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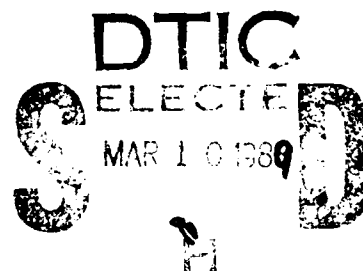
PATIENT-HANDLING AT SEA IN SUPPORT OF THE MARITIME STRATEGY

by

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Abstract of

PATIENT-HANDLING AT SEA IN SUPPORT OF THE MARITIME STRATEGY

Execution of the offensive phase of the Maritime Strategy will result in deaths and injuries in the battle force. Appropriate disposition of the injured will be required for moral, morale, and mission achievement purposes. This paper qualitatively examines the patient disposition methods available to support the offensive phase of the Maritime Strategy, estimates the types of injured anticipated, and makes recommendations to improve patient-handling in aircraft carrier or surface action task forces involved in such operations. Patient disposition methods include: retention; evacuation by air, shuttle ships, or disabled ships; or transfer to hospital ships and/or primary casualty receiving ships. The advantages and disadvantages of each of these methods are discussed. Anticipated types of injuries and illness include; burns, smoke inhalation, hypothermia, near-drowning, combat stress, and multiple system trauma. Interviews with ships' Commanding Officers support the likelihood of communication, logistic, and transportation difficulties in such a scenario. Battle forces will require integrated medical planning, patient regulating and may require situation-specific medical augmentation. Research, manning and training efforts to support this scenario should focus on medical diagnosis and care in isolated settings.

PATIENT-HANDLING AT SEA IN SUPPORT OF THE MARITIME STRATEGY

CHAPTER I

INTRODUCTION

"It has been the American tradition to provide care for our wounded in time of war. Historically, this has had practical benefits: The certainty that care was available has motivated troops to fight, and medical systems have returned many combat-hardened personnel to their units."¹

"Because seasoned and well-trained personnel are of inestimably more value than raw recruits and there is always only limited manpower, it is imperative that the medical service not only strive to shorten the period of healing, making possible early return to duty, but also institute hygienic and preventive measures to limit the incidence of disease."²

If the offensive nature of the Maritime Strategy is going to be politically acceptable and credible then we need adequate means to handle the wounded that result. The purpose of this study is to qualitatively examine the impact of the current Maritime Strategy on patient handling methods, during offensive operations at sea, in a technologically sophisticated wartime environment. This examination will focus on surface action and carrier battle groups. Amphibious and submarine patient casualty needs will not be addressed.

To most it will be immediately obvious why we need to have an ability to evacuate the wounded and ill from combatant

1. James D. Stewart, "Evacuating the wounded: Why it will be so difficult." Military Logistics Forum, Jan/Feb, 1986, pp. 32-38.

2. Emmett D. Hightower, "Medical Service in the Seventh Amphibious Force." Chap 7 of History of the Medical Dept. of the U.S. Navy in World War II, NAVMED P-5031, 1953 p. 183.

ships, but it bears repeating. In a book written a short time after World War I, Dr William Mann summed up the reasons well. He said:

" The presence of battle casualties on fighting ships decreases the fighting efficiency for the following reasons: (a.) The presence of dead and mangled comrades lowers the morale of the crew. (b.) A number of sick and wounded requires the attention of attendants needed for combatant duties. (c.) Battle casualties occupy space and consume supplies needed for combatants. (d.) Medical supplies and hospital accommodations on board are barely sufficient to care for the casualties of one action.³

A specific example related to the difficulties produced by the wounded at sea occurred during World War II:

"On the USS New Mexico (BB) a 'kamikaze' landed on the superstructure killing 30 men and wounding 129 others. It was not possible to evacuate the wounded until 13 days later. For the first four days following the explosion the personnel were almost constantly at general quarters and under repeated air attack. This condition placed medical department personnel under serious strain. Battle dressing stations had to be fully manned during the day to provide first aid for casualties. Definitive treatment could not be carried out until night. Critically wounded were put into an air-conditioned ward but many of the seriously wounded, as well as those with mental illnesses, were of necessity placed in poorly ventilated compartments. The repeated gunfire produced a state of anxiety among the wounded, and the retention aboard the battleship had an adverse effect upon the morale of the crew."⁴

We need to care for our wounded. Why then should the Maritime Strategy require a reassessment of our patient-handling methods? The reason lies in the offensive phase of

3. William L. Mann, Medical Tactics in Naval Warfare, (Washington, DC: United States Government Printing Office), 1927, p. 71.

