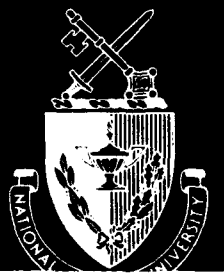
Planning For The Mobilization Of The Nation's Medical Resources



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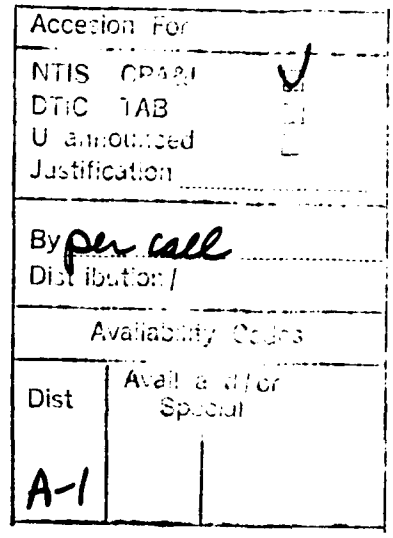

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1985

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DISCLAIMER-ABSTAINER

This research report represents the views of the authors and does not necessarily reflect the offical opinion of The Industrial College of the Armed Forces, the National Defense University, of the Department of Defense.

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FOREWORD

There is growing concern for the capacity of the military services to medically support the probable range of military contingency operations. This reality was brought to national attention in the recently circulated "Long Commission Report" which investigated circumstances surrounding treatment of U.S. casualties incurred in the Beirut Bombing.

The following is an excerpt of a recent OSD Health Affairs statement on the present state of medical contingency planning.

> "If war came today in Europe, we could provide emergency surgery and resuscitation to at most one in five of our wounded in the combat zone. The situation is worse in Korea and Southwest Asia. Our lack of deployable hospitals would result in a death rate among our wounded of well over 20%--as compared to the 2.5% death rate in Korea and Vietnam."

In a crisis, it would take at least 18 months to relieve our shortages of medical equipment. During that period we would not be able to return the numbers of patients to duty that would be needed to sustain our combat strength.

"Planning for the Mobilization of the Nation's Medical Resources," a study by the ICAF Medical Mobilization Studies Committee, led by LTC William Sandidge, critically examined these and other issues. Hopefully, their recommendations will add to the momentum to address these problems.

The study won the Joint Chiefs of Staff Award for Excellence in Research--the premiere research award among the senior-service schools.

JOSEPH E. MUCKERMAN, II
Acting Director
MCDC

ABSTRACT OF RESEARCH REPORT
INDUSTRIAL COLLEGE OF THE ARMED FORCES

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TITLE OF REPORT

PLANNING FOR THE MOBILIZATION OF THE NATION'S MEDICAL RESOURCES

Unclassified Report

Problem Statement: This paper investigates the ability of the medical assets of the Department of Defense and the civilian sector to support the medical requirements anticipated in a major outbreak of hostilities such as a conventional war in Europe. With the preceding as a baseline, five functional, interrelated arenas were studied, i.e., Manpower, Facilities, Logistics (Equipment, Supplies, Pharmaceuticals), Transportation, and Preventive Medicine.

Findings/Conclusions: Presently, the United States does not have adequate military health care facilities, personnel (especially surgeons and corpsmen), intratheater or intertheater medical evacuation capability to deal effectively with any but the most meager of hostilities.

The required medical logistical capability to support a NATO/Warsaw confrontation does not exist for many reasons. Lack of an institutionalized process with adequate central leadership, poor inter-service cooperation, inadequate funding, restrictive FDA policies, poor coordination between DOD and the civilian health care industry, and lack of interest on the part of an eroding health care or medical industry base all contribute to these deficiencies.

The shortcomings of our military medical systems are magnified even more when one realizes the inadequate staffing, dated equipment, and ineffective use of military preventive medicine assets. This valuable "force multiplier" all too often has been overlooked with subsequent unncessary taxing of medical facilities.

Recommendations: The total number of recommendations of each of the functional areas studied are too numerous to be presented here. Some of the major recommendations are as follows:

1. Improve recruitment into the Reserves through the use of educational incentives such as loan repayment/forgiveness, sponsored civilian residencies, and Armed Forces Health Professions Scholarships.

2. Secure a guaranteed supply of appropriate medical personnel for vacant billets in CONUS MTFs (that occur as a result of active

units deploying to theater) by contracting personal services and/or provider group contracts.

3. Seek legislation for a draft of medical personnel that will include preregistration, an expanded window of vulnerability , and women. Only a draft holds the most promise of fixing several manpower problems which include the proper mix of specialties and the proper numbers of support personnel.

4. Increase use of the provisions of 10 U.S. Code 2340 (A)(16) to protect and maintain a viable medical industrial base especially in the surgical instrument field and key pharmaceuticals.

5. Establish a joint DLA/DPSC/DMSB task force to develop the necessary methodologies and policies for implementing the badly needed cost savings programs in order to stock medical WRMS.

6. Ensure through the OASD(HA) that the Military Services programs adhere to the Defense Guidance which requires that they procure the badly needed deployable medical systems.

7. Consider establishing a joint procurement office which is funded to complete the necessary medical programs.

8. Ensure via the Surgeons General of the Military Services that the design of the Deployable Medical Systems is not too technologically sophisticated to survive in the combat environment.

9. Develop a comprehensive CONUS evacuation distribution strategy and plan utilizing military C-9 aircraft and CRAF to evacuate patients from CONUS aerial ports of entry to airfields supporting military, VA, and CMCHS hospital facilities.

10. DOD modify the CRAF program to utilize civilian aircraft for intertheater evacuation and domestic redistribution of litter patients. The aircraft would have to be modified to accept litter patients.

11. Increased emphasis must be placed on the completion of the JCS Study on CONUS distribution/redistribution of patients.

12. Recognize that sound preventive medicine programs will significantly reduce disease and nonbattle injury rates hence reducing medical treatments and evacuation requirements.

13. Recognize that current military preventive medicine strategies, programs and resources cannot support a wide range of contingencies because of deficiencies in staffing, organization, training, planning, R&D, and medical intelligence.

14. Recognize the need for increased communication between experienced preventive medicine personnel and military planners and operational commanders.

EXECUTIVE SUMMARY

Recognizing that there are significant shortfalls and problems associated with the military medical systems to support a full mobilization effort, this seminar set out to examine these issues. It was designed to examine not only the medical resource shortfalls in the Department of Defense medical organizations and contingency plans but also to examine the ability of the civilian health care industry to support military mobilization needs. The classical NATO/Warsaw Pact confrontation scenario was used as a baseline. It was a given that there would be a conventional war with limited warning and hence minimal time between mobilization and actual hostilities.

The seminar approached this scenario, using five functional arenas: Manpower, Facilities, Logistics (Equipment, Supplies, Pharmaceuticals), Transportation, and Preventive Medicine.

Presently, the United States does not have adequate military health care facilities, personnel (especially surgeons and corpsmen), intratheater or intertheater medical evacuation capability to deal effectively with any but the most meager of hostilities. The required medical logistical capability to support a NATO/Warsaw confrontation does not exist. While CONUS hospital facilities are close to being adequate by using DOD and VA facilities and the Civilian Military Contingency Hospital System, there is not adequate evacuation capability to get the patient to the bed.

The medical personnel shortages are critical in the surgical specialties and in terms of support personnel, i.e. corpsmen. The civilian sector easily can meet the anticipated needs. The trouble is there is no expeditious way to get them on board. The system needs more personnel in uniform to meet the immediate, early requirements, with a means of rapidly bringing the civilians needed into the CONUS DOD facilities during a mobilization.

In spite of major actions being taken to reduce the hospital force structure shortfalls in theater, the present assets are incapable of meeting the minimum 15-day peak evacuation policy. Hence, the ground and aeromedical evacuation assets, already inadequate, are taxed even more.

The problems of the medical logistical system to support and prepare for such a scenario are significant. There has been a lack of an institutionalized process with inadequate central leadership, poor inter-service cooperation, inadequate funding, restrictive FDA policies, poor coordination between DOD and the civilian health care industry, and lack of interest on the part of an eroding health care or medical industry base. Add to the preceding the inadequate personnel and the medical preparedness planning is, indeed, stymied.

The preceding concerns about readiness issues and the shortcomings of our military medical systems are magnified even more when one realizes the inadequate staffing, dated equipment, and ineffective use of military preventive medicine assets. This valuable "force multiplier" all too often has been overlooked with subsequent unncessary taxing of medical facilities.

The total sum of the conclusions and recommendations of each of the functional areas studied are too numerous to be presented here. Some of the major recommendations of this study are as follows:

1. Improve recruitment into the Reserves through the use of educational incentives such as loan repayment/forgiveness, sponsored civilian residencies, and Armed Forces Health Professions Scholarships.

2. Secure a guaranteed supply of appropriate medical personnel for vacant billets in CONUS MTFs (that occur as a result of active units deploying to theater) by contracting personal services and/or provider group contracts.

3. Provide corpsman training to soldiers with support specialties that are in less demand during wartime and offer such training on a voluntary basis to other soldiers leaving active duty or entering the Reserve Components.

4. Seek legislation for a draft of medical personnel that will include preregistration, an expanded window of vulnerability , and women. Only a draft holds the most promise of fixing several manpower problems which include the proper mix of specialties and the proper numbers of support personnel.

5. Dedicate aircraft for the Armed Services Regulating Office for patient disposition (especially in CONUS).

6. Do not reassign all the personnel of Aeromedical Staging Facilities when there is a mobilization since that removes all corporate knowledge.

7. Increase use of the provisions of 10 U.S. Code 2340 (A)(16) to protect and maintain a viable medical industrial base especially in the surgical instrument field and key pharmaceuticals.

8. Establish a joint DLA/DPSC/DMSB task force to develop the necessary methodologies and policies for implementing the badly needed cost savings programs in order to stock medical WRMS.

9. Ensure through the OASD(HA) that the Military Services programs adhere to the Defense Guidance which requires that they procure the badly needed deployable medical systems.

10. Consider establishing a joint procurement office which is funded to complete the necessary medical programs.

11. Ensure via the Surgeons General of the Military Services that the design of the Deployable Medical Systems is not too technologically sophisticated to survive in the combat environment.

12. Develop a comprehensive CONUS evacuation distribution strategy and plan utilizing military C-9 aircraft and CRAF to evacuate patients from CONUS aerial ports of entry to airfields supporting military, VA, and CMCHS hospital facilities.

13. DOD modify the CRAF program to utilize civilian aircraft for intertheater evacuation and domestic redistribution of litter patients. The aircraft would have to be modified to accept litter patients.

14. Develop a joint standardized plan for identifying likely modes of transportation by which patients would be transported from airheads to military, CMCHS, and VA hospitals.

15. Increased emphasis must be placed on the completion of the JCS Study on CONUS distribution/redistribution of patients.

16. Recognize that sound preventive medicine programs will significantly reduce disease and nonbattle injury rates hence reducing medical treatments and evacuation requirements.

17. Recognize that current military preventive medicine strategies, programs and resources cannot support a wide range of contingencies because of deficiencies in staffing, organization, training, planning, R&D, and medical intelligence.

18. Recognize the need for increased communication between experienced preventive medicine personnel and military planners and operational commanders.

CHAPTER I

INTRODUCTION

The inability of the military services to medically support military contingency operations has been known since a major Pentagon exercise in 1978.[1] The recently circulated "Long Commission Report", which investigated the circumstances surrounding the treatment of United States Casualties in the Beirut bombing, accentuated public awareness of this critical problem.

In spite of numerous studies, heightened awareness, laudable tri-service cooperation, and increased spending there are still significant medical readiness deficits. On May 1, 1984, Assistant Secretary of Defense for Health Affairs, William Mayer, M.D., explained:

> Our wartime scenarios have predicted that, if a full scale conventional conflict broke out in Europe tomorrow, we would have sufficient medical capability to provide initial surgery for only 20 percent of the estimated casualties....We are woefully short of deployable equipment and material that we do have is old and obsolete. We are still faced with critical shortages of key medical personnel who would be needed in wartime, most notably surgeons and nurses...[2]

In response to another question asked of him, Dr. Mayer quoted Dr. Jay Bisgard, an Air Force Physician, as having said that "...DOD must remember that the wartime mission is the reason for being for the military medical services."[3] Similar sentiments have been echoed by the Surgeons General of the Army, Navy, and Air Force.

Lieutenant General Mittemeyer, Surgeon General of the Army, said in a prepared statement for the Subcommittee, "Our mandate is to ensure that if we must commit our soldiers to combat, they will be medically supported by the most flexible and highly responsive health care delivery system possible."[4] Vice Admiral Lewis H. Seaton, Surgeon General of the Navy, said in his statement, "Wartime medical readiness is my first priority."[5] Lieutenant General Bralliar, Surgeon General of the Air Force, likewise stated, "...medical readiness is our first priority."[6]

The ability of our Nation's military forces to successfully fight a protracted war or a short war that results in large numbers of casualties depends to a large extent on the capacity or medical readiness of the military medical services to provide adequate medical care to members of the armed forces in a theater of operations or in the continental United States. Perhaps the most important element in determining medical readiness is the immediate availability to the military medical services of deployable medical manpower in adequate numbers to provide the requisite medical care.

The preceding is most ironic when one considers that the Health Care Industry is one of the fastest growing industries in the United States, accounting for over 10% of the GNP (322 billion in 1982). After the Department of Defense, it is the nation's largest employer. With over 7,000 hospitals, 900,000 hospital beds--not to mention one million long-term care beds--there certainly is not a national bed shortage. With over 500,000 physicians in the country who have adequate support personnel, the manpower is obviously there. To have

such civilian assets the industrial base to meet civilian needs most certainly is there.

