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Tactical and Logistical Compromise in the Management of Combat

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Tactical and Logistical Compromise in the Management of Combat Casualties: There Is No Free Lunch!

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In combat operations, sustainability as well as flexibility are of paramount concern. Health maintenance and casualty management programs are crucial underpinnings of any such plans and must be thoroughly integrated with tactical operations. The structure and operation of medical services is essentially a function of command direction, and the decision for a specific form of supporting activity in any given maneuver is ultimately the responsibility of the operational commander. Consequently, the relationship between medical service options and command decision warrants continuing study by the Navy-Marine Corps line community.

Every operational commander must determine whether his warfighting concepts and plans are supportable. His judgment will significantly influence the order of battle and tactics, as well as the sustainability of employed forces. Conversely, he must also assess the cost of such support factors in terms of tactical mobility and the competing demand of an essentially logistical function for portions of his offensive assets. Recognition of the cost/benefit ratios of the component parts of operational assets must be continuously analyzed. An appreciation of the intrinsic assets and liabilities of the casualty treatment continuum would thus make line commanders better informed "consumers" of operational medical care.

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The Design of Medical Support Systems

Medical support plans for land and sea-based combat operations are specified by tactical requirements. The value of the complete matrix of operational medical support activities is contingent upon its ability to functionally adapt and conform to the different and often rapidly changing needs of combat elements. The field medical system in Vietnam, for example, was an effective medical support structure and remains a valuable model for operations under similar tactical, logistic and administrative conditions. (It closely approximated the civilian model of urban emergency services, characterized by rapid transport of automobile accident victims, as well as victims of inner city violence, to nearby medical facilities.)

In future conflicts, demands on the military medical support structure may be significantly new and different. Predicted tactical changes in warfare may well prevent us from using medical support systems similar to those which yielded our remarkable medical record in Vietnam. With only occasional exceptions, such as the military actions at Khe San and at Hue during the Tet offensive, there were few prolonged battles in Vietnam, and most casualties resulted from relatively brief "fire fights." As we established control over combat areas, evacuation helicopters were called in, and the casualties were flown to hospitals in a fashion similar to that provided by urban emergency medical services in peacetime. It is possible, however, that future combat activity will continue for days or weeks. Successive waves of casualties may be generated, and they will require attention by medical personnel while battle continues and while forces continue to move.

A future war may begin by tactical and possibly strategic surprise. Under such a circumstance, the sustained buildup over unthreatened sea and air lines of communication that we had in Vietnam would probably be denied to us. The development of precision-guided munitions, as well as the availability of accurate, simple, hand-held missiles to enemy forces—all of which are capable of destroying armored vehicles and aircraft—will broaden the potential for an enormous increase in firepower and lethality at the tactical level. Consequently, it can be predicted with virtual certainty that a future war will produce unprecedented losses of men and materiel. Because tactical dispersion will be necessary on land as well as at sea, communications and transportation between support and combat echelons will prove difficult, at best. Insecure rear areas may force medical units that provide advanced surgical care—including the casualty receiving and treatment ships of an amphibious task force—to be far from the supported combat formations, thus delaying treatment of the wounded. Consequently, operational medical doctrine will require considerable restructuring if it is to preserve lives and sustain manpower resources.

The command decision-making process requires the consideration of many competing factors. For example, both the logistical burden required to evacuate a casualty to a remote facility ashore or afloat, and the forward transport of a replacement, must be balanced against the burden of holding and treating the casualty in a more forward area. Additionally, more logistical support is required wherever there are more hospital beds. If most beds are used for intensive rather than intermediate or light care, the support burden further increases, and tactical mobility decreases. The movement and placement of hospitals forward (or to the rear if things go badly) can thus increase competition for scarce transportation resources. Availability and type of transport, as well as the nature of the tactical situation, can impact upon the depth of medical care available at differing levels. Such combat-related realities must be factored into every casualty management equation. All are within the province of the combat commander's discretionary authority. Each support element bears a functional and logistical price tag.