4. Joseph L. Schwartz, "Experiences in Battle of the Medical Department of the Navy," Chap. Two of History of the Medical Department of the U.S. Navy in World War II. p. 116.

the Maritime Strategy.⁵ While the Maritime Strategy takes into account the wide range of options available to a maritime power and the wide range of situations that might require the use of naval forces, it also has an offensive component designed around a specific scenario. In the unlikely event of a war with the Soviet Union, our strategy includes the capability of assembling battle forces consisting of two to four carriers (possibly a battleship) and their necessary supporting ships. These forces have to be capable of conducting offensive operations in a wide variety of environments, for a sustained period of time. They will be opposed by a technologically sophisticated foe who can employ missiles, mines, torpedoes, and bombs against the force.

These battle forces will require periodic support from underway replenishment groups including oilers, supply ships and ammunition ships. Communications and transportation among the individual ships may become difficult. Cold, stormy weather may allow only infrequent air operations. All of these factors will affect our ability to care for the wounded.

Present patient-handling practices rely heavily on the rapid air evacuation of a limited number of patients suffering primarily from disease or non-battle injuries (DNBI). The focus of attention has been on battle-field casualties and on injured occurring in amphibious operations. In the execution of the offensive phase of the Maritime Strategy, human casualties are likely to be different in type, and more

5. Adm. James D. Watkins, "The Maritime Strategy," U.S. Naval Institute Supplement, January 1986.

difficult to evacuate. The nature of sea engagements and the disposition of the personnel in the force means that when a ship is hit, many are suddenly killed and injured. This contrasts with situations on land where the troops are often more widely dispersed and battle injuries are more likely to occur in a relatively steady stream. Continuation of the mission, or survival of the ship, may be of such importance as to make casualty handling a secondary consideration. In fact, the situation may be similar to that predicted by Rear Admiral B. Eiseman. In the next war he predicted evacuation difficulties, threatened logistic chains, dispersed medical assets, and the probable need for evacuation time to be dictated by military and not medical considerations.⁶ Such conditions appear to exist in the offensive phase of the Maritime Strategy.

In setting the framework to predict future patient handling requirements a number of assumptions are necessary:

1. Weapons will inflict more damage in the future.
2. Manpower shortages will continue.
3. Disease incidence from non-battle injuries will continue to decline.
4. Because of the general increase in specialization and the high overall level of training and experience of our personnel, each individual will become more important for mission completion.

6. Ben Eiseman, "The Next War: A Prescription." U. S. Naval Institute Proceedings, January 1975. pp 33-40.

This paper takes the assumptions above and views them in light of the Maritime Strategy, recent history and selected input from experienced professionals. Predictions are then made regarding the type and distribution of illness and injuries, patient handling options are reviewed and changes are recommended in patient-handling at sea.

CHAPTER II

METHODS

A questionnaire was developed and was administered to twelve senior naval warfare officers (O-5 and O-6 Post Commanders from surface, aviation and submarine communities) to develop an idea of tactical situations that might be expected and the type of casualties anticipated. They were asked about weapons effects, damage estimates, and patient handling methods in execution of the offensive phase of the Maritime Strategy.

A war game was reviewed in which a battle force conducted sustained offensive operations in a cold environment. The decisions made in this scenario are presumably analogous to those that would be made in a real setting.

The exercise of a battle force in a cold environment was reviewed to assess patient handling methods and anticipated problems.

A literature search was conducted to review past situations and the casualty-handling methods adopted. In addition, I conducted interviews and reviews of recent U. S. battle situations, (U.S.S. Stark and U.S.S. Samuel B. Roberts), and met with representatives of OPNAV (Op 932), CINCLANTFLT, SURFLANT, and the Center for Naval Analyses.