Purpose of Study

The research seminar was developed to not only examine the medical resource shortfalls in the Department of Defense (DOD) medical organization and contingency plans but also to examine the ability of the civilian health care industry to support military mobilization needs. What is available now, what is needed, and what are the shortfalls? What is the most effective utilization of the civilian health care industry in terms of eliminating shortfalls and reducing the lead times? These are the questions that need answers.

To pursue the preceding concerns, questions, and issues the European Conventional War Scenario described below was utilized as the baseline case. It is against this scenario that the status of our progress in medical readiness is measured. However, it must be noted at the outset that this document does not limit itself to only this scenario. As issues and problems were discovered that went beyond the scenario, they were pursued.

European Scenario

As noted above, to productively explore the multiple issues involved, there must be a meaningful baseline from which to start. Hence this scenario. For years, it has been felt that a NATO and Warsaw Pact confrontation would have a direct effect upon the security of the United States. It is believed that such a

conventional war would begin with limited warning and hence minimal time between mobilization of our assets and actual hostilities.

The ability of the military medical community to support this type of conflict has been questioned throughout the Department of Defense as well as Congress. Currently there is a limited medical capability forward deployed in Europe to support any outbreak of hostilities. Upon mobilization, active duty medical personnel will have to be deployed from hospitals in CONUS to bring the European medical units up to their required operating strength. These units from CONUS will not only go to existing units but to prepositioned units (POMCUS).

As a result of this initial large exodus of active duty medical personnel from their CONUS facilities, an acute shortage will develop at home. This reduction of capability of CONUS medical facilities will occur at a time when the requirement is greatly increased because of the large numbers of anticipated casualties being evacuated from the war theater to CONUS.

The role of the Medical Reserve Units in all of this is critical. Not only will they be tasked immediately to backfill the CONUS facilities but predesignated personnel and units will deploy almost as rapidly as their active duty counterpart to provide support in both the combat zone and the communication zone.

Understanding the significance of the sheer numbers of casualties anticipated (both combat and noncombat) and the equipment and supplies required to meet their most basic needs is staggering. Add a 15-day peak evacuation policy and the need to evacuate patients

takes a significant jump. The logistics for regulating the flow of casualties from the theater to CONUS to military staging areas and then to either military, VA, or civilian hospitals becomes overwhelming at best.

With that as a backdrop, the seminar began.

Study Design

A series of 12 research seminars and a domestic and foreign field trip were conducted to examine the stated issues (See Appendix A for listings). The resident seminars and field trips were designed to examine in depth the health care industry's capacity to not only meet peacetime needs but its capacity to respond to the surge that mobilization would require of it for both the civilian and the Department of Defense needs. Simultaneously, issues internal to the DOD and those uncovered during the studies were explored. In addition to the preceding, the members divided into teams to study specific functional areas as Manpower; Facilities/Force Structure; Logistics (Equipment, Supplies, and Pharmaceuticals); Transportation; and Preventive Medicine, which are presented in the following chapters.

The study attempted to pull together the background and issues in each area in order to present an understandable picture of the status of that area today, i.e., to articulate the real issues of each functional area as they are today.

The final CHAPTER is a summarization of those issues, conclusions, and recommendations that this seminar felt were

important to allow a more effective utilization of the Health Care Industry from a military standpoint.

CHAPTER II

MANPOWER

Introduction

The ability of our Nation's military forces to successfully fight a protracted war (or a short war that results in large numbers of casualties) depends to a large extent on the capacity of the military medical services to provide adequate medical care to members of the armed forces in a theater of operations or in the continental United States(CONUS). In other words, medical readiness becomes a critical issue. Perhaps the most important element in determining medical readiness is the immediate availability to the military medical services of deployable medical manpower in adequate numbers to provide the requisite care.

The determination of what constitutes "adequate numbers" or what force structure is required is an issue that has been addressed by all three Services and by the Office of the Assistant Secretary of Defense /Health Affairs (OASD(HA)). Each Service and the OASD(HA), all use essentially the same methodology for generating casualty estimates, which, along with evacuation policy, form the basis for determining the force structure. The evacuation policy and casualty estimates for their commands are provided to the Services by the Commanders-in-Chief of the unified and specified commands.

These data determine the number and type of medical unit required by each service in each command, based on their portion of the casualties occurring in a given scenario. However, the Services are not using the same manpower requirements' model so there is variability among the Services in the size and composition of the staffs required for the same type of health facility. This inconsistency can make it difficult to develop logical, consistent plans and to determine force requirements that will not result in redundancies.1

For example, several studies during the past three years and recent Congressional testimony by ASD(HA) and the three Surgeon Generals have indicated that the military services do not have enough medical manpower to meet the requirements of a NATO scenario. There is considerable disagreement on precisely how large the shortfall is. Such inconsistencies reflect the fundamental differences in the methods used to calculate requirements in each of the Services. There has been no disagreement, however, that the shortfall not only exists but that it poses a major problem under any wartime scenario.[2]

Assistant Secretary William Mayer, M.D., has told the House Appropriations Defense Subcommittee,

> Our wartime scenarios have predicated that if a full-scale convention conflict broke out in Europe tomorrow we would have sufficient medical capability to provide initial surgery for only 20 percent of the estimated casualties...we are still faced with critical shortages of key medical personnel who would be needed in wartime, most notably surgeons and nurses..."[3]

Despite how the Services determine their requirements, there is agreement on the part of all concerned that there is a significant shortfall, especially in terms of surgeons, surgical nurses, and corpsmen. For purposes of discussion, the requirements for the NATO scenario outlined in Chapter I will be used. This scenario assumes a conventional war in Europe against the armed forces of the Soviet and Warsaw Pact nations. It also assumes a short warning period before the initiation of hostilities, followed by intense combat that generates a high rate of casualties.

The manpower shortfalls are estimated to be in the range of 1,700-2,000 physicians, 2,400-4,400 surgeons, 19,000-22,000 nurses, and 39,000-60,000 corpsmen.4

Recognizing the shortfall in medical personnel, the Services plan to overcome these shortages by utilizing a "total force concept". This concept considers active duty, reserve and DOD civilian personnel as part of a "total force" that can be counted on in time of war. As a result, the Army and Air Force plan to overcome shortfalls in their European medical requirements through deployment of active and reserve units from CONUS. Reserve medical forces (National Guard and Reserves) will fillout active units as well as backfill deployed active units. The Navy plans to meet their fleet and Marine Corps requirements for medical manpower in battle zones largely from the active force with the reserves filling in the vacated CONUS billets.5

Seventy percent (70%) of the deployable medical resources of the Army are in the Reserve Components. Recognizing the vital role of

the Reserves, the Army is attempting, with some success, to decrease the Reserves shortfall of medical personnel through the use of Medical Detachments (MEDDETs), which allow reservists to drill at their own civilian hospitals. A total of 1,058 spaces for physicians are to be devoted to the MEDDETs program. As of 01 May 1984, a total of 48 separate MEDDET units had been established, with no increases in overall unit strength authorizations.[6]

The Navy plans an increase of 1,400 authorizations for reserves during FY 85. Navy medical reserve forces will staff fleet hospitals in the communications zone as well as backfill for deployed active forces in CONUS facilities.[7]

The Air Force relies heavily on Reserve Forces for both initial deployment of complete units and backfill of CONUS fixed facilities. Major personnel increases are programmed for the Air Force Reserve, including three 250-bed hospitals, 2 aeromedical staging units, 10 mobile aeromedical staging facilities, expansion of 406 tactical aeromedical evacuation crews, and 198 strategic aeromedical evacuation crews. Likewise, the Air National Guard will get 49 new aeromedical evacuation crews, expansion of 134 existing crews, and 20 mobile aeromedical staging flights.[8]

While there is more reliance being placed on Reserve Forces, corresponding increases in manning levels have not been authorized. Table 1 presents a detailed comparison of medical personnel required and that which is available from all active and inactive sources. Tables 2 through 5 show the degree to which the medical corps of the Services rely upon Reserve Forces.[9] .

TABLE 1

COMPARISON OF MEDICAL PERSONNEL REQUIRED FOR WAR AND AVAILABLE IN THE ACTIVE AND RESERVE FORCES—OVERALL

	—OVERALL—	
	FY-82	FY 83
	PHYSICIANS	
Total Wartime Requirements	27468	26824
Total Available in Guard, Reserve and Active Components	15367	16204
Available from IRR	2561	2139
Available from Standby	5195	4935
Available from Retirees	4437	1820
TOTAL AVAILABLE	27560	25098
Percent of Required	100%	94%
	NURSES	
Total Wartime Requirements	46535	48507
Total Available in Guard, Reserve and Active Components	17598	18420
Available from IRR	2657	2622
Available from Standby	4240	3791
Available from Retirees	3548	1844
TOTAL AVAILABLE	28043	26677
Percent of Required	60%	55%
	CORPSMEN/MEDICS	
Total Wartime Requirements	100490	135873
Total Available in Guard, Reserve and Active Components	78305	82541
Available from IRR	8685	7606
Available from Standby	175	38
Available from Retirees	3745[1]	6568
TOTAL AVAILABLE	90010	96753
Percent of Required	111%	71%
	HEALTH CARE SPECIALISTS	
Total Wartime Requirements	70672	118368
Total Available in Guard, Reserve and Active Components	50706	86810
Available from IRR	3366	8681
Available from Standby	1815	211
Available from Retirees	2111[1]	11185
TOTAL AVAILABLE	57998	106887
Percent of Required	122%	90%

Note:

[1] **Total does not include Army retirees. Data as of August 30, 1983**

TABLE 2

RESERVE COMPONENT MEDICAL CONTRIBUTIONS TO THE TOTAL FORCE — ARMY

Medical Reserve Elements	Army National Guard % of Total Force	Army Reserve % of Total Force	Combined % of Total Force
Station Hospitals (300 Beds)	0	87	87
(500 Beds)	0	66	66
Combat Hospitals	28	34	62
General Hospitals	0	79	79
Evacuation Hospitals	25	54	79
MASH	10	50	60
USA Hospitals	0	100	100
Medical Battalions	47	33	80
Medical Groups	16	61	77
Medical Brigades	50	33	83
Air Ambulance Co	33	0	33
Ambulance Co	42	25	67

Data as of August 2, 1983

TABLE 3

RESERVE COMPONENT MEDICAL CONTRIBUTIONS TO THE TOTAL FORCE—AIR FORCE

	Air National Guard % Total Force	Air Force Reserve % of Total Force	Combined % Total Force
Tactical Clinics	68%	23%	91%
Tactical Hospitals	43%	24%	67%
Aeromedical Evacuation Groups	—	100%	100%
Aeromedical Evacuation Sq.	13%	62%	75%
Aeromedical Evacuation Fl.	44%	56%	100
Overall (Manpower)	9%	16%	25%

Note:
The Air Force Reserve and Air National Guard have units which serve as personnel augmentation packages directly comparable to active duty medical units.

Data as of April 30, 1983

TABLE 4

RESERVE COMPONENT MEDICAL CONTRIBUTIONS TO THE TOTAL FORCE—NAVY

Medical Reserve Elements	Naval Reserve % of Total Force
Station Hospitals	1
Combat Hospitals	
General Hospitals	
Evacuation Hospitals	
Other Hospitals	
Medical Battalions	
Medical Groups	
Medical Brigades	
Other (specific)	13.5 Composed of 101 medical contingency response units and 20 surgical teams
Overall (Manpower)	

TABLE 5

RESERVE COMPONENT MEDICAL CONTRIBUTIONS TO THE TOTAL FORCE—MARINE CORPS

Medical Reserve Elements	Marine Corps Reserve % of Total Force
Station Hospitals	1
Combat Hospitals	
General Hospitals	
Evacuation Hospitals	
Other Hospitals	
Medical Battalions[1]	25%[1]
Medical Groups	
Medical Brigades	
Other (specific) Dental Battalions[1]	25%[2]
Overall (Manpower)	25%[3]

Note:

[1] percent represents wartime T/C; full activation of Med Bn by FY87.

[2] percent represents wartime T/C; full activation of Den Bn units by FY87.

[3] percent represents wartime T/C; units consist of Navy and Marine Reserve Personnel.

Data as of April 30, 1983.

It is clear that the military services will need to rely heavily on the Reserves in carrying out their wartime mission. Consequently an increasingly heavy burden is being placed upon the Reserves at a time when they are already overtasked. Nonetheless, the most practical way for the active forces to quickly acquire a larger number of trained and combat-ready medical personnel is to call on the Reserves. This plan assumes that there has not been an administrative shifting of responsibility without the necessary tools to do the job. The Reserves themselves must be staffed and combat ready.

The preceding assumption, notwithstanding, there are several other key issues involving the total force concept. First of all, considering both the fiscal realities of national defense and the fact that there is a smaller requirement for active forces in peacetime than in wartime, it makes sense for the active forces to depend on the Reserves in wartime. At issue, however, is the ability of the Reserves to provide the required quantity of trained and combat-ready personnel quickly when fiscally constrained and unable to recruit surgeons, nurses, and other key health care professionals.

Both the Army and Air Force feel that their Reserve Forces will "get well in the out years" through manpower increases programmed in the FYDP. Regrettably, due to the nature of competition for scarce fiscal resources, programmed increases in the FYDP, and its supporting POM process, have a history of slipping farther and farther into the out years in each successive PPBS cycle. It must be

understood that building a trained and combat ready Reserve Force of sufficient size is a long and expensive process.