Policy Considerations in Casualty Management Doctrine

Survival or death of the combat wounded is fundamentally affected by the speed with which they are given medical care. The early delivery of first aid and the resuscitation of those vital body functions which have been degraded by injury, as well as the implementation of initial stabilizing surgery, are particularly important in this process. Throughout the history of warfare, successful treatment of battle casualties has always been influenced by the time between a soldier's wounding and the delivery of medical treatment to him. Perfection in such matters as hospital care; command, control, and logistics; readiness of professional and ancillary personnel; and sophisticated advanced casualty management techniques will be fruitless unless the wounded man can reach this system in time. (Even in World War I military physicians understood the importance of time in saving lives. If the badly wounded patient was given adequate shock therapy within one hour of being wounded, his chance of living was 90 percent. This decreased markedly with time, so that after eight hours his chance dropped to 25 percent.)[1] In addition, the effects of delay upon initially simple wounds converts many of these into complex, infected, and often life-threatening ones.

The timeliness of both treatment and evacuation of casualties is extremely important. Since the beneficial results of military surgery are found in correctly timed treatment—and not in temporary custodial care or mere introduction into an evacuation system—any delay in treatment of those with potentially salvageable wounds increases the risk of death. Delay in treatment, due to evacuation lag, is tantamount to denying care to those who could have survived with early surgery.[2] It may cause those who could have been returned to duty to require longer treatment, due to deterioration in their condition!

Military surgeons in World War II strove to bring surgical treatment to their patients within the "golden period"—the first six hours after wounding, prior to the onset of irreversible deterioration. How well they attained this objective is not a matter of specific record, but several European theater surgical groups were able to treat 21 percent of the combat injured in the first six hours following wounding, and an additional 47 percent in the next six.[3] In view of the speed with which the severely wounded die, every effort to make surgery promptly available to these men must have paid large dividends for those fortunate enough to have received proper care. Equally important was preventing deterioration in the condition of those whose wounds were not life threatening, so that they could be rapidly returned to duty.

An experienced military surgical consultant, Dr. Edward P. Churchill, once stated, "Men are not ration boxes, and special requirements of traumatic wounds may provoke certain overriding considerations." He noted that military planners who are unfamiliar with the realities of combat wound management often suggest that medical evacuation is but an exercise in logistics, in which numbers of anticipated casualties, numerical capacity of transport facilities, the time availability of transport shuttles, and the numbers of available beds are the primary considerations. In reality, however, prior to consideration of evacuation, military planners must either accede to a reasonably precise schedule of wound care, or accept the grim responsibility for permanently sacrificing large numbers of combat troops (by virtue of placing them into a protracted evacuation chain for what were initially simple wounds).[4]

Disregard for these time limitations implies acceptance by the command and its medical officers of an overall increase in death, or at least disability, and the return of fewer men to duty. Unfortunately, mistakes made in medical care administration are not reversible by command decision![5] Therefore, in preparation for any future war, emphasis should be placed on improving our ability to treat casualties at the most forward located, lowest echelon possible. Can this sobering reality be integrated into modern tactical and logistical doctrine? This is a command decision as well.

Tactics and operational doctrine are subject to the command evaluation process in order to determine the extent to which operations can be both executed and supported. This is important, since the major impact of any medical support shortfall will ultimately fall upon the combat forces commander. If casualties cannot be evacuated, they will impede operational mobility and pose a major morale threat to forward moving forces. If inadequate medical services and inadequate evacuation sources coexist, those casualties most likely to return to duty (generally those with extremity wounds from fragments, which constitute between 70-90 percent of all survivable injuries) will be sent the farthest away, since they are transportable

and in the best condition to tolerate evacuation. (However, with long delays prior to receiving care, this group will develop infections, and physiologic stability often deteriorates. This leads to longer periods of recuperation and delayed returns to duty.) Those casualties least likely to return to duty (among the 3-10 percent who require initial lifesaving surgery) will be kept in forward areas, due to their serious and unstable condition. These may then pose a much greater logistical demand upon the system due to the serious nature of their wounds requiring intensive care.