Input from the various methods listed above was then analyzed in a subjective fashion providing answers where available. The intent is to present the arguments for and against each of the patient handling methods listed below, discuss in greater detail the types of injuries anticipated, and then make a number of recommendations designed to improve our handling of the wounded.

Patient handling methods considered included:

A. Retention. Patients might be retained either on the individual ship or in the battle force. In some situations retention on the individual ship or in the task force may be the only option. Transportation constraints, weather conditions or the battle situation might require it.

B. Air evacuation. Air evacuation is the method most frequently employed at present and is obviously the preferred option from the point of view of rapid, definitive care of the patient.

C. Shuttle ships. There are two broad categories of ships that might serve to transport patients: dedicated units specially designed to handle patients, as the British had during the Falklands war, and the logistic force ships such as the AE, AO, and AFS. Military Sealift Command vessels might also be included in this category.

D. Disabled units. Disabled units might serve to hold or transport patients depending on their medical capabilities and their mobility.

E. Hospital ships. The Navy has two hospital ships. They could serve to both transport and treat patients.

F. Casualty-receiving ships. Casualty receiving and treatment ships are designed to receive injured. They include the LPH, the LHA and the LHD.

G. A combination of the above. This is obviously the most logical solution depending on the specific situation.

CHAPTER III

RESULTS

A. QUESTIONNAIRE.

The answers to the questions asked of the twelve senior officers (O-5 and O-6 Post Commanders) were generally as follows: (The answers of the majority are in brackets and underlined.)

1. Are patient casualties likely to be produced in execution of the maritime strategy? (Yes.) If so what kind? (All kinds, situation dependent.) Battle versus nonbattle? (All kinds.) Killed versus wounded versus drowned? (Can't say.)

What sort of attrition rate do we anticipate? (Hard to say but may be high.) Which type of units? (Highest rates in frigates and logistic ships.)

2. Will we be able to transfer patients within the battle force in wartime? (Yes.) By what means? (By helicopter.) How frequently? (Situation dependent but may not be until 24-48 hours.) How dangerous will it be? (Situation dependent.)

3. How easy will communication be between the units? (Situation dependent. Depends on satellite availability. If enemy knows where you are then radio silence will not be required.) How easy will it be from the force to the theater commander? (Same answer as above.)

4. Will we be able to use air transport to evacuate patients from the battle force? (Generally yes.) What sort of capabilities would we have and how frequently

would they be available? (Situation dependent but availability will be tight.)

5. Will we be able to use logistic support vessels to evacuate patients? (Yes.) How frequently? (Every three to four days.) Under what conditions? What about using damaged or disabled vessels for evacuation? (Possible but unpredictable and depends on circumstances.)

6. What are the present plans for tactical deployment of the battle groups? (Situation dependent. May be narrow or wide. Tail ships will be about 100 miles away.) How wide will the dispersal be? Are these plans undergoing alteration? What degree of dispersal is anticipated? (See above.)

7. Are the most likely causes of casualties accidents, mines, torpedoes, or missiles? (Surface ship personnel say missiles, submarine personnel say torpedoes and mines.) Are there other possibilities? (In nuclear scenario, yes.)

8. Are we able to centralize the diagnostic and short-term therapeutic procedures? If not then procedures available may be much more limited? (Yes.)

9. How dispersed will medical assets be? What kind of training will be required? (Not answerable by interviewees.)

10. How long can we expect the time to be between evacuations? (Situation dependent.) How long should we plan to maintain casualties in individual units or in the force? (24-48 hours on individual units, 2-3 days in force.) Does our present manning, training, and supply system support this? (Present system does but depends on number and type of casualties.)

11. Do we have policies regarding casualty rescue from sinking or hit ships? (Some said yes, others no.) What are they? Are they workable? How should I handle sunk ships in terms of casualty rates? (Not answerable.)

B. WAR GAME REVIEW.

Patient handling issues in the war game were reviewed at the theater level. While specific scenario results were relevant to tactical issues in general no practice in patient generation was obtained.

C. EXERCISE REVIEW.

The trip report from the exercise Teamwork 88 was reviewed. The major relevant findings were: "the inability to promptly evacuate casualties due to poor communications and intense competition for transportation assets," and the cold wet weather generating numerous exposure casualties.⁷ Also noted was the need to include medical play of blue water forces.