Without belaboring the obvious, it should be noted that this process requires funds for sufficient end strength, training, equipment, and supplies. At the same time, under the best of circumstances, even if the reserve billets exist, it is neither quick, easy, nor guaranteed that the Reserve billets will be filled. The nature of the All Volunteer Force (AVF) and the status of the national economy both play major roles in determining the viability of the active and Reserve Forces. The Reserve Forces in particular are vulnerable to mission degradation due to outside influences. It is not enough, therefore, simply to plan on help from the Reserves. It is also necessary that resources be devoted to ensuring that they attain and sustain the capabilities expected of them.10

Even under the assumption that the Reserves remain funded to reach programmed medical manpower levels by the end of the FYDP period, those programmed levels themselves are fiscally constrained levels which fall below those levels which are believed by medical planners to actually be necessary in a European war. It must be concluded that even with programmed funding, followed by programmed accession of medical personnel, there will be a shortfall in available medical manpower in the event of war.

Another issue arising from this planned reliance on the Reserves is that of timing. What is more, programmed funding and programmed accession of medical personnel will not produce even the fiscally constrained force until late in the FYDP period.[11] What can be

expected if war comes early or if the programmed force is achieved but proves to be inadequate?

Current plans call for reserve units and individuals (as well as active duty personnel) to deploy to prepositioned medical assemblages in Europe. The Reserves will also be mobilized to backfill deploying active units from the CONUS. The earlier war comes, the greater the Reserve shortfall will be in accomplishing these two tasks. It is assumed in these plans that the initial shortfall in active forces in theater will be offset by active and Reserve units and individuals deployed from CONUS. The resulting personnel vacancies in fixed CONUS medical treatment facilities (MTFs) will be partially offset by other Reserves. Significant questions remain. Who is to fill the vacancies in the CONUS MTFs which the reserves cannot fill? How will casualties among medical personnel in theater be replaced? How will existing vacant reserve billets be filled?

In Summary, the foregoing describes what is essentially a single medical manpower shortfall issue, which includes four distinct elements. The first is the shortfall that results from comparing the programmed force to the real wartime requirement. The second is the shortfall that results in theater in the active force when war begins. The third is that which results in CONUS MTF's when their active personnel are deployed to the theater and the Reserves, with existing staffing shortfalls of their own, are called up to replace the deployed active forces. Finally, the fourth element is the shortfall which exists in the Reserve components.

Discussion

What are some potential solutions to the deficiencies just described? If war should come, it appears to be inevitable that mobilization beyond the mere call-up of reserve forces will be necessary. It is clear that if one assumes a long war scenario then the onset will bring an immediate need for a draft, not only to meet the need for line combat troops but also the long term medical manpower requirement. There are sufficient numbers of medical personnel in the civilian workforce to more than meet the military's requirements under any scenario. In fact, there is currently a surplus of medical manpower in many categories, including surgeons and nurses, identified as critical in wartime. Furthermore this surplus is projected to continue through the 1990's.[12] The authors of the 1984, Report to the President and Congress on the Status of Health Personnel in the United States, have projected a surplus of 11,800 general surgeons and 5,000 orthopedic surgeons in the civilian sector by 1990.[13] A similar surplus is projected for all of the medical specialties and other health care professions that would be required by the Services in the event of war.

Unfortunately, while a draft will be necessary to provide the manpower resources needed to fight a long war, the draft will not help the immediate short-term medical manpower deficiency that will exist in theater (surgeons, surgical personnel, and corpsmen), neither will it help the shortfalls created in CONUS due to deployment of active duty medical personnel. Assuming that M-Day and D-Day are close in time, and assuming that approximately 120-180 days will elapse after M-Day before the first drafted professional medical

personnel are available (longer for corpsmen), it is obvious that a much faster short-term solution is required.

The need for a better and faster solution is made even more evident by the time-phased requirements for medical personnel that the DOD has requested of the Selective Service in the event of mobilization. For example, in a letter Vernon McKenzie, Acting Principal Deputy Assistant Secretary for Defense, sent to Thomas K. Turnage, Director of the Selective Service System, in October 1983, he listed the time-phased requirements for general surgeons as 734 by M + 20, 434 more by M + 30, and an additional 270 by M + 40.14 Similar requirements for other categories of health care professionals were also listed.

Several suggestions for short-term peacetime solutions can be found in the literature. Such options range from preregistering all or selected categories of medical personnel to selectively drafting certain categories of medical personnel, to concentrating on recruitment of specific medical personnel into the Reserves, perhaps motivated by draft avoidance.

Recent efforts to improve reserve recruitment have shown some success and should be continued. However, given the magnitude of the shortfalls and the vagaries of recruitment and the economy, it appears that additional incentives are needed. Since economic considerations and convenience seem to play major roles in personal decisions regarding reserve affiliation, it is suggested that a system of economic motivators, such as higher pay and sponsored educational programs, be used to enhance reserve recruitment.

Education is a particularly attractive inducement since it can be tailored to correspond to an individual's long-term goals.

An educational inducement that might prove particularly effective in attracting physicians to the reserves would be expanding the Armed Forces Health Professions Scholarship program to include a number of positions that would require a reserve commitment rather than an active duty obligation. The service obligations for these training positions would be extended to a time that would be triple that of the normal active duty requirement. A modification of such a program might be to offer loan forgiveness or loan repayment for direct Federal student assistance. Federally guaranteed student loans made through private lending institutions would also be included. The programs would be directed toward known health care personnel shortfalls. Again, the reserve commitment would be extended well beyond the active duty obligation incurred with a direct support programs. Since repayment of educational loans usually takes place years after establishing themselves, programs could even be designed to cover the long term loan obligations of health care professionals after they have proven themselves in the civilian sector. Programs such as these might prove attractive to health care profession students because there would be no active duty requirement and because there would be relief of the high cost of their education.

The potential pool of applicants might also be increased because the Federal government's continued involvement in student support would be encouraged. For example, in the 1981-82 academic year, 78

percent of all medical students received some form of financial aid in the form of a loan or scholarship. In that same year, 84 percent of the total financial aid was directly attributable to federally-sponsored programs.[15] Although this alternative might appear to be expensive, it would ultimately prove to be much less expensive than raising pay or increasing the number of active duty billets. Also, it offers the opportunity to match known shortfalls with the properly skilled personnel. In addition, the programs could be tailored to be offered only to health care professionals who had completed their training and proven their worth.

Another inducement that might prove useful in recruiting physicians for reserve service would be to support quality civilian residency programs in return for a reserve service commitment. There are growing concerns that the residency positions available will not be sufficient to accommodate qualified applicants. Evidently, this shortage is occurring because the number of potential applicants has steadily expanded, while the number of accredited first-year graduate positions has not. Also, there is some indication that the number of residency positions in hospital-based programs may be reduced because of funding constraints and financial difficulties that are occurring as a result of the changing economics of the health care industry.

The preceding suggested programs (loans, residencies, etc.) would allow the Services to improve their planning and to ensure that they would have the appropriate mix of health care specialists to meet all contingencies. As stated above, while these alternatives may initially prove to be expensive, they will ultimately prove to

be a less expensive means of filling reserve positions than present recruitment techniques. Also, it would guarantee that the personnel recruited had the specific qualifications required by the Services.

Even though improvements in reserve recruitment may be realized through the use of these financial incentives, other methods of addressing the short-term shortfall in the active forces must be found. What follows is a consideration of a multifaceted approach to solving these problems.

The short-term medical manpower shortfall in CONUS MTF's can be solved by contracting for civilian surgeons, registered nurses, Emergency Medical Technicians (EMTs), licensed practical nurses and licensed vocational nurses (LPN's;LVN's). Under a program analogous to the Civilian Military Contingency Hospital System (CMCHS), personal services contracts, for nominal retainer fees, could be negotiated with the required numbers and types of medical personnel, which would require them to report to predetermined CONUS MTF's in the event of a national security emergency as determined by the President. The contracts would specify the conditions of employment to the satisfaction of both military medical planners and individual medical providers. Care would be needed to ensure that providers would not be contracted away from CMCHS facilities to the detriment of that program. Legislation could be requested to exempt contracted medical providers from future drafts to ensure their availability. Such an exemption should also enhance the marketability of the program and serve as an inducement to participation by those wishing to avoid a draft. Procedures would have to be established to deal

with providers who, subsequent to contracting, find it necessary to relocate geographically or otherwise become unable or unwilling to serve.

In addition to the preceding, the possibility of contracting with provider organizations should be investigated. Large scale provider groups such as Health Maintenance Organizations (HMOs), Preferred Provider Groups (PPGs), and health corporations (i.e., Humana, Kiaser Permanente, etc.) could be contracted to provide the entire spectrum of care at selected CONUS MTFs or any specific portion of care needed in a general area. While these ideas may have merit as a solution to the short term CONUS MTF medical personnel shortfall, they would contribute only indirectly to the short-term theater shortfall and very little to the long-term overall shortfall. The only potential gain to the short-term theater shortfall would be the possibility of contracting sufficient civilian providers to free up additional military providers for deployment from CONUS to the theater. The determination of feasibility of this proposal would require complete cost benefit analysis and market potential analysis, both of which should include participation by appropriate civilian professional provider organizations.

The more difficult problem is the resolution of short-term and long-term theater shortfalls. Both problems ultimately require a draft. The only way to get enough medical manpower in wartime is to draft it. Likewise, there are several advantages to a peacetime selective draft of medical personnel. For instance, a guaranteed supply of entering medical personnel would make it possible to modify

the system of pay and allowances for physician by lowering the pay scales for first-term personnel and by adding additional incentives (e.g., money or education, or both) for career active service or subsequent service in the Reserve Forces. Furthermore, a draft would allow a correct mix of talent rather than having the right numbers but wrong talent as exists today. Additionally, the national pool of medical personnel with some military experience would be enlarged by those draftees who ultimately would return to civilian life. However, given the historical repugnance that the general population has shown to a draft and the political difficulties inherent in a peacetime draft, it is not practical to consider a peace-time health care professional draft as representing the only possible solution to this problem.

Nevertheless, in the event that the nation does mobilize, it is important to improve the draft in order that it might be better able to meet the Department of Defense's time-phased requirements. The best way for achieving these improvements is to amend existing Selective Service legislation to allow for preregistration of health manpower personnel. The age-related window of vulnerability would have to be enlarged for medical personnel to compensate for their prolonged training. Arguments based on the issue of equity (which holds that it is not fair to single out particular groups or individuals for the draft) would be loud and long, probably inspiring litigation. Nevertheless, the overriding responsibility has to be the interests of national security.

Another issue associated with the drafting of health care professionals is that of gender. It is important to remember that women constitute a sizable and growing proportion of the health professions workforce. They predominate in the nursing profession and comprised 6.7% of the total physician supply in 1970, 12% in 1980, and are predicted to be 16.4% in 1990, and 20% by the year 2000.[16] Furthermore, the estimated projections may be low since women made up 31.7% of the first-year medical school classes during 1982-1983 school year.[17] There have been similar substantial increases in other health professions, including podiatry, dentistry, pharmacy, and in public health, where women comprised about 55% of the enrollments in the 1980-81 school year. Given the substantial and growing participation of women in the health care professions and the historically proven need to draft four individuals for every one accepted, it seems that it would be unwise to consider a draft without considering the recommendation that women not be excluded from such a draft.

There is currently statutory and military policy that prohibit women from participating in combat. Congress determined that registration was to be carried out as a means for enhancing the Nation's mobilization capability to provide <u>combat</u> troops. As a result women are excluded from the requirement for registration. However, the Defense Department has no need, nor any intention, of placing health care personnel in a combat role. Hence it would seem that the Congress might prove less unwilling to allow a registration

of women health professionals, if, indeed, it ever agrees to a registration of health professionals at all.

Even though the potential exists for resolving the skill preregistration and window of vulnerability issues, it must be acknowledged that, in the unlikely event that everything works well, there would still be lapses of up to 90 days or more before the first drafted medical personnel were available for duty due to processing and required basic training. Corpsmen present an even more difficult problem because it will take substantially longer for them unless some way is found to pre-train a pool of manpower with corpsman skills. Furthermore, the projected shortfall between wartime requirements and actual corpsman assets in reserve units, which are expected to fill the manpower needs through the first 60 to 120 days of a war, were over 14,000 as of late 1983.18 The immediate conclusion is that the national cadre of LPN/LVNs and Emergency Medical Technicians (EMTs) is a place to start. Under the concept suggested above for contracting for personal services, it is expected that only a portion of those eligible would enter into such contracts. The proposed draft legislation mentioned earlier must, therefore, specifically include preregistration of these types of health care personnel. This would provide the earliest possible access to large numbers of trained individuals with skill similar to corpsmen and would provide an incentive for many such individuals either to contract for CONUS MTF service or to join a Reserve Unit. In considering this alternative, it is important to remember that it would require a legislative change in the Selective Service Act to

implement preregistration of health care personnel and that it would meet opposition. Also, while it might prove effective in identifying individuals who could be inducted and quickly trained as corpsmen, it would do little to solve the problem of meeting the shortage of corpsmen that exists today and would continue to exist for at least the first 60 to 120 days of a war.