Amphibious Operations as a Model

The modern sphere of amphibious warfare provides a logical setting for analysis of the interrelationships between tactics and medical services, and the types of command choices that must be made. These are the most complex of military operations and historically have borne the highest casualty rates associated with combat assaults. For example, analysis of tactical activity profiles in World War II by U.S. Army and Marine Corps divisions demonstrated that the highest rate of wounding occurred in the opposed overwater assaults designated as "beachhead operations." The average wounding rate of 11.04 per 1000 men per day was seven times the average rate for a division in combat in World War II, and more than twice the average for practically all other types of action, such as offensive breakthrough operations, reduction of ports and towns, assaults on fortified lines, or river crossings.[6] Casualty rates involving as high as 25 percent of landing force personnel have been reported in certain selected actions.[7]

Support requirements, including medical care, have been an integral part of amphibious operations, no doubt beginning with the Greek assault across the Aegean upon the beaches near Troy in Asia Minor, and the subsequent 10-year siege of that city. With time, technological development has further complicated amphibious warfare. Simultaneously, the component parts of attacking forces, those charged with the mission of effecting landings from the sea, have also increased. Consequently, the integration of all the arms and troop movements needed to gain success in such operations has became more complex. Improvements in gunnery and air power have provided greater advantage to defenders as well, further complicating the decision-making matrix for amphibious commanders.

The British failure to take the Dardanelles at Gallipoli in 1915 was adjudged an amphibious fiasco because of faulty doctrine, ineffective amphibious techniques, poor leadership, and an utter lack of coordination between attack and supporting elements. In the Pacific in World War II, the Marine Corps and Navy were ultimately able to establish a workable doctrine for both troop and naval components within an amphibious attack force, beginning with the first U.S. landings at Guadalcanal in August 1942. Similar landing force

doctrine, organization, tactics, and techniques facilitated the prosecution of amphibious operations against the Axis powers in Europe as well, beginning in 1942 with the landings in French North Africa. In each case, the early operations highlighted the enormous difficulties associated with providing the essential medical support elements. Only in late 1944 and 1945 were these problems adequately solved.

It is axiomatic that medical service during amphibious operations must be thoroughly integrated with tactical operations, and also flexibly applied. Its fundamental purpose is to provide early stabilization of casualties, and furnish their evacuation when required. In the early phases of a landing operation, assault units are committed to the execution of a specific plan. Once the landing has been initiated, the ability to effect changes is obviously restricted. Other than the services of medical personnel organic to combat units, only limited numbers of facilities for additional medical care are generally available. These are set up only as required for supporting the existing situation or to meet contingencies of the immediate future. Means not required for these purposes are held in reserve to meet emergencies and support further troop movements. As the attack progresses and the situation changes, the tactical plans of the commander are often altered or modified to meet the requirements of new developments. A change in tactical plans may require an immediate redistribution of medical support. An adequate medical reserve is the most positive assurance that flexibility in the medical service can be achieved. As long as a commander retains a reserve of combat elements, a proportionate reserve of medical means must be held to support them when they are committed.

Experience in past amphibious conflicts has demonstrated that an amphibious assault against a stubborn, well-entrenched adversary can be expected to produce a large number of casualties. The highest rates usually occur during the critical assault phase of the operation, when the medical service has a minimum number of medical personnel and facilities ashore. The essence of medical support of such operations is in the maintenance of contact with supported units; therefore, mobile medical units must retain their mobility. Once a medical facility is receiving casualties, its mobility is dependent upon the evacuation of its patients by a higher medical echelon or on leaving patients to be picked up by supporting medical forces. A large number of casualties, and the need to both care for them and make the best practical disposition of them in the face of inadequate facilities and other unforeseen difficulties, may bog down and even defeat an operational undertaking. Medical support mechanisms must also be closely correlated with the management of tactical problems, since the same hostile fire that stops combat troops also retards or prevents the movement of casualties. Terrain that is difficult for troops to traverse is equally difficult for removing the wounded. Extreme climatic conditions that impede tactical operations

will inevitably increase the number of sick and injured to be evacuated as well.