D. LITERATURE SEARCH AND INTERVIEWS.

Results of the literature search and interviews will be incorporated into the conclusions and recommendations.

7. North Atlantic Treaty organization Memorandum C-004-276-88 of 6 October 1988, From C-004 to C-00.

CHAPTER IV

CONCLUSIONS

A. NUMBER AND DISTRIBUTION OF PATIENTS.

Any analysis concerning patient handling should address the type and number of casualties anticipated. Our best prediction of future casualties is usually based on historical evidence. Planning factors for casualties following World War I are of some interest. The ratio of one killed (including those dying by drowning) to one wounded was proposed, and the observation was made that the deaths from drowning be somehow omitted, "since they are of little concern to the medical department in making plans for battle."⁸ The observation was made that, as the percentage of total casualties increased, the ratio of killed to wounded rose rapidly.⁹ The wounded rate for the British force at the Battle of Jutland was sixteen per cent.¹⁰

Casualty estimation from World War II is more pertinent. The Center for Naval Analysis has examined and provided estimates of casualty rates from kamikaze hits on ships during World War II. Not surprisingly, they found the larger the ship, the lower the fraction wounded, the fraction wounded rising as the number of hits increases. For destroyers and escort vessels the wounded rate (killed are excluded from the analysis) ranged from 8 to 18 per cent as the number of

8. Mann, p. 37.

9. Ibid., p. 33.

10. Ibid., p. 36.

kamikaze hits rose from one to three.¹¹ Thus, the proportion of casualties occurring is related to ship type. The smaller the ship, the larger the proportion of casualties. For the naval portion of the Battle of Okinawa, the ratio of killed to wounded was one to one.

Presumably, kamikaze hits are analogous to guided missiles or bombs. However, there are a number of factors that are likely to effect the results: The generally increased explosive strength and the improved penetration, of the modern warhead; the effect of the unburnt fuel; the improved guidance system increasing the likelihood of a center hit; and the aluminium superstructure of many of our vessels, would tend to increase the number of casualties, and the proportion of those casualties that are killed. The type of weapon employed is likely to effect both the number and type of casualties produced.

Missiles are a prime concern of the surface Commanding Officers interviewed. Smoke inhalation and burns are likely. In recent situations where ships have been hit with missiles, e.g. the HMS Sheffield, the USS Stark, the smoke and the burning fuel have produced a considerable number of casualties (10-20 per cent of the crew). Modern mines and torpedoes are designed to split ships in two, and for the smaller ships, sinking is usually the result. The pressure caused by the explosion is also likely to produce traumatic and orthopedic

11. Samuel D. Kleinman and Kathy A. Carpenter, Navy Casualties at sea in World War II. Center for Naval Analyses, (CNA) 80-1030 / 15 June 1980.

injuries. If the ship sinks, and the water is cold, death rates will be high and hypothermia and near drowning will occur in those who survive. Bombs will produce blast and fragmentation injuries. High velocity missile wounds from surface to surface engagements, or air to surface bullets, are relatively unlikely.

Steps are being taken to develop estimates of the number of patients produced as a result of modern weapons being used in modern shipboard environments. Jack Hawkins, a researcher at the David Taylor Naval Ship Research and Development Center, is working on such a model. This model will provide a basis for the development of planning factors for patient handling in a variety of scenarios.

While the number of drowned and those otherwise killed is important, it produces little impact on medical planning and patient handling. Near drowning, and hypothermia however, are likely to be significant problems. The large number of burn casualties expected is of considerable concern. As Dr Arthur Smith stated, "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 per cent of those injured aboard ships, and 14 per cent overall, as opposed to less than two per cent of injuries during World War II."¹² In the last 20-30 years our ability to handle burns has shown considerable improvement, but this improvement has largely relied on high technology and manpower

¹². Arthur M. Smith, "The influence of Medicine on Strategy," Naval War College Review, 1987? p. 28.

intensive systems in sophisticated burn units. Our ability to handle burns and in isolated settings is still limited as experience in the Falklands war exemplified.¹³

Injuries due to shrapnel are likely to decline since shellfire is much less probable than formerly.