Another alternative would be to provide corpsmen training to soldiers with other military occupational specialties (MOS) that might be in less demand in a wartime scenario. This training could be provided to them shortly before they left active duty. Then, if necessary, they could be recalled while in the Individual Ready Reserve as medical corpsmen. This would provide an expanded body of relatively recently trained individuals available for fairly rapid deployment in the event of war. In addition, corpsman training could be provided to infantrymen on a voluntary basis. This would provide immediate additional medical assets to infantry units and would lessen the likelihood that infantry units would be left without medical support if a corpsman became a casualty. This alternative would involve increased training costs and require careful analysis to determine which of the current MOS's would be less in demand during wartime. However, it does have the advantage of rapidly increasing the pool of trained manpower available for assignment to authorized but vacant corpsman billets in the Reserves.

Yet another alternative for providing medical support to U.S. military forces in the war zone is to obtain agreements for increased medical support from allied nations likely to be in the war zones.

Agreements have already been reached with some allied nations for prepositioning of medical supplies and for sharing medical facilities. Efforts, therefore, could be made to expand these agreements to include commitments of medical manpower. Although agreements of this nature should never be pursued as the exclusive, long-term solution to the problem of shortages of medical manpower, allied medical personnel could provide crucial support in stabilizing casualties for distant evacuation during the early days of a conflict before American medical units have become fully staffed.

Although at first glance this may seem unreasonable to ask of our allies since they will have the burden of both their military and civilian needs, it is really not unreasonable that they should assist in the medical support of those forces fighting to defend their country. However, it may be unrealistic to expect them to have the assets available since one must assume that they will suffer heavy military and civilian casualties and probably sustain significant damage to their medical facilities as well.

Nevertheless, the U.S. should continue to seek to enhance the agreements to provide medical support that we have with other nations by investigating areas of potential support. For example, Belgium has agreed to provide support despite its limited facilities, equipment and supplies. Perhaps this agreement could be strengthened if the U.S. could furnish prepositioned medical treatment assemblages along with the required equipment and supplies if Belgium could provide the manpower necessary to staff the treatment facilities. All such host nation agreements should be studied in order to

capitalize on the particular strengths and capabilities of each nation.

Conclusions and Recommendations

Should there be a conventional war in Central Europe, four different types of medical manpower shortfalls are predicted: (1) long term, (2) short term in theater, (3) short term in CONUS MTFs, and (4) short term Reserve Components.

To solve these problems requires a realistic look at a limited number of options. The authors believe that to be successful will require an approach utilizing a combination of the following recommendations.

1. A selective peacetime draft of the required medical personnel (including preregistration and female participation) must be sought through early legislative action.

Such action would allow the the correct mix of talent and would increase the numbers of civilian medical personnel who have military experience.

At a minimum, it is necessary to amend existing Selective Service legislation to allow for preregistration of health personnel. The age-related window of vulnerability would have to be enlarged for medical personnel to compensate for their prolonged training.

Likewise, with the substantial and growing participation of women in the health care professions, it would be a waste of assets not to consider that women

health care professionals should be included in future draft legislation.

2. The use of personal services contracts and/or provider group contracts to guarantee the availability of adequate numbers of appropriate types of civilian medical personnel to fill vacancies in CONUS MTFs.

Such contracts would require the personnel or groups to report to predetermined CONUS MTFs in the event of a national security emergency.

The contracts should specify the conditions of employment and ensure that the providers could not be contracted away from CMCHS facilities (See Chapter III).

Legislation would be needed to exempt contracted medical providers from future drafts which would enhance the marketability of the program.

3. Create additional financial and educational incentives to enhance reserve recruitment.

This could be encouraged in a number of ways. (1) Include positions in the Armed Forces Health Professions Scholarship program that would involve a lengthy reserve service requirement. (2) Pay (or repaid in the case of certain specialists who have proven themselves) student loans in return for a reserve service requirement. (3) Sponsor individuals in those civilian medical residency programs that would ensure the anticipated needs of specialties in return for a reserve service commitment.

(4) Number 3 could be expanded to paramedical personnel training programs in those areas where shortages are noted.

4. Offer corpsman training to enlisted personnel with other military occupational specialties or to those personnel leaving active duty or in the Individual Ready Reserve.

Such a program would provide an expanded body of medical support personnel for rapid deployment and would lessen the likelihood that units would be left without medical support.

5. Continue pursuit of Host Nation Support aggreements to enhance our ability to meet our requirements during the initial critical days of conflict. These agreements should be expanded to include commitments of medical manpower and facilities. The need to preposition medical treatment assemblages, equipment, and supplies appears obvious. (See Chapter IV for more detailed commentary.)

Finally, participation in this seminar has clearly shown the absolute necessity for increased interservice cooperation and standardization of health care delivery. Duplication and lack of standardization plays a larger role in perpetuating shortfalls of all kinds than is realized or admitted. The Interservice Training Review Organization (ITRO) and the Combat Casualty Care Course (C4 Course) are a healthy start. However, there is much that can and should be improved in the arena of interservice communication. Joint efforts in such areas as medical operational readiness planning, facility

construction, peacetime and wartime health care delivery, and operational medical readiness training should be a top priority.

CHAPTER III

FACILITIES and FORCE STRUCTURES

Introduction

> Readiness for war is recognized today as the primary mission of the medical departments of the Military Services, and the inability of the military health care system to provide adequate wartime support in any potential theater of combat is universally acknowledged.1

Obviously, the problems of inadequate medical readiness has been examined in detail for several years. However, very little effort has been devoted to the assistance that the civilian medical facilities may have to offer. In 1980, the Civilian-Military Contingency Hospital System (CMCHS) was devised by the Department of Defense (DOD). Although originally designed to support military casualties, it was readily seen as a means to cope with civilian casualties also. A further refinement of this concept is the formation of the National Disaster Medical System (NDMS) which will be introduced in 1985. This section will primarily deal with the facilities available for military casualties through the CMCHS. Using three different parts of the United States as guides, we will evaluate the capability and access to the system. Potential areas

for problems will be identified and recommendations offered if applicable.

The term "bed" as it is used in this chapter represents not only the physical entity but the staff and resources necessary to effect total and competent patient care.

Background

Hospital Care Costs

With complex technologies and procedures, specialization, and interrelatedness of treatments at various stages in episodes of illiness, hospitals have become the focal point of the health care sector and, in some cases, hospitals are beginning to serve as the health care centers for communities by providing a wide array of services in addition to acute inpatient services. Such services may include organized outpatient clinics for the provision of non-emergency medical or dental services, home health srvices, outpatient hemodialysis, hospice care, skilled nursing care, self-care, pharmacy service, health education, and the like.

Hospital care as a percentage of total systems costs increased from 35 percent in 1950, to 47 percent in 1982, and is expected to garner a larger share by 1990. The $136 billion spent on hospital care in 1982 makes up 4 percent of GNP. To put this expenditure amount into perspective, 6,915 hospitals with 1.4 million beds handled 39.1 million admissions and 384 million patient days of service in 1982. In addition, 314 million outpatient visits were provided (American Hospital Association, 1983). Although the

proportion of the population with one or more hospital episodes (10 percent) has not changed in the last decade, intensity and sophisticaiton of care have increased substantially.

The 1982 hospital outlays of $135.5 billion were distrubuted to four major sectors: community hospital inpatient care (73 percent of total hospital), community hospital outpatient care (12 percent), Federal hospital care (7 percent), and all other hospital care (8 percent).

Third-party payments play a very significant role in financing hospital care since only about one-tenth of this care is paid directly out of pocket by the patient. Private health insurance covers one-third of the outlays; Medicare covers over a quarter; and Medicaid's share is less than a tenth. Medicare's share has increased from 18 percent in 1972 to 27 percent in 1982, reflecting an average annual expenditure growth rate of 19 percent; total hospital outlays increased at an average annual rate of less than 15 percent during this same period. Other third-party payors experienced stable or declining shares.

Total hospital expenditures are expected to rise from $135.5 billion in 1982 to $166 billion in 1984, $227 billion in 1987, and $304 billion in 1990. From 1972-1982, annual percent increases in total hospital spending exhibited substantial variation with a low of under 11 percent in 1973 (Economic Stabilization Program period) to a high of over 17 percent in 1981.2

Military Hospital Beds

The U.S. Military has about 18,000 hospital beds of which 2,000 are overseas. Current planning estimates a need of nearly 65,000 beds in the event of hostilities coupled with a Peak Evacuation Policy of 15 days. It is obvious that a significant shortage is present. While DOD has POMCUS (Prepositioned Material Configured to Unit Sets) units overseas, they will only provide limited increase in capability. The medical units which will deploy to the theater will come from active CONUS forces and selected Reserve forces. While there are significant numbers of these units, approximately 70% are in Reserve Components which have severe personnel and equipment shortages. Designated to deploy, these Reserve hospital units will not get to the theater to fill immediate needs and even when they do arrive will be operating at reduced capability due to the shortages mentioned previously. Forward deployed and POMCUS units in transfer will have to receive personnel fillers from the active force in CONUS. Additional fillers wil be required for both Active and Reserve hospitals deploying to the transfer point. Even though individual health professionals and some Reserve units will backfill CONUS medical treatment facilities, a significant DOD bed shortage will persist in CONUS. Figures 1 and 2 are unclassified graphs which reflect the anticipated shortages of both theater and CONUS hospital facilities.

THEATER

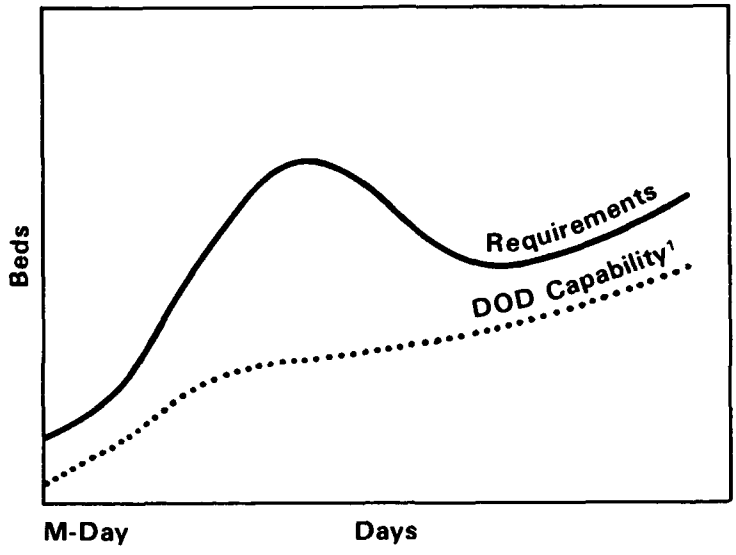


Figure 1. Theater Requirements
(Source: FY86-90, Service Program Objective Memoranda)

CONUS

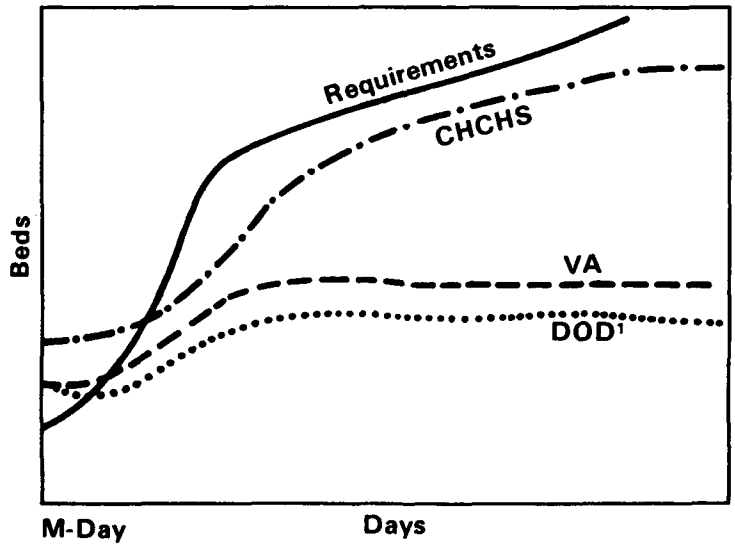


Figure 2. Conus Requirements
(Source: FY86-90, Service Program Objective Memoranda)

Recognizing that shortage, the individual services are attempting to requisition and store the necessary hospitals and supportive supplies to achieve the anticipated needs. It will require several fiscal years before these facilities will be available.

With such persistent overseas and CONUS deficits, there is an obvious need to find other solutions. It is obvious that there will be an unprecedented need to evacuate ill and injured personnel to CONUS. How the system will handle this increased load and where the treatment facilities will be is the subject of this section of the paper.

The Armed Services Medical Regulating Office (ASMRO) is located at Scott Air Force Base and will regulate the patient flow from the area of conflict into the Continental United States (CONUS). In all probability, during the early days of a conflict, the incoming patients will be brought to one of the Aeromedical Staging Facilities (ASF) located in CONUS. Thereafter, as the influx of casualties becomes enormous, the five CONUS-based ASFs will not be able to cope and ASMRO will be regulating the flow of patients to any one of the 48 CMCHS areas.

The airfield at which the evacuation planes land becomes a medical regulating office of its own for the area within which it operates. In the peacetime environment, the five CONUS based ASFs traditionally use the military hospitals in their area as well as the Veterans Administration (VA) system for selected patients based upon predetermined criteria. There is no use of civilian hospitals during peacetime. During wartime or testing periods, the VA Hospitals

become the primary contingency backup to the Department of Defense. The civilian participating hospitals are programmed to receive patients consistent with their capabilities following the VA saturation or in areas where no VA hospitals are located.