In the early assault phase of amphibious operations, emphasis is necessarily given to the lift of combat power ashore, namely men, equipment and supplies, to achieve the tactical objective. Medical evacuation generally works in reverse order against this forward flow. It relies heavily upon shared use of the same surface and air vehicles that must generally return from the landing zone to the amphibious task force to pick up and deliver the next wave ashore. Assignments of transport adequate to meet the requirements for casualty evacuation may well slow down follow-on assault echelons in the early phases of an amphibious assault. This obviously falls within the realm of command decision and is yet another tactical compromise that must be considered.

Regardless of the location of the employment of troops during an amphibious operation, the necessity for organized evacuation arises as soon as contact with the enemy is made. The system of evacuation of casualties varies with the progress of the landing. Optimally, prompt and orderly evacuation of casualties from forward areas should be accomplished in a manner which interferes as little as possible with other military requirements. Nevertheless, operational commanders must recognize that the accumulation of casualties within any combat unit inevitably restricts movement. In addition, the lack of proper facilities for the care of the wounded may well exert a seriously depressing effect upon the morale of combat troops.

Unfortunately, the withdrawal of casualties against a constant forward flow of troops and supplies is never implemented optimally. It is nearly impossible to transport a wounded marine through an evacuation chain without delays. In addition, the more closely the evacuation of casualties is integrated with the forward transport of combat personnel or war materiel, the more difficult it is to deliver needed medical treatment in reasonable time intervals. Delays may also be created by the circumstances of the particular military situation. Such conditions may retard casualty evacuation and also immobilize medical units within the combat area.

Experience during previous landing force operations has demonstrated that there is no typical chain of evacuation through which a casualty is moved. The wounded may receive initial medical treatment on site, at some local collection point, or during evacuation. Many options have existed, depending upon the tactical situation and available resources. However, the constant overriding credo of medical policy mandates that regardless of organizational structure, the wounded must receive the most expeditious care possible at all levels in the medical support continuum—from the place of wounding to the medical treatment facility best suited to meet specific treatment needs. This sphere of combat support requires creative and adaptive planning for controlling patients and vehicles and for ultimately getting patients to the appropriate receiving facility afloat, if such is required.

Medical planning must also incorporate measures for meeting unpredictable peak loads of patients. This irregular distribution of casualties in time and space may place an insurmountable burden on certain medical units or ships, while others are relatively unoccupied. The probable location of areas of high casualties can be deduced by an analysis of tactical plans and terrain. Generally, these are found to be greatest in the area of the main attack. This has prompted development of the art and discipline of medical casualty regulation.

Traditional options for ministering to sick and wounded members of the assault force in amphibious operations must consequently be reassessed continuously by every operational commander. An analysis of the functional implications for both ground and afloat components of the Navy-Marine Corps continuum must be developed. This requires a continuous integration of many interdependent critical factors: time; distance; dispersion of units and personnel; casualty rates; distribution of medical facilities; evacuation policies; available methods of evacuation; availability and priority of equipment; availability of water, surface and air transportation; the necessity of providing for a reserve; and the ever-changing tactical and strategic situation. The larger the area of operations, and the faster the progress of military operations, the more important this will become and the more difficult to evaluate. Only when the tactical situation becomes static for a reasonably long period of time is it possible to approach ideal medical planning and operational conditions. In the interim, difficult choices obviously must be made by the operational commander and his staff.

Over-the-Horizon Amphibious Doctrine

New weapons and communications technology, as well as new forms of assault vehicles, are expected to favor over-the-horizon amphibious assaults in the years ahead. This assault concept serves to protect amphibious task forces from the increasingly threatening weapons of potential adversaries, while simultaneously providing greater tactical latitude for U.S. landing forces. It reflects recognition of the 250 nautical mile range of Soviet antiship cruise missiles, the extensive Soviet shallow and deep water mining capacity out to the 100-fathom curve, and the ballistic threat from Soviet infantry fighting vehicles. In an amphibious landing today, although the surface-to-surface missile threat may be quelled at an early point, support ships may still be required to stand out many additional miles from shore to remain out of artillery and missile range. This can present a significant challenge to traditional systems for ministering to the sick and wounded members of the assault force.[8]

The LCAC (landing craft air cushion) is the linchpin of a significant upgrade to our surface-launched amphibious assault capability that also includes a new

LSD-41 *Whidbey Island*-class ship and the *Wasp*-class LHD-1 amphibious assault ship. Given the potential addition of the MV-22 Osprey tilt-rotor aircraft and the advanced amphibious assault vehicle (AAAV), the capacity for transport of assault elements over greater distances may increase even further.