The incidence of psychological casualties in such a situation is also of concern. The citation above regarding the kamikaze attack on the New Mexico is pertinent. Assuming the force has to remain at battle stations and is subject to attack over a number of days battle fatigue is likely to develop in some individuals and may require early treatment or evacuation. On the other hand the incidence of psychiatric casualties in the Falklands War was relatively low.¹⁴ Even a single incident can produce battle stress. Psychologic casualties constituted 20 per cent of the wounded on the U.S.S. Samuel B. Roberts when it was hit by a mine in the Persian Gulf.

Injuries from explosions will create large numbers of individuals with blast, traumatic and orthopedic injuries. These individuals will require blood, surgery, and intensive care, as soon after the injury as possible. The mine explosion on the Samuel B. Roberts lifted machinery and people

13. P. Chapman, "Operation Corporate--The Sir Galahad Bombing," Journal Royal Army Medical Corps, Vol 130, 1984, pp. 84-88.

14. H. H. Price, "The Falklands: Rate of British Psychiatric Combat Casualties Compared to Recent American Wars," Journal Royal Army Medical Corps, Vol 130, 1984, pp. 109-113.

causing orthopedic injuries as well as the burns and psychologic casualties noted above.

The requirement for evacuation due to disease and non-battle injury still needs to be considered although it is less of a factor than formerly. An evacuation requirement of one per 1000 per day due to accidents and disease would not be unexpected. Many which might be evacuated in peacetime may not be handled in the same fashion in wartime.

Based on the preceding, the wounded produced in the offensive phase of the Maritime Strategy will occur in clumps, the ratio of killed to wounded will be high, proportionately greater on smaller ships, and will include burn, orthopedic, psychologic and multiple trauma injuries.

8. PATIENT HANDLING OPTIONS

1. Patient retention. Patient retention requires further consideration. Based on the answers given by the senior naval officers, it may be necessary for individual ships to hold patients for 24-48 hours and for the force to hold the patients for two to three days. In certain situations mission essential personnel with mild injuries may need to be held for longer periods of time than that promulgated in the theater evacuation policy. Since the number of beds in the force are limited, others may need to be evacuated who require less convalescent time than is stated in the evacuation policy. Retention of mildly injured personnel in the force might also reduce personnel shortages and maintain combat capability

although the medical burden would rise. In certain circumstances it might also be justified if the situation were such that there was more danger to the patient or others if evacuation were undertaken. Such a situation would affect medical capabilities and logistic requirements. It might either hinder or help morale depending upon the situation.

Despite the possible requirement to hold patients on the smaller ships general allocation of physicians to these ships appears unwise. While at general quarters a ship is a set of mini-environments where patient movement may be difficult. Such a policy would be wasteful of scarce medical manpower. If a ship is in danger of sinking then the first focus of the medical department will be on those who are able to keep the vessel afloat. Such was the case in the U.S.S. Stark incident for example. Doctors assigned to small ships could rarely do more than the corpsman because of space, equipment and supply limitations. In certain situations the isolation of the ship and the importance of the mission make addition of a physician necessary.

In wartime, routine casualty evacuation requirements will probably decline. Individuals that are now evacuated for relatively minor complaints such as toothache would probably be held and given minor treatment on the vessel. The proportion who could be held is hard to estimate. Based on a study done by the Naval health Research Center, and comparing medevac rates from submarine versus surface ships, it looks

like a 30-50 per cent reduction is feasible for non-battle injuries.¹⁵

In some circumstances transfer from the outlying ship to the carrier (or battleship) may be feasible but additional transfer outside the task force may be difficult. Patients may need to be held on the carrier, for a three to four day period until evacuation is possible.

2. Air evacuation. Air evacuation will probably occur in two stages: first to the capital ship and thence out of the area. Helicopter availability will be extremely limited and the patient handling capacity of the helicopters routinely assigned to a battle force is also low (1 to 3 stretcher patients). Thus, while good for morale, and generally best for the patient, the restricted availability is of concern. Poor weather, high sea states and limited visibility will reduce helicopter availability and make patient transfers hazardous for both patient and crew. Flights off the carrier will also be limited in terms of patient carrying capacity.