The beds available outside the Department of Defense and the VA Hospital system are currently estimated at approximately 61,000.[3] These are located in 48 CMCHS regions and utilize over 700 hospitals. Also, the VA hospital system becomes more accessible to the routine patient during a wartime conflict. The VA has committed 19,000 staffed operating beds within 72 hours of notification. Thus with the VA commitment and the current abundance of civilian hospital beds within CONUS there should be no problem with bed space if there were to be a conflict as given in the introduction to this paper. However, it stands to reason that this abundance cannot last much longer within the civilian sector since an empty bed is costly. Consequently, unused hospital beds will be put to other uses as a cost-saving measure and no doubt smaller hospitals will simply close down. The end result is that over time there will actually be fewer civilian beds available to the Department of Defense in an emergency. Those beds that are available most likely will be occupied by acute care patients. NDMS will seek to solve some of these problems by increasing the number of regions and increasing the number of beds available to 100,000.

Realizing that CONUS bed availability is not the only source of beds to be used, Dr. Mayer informed Congress in 1984 that "...Several agreements have been reached with friendly nations for shared use of

medical facilities and prepositioning of critical medical supplies for use in a mobilization."[9] West Germany, for example, already has plans for earlier patient release and more stringent admission standards for civilian cases during a crisis. In addition, plans are underway to allow more beds within existing hospitals and to set up additional beds in nearby facilities such as public schools.

Discussion

ASMRO

The Armed Services Medical Regulating Office regulates where the patient is going but does not control the airlift system. Rather it is at the mercy of the airlift system which could create tremendous problems in evacuation during a major conflict from any theater. There are many logistic type problems in this environment which will be dealt with in other sections of this paper. The operation of ASMRO appears clean, neat, and in control of patient regulating. In essence, ASMRO will direct the patient from an airfield in the theater of operations to an airfield in CONUS THe disposition of the patient from the CONUS airfield does not rest with ASMRO but with the receiving hospital or an Aeromedical Staging Facility as in the five areas of CONUS.

ASF

The Aeromedical Staging Facility is a holding area where patients can be held until further disposition is ready. In a conflict situation patients would be sent to nearby civilian, VA, or military hospitals consistent with the category of care necessary.

The normal ASF has a capacity of 95 beds but this can be expanded to 250 in a contingency situation.

The 1st ASF, Scott Air Force Base, was fully aware of what was to be done in an evacuation scenario as we have described. Their commander is part of the hospital at Scott even though the ASF is a separate organization. Scott has the only military hospital in the area so the necessary triage is easily accomplished and patient routing to the civilian hospital is relatively uncomplicated. The biggest problem encountered is the method by which patients will be transported to the participating hospitals. There are not sufficient modes of transportation available at Scott for the 1st ASF. Consequently, once there are large numbers of patients, the lack of transportation will be the biggest bottleneck for what appears to be an otherwise good system.

The 10th ASF at Andrews Air Force Base identified the mode of transportation as being one of the biggest bottlenecks in the system for getting a patient to a hospital bed. On the other hand, Chicago hospitals and the Chicago Fire Department have developed a system which utilizes school buses as the mode of transportation. In the exercises conducted in Chicago, the school buses have solved that particular problem. Interestingly enough, the Chicago community perceived this contingency situation for the Department of Defense as a good model for civilian mass casualty situations in their own area. Therefore, the participation of the County and hospitals was significant.

Both the 1st and the 10th ASF identified a problem which could undermine the whole process at once, the personnel assigned presently are reassigned in the event of a mobilization! Reservists take their place, yet the Reserves have never practiced in that environment and will have no institutional memory about what should be done. This could prove to be costly in terms of time and effectiveness which can only have an adverse effect upon the care of seriously ill or wounded patients.

Having talked to two ASFs, we have realized that there is no one ASF in charge and no one person directs the interaction of the five ASFs in CONUS. The 10th ASF has expanded its use of computers and actively pursued interest on the part of the civilian hospitals in their area. The 1st ASF has not expanded itself to the same extent. One ASF does not necessarily know what the other ASF is doing beyond normal day-to-day operations. If one person or group was overseeing the five ASFs, then anything of importance done by one would be shared by the others.

CMCHS

The Civilian-Military Contingency Hospital System provides backup support to the Department of Defense and the VA medical facilities. The civilian hospitals have freely become part of the system and committed a certain number of their beds to DOD use if needed in time of crisis. Some hospitals have elected not to participate, primarily due to staff members expressing a strong displeasure in supporting a military that has nuclear weapons. We visited two hospitals in Chicago, one a participant and one not. The

feeling of the executives in the non-participating hospital is that in the event of a major conflict no patients will be turned away and all who need treatment will receive it. At such a time the military aspect of the problem would be a non-issue.

Many hospitals have participated because of patriotic sympathies of their staffs. Others because it would be a satisfactory way of organizing their own area mass casualty situations. Still others because there is an apparent glut of hospital beds and finding any potential use for them is encouraging. More and more hospitals are becoming proprietory, grouping together and ridding themselves of beds that are not being used. Hospitals are turning to other uses for their beds and, therefore, the perceived excess of beds will begin to reverse. What effect this will have on the number of beds available to DOD is unknown. It must be evaluated.

The manner in which the civilian hospitals are involved is different in the three areas we evaluated. At Scott, the base hospital is the only military facility in the area and will essentially control the disposition of patients into the civilian environment. In the Washington, D.C., metropolitan area a Joint Operations Center(JOC) is set up to control the disposition. The Army is responsible for an area of hospitals as are the Navy and Air Force. Each service takes a turn being in charge of the JOC for a year at a time.

The big question arises concerning the service in charge and the other two which are not when a contingency system is actually put into effect.

Previous mock scenarios have not always been smooth. In Chicago, on the other hand, the civilian hospitals through their own organization seem to have control of the disposition process. The local military hospital had not taken charge as it should have. This does not mean that the contingency system would not work. In three areas of the country there were three different approaches to the patient disposition process. We can only assume that the other 45 areas probably work equally as efficiently.

Now, in 1985, another system is being undertaken to increase the beds available to over 100,000. Will the National Disaster Medical System work any better?

HOST NATION SUPPORT (Also see Chapter IV)

Host Nation Support (HNS) is readily seen as a good answer to an immediate problem, inadequate medical facilities for our personnel in the event of a major conflict on foreign soil. Many agreements have been worked out over time with some being more comprehensive than others. With West Germany's intended use of their medical assets, we have access to support. This is not without some problems, though, which need to be addressed. With a conflict taking place on the host nation's soil, there most likely will be many casualties for both ourselves and our allies. It stands to reason that their wounded and ours would be competing for the same bed and care in many instances. While many say this is no problem it remains to be seen if the priorities would not change under the stress of actual conflict. Additionally, we are told that we have space allocated to us for beds and authorization to preposition medical equipment and supplies in

support of the HNS programs. Are the supplies and other equipment there? Of the material prepositioned, is it protected from the environment as our tanks are? Are there plans and dedicated assets to move and set up this material in the event of a true crisis? Judging from what we saw during our recent trip to West Germany, the positive answers are doubtful.

As one reflects upon HNS and the prepositioning of equipment and supplies, one can readily see the numerous problems inherent in the program, with the inability to move the material in a hurry being one of the most frightening ones. Yet the ability to move the injured combatant is equally fraught with problems, especially if the move is to CONUS. While little may be able to be done to change the Evacuation Policy from 15 to 30 days (since we are having problems getting the supplies to support 15 days as it is) we need to plan to do more to care for our personnel wherever the conflict should occur. Host nation support may be the only solution for the immediate future. Given the volatile political climates of several of the countries involved, meaningful discussions in this area were most difficult.

Conclusions

The facilities currently identified through DOD, the VA, and CMHCS appear to be sufficient to deal with the casualties the military anticipates in a NATO scenario. However, further work is needed in obtaining additional civilian health resources.

Unfortunately due to transportation problems there are significant chokepoints within the system from the battlefield to the CONUS hospital bed.

No exercise has ever used this system to exhaustion, therefore its complete capability or failure is unknown.

Recommendations

1. Dedicate aircraft for ASMRO to use for patient disposition.

2. Identify what bed mix is available ,i.e., surgical, medical, psychiatric, etc.

3. Develop alternate methods of transportation from the airfields to the participating hospitals.

4. Do not reassign all personnel assigned to an ASF during mobilization.

5. Create communication among the ASFs for more efficient operation and sharing of ideas. Some one authority should be in charge of all the ASFs.

6. Develop a better disposition system in areas where there is more than one service hospital present.

7. Exercise the CMCHS plan more often with a conscious attempt to improve the planning and coordination between DOD, the VA and the CMCHS participants.

8. Delay entering the NDMS until certain the CMCHS will work effectively.

CHAPTER IV

LOGISITICS (Equipment, Supplies, and Pharmaceuticals)

Introduction

> "For want of a nail the shoe was lost: for want of a shoe the horse was lost: and for want of a horse the rider was lost." George Herbert (1593-1633)

George Herbert's poetic words point out an age-old logistic problem: failure to provide the simplest of items can spell the downfall of the greatest of enterprises. Logistical support includes many things, food, fuel, ammunition, transportation, water, and medical support, to name but a few. While each type of logistic's support is important, the value of effective medical support in the overall success of a military campaign should never be minimized.

Strong medical support accomplishes many things. It is one means by which a nation demonstrates its resolve to carry out its plans for war. From a morale standpoint, combatants are more willing to go in harm's way if they know they will be taken care of in the event of injury or illness. Thirdly, effective medical assets is a means for returning combat experienced personnel to duty, thus reducing the requirements for acquiring and training new personnel. Concern about the military medical system to support military contingencies is not new. Problems cited from 1978 to the present

span a wide spectrum of "war stopping" inadequacies ranging from inadequate supplies and equipment to inaccessibility to the medical system in the battlefield. Previous Industrial College of the Armed Forces (ICAF) medical mobilization studies have addressed various aspects of these problems. They have indicated that our nation's ability to provide medical support has been found wanting in all but the most meager of scenarios. Lack of adequate numbers of deployable medical systems, insufficient war reserve stocks of medical supplies and equipment, and lack of industrial preparedness are only some of the problems noted. Appendix B is an anthology of recent ICAF Medical Mobilization Studies.

In concert with these previous efforts, this portion of the study will address the current status of the United States medical industry and its capacity to support planned military requirements as exemplified by the Production Base Program. This chapter will also provide a general survey of current medical planning for deployable systems and the many problems that arise in planning for the procurement of supportive equipment and supplies both domestic and foreign. Specific NATO and host nation support issues associated with medical logistics will also be presented.

Background--Medical Industrial Preparedness Planning

> (U) In the event of a major conventional war involving U.S. forces, a maximum U.S. industrial and military mobilization effort should be anticipated, even though this effort may not contribute to the initial campaign.1

Mobilization readiness implies the capability to wage war on short notice in terms of adequate resources. it implies "D-to-P" industrial planning and selective surge responsiveness. The resources would include men under arms, military equipment at hand, stockpiling of critical raw materials, basic industrial capacity and reserve military production capacity.

During the Vietnam conflict there was neither a declaration of national emergency nor an industrial mobilization per se. Consequently, the planned producer program initiated in WW I, finely tuned in WW II, and used to a limited degree in the Korean War was not exercised at all during the Vietnam conflict. (For a detailed account of the evolution of industrial planning in the United States see Appendix C.) The production contracts for conversion to military goods were let on a peacetime competitive basis and producers became discouraged to participate. The industrial preparedness planning process became disrupted and lost its credibility. To appreciate the material presented in this paper it is worthwhile to review some of the more recent events.

In 1967, the severe weaknesses within the Industrial Preparedness Plan (IPP) were recognized and DOD Directive 4005.1 was issued making industrial preparedness planning mandatory for DOD components. The Defense Logistics Agency (DLA) and the separate Services were to plan with industrial management for the increased production of military goods in a national emergency. The objectives were to avoid conflicting demands on specified facilities, to eliminate delays in mobilization when shifting to wartime production,

and to provide the best use of existing production capabilities in the least amount of time.

DOD Directive 4005.3 itemized DLA and the Services the responsibilities of selecting planning items, computing emergency production requirements, and distributing requirements through industry. DOD Directive 4005.3M itemized industrial management the responsibilities of determining industrial capability to produce planning items, performing required maintenance and repair, and negotiations proposed production/maintenance and repair schedules.

In 1975, a Review of Army Mobilization Planning (RAMP) study reached some disturbing conclusions. It found that (1) a logistical assumption of "D +6" was being used (stockage levels were to be based upon D-day plus six months for a limited war as opposed to the earlier D-P concept based on a full-scale conventional war); (2) less than 80% of the items that required planning had current planning agreements; (3) there was a lack of sufficient personnel to perform the functions of the IPP as required by DOD directives; (4) there was a need for improved communication between the planner and industry; and (5) there was a perception by the industry that industrial preparedness planning was badly managed and given a low priority by the government.

The RAMP study recommendations included the revision of logistical assumptions based on the threat and the need for a revitalized IPP by 1980. It further recommended that increased support, resources, emphasis, and guidelines from the highest level be provided to insure coordination of IPP programs.2 The preceding

is most important since industrial planning is the fundamental basis for the development, acquisition, and fielding of major weapon and support systems, including deployable medical systems.

The following discussion will touch upon the current state of the Medical IPP, to illustrate how many of the RAMP study recommendations have faired in subsequent changes of executive and congressional leadership.

Discussion

As noted in previous chapters, the NATO scenario requires the Military Services to provide sufficient medical assets to support a minimum 15-day evacuation policy at the peak casualty periods for a period of 60 days. While the exact planning numbers are classified, it can be said that more than 100 hospitals ranging in size from 60 to 1,000 beds are required to accomplish the mission. Since the warning time will be short, these hospitals and their necessary 60-day supplies must be on hand--either prepositioned or immediately available for deployment from CONUS--if they are to meet the requirements in a timely manner.