The new high speed LCACs may well replace much of the close-in task force surface support previously utilized. It has been stated that only 20 percent of the world's beaches are assailable by conventional displacement-hulled landing craft, due to their stringent beaching requirements. The LCAC, however, is purported to have the potential to glide over 80 percent of the world's beaches, without even the hydrographic surveys of boat lanes required for traditional landing craft. One must then acknowledge that the employment of LCACs to deploy assault elements over previously unassailable beaches may well preclude use of conventional craft for even follow-on echelons of logistical support in some of these locations.[9]

Will ready evacuation of casualties by air be assured? In the face of modern antiaircraft defense, including increasingly ubiquitous and highly effective light shoulder-fired heat-seeking missiles, the survivability of helicopters on the modern battlefield is certainly not assured. The CH-46 helicopter remains the backbone of Marine Corps troop-lift and aeromedical capability, but its future role may be confined to peripheral zones. In Vietnam, without any air-to-air threat, and despite a reduction in helicopter operations in high-threat areas, it has been estimated that the U.S. Army still lost 17,700 helicopters.[10] Due to battle damage and losses following the *Mayaguez* seizure in the Gulf of Thailand, only one of the nine helicopters used in the initial mission was capable of a second mission. In Afghanistan, the antiaircraft ground defense of the Mujahedin allegedly led to the loss of 250 Soviet Mi-24 Hind helicopters within the first 18 months following the Soviet invasion. In the 1983 Grenada invasion, seven U.S. H-60 Blackhawk and two AH-1 Cobra helicopters were lost—approximately 10 percent of the 88 combat helicopters used. This was a rate comparable to the prohibitive daylight bomber loss rate in World War II.[11] Consequently, heavy reliance upon helicopter evacuation of the wounded may well decrease. (The effectiveness of the MV-22 Osprey in such circumstances remains unproven.)

Medical Support of Modern Over-the-Horizon Operations

Due in part to the availability of new assault vehicles, amphibious tactics are obviously undergoing change. In addition, weapons technology has forced assault and supporting units on both water and land to be dispersed over greater distances and over beaches which may not accommodate the majority of surface support craft. The result? Managers of medical systems for

amphibious operations face several perplexing and occasionally paradoxical dilemmas.

Dilemma I. In response to greater enemy firepower and new tactical doctrines, both vertical envelopment elements and beach assault waves, including medical support units, will be widely dispersed. Land warfare may once again depend, as it did more than 40 years ago, on ground vehicle transportation of the wounded. Will this be available in sufficient quantities?

Dilemma II. As extensive over-the-horizon operations become common, the LST and displacement-hulled landing craft, e.g., LCU and LCM-8, may well disappear from our fleet. However, we have grown accustomed to the ready availability of surface transport for casualty evacuation when air assets are not available. Consequently, in amphibious operations, surface craft evacuation may once again grow in importance more rapidly than we are prepared for. Will this be available in sufficient quantities?

Dilemma III. Traditional amphibious medical doctrine is further complicated by the reality that the modern era of naval warfare will be a far more dangerous one for hospital ships as well, due to the ability of the enemy to fire weapons at these ships at a range far exceeding that required to identify them as hospital ships. Such offensive capabilities now threaten the privileged immunity formerly enjoyed by these vessels, which roamed the high seas at will in fulfillment of their mission during the actions in Korea and Vietnam. For purposes of protection, they may be forced to exercise their only option—geographic dispersion.[12] Further complicating the situation, our modern TAH hospital ships are primarily designed for accepting casualties by air transfer. Waterborne transfer of casualties to such vessels, when not at anchor, will be extremely difficult and of very limited utility.

