combat line officers and their medical department counterparts in medical war planning. Line officers may then become familiar with the medical implications of new combat technology as well. This form of dialogue would certainly not be unique, since there has existed a great tradition of joint medical and line collaboration in the Navy. The noteworthy successes in extending capabilities and enhancing the performance of aviation and submarine communities in increasingly dangerous environments can be directly attributed to this association.

Conclusions

Today there are few naval operating areas in which local nation states do not possess conventional weapons nearly as capable as those of the superpowers. The growing danger of unconventional threats must also be acknowledged. Chemical and biological weapons are available and are being used in the Iran-Iraq war today. Nuclear materials are also available beyond the five states possessing nuclear weapons, a fact that has implications for future crises and small war situations. Our Nation's ability to respond to multiple potential forms of global threat, especially those present within the three major theaters of potential superpower confrontation—Europe, Southeast Asia, and Southwest Asia—will depend heavily upon the Navy's forward deployed forces.

To meet these threats, U.S. forces, deployed worldwide, must be prepared in terms of both doctrine and materiel, a reality which includes the concept of medical preparedness. General P.X. Kelley, former Commandant of the Marine Corps, stated that issues such as fleet medical support "are often overlooked when novices discuss amphibious operations; the professional

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knows how easily an operation can founder without these naval support elements."⁶ Although the vagaries of combat cannot be controlled, the Navy must, to the maximum extent possible, provide for the health care of the personnel who navigate its ships and fire its missiles. Provision for their individual health care needs requires dedicated interest, flexibility, and creativity. A joint approach to strategy development, involving line-medical dialogue, is the key to this end. Without it, a supporting infrastructure is doomed to failure as is the credibility of our national defense policies. Correspondingly, a broad spectrum educational and research commitment, spanning the breadth of all the uniformed services, would provide both the trained personnel and strategic orientation necessary for adapting medical support to the complexities of our future military responsibilities.

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