3. Shuttle ships. In the Falklands the British converted some ships into ambulance ships capable of transporting stable patients from the hospital ship to a port for further evacuation. These units functioned well although delays in the time between stabilization and definitive care necessarily occurred. These ships are required to operate in accordance with the Geneva Convention and therefore need to be marked,

15. D. Stephen Nice, "U.S. Navy Medical Communications and Evacuations at Sea," Military Medicine, Vol 152, No. 9, 1987, p. 447.

communicate in the clear, and are lit up at night. Such ships are not generally available to us at the present time. Host nation support arrangements with other countries might be worked out. Manning of such units might require the use of scarce medical and nonmedical manpower.

Logistic Support ships were generally suggested by the post commanders as the most logical means to evacuate large numbers of patients. They would generally join the task force at few-day intervals and might move between the combat zone and the communications zone. Some of these ships are designed to carry medical officers in wartime and have small wards (AE's, AOR's, AFS's). Others have no more medical capability than do the smaller combatants (AO 177 class). There are a number of difficulties with the use of such ships. Their availability will be limited. Potentially they might suffer a high attrition rate since they are valuable targets. They are not designed to carry patients. Medical capabilities are also extremely constrained on the Military Sealift Command logistic support ships. The logistic ships may be unusable if their use as carriers of patients would impair their mission of replenishing the task force. Even if used, their accommodations are so limited that the types of patients they could handle would be restricted.

4. Disabled ships. Disabled ships could potentially serve to carry patients. They might be unable to perform other missions, they might have some medical capability depending on the unit, and they might be going to the

communications zone if local repair capabilities are not available. On the other hand, the damage may impair their ability to handle casualties, they may be more vulnerable to further attack and they may not be capable of handling casualties even if they are not damaged. Based on Falklands war, we might expect the attrition rate to be highest in the frigates and smaller picket ships. Most disabled ships will not be designed or equipped to act as patient holding units even when the patient is in a stable condition. Perhaps their greatest disadvantage is that their availability and capability is unpredictable.

5. Casualty Receiving ships. Casualty receiving ships are designed to handle between 150 and 600 patients during amphibious operations, after the marines have disembarked. They have their own helicopter assets, 2,4, or 6 operating rooms, and, in wartime a medical augmentation team. But, as the interviewees said, they have other functions to perform and probably will not be co-located with the battle force. In addition, they are only designed to perform additional stabilization of patients and evacuation outside the combat zone will probably still be required.

6. Hospital ships. The two hospital ships, USNS Mercy and USNS Comfort, are each designed to hold 1000 patients, receive up to 200 patients a day, and each have 12 operating rooms. Since they are dedicated to patient care they have no competing priorities. These two ships have the broadest therapeutic mix and greatest diagnostic capabilities of any

combat zone facility. They have disadvantages also. Each requires many medical assets, thus putting all medical eggs in one basket. They still provide a combat zone level of care, and are not designed for definitive care. Further evacuation of the majority of the patients will still be required. Protection of these ships from mines, missiles and torpedoes will be necessary even though they are legally protected by the Geneva Convention. This will increase the workload of the defensive units. Similarly to the dedicated ambulance ships, the hospital ships have to communicate in the clear if adhering to the Geneva convention. This will complicate regulation of patients and may make tactical movements of nearby ships difficult. In addition, hospital ships do not have endogenous helicopter capability, nor can they refuel helicopters except to meet emergency needs. Presently the hospital ships adhere to U.S. Coast Guard regulations and are regarded as passenger ships. As such, they will have to carry cold weather flotation gear when they go further north than 34 degrees.

In reviewing available options, none are without difficulty. Restricted availability of air assets appears to be a given. Since this is so patient handling will, to a large degree be determined by the tactical situation. The option that the ship commanders will most readily turn to, assuming air availability is restricted, will be the logistic force ships. Plans are underway to develop a repair ship which would have improved patient handling capability.

To summarize, patient handling during execution of the offensive phase of the Maritime Strategy is likely to be characterized by the sudden occurrence of large numbers of patients, many with burns, smoke inhalation and psychiatric conditions. Communication will be limited and patient transfer will be difficult and is likely to be delayed. The tactical situation will determine evacuation availability, and minor injuries in key personnel may require their retention on the damaged vessel for a period of time. The increased lethality of weapons, the harsh environment, and the dispersal of the force is likely to result in a high mortality to injury ratio.