Dilemma Summation. The operational and tactical implications of over-the-horizon warfare will impact heavily upon the disposition of those Marine Corps casualties who require medical attention beyond that available on shore. With a reduced role for the LST and displacement-hulled landing craft, and the additional potential for reduced air superiority in future conflicts, current concepts of amphibious operational casualty care maudate reconsideration. If these requirements are not satisfied, casualties may be immobilized for hours at advanced positions on land without adequate professional medical attention, producing a significantly increased incidence of wound infection, complications, and death.

Logistical sequelae also merit consideration. The longer distances involved in modern amphibious operations may create enormous logistic demands within the theater. Air and sea supply routes may be susceptible to challenge

as well, thus adding to the logistical burden. Medical items requiring special handling, particularly whole blood and biologicals, may be scarce. Supplies required for resuscitation may become mired in the transportation system. Improvisation by medical units and personnel at all echelons may ultimately provide the only solution.

Following the landing of assault echelons, manpower losses may be increased due to the lethality of modern offensive weapons, which have a greater capability not only to cause casualties, but to cause multiple "hits" on each casualty. Limited bed availabilities, plus logistical and medical manpower shortages, may also decrease the quantity and quality of surgical care that is available. This will not only reduce our ability to heal wounds, but will also complicate the wounded man's problems and lengthen his period of convalescence. Critical manpower that could otherwise be returned to duty in weeks may ultimately require evacuation from the theater. In short, modern amphibious tactics could radically degrade the performance and utility of the medical support system and affect the return-to-duty rate of lightly injured personnel.

In any major future land or over-the-horizon amphibious conflict, the greatest vulnerability of the medical support system will primarily involve the several lower echelon elements of the health care chain, between the battle area and the hospital. This raises the question, then, of the need for a reappraisal of the graduated system of medical care availability which is doctrine in modern amphibious operations. We may need to reassess our heavy dependence upon afloat amphibious task force resources for wholesale casualty evacuation and treatment. One can reasonably question whether large-scale nonselective helicopter evacuation of all marine casualties, both minimal and serious, from the point of wounding to ships of the amphibious task force, is even feasible. In addition, will it provide adequate care and recuperation of the wounded and their timely return to duty? The likelihood of casualty receiving and treatment ships remaining on station for prolonged periods is certainly doubtful. It may be necessary to transfer ashore, earlier than we do now, an efficient and discriminating advanced medical capability. The mission of the medical personnel involved would be to sort out the light from the heavily wounded, stabilize those with grave wounds, and better prepare the latter, selectively, for the potentially arduous transfer to the amphibious task force. Such units might well provide flexibility in medical support, since their surgical capabilities can be tailored to meet special operational requirements.

Command Options

Significant discretionary judgment is required in analyzing the various benefits and tradeoffs associated with combat casualty support. Without

Naval War College Review, Vol. 43 [1990], No. 1, Art. 5

question, appropriate priority must be given to medical care, evacuation and the casualty regulation process. There is a cost attached to any option chosen. This has been demonstrated historically as follows:

Revolutionary War Model. No evacuation or treatment until the battle is concluded. Casualties are then collected and hauled away. Within this model, there are no returns to duty.

Civil War Model. Some "underfire" evacuation, by dedicated means, to battlefield surgical hospitals. There is little return to duty in this model.

World War I. "Underfire" evacuation and first aid, with dedicated evacuation to hospitals just off the battlefield. Some returns to duty emanated from this model.

World War II. Faster evacuation and treatment, with forward facilities for initial lifesaving surgery. This was followed, however, by over-evacuation and wide casualty dispersion through multiple hospital echelons, in theater and beyond. In this model there was a better return to duty rate, but a heavy logistical burden.

Korea. Inception of the use of helicopters to transport the few seriously wounded to mobile army surgical hospitals in relatively forward locations. In this model there was again a better return to duty rate, but also extensive over-evacuation following stabilizing treatment.

Vietnam. Medical support by area hospitals, including hospital ships, receiving helicopter evacuations directly from front line units. This resembles the civilian traffic accident casualty treatment and evacuation model. In this model there is a far better return to duty rate, but an enormous logistical burden, including a potentially high helicopter loss.