The Military Services are procuring deployable hospitals and developing overseas sites for them. However, their policies regarding the provisioning of these hospitals, coupled with the realities of a limited budget combine to make it most difficult to ready these hospitals. In addition to the hospitals themselves, there are numerous problems with acquiring and storing the necessary materiels. Yet some planning has shown promising results.

The size and complexity of the many issues (both political and logistical) involved are significant. To properly discuss the numerous attempts to enhance medical readiness and to plan for deployable medical systems, one must become familiar with the medical industry, the pharmaceutical industry, and some of the basic terminology and programs associated with the move to improve medical combat support.

Since the latter involves a large amount of material, it will be subdivided into the ten related topics listed here: 1) Status of Deployable Medical Systems Planning; 2) DEPMEDS-- A Microstudy in Current Major Systems Planning; 3) Dated and Deteriorative (D&D) Items and Medical War Reserve Materiel Stocks; 4) Medical Industry, An Overview; 5) Pharmaceutical Industry, An Overview; 6) The Medical Industrial Preparedness Planning Lists (IPPL); 7) Standardization of Medical IPPL Items and The D-Day Significant Items List (DDSIL); 8) Problems Noted in the Medical IPPL; 9) Management of Dated and Deteriorative (D&D) Supplies; and 10) Host Nation Support.

1. Status of Deployable Medical Systems Planning

Since NIFTY NUGGET (1978), every mobilization/deployment exercise has demonstrated that it would take 18 months to 2 years after mobilization (M-day) to procure and deploy medical systems in sufficient quantities to provide the care necessary to maximize the return of injuried or ill personnel to duty. The overall improvement of the readiness of the combat medical support system has been quite slow.

There is definate progress, however, in the military plans to improve theater support through procurement of over 50,000 hospital beds configured in approximately 150 deployable medical facilities. But this effort has not been without problems. In peacetime the tendency is to overlook the requirement for combat medical support programs in favor of more glamorous weapons systems. In addition, there is the constant pressure to improve dependent and retiree care. Consequently, combat medical support programs are easy prey to cuts, slowdowns and funding in the out years.

Recent years would have been no exception were it not for strong support from the Assistant Secretary of Defense/Health Affairs (ASD(HA)). During its deliberations on the FY-85 budget he brought the issue of lack of support for combat medical readiness before the Defense Resources Board (DRB). He noted that none of the Services' FY 1985-89 medical programs had been accelerated or expanded in spite of the clear direction of the Defense Guidance. He noted that the Defense Guidance in FY 1986-1990 directed the Services to "...at least maintain the procurement schedule in the FY 1985-1989 FYDP, and accelerate that schedule if possible." The ASD(HA) made it clear that in reality the Services had either postponed medical readiness programs, failed to fund them, or both.

Consequently, it is most encouraging to note that the Program Decision Memorandum published recently by the DRB has reestablished a fully funded program and reinstated the FYDP procurement schedule so that all units are to be procured by FY 1990.3

For the moment the issue of funding priorities for combat medical systems has been put to rest. Having these systems in the inventory will do much to reduce the surge requirement for industry in the event of mobilization. However, the ability to maintain these new systems in a constant state of readiness and to sustain their operations during a conflict remains in question. Before turning to some of those issues, however, a look at the development of the Deployable Medical Systems (DEPMEDS) demonstrates what can be accomplished with tri-service cooperation and high level backing.

2. DEPMEDS--A Microstudy in Current Major Systems Planning

The planning, development, acquisition, and deployment of the Deployable Medical Systems demonstrates a rare example of expeditious and timely medical industrial preparedness planning accomplished by the DOD (Health Affairs) and the Tri-service medical departments.

In February 1983, it was decided by OASD(HA), the Military Services, and the DLA to accelerate the development of this new major medical support system since the inflatable Medical Unit Surgical Transportable (MUST) concept had to be scrapped. The Military Field Medical Systems Standing Steering Group (MFS^3G) was formed to act in coordination with the Defense medical materiel Board (DMMB) to develop the clinical requirements. By August 1983, the DLA approved the DEPMEDS logistics support plan.

Unlike other programs, DEPMEDS was processed by means of a unique Defense Personnel Support Center (DPSC) project office and task group of functional experts. In concert with the activity at

DPSC, funds had been budgeted in the FYDP to support the planning and assemblage of DEPMEDS for DOD.

The task force was faced with cataloging over 1,200 new line items with NSN assignment, identification and management lists. Over 700 new specifications had to be developed. There was a tenfold increase in workload. Three years of work was done in nine months. Such an accomplishment required intensive management throughout a complex network for DLA at Fort Detrick, to DPSC in Philadelphia, to the assembly area at the Ogden Depot. Such imaginative management required a unique strategy for distribution of stock on hand, direct vendor delivery, diverted shipments, and use of service assets.

Field tests of the 400-bed evacuation hospital prototype, the 21st Evacuation Hospital, occurred on time at Fort Hood, in October 1984. A Tri-service test, it required approximately 5,000 line items and cost $4.7 million to produce.

In accordance with the planning and development of this prototype, a plan and program have been created to support the future industrial production and distribution of the entire operational DEPMEDS system. The DOD goal of economy of scale has been reached through management by standardization, automation, and specialization. Furthermore, an essential element of this process was the development of an automated communication/information system. Such a system will augment the Standard Automated Management System (SAMMS). The system will be operable in early 1985 which should expedite the culmination of DEPMEDS as well as future projects.

Thus, one can see that industrial preparedness planning for DEPMEDS has been very successful for reaching the immediate, short-term goals of prototype, assemblage, testing, and initial production and prepositioning. However, other long-term issues need to be examined. One significant long-term problem of medical support is how to deal with disposables and dated and deteriorative (D&D) items in DEPMEDS and other units' stores.

3. Dated and Deteriorative Items and Medical War Reserve Materiel Stocks

Department of Defense policy states that military readiness must be maintained by ensuring the availability of adequate stocks to support the Military Services during war.[4] These stocks are known as War Reserve Materiel Stocks (WRMS), defined as, "...the total materiel assets required to equip and support the approved forces through the period set forth in the Defense Guidance for war materiel planning purposes. The WRMS are those stocks that are required to maintain our forces through the "D to P" period, i.e., from the time mobilization is declared until industry can produce sufficient quantities of materiel to support the war effort. WRMS are further divided into two categories:

> (1) Prepositioned War Reserve Materiel Stocks (PWRMS): That portion of the WRMS that the Military Services are required to hold and position at or near the point of planned use or issue just prior to hostilities. This generally is considered to be 60 days worth of supplies.
>
> (2) Other War Reserve Materiel Stocks (OWRMS): The balance remaining after the PWRMS are subtracted from the WRMS. In other words, that materiel required to support the force from day 61 to the end of the planning

> period. These materiel items are to be owned, financed, and managed by the assigned Inventory managers. In the case of medical materiel, this is the Defense Personnel Support Center (DPSC) of the Defense Logistics Agency (DLA).5

The DEPMEDS and other field medical units are part of the medical WRMS.

Management of medical WRMS (PWRMS and OWRMS) has been fraught with several problems. Inadequate funding and each Service managing their requirements differently make the process difficult. How to deal with the storage of D&D items, however, has been a major stumbling block that must be addressed.

D&D items are those items which have an expiration date after which they are generally discarded. They include such supplies as X-ray film, pharmaceuticals, laboratory reagents, intravenous fluids, and certain bandages.

High procurement costs, coupled with relatively short shelf life precludes maintaining a 60-day level of dated and deteriorative items. For example, the total PWRMS cost for pharmaceuticals (the largest groups of D&D items) is over $90 million. Of that, $45 million are items felt to be critical or unique to the military. With an assumed average shelf life of 36 months the average maintenance cost for this category alone would be over $30 million. The new DEPMEDS, a part of the PWRMS, will be stocked with the 60-day level except for the D&D items.

All Services have deficient supplies of dated and deteriorative items and each attempts to deal with the problem differently. In the case of the Marine Corps, 72% of the value of the total Marine

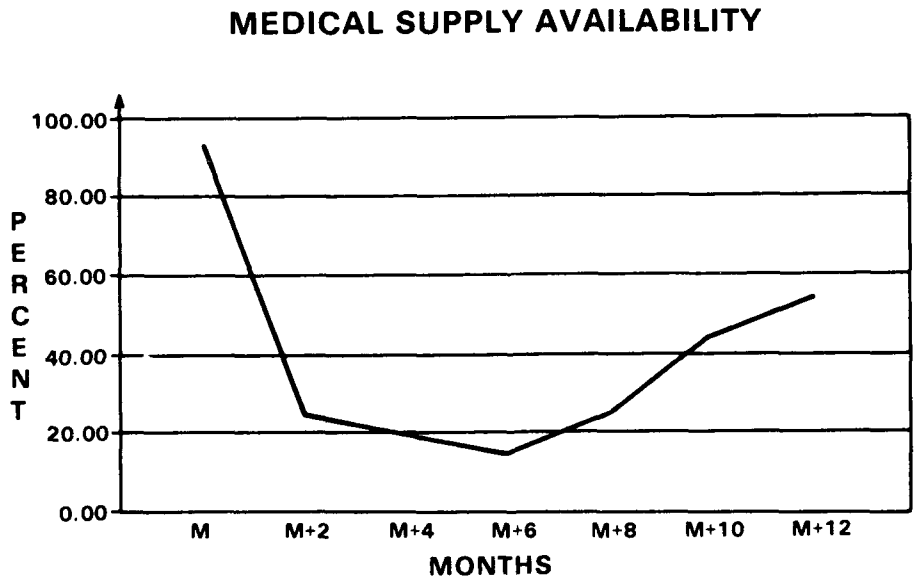
Amphibious Force (MAF) AMAL is composed of items with shelf lives ranging from 13 to 36 months with 55% of that group having a shelf life of 13 to 24 months.[6] In 1981, the Marine Corps issued a policy statement that six dated and deteriorative items costing $5.4 million per year to maintain would be reduced to a 10% stockage level.[7] For the balance of the Marine Corps Medical WRMS, the Marine Corps War Reserve Policy Manual permits each MAF commander to maintain a minimum of 30 days of medical and dental items for a Marine Amphibious Brigade (MAB), about one-fourth of the 60-day requirement. The remainder may be stored with the Inventory Maintenance Manager (IMM) or simply planned for delivery through the IMM or a commercial source if the supplier can guarantee shipment in time to meet operational plan requirements. D&D items, other than the high cost items previously mentioned, are to be stocked at the minimum 30-day level.[8] The Army war reserve inventories of dated and deteriorative were more than $20 million deficient as of November 1983.[9] The Navy too has similar policies and problems.

The Air Force has a different approach. It plans to stock all D&D items and replace them as they expire. Losses are expected to run at least $400,000 per year for each 500-bed hospital. Total losses for all Air Force hospitals easily could exceed $20 million per year if no solution is found.

The OWRMS picture is even more bleak. As of September 1984, the total medical OWRMS requirement was $1 billion and consisted of 6,873 line items. Presently, there is $63 million worth of the requirement on hand. Funding for the other $937 million worth has not been

available for many years. The future does not seem to hold any prospect for change. Even if the funds were forthcoming, DPSC is precluded from holding more dated and deteriorative stock than it can rotate in peacetime. With a wartime requirement some ten times larger than peacetime, the possibility of maintaining adequate OWRMS is most remote.

In the event of mobilization, the poor state of medical OWRMS would have severe adverse effects on supply availability. As shown in Graph 1, medical supply availability is approximately 94%. Five months into mobilization this will drop to 14% or only one in eleven orders would be able to be filled.10



Graph 1.

DPSC attempted to correct some of the preceding by developing a Priority Allocation Methodology System. Lack of input by the

Services forced this concept to be abandoned. As an alternative, DPSC has pursued a concept which will authorize supply issues through the use of a Joint Chiefs of Staff project code. Personnel in the geographic area being mobilized will be assigned a specific JCS code which will have to be shown on all requisitions in order to receive priority processing. This concept, scheduled to be tested during WINTEX/CIMEX 85, has yet to be approved by the Military Services or the DMSB.[11]

A 1980 DOD report commented that although annual planning provides for WRMS, spares, and subsystems each year the budget crunch favors end item deliveries at the expense of WRMS and spares.[12] The same appears to be true for medical WRMS, both PWRMS and OWRMS.