Is the harsh picture painted above peculiar to the offensive phase of the Maritime Strategy? I think not. An unconventional warfare environment would result in a similar picture, including the burn and psychiatric casualties. Even a small war in a third world scenario would produce similar difficulties although communication and logistic support might be easier. In the Falklands War the British experienced many of these same difficulties with patient handling and evacuation.

CHAPTER V

RECOMMENDATIONS

What modifications are required in planning, management, personnel, training, facilities, equipment, supplies, and communication in order to better handle the scenario and the conclusions drawn above? My recommendations follow.

Medical planning needs to be done well in advance. All fleets should have planners assigned. In addition, as early in the planning phase as possible, a medical planner should be selected for the battle force. Issues that should be addressed and coordinated with all parties includes patient handling methods available, patient handling policies, logistics requirements, medical regulation and evacuation guidelines corresponding to the situation, and proposed methods of handling disease and non-battle injuries.

Early in the development phase of the task force a task force surgeon should be designated. This individual should play a role similar to that already prescribed for an amphibious task force surgeon. He should have a knowledge of carrier operations, medical capabilities and limitations of the ships in the task force, and of medical regulating. If the battle force is going to be manned by ships from different nations, handling of patients will become more complex. The task force surgeon will require a knowledge of the medical capabilities and limitations of other nations' ships. General

agreement on patient handling procedures in such settings will have to be developed. Working for the task force commander, he should have the authority and ability to provide guidance to the task force on patient handling requirements and patient management.

If burns, smoke inhalation, hypothermia, and psychiatric illness compose the major portion of the battle casualties, as this scenario predicts, then ships having medical officers could function well with an internist or general practitioner. Surgical capabilities should remain on the capital ships. Because of the need to be flexible and to possess redundancy medical personnel assets should be dispersed and not concentrated on one vessel. The smaller combatants should generally be manned with two corpsmen, physicians only being placed on them in circumstances of extreme isolation or overriding mission concerns. The battle force might require medical augmentation or redistribution of medical personnel in support of the offensive scenario. A psychiatrist, psychologist, or psychiatric technician might be included.

Training in the circumstances of triage peculiar to the shipboard environment should be stressed. The ability to rapidly handle a large number of patients is essential, meaning that training of auxillary personnel and the crew in first aid etc is a key element in the shipboard medical training process. Management of burn and smoke inhalation casualties in the shipboard environment should be included in all training programs for shipboard medical personnel.

Facility modifications required to support this scenario are difficult to achieve in the short term. Contingency plans for the use of logistic force ships to transport patients might be developed. Casualty overflow plans need to be considered for the capital ships. Repair ships with improved patient handling capability will help the situation. Steps to obtain ambulance ships for wartime is appropriate.

Logistic support difficulties, the harsh environment, and the limited repair capability means that medical equipment designed to function in shipboard settings needs to be rugged, reliable and maintainable. Limited space for storage places a premium on size and supply requirements. Intravenous fluid production and respiratory equipment for burn care would have to comply with the above requirements.

The availability of communications for radio diagnosis and patient management will be limited. Even medical regulation will be difficult to conduct. Therefore, guidance and procedures for handling patients needs to be developed in advance. Limited communications means that more information on patient management should be with the individual units. Computer information storage and computer diagnostic algorithms will need continued development to reduce the impact of communication difficulties.

Another recommendation, of a broader nature, deals with the handling of patients in war games and exercises. In order to evaluate the impact of medical support on the Maritime Strategy, patient handling situations need to be included in

both war games and exercises. Use of the patient generation model developed by Jack Hawkins and mentioned above would be appropriate. While play at a theater level is important, play in the maritime setting is also essential.

The medical planning and management requirements for a battle force should be incorporated into Naval Warfare Publication #6 in a format similar to that for the amphibious task force.

Research should be conducted into the best way of handling burn patients in isolated settings. What type of burn dressings should be employed? Could we lower body temperature, reduce metabolic rate and thereby increase survival time before sophisticated care becomes available? What steps could or should be taken to avoid sepsis in battle casualties whose evacuation is delayed beyond the six hour golden period? In fact, means of handling patients in isolated settings should be one of the principle foci of our research and development program.

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