It is thus within the province of the line commander to decide upon the level of medical support that he is willing to allocate:

- He may decide upon local first aid only, through buddy and corpsman care alone. This will resnlt in a far greater complication and death rate among all the wounded and will drastically curtail returns to duty.
- He may decide upon first aid and then evacuation in boats or aircraft returning to ships. This requires a well-developed command, control, communication, and medical regulatory network, since casualties must be directed to the proper ships for sorting of their wounds and proper treatment. This will have a negative impact upon assault and resupply turn-around times.
- He may decide upon local first aid and a casualty command, control, and communications medical regulation network. In addition, he may also

provide forward advanced capability medical teams to achieve forward stabilization and sorting of casualties, facilitating a more selective evacuation of only the seriously wounded. This would minimize any impact upon resupply and assault vehicles by selecting for evacuation only those who require more advanced rear echelon care.

The landing force commander in an amphibious operation must thus make certain choices. If he does not give appropriate priority to forward medical care, evacuation, and a sophisticated casualty regulation network, he runs the risk of suffering a huge logistical burden and an adverse impact upon morale while the dead and injured remain ashore. On the other hand, there will be an adverse impact upon the transport of assault echelons if medical evacuation back to casualty receiving ships is not planned, practiced and controlled. Furthermore, inattention to these issues will result in the loss of trained troops who could have been treated and returned to duty had medical planning and resources been appropriately integrated into overall operational plans.

It is imperative that the operational evaluation of any new tactical doctrine, such as over-the-horizon amphibious assault, include realistic casualty "play." This involves forward first aid, casualty collection at beach or helicopter evacuation stations, medical regulation of casualty evacuation, practiced control of forward and retrograde movement of land, water and air vehicles, and reception at the appropriate casualty receiving ships. These medical support elements must be realistically integrated and tested with the same vigor as any other element of amphibious operations. Without dedicated incorporation of these concepts into tactical planning, the amphibious command will pay a significant price in manpower effectiveness. On the other hand, it must also be recognized that there are definite logistical costs when these concepts are included. In essence, "There is no free lunch."

Notes

1. Robert M. Hardaway, *Care of the Wounded in Vietnam* (Manhattan, Kan.: Sunflower Univ. Press, 1988), p. 6.
2. Edward D. Churchill, "Surgical Implications of the Evacuation and Distribution of Battle Casualties" in Gilbert W. Beebe and Michael DeBakey, *Battle Casualties* (Springfield, Ill.: Charles C. Thomas, 1952), pp. 242-257.
3. Beebe and DeBakey, pp. 96-100.
4. See Edward D. Churchill, *Surgeon to Soldier* (Philadelphia, Pa.: J.B. Lippincott, 1972).
5. *Ibid.*
6. Beebe and DeBakey, pp. 71-72.
7. See Bureau of Naval Personnel, "Combat and Field Medical Practice" (NAVPERS 10819), February 1949.
8. David H. Smith, "New Speed for the Spearhead," U.S. Naval Institute *Proceedings*, November 1987, pp. 41-45.
9. See U.S. Marine Corps Development and Education Command, "Employment of Landing Craft Air Cushion (LCAC) in Amphibious Operations" (TACMEMO PZ005770-1-85), November 1985.

Naval War College Review, Vol. 43 [1990], No. 1, Art. 5

10. James P. Etter, "New Aircraft Require New Thinking," U.S. Naval Institute *Proceedings*, November 1987, pp. 38-39.
11. Richard A. Gabriel, *Military Incompetence: Why the American Military Doesn't Win* (Hill and Wang, 1985), pp. 180-181; Etter, pp. 38-39.
12. Ben Eiseman, "The Next War: A Prescription," U.S. Naval Institute *Proceedings*, January 1975, p. 36.

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"Something also ought to be written about the often invisible success of good plans. The Battle of the Nile would have been to a journalist nothing but chaos, destruction, violence, grit, and determination, but to a student of naval tactics it is the sublime example of meticulous planning and intelligent execution, which is why we so esteem the genius of Horatio Nelson."

Wayne P. Hughes, Jr.
Phalanx, December 1989, p. 34