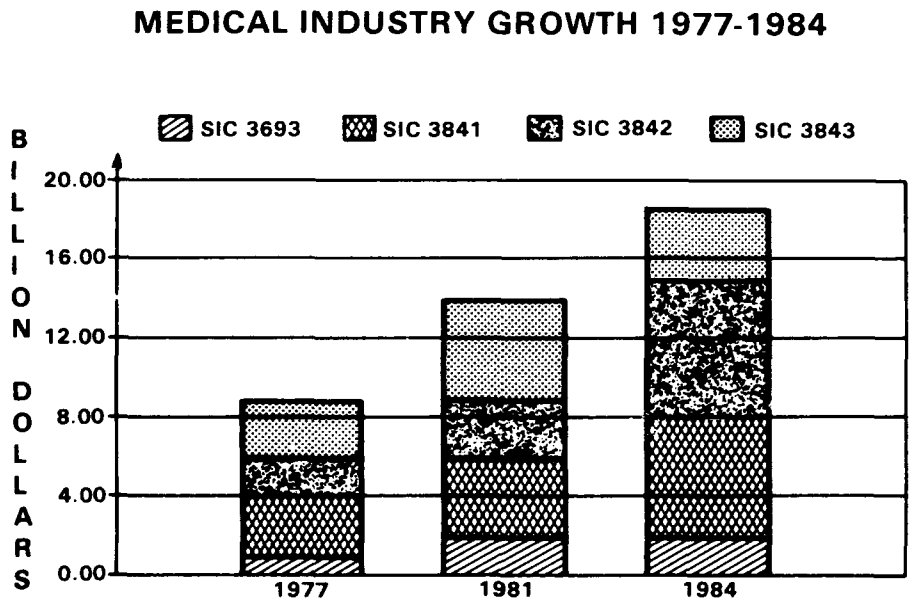
4. The Medical Industry, an Overview

There are four basic groups in the medical industry. They are (1) X-ray and electromedical equipment; (2) surgical and medical instruments; (3) surgical appliances and supplies; and (4) dental equipment and supplies. Of the 2,600 medical manufacturing facilities, most are small, with 69% employing less than 20 persons. Approximately 32 facilities produce 40% of the total output. While in some respects the industry is large, the output is relatively fixed and concentrated.[13]

In 1984, the U.S. Department of Commerce contended that the medical and dental instruments and supply businesses would do very well since its projected growth rate of 6.8% is considerably higher than the 4.4% and 5.4% rates experienced in 1982 and 1983. The annual inflation adjusted rate at which shipments of products are

expected to increase is some 6.3% for the next five years. The real growth rate between 1972 and 1983 was 6.5%. Change in the total value as output between 1977 and 1984 is shown in Graph 2.14

The failure to fund and maintain WRMS will require the medical industry to be capable of surge capacity in order to increase production to anticipated wartime requirements. Unlike other sectors of the defense industry, the peacetime medical industry is maintained by consumption of medical products by both government and civilian health care providers. This peacetime capability is not sufficient to meet wartime requirements. The industries' ability to immediately surge to meet wartime needs is highly questionable due to several mitigating factors.



Graph 2.

The use of microprocessors and other semiconductor devices have increased significantly in radiological and other diagnostic equipment, clinical laboratory analysis units, and medical information systems. This may present a problem since it will be shown below that the semiconductor market relies almost entirely upon imports from areas which can easily be interdicted.

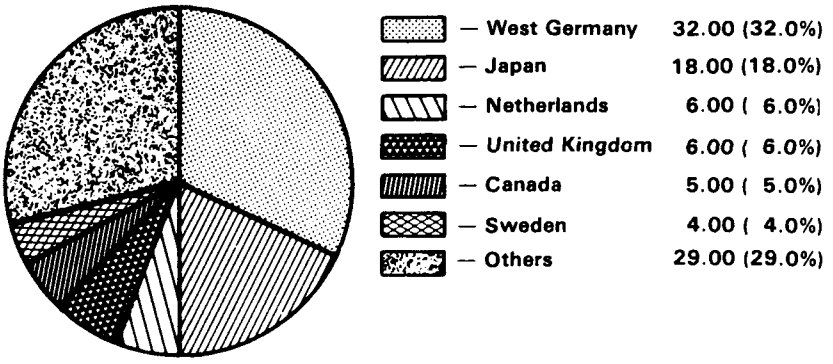
Imports have increased about 25.7% since 1982 while exports have increased by only 2.7%. In some areas, imports have increased at the expense of decreased exports. For example, in the surgical and medical instruments sector, exports decreased 3% from 1982 while imports increased by 15%. The principal trading partners with the U.S. in 1982 are shown in Graph 3 and Graph 4 below. While much of the growth in imports is the result of the strong U.S. dollar, there is a chronic trading deficit with West Germany. In the past five years the imports from Japan have grown at an annual rate of 23%.[15] Tables 1 and 2 show the trends and projections for the surgical and medical instruments industry from 1972 to 1984.

While there is growth in the industry, there is a concomitant growth in imports from areas distant from our shores. In some instances the areas may well be the site of future conflicts. The continued growth of imports jeopardizes our ability to mobilize since it erodes our industrial base and there is the real possibility of interdiction. In some of the industry visited by this research seminar, inventories of both raw and finished products were being maintained at a relatively low state, varying from 30 to 90 days. In addition, there is an ever-increasing dependence for off-shore

components ranging from raw chemicals for the pharmaceutical industry to microprocessors for finished electronic hardware. Semiconductors, resistors/capacitors, and other electrical components used in medical appliances are almost exclusively manufactured in the Far East.16

In light of the preceding, one principal manufacturer of electrical diagnostic equipment admitted they are uncomfortable with the fact that their second and third tier subcontractors place heavy reliance on overseas suppliers. It was felt that any major interruption in these sources would impact adversely on their overall output. Further specifics on weaknesses within the U.S. medical industry will be presented in Section 6, but first an overview of the pharmaceutical industry.

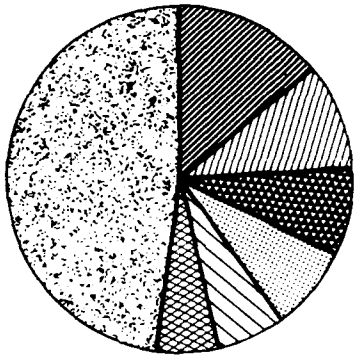
U.S. MEDICAL INDUSTRIES IMPORTS 1983



TOTAL: 100.000 (100%)

Graph 3.

U.S MEDICAL INDUSTRIES EXPORTS 1983



— Canada	14.00 (14.0%)
— Japan	10.00 (10.0%)
— United Kingdom	8.00 (8.0%)
— West Germany	8.00 (8.0%)
— Netherlands	6.00 (6.0%)
— France	6.00 (6.0%)
— Others	48.00 (48.0%)

TOTAL: 100.00 (100%)

Graph 4.

Table 1

SURGICAL AND MEDICAL INSTRUMENTS (SIC 3841): TRENDS AND PROJECTIONS 1972-84

(in millions of dollars except as noted)

Item	1972	1977	1979	1981	1982[1]	1983[2]	Compound annual rate of growth 1972-83	1984[3]	Percent change 1983-84
Industry Data									
Value of shipments[4]	961.8	1,833.1	2,253.5	3,158.2	3,475.0	3,890.0	13.5	—	—
Value of shipments (1972 $)[4]	961.8	1,273.0	1,347.0	1,587.0	1,613.0	1,688.0	5.2	1800.0	6.6
Total employment (000)	34.5	43.2	49.9	54.6	55.1	55.7	4.5	58.2	4.5
Production workers (000)	24.3	29.2	33.6	35.4	35.4	37.0	3.9	38.7	4.6
Average hourly earnings of production workers ($)	3.36	4.55	5.43	6.34	7.07	7.43	7.5	—	—
Capital expenditures	42.0	87.2	142.3	183.7	—	—	—	—	—
Product data									
Value of shipments[5]	984.2	1,891.3	2,431.7	3,257.2	3,580.0	4,010.0	13.6	—	—
Value of shipments (1972 $)[5]	984.2	1,313.4	1,453.5	1,636.8	1,662.0	1,740.0	5.3	1,854.0	6.6
Product price index (1972 = 100)[6]	100.0	144.0	167.3	199.0	215.4	230.5	7.9	—	—
Trade									
Value of exports	140.7	400.6	410.3	565.6	605.3	585.0	13.8	615.0	5.1
Value of imports	31.1	99.1	146.1	195.2	221.7	255.0	21.1	295.0	15.7
Exports/shipments ratio	0.143	0.212	0.169	0.174	0.169	0.146	—	—	—
Import/new supply ratio[7]	0.031	0.050	0.057	0.057	0.058	0.060	—	—	—

[1] Estimated except for product price index, exports, and imports.
[2] Estimated.
[3] Forecast.
[4] Value of all products and services sold by industry SIC 3841.
[5] Value of shipments of surgical and medical instruments products produced by a industries.
[6] Developed by the Office of Research and Analysis, and Statistics. BIE.
[7] New Supply is the sum of product shipments plus imports.

Source: Bureau of the Census and Bureau of Industrial Economics. Estimates and forecasts by the Bureau of Industrial Economics.

SURGICAL APPLIANCES AND SUPPLIES (SIC 3842): TRENDS AND PROJECTIONS 1972-84

(in millions of dollars except as noted)

Item	1972	1977	1979	1981	1982[1]	1983[2]	Compound annual rate of growth 1972-83	1984[3]	Percent change 1983-84
Industry Data									
Value of shipments[4]	1,453.5	2,597.3	3,443.4	4,733.9	5,300.0	5,990.0	13.7	—	—
Value of shipments (1972 $)[4]	1,453.5	1,649.1	1,990.4	2,336.6	2,490.0	2.656.0	5.6	2,858.0	7.6
Total employment (000)	43.9	53.9	58.7	64.9	65.5	67.5	4.0	69.9	3.6
Production workers (000)	29.8	36.8	39.8	44.0	44.7	46.3	4.1	47.9	3.5
Average hourly earnings of production workers ($)	3.40	4.90	5.72	6.69	7.15	7.56	7.5	—	—
Capital expenditures	47.5	68.6	99.1	190.0	—	—	—	—	—
Product data									
Value of shipments[5]	1,142.1	2,413.0	3,016.5	4,225.5	4,730.0	5,340.0	15.1	—	—
Value of shipments (1972 $)[5]	1,142.1	1,532.1	1,743.6	2,085.6	2,224.0	2,368.0	6.9	2,548.0	7.6
Product price index (1972 = 100)[6]	100.0	156.9	172.8	202.3	202.7	225.5	7.7	—	—
Trade									
Value of exports	76.6	178.2	257.6	356.0	375.1	395.0	16.1	435.0	10.1
Value of imports	13.1	51.4	105.2	94.6	108.3	110.0	21.3	115.0	4.5
Exports/shipments ratio	0.067	0.074	0.085	0.084	0.079	0.074	—	—	—
Import/new supply ratio[7]	0.011	0.021	0.034	0.022	0.022	0.020	—	—	—

[1] Estimated except for product price index, exports, and imports.
[2] Estimated.
[3] Forecast.
[4] Value of all products and services sold by industry SIC 3842.
[5] Value of shipments of surgical appliances and supplies products produced by all industries.
[6] Developed by the Office of Research, Analysis and Statistics, BIE.
[7] New supply is the sum of product shipments plus imports.

Source: Bureau of the Census and Bureau of Industrial Economics. Estimates and forecasts by the Bureau of Industrial Economics.

5. Pharmaceutical Industry, An Overview.

The drug and pharmaceutical industry is another area of concern in mobilization. Unlike the medical and dental industry, it enjoys a positive balance of trade, aporoaching some $1.3 billion in 1983. This positive trade balance is the result of the industry's long-standing reputation for product safety and efficacy. In 1983 the domestic industry accounted for 24% of the world market for prescription drugs.[17] While it is believed that there will be continued moderate growth, there are some negative trends in terms of effects on mobilization. Major world priorities for the development of human vaccines are aimed at malaria, tuberculosis, chlamydia, dengue fever, encephalitis, leprosy, herpes, and schistoaomiasis. All of these are of Military significance and only five corporations are now producing vaccines in the United States, including one that is Canadian owned.[18](See Section 8 below).

There is a trend toward internationalization with foreign drug firms establishing facilities in the United States, yet at the same time many U.S. firms are moving their research effort to subsidiaries overseas. In studying both the health care equipment and the pharmaceutical industry, the most pressing issue was the concern that the effect of the use of Diagnostic Related Groups and Prospective Payment (DRG/PP) in determining reimbursement to providers for Medicare patients would be adverse. Until the total fallout from

these new cost control measures is known, all are in a watch and wait mode.

The Pharmaceutical Manufacturing Association acknowledged that while there was a delayed surge potential, the industry does little stockpiling of raw materials or finished goods. In addition, many pharmaceutical companies are reluctant to become involved with government contracts due to over-regulation by the Food and Drug Administration (FDA) which they see as a major chokepoint to any mobilization effort. For example, it takes seven to ten years to market a new drug and about five to seven for an established manufacturer to begin production of an approved drug at a new location (even if the company made the drug in one of its other plants). Other problems associated with the pharmaceutical industry will be discussed in Section 8 below.

Table 3 demonstrated these projected trends.

Table 3

PHARMACEUTICAL PREPARATIONS (SIC 2834): TRENDS AND PROJECTIONS 1972-84

(in millions of dollars except as noted)

Item	1972	1977	1979	1981	1982[1]	1983[2]	Compound annual rate of growth 1972-83	1984[3]	Percent change 1983-84
Industry Data									
Value of shipments[4]	7,149.5	11,459.4	13,738.0	17,503.2	19,990.0	22,000.0	10.8	—	—
Value of shipments (1972 $)[4]	7,149.5	8,821.7	9,320.2	9,702.4	9,820.0	10,100.0	3.2	10,415.0	3.1
Total employment (000)	112.0	126.4	130.0	130.0	129.9	131.0	1.4	131.0	0.0
Production workers (000)	57.0	63.1	66.7	64.8	64.0	63.5	1.0	64.0	0.8
Average hourly earnings of production workers ($)	4.40	6.33	7.41	8.88	9.74	10.48	8.2	—	—
Capital expenditures	166.7	419.3	595.3	729.3	—	—	—	—	—
Product data									
Value of shipments[5]	6,295.4	9,639.5	11,539.1	14,622.7	16,450.0	18,200.0	10.1	—	—
Value of shipments (1972 $)[5]	6,295.4	7,519.1	7,925.2	8,192.0	8,490.0	8,728.0	3.0	9,000.0	3.
Product price index (1972 = 100)[6]	100.0	128.3	146.0	179.0	197.3	227.0	7.7	—	—
Trade									
Value of exports	181.5	319.7	339.4	532.0	562.8	709.2	13.2	890.0	25
Value of imports	14.5	33.9	56.7	52.6	40.7	78.2	16.6	110.0	40
Exports/shipments ratio	0.029	0.033	0.029	0.036	—	—	—	—	--
Import/new supply ratio[7]	0.002	0.004	0.005	0.004	—	—	—	—	—

[1] Estimated except for product price index, exports, and imports.

[2] Estimated.

[3] Forecast.

[4] Value of all products and services sold by industry SIC 2834.

[5] Value of shipments of pharmaceutical preparations products produced by all industries.

[6] New Supply is the sum of product shipments plus imports.

Source: Bureau of the Census and Bureau of Industrial Economics. Estimates and forecasts by the Bureau of Industrial Economics.

6.The Medical Industrial Preparedness Planning Lists.

An objective of medical industrial preparedness planning is the determination of where essential items can be obtained in support of medical systems and medical war reserve materiel stocks. Part of the mechanism to meet these objectives is the General Mobilization Reserve Acquisition Requirement (GMRAR) through which the separate Services notify the DLA of their industrial preparedness requirements. The requirements represent the uniqueness of each of the Services in terms of size, mission, authorized allowance lists, field medical units, etc. These requirements are then expressed as a monthly quantity in the Standard Automated Materiel Management System (SAMMS) Report and become part of the PWRMS and the OWRMS.

Once all the monthly requirements for industrial preparedness planning are derived, then those items which need intensive planning to avoid shortages during a mobilization are identified. It is these items that constitute the Industrial Preparedness Planning List (IPPL). An updated IPPL is submitted annually to the DLA by the Defense Support Centers.

For medical, the procurement activity which administers the IPPL is the Defense Personnel Support Center, Directorate of Medical Materiel. One source of input is from the DOD Industrial Preparedness Program Production Planning Schedule or DD Form 1519. This form is submitted by producers and shows the nature of their commitment and production capacity. The Armed Forces Production Planning Officer (ASPPO), an industrial specialist from the Defense

Contract Administration Service, follows up on DD Form 1519 reports and also assists in negotiating planned production contracts.

To be effective, competition among users should be eliminated. Industry should be acquainted with wartime tasks and encouraged to participate in the planning. Updated lists of producers and their capacities must be maintained as well determining what items can (and cannot) be obtained from conversion of the private sector to the military. Another measure of successful planning would be little need for new plant construction during wartime.

The current medical IPPL consists of 731 items to be produced by 205 companies. Of that list, there are 130 major, generic groups and components. The list can be broken down into subgroupings by priority as well as by general functional areas as shown in Table 4.19

The priority classification--a measure of the degree of criticality--assigns Priority 1 to weapon systems, Priority 2 to weapon system support, and Priority 3 for other support items. DPSC awards a Priority 2 or 3 for a medical IPPL item based upon time phasing, i.e., how soon it will be needed in the combat zone.[20] The Defense Medical Standardization Board (DMSB) reviews all of DPSC decisions.

Table 4
Priority and Functional categorization of the Major Medical IPPL Items[20]

	Generic Groups		NSN Line Items
	Priority I	Priority II	
Pharmaceuticals (NSN 6505/6508)	18	16	97/2
Bandages (NSN 6510)	10	17	89
Surgical/Dental instruments (NSN 6515/6520)	9	26	383/40
X-Ray equipment (NSN 6525)	1	1	12
General hospital equipment (NSN 6530/6540/6545)	16	8	80/8/16
Laboratory equipment (NSN 7105)	3	3	3
Individual supplies (NSN 6850/7210)	2	-	1/1
	59	71	731

7. Standardization of Medical IPPL Items and the DDSIL.

Once the medical IPPL items have been identified for each of the Services by the DPSC, then the Defense Medical Standardization Board (DMSB) draws together a standardized D-Day Significant Item List (DDSIL). This is done to attempt standardization among the Services and to reduce inventories and cost. (The DMSB is addressed in Section 9.) This phase really should be concurrent with the preparing of the IPPL but, as will be shown, the process of formulating the DDSIL has many problems.

Pharmaceuticals were the first class of medical supplies to be drawn up as a DDSIL. Of the initial 1,000 items submitted to the DMSB, 383 items remain. Ideally these items should serve as the source document for the items that should be included with WRMS as well as used daily during peacetime. However, the different Services' preference for different proprietory choices for the same

drug, different sized packaging for the same drug, the right for each service to have unique "D-Day Preferred" items leads to undermining of the purpose of the DDSIL.

Substitution is another problem area. While substitution of drugs is common in the daily practice of medicine, it is the physician, not the logistician, who has such authority. Hence when an item is ordered that is not available, DPSC has no authority to substitute. There are exceptions granted by the DMSB. However, there is no standard substitution list available for items on the DDSIL. It would seem that it would be advantageous for DPSC to have authority to substitute those items on the DDSIL which will be critically short during wartime.

In addition, there needs to be an approved list of packaging substitution for DDSIL. For example, two 500-unit items should equal one 1000-unit item. Presently this is not so. The DMSB as clinical advisor to DPSC is responsible to develop such substitution lists. To date neither list has been provided.21

As far as DEPMEDS is concerned, a standardized pharmaceutical DDSIL is being implemented. The remaining classes of medical supplies (See Table 4) also were to be included in the DDSIL. However, there has been a hesitance to "leap into the breach" until DEPMEDS is more organized. Hence, the development of the DDSIL for DEPMEDS has ceased.[22]

8. Problems Noted in the Medical IPPL.

Since the IPPL is currently the only viable stop gap measure, it must be looked at more closely. As noted previously, the various

supply items on the medical IPPL are broken down into several different classes. There appear to be significant problems associated with all of them. The following material discusses concerns associated with several of these classes.

a. Pharmaceuticals--Opiates In the supply class of pharmaceutical (NSN 6505/6508), there is a perceived shortfall in the supply of opiates. Domestic peacetime production of morphine (and other opiates) is controlled by the Drug Enforcement Administration (DEA). The current quantity is well below the military wartime requirements. In addition, the number of domestic manufacturers has recently decreased from three to two. Consequently, the potential for excessive lead time to shift to a wartime tempo is very real. The Defense Medical Standardization Board and the DEA should establish an agreement that the military production requirements can be contractually expedited in a national emergency.

b. Pharmaceuticals--Antibiotics Antibiotics are a domestic production base that may be lost to foreign competition. Lederle, a major source of tetracycline, recently announced that they were closing their tetracycline fermentation plant due to German, Spanish, and Portugese competition. Because of their NATO status, these competitors were not considered "foreign". To keep Lederle's bulk tetracycline plant open, DPSC obtained an "A-16" from DLA. (An "A-16" approval is a special authority under 10 U.S. Code

2304(a)(16) to negotiate contracts in order to preserve the production base.) In two years Lederle will reconsider extending the contract. For now, at least, an important domestic industrial capability has been salvaged by agreeing that DOD will purchase the quantities necessary to guarantee a certain production capability.23

c. Pharmaceuticals--Vaccines Similar shortfalls are present in the arena of vaccine fermentation plants necessary to support the Processing for Overseas Requirements (POR) vaccination program. Troops will require POR vaccinations for adenovirus, typhoid, smallpox, cholera, tetanus and plague (as well as tuberculin skin tests). Troops already in place in NATO will require updating of many of these same vaccinations. Although presently the stockage levels are currently adequate, our industrial base is eroding.

The only producer of smallpox and adenovirus vaccines (Wyeth) has stopped production due to their production line being deemed unsafe and outmoded. Production will resume only after Wyeth can negotiate an incentive contract with the government which will allow for construction of a new production facility to support government contingency requirements.24

As it is, there are no systemic plans from DOD through 9th MEDCOM levels for "in country" vaccination upon mobilization. Dispensing form bulk stock will require repackaging, distribution to units, manpower and equipment

which needs to be planned for and excercised. As bulk stock eventually dwindles due to expiration dates, it is doubted that there is an adequate domestic industrial base to provide the surge production needed for the required vaccines.

d. Pharmaceuticals--Nerve Agent Antidote Atropine, a specific nerve agent antidote found in the Mark II kit, is not available domestically and must be stockpiled. Since atropine is also a key drug used to stabilize surgical patients, enough must be on hand for both purposes. The General Service Administration maintains the national stockpile of those critical items not domestically available which are felt to be required to support the production base. Opium salts, atropine, quinidine, and dental mercury make up the bulk of the medical items on the list. Like morphine, the wartime requirements outstrip the peacetime needs, resulting in the costly shelf rotation problems due to expiration dates, which is discussed in section 9 on Dated and Deteriorative items.

The nerve agent antidote kits illustrate another problem recently resolved with an "A-16" request. There was a need to upgrade the old Mark I kits to the Mark II. To cut costs, the glass injectors had to be salvaged and refurbished. The "A-16" prevented a foreign bidder from destroying a unique domestic production requirement.

e. Blood Products. The Military Blood Program 2004, published in 1984, has recommended several new and very

sophisticated additions to blood processing in the field. The use of autotransfusion and frozen blood has been recommended for use in the field/combat hospital environment. The required equipment has been included in the operating rooms and laboratory of the prototype DEPMEDS hospital. Such injection of new technology will not only require dramatic "high tech" revision of the IPPL but an increase in the sophistication of the combat and communication zone hospitals. All of this increases logistic support requirements.

The source of blood and blood products is another set of issues. The DPSC has established a unique agreement with both the American Red Cross (ARC) and the American Association of Blood Banks (AABB) for support in time of war. All that is required is for a blood order to be submitted to ARC/AABB and the requested amount will go directly to the Armed Services Whole Blood Processing Laboratory (ASWBPL) at McGuire Air Force Base.

Other NATO planners have decided to use lyophilized hemoglobin in place of whole blood or packed cells as a second-best substitute or a back-up reserve in the field. United States planners have thought about the prepositioning of frozen blood as an immediate back-up source in the early days of a war before nonfrozen blood is available. However, EUCOM and the 7th MEDCOM planners are apparently planning to

rely solely on blood obtained from departing noncombatants and the Armed Services program at McGuire.

f. Bandages. Bandages and dressings (NSN 6510) present a unique problem in the planning and production of camouflaged dressings. Except for one domestic source, all other surgical dressing manufactures have declined to participate due to the fact that the colored lint of the camouflaged production line contaminates the white dressing production line. Should there be a surge need for camouflaged bandages, this sole source will be unable to meet anticipated needs.

g. Surgical and Dental Instruments. The concern with this category (NSN 6515/1520) is that the United States is losing its production base for surgical instruments. A 1980 study by DPSC revealed that the ability to produce surgical forgings decreased by 4.4% between 1977 and 1980. During the same period the capability to produce finished instruments decreased by 17.7% with two producers going out of business and a third resorting to selling only imported instruments. Between 1980 and 1984, another DPSC study of 16 companies revealed that domestic capability to manufacture surgical quality forgings had decreased 64%. Domestic capability to manufacture finished surgical/dental instruments from forgings decreased by 39%. Furthermore, during that same four-year period three more companies stopped production of such instruments.

Six of the ten planned emergency producers have made drastic cutbacks due to poor sales as a result of imported instruments (See Table 4). Schilling Forge, the largest U.S. forging source for surgical instruments, has recently announced that it may discontinue its surgical instrument production capacity. Since it is the sole subcontractor capable of forging the entire spectrum of surgical instruments, this would be a significant loss. American Hospital Supply has also announced the closure of their forging plant in Florida. Table 5 reflects the magnitude of the cutbacks and closures which are the direct result of cheaper foreign imports which are of a lower quality and have a significant shorter life span. It is hoped that the recent submission of "A-16" requests for negotiations will give the support necessary to produce our superior domestic product.25

Table 5
Surgical Instrument Production Capability per Month

Firm	1980	1984
Grieshaber	75,000	35,000
A & P Surgical	30,000	8,000
Codman & Shurtleff	35,000	17,000
Columbia Surgical	20,000	10,000
Michigan Instruments	20,000	6,000
J. Sklar	30,000	12,000
TOTALS	210,000	88,000

h. Hospital Equipment and Supplies. The hospital equipment class of medical IPPL items does have problems (NSN4110/6530/6540/6545). For example, one of the items listed is a customized field refrigerator for biologicals. Not only is it supposed to refrigerate, it is also to keep

biologicals from freezing in the artic by having the ability to heat. In the 1980's, the cost was $1000. Now, the cost is over $7000 per unit and is noncontractable due to expense.

Another problem worth noting is the availability of plastic feedstocks for the manufacture of the myriad of disposable plastic-based appliances, tubing, syringes, and packaging materials used in the medical industry. No longer is anyone capable of producing the glassware which the plastic replaced. The war reserve stocks cannot rely upon the manufacturer/civilian inventories to provide the dated and deteriorative or disposable items needed in an emergency.

In 1980, Clark and Kline noted that while medical plastics were only a small part of the total petrochemical industry, they were not immune to the oil shortage crisis of 1973-1974. They recommended that plastic feedstock should be stockpiled above that currently in the military and civilian inventory.26

9. Management of Dated and Deteriorative Supplies.

As noted above, there are fundamental problems in the management of dated and deteriorative (D&D) medical supplies. Past ICAF studies (Appendix B) have pointed out the dangers in over-emphasizing the technical sophistication of the teaching hospital/university medical school. The combat medical environment demands logistical and operational simplicity and austerity. Unfortunately, there has been an increasing tendency for excessive sophistication in medical

planning which has compounded the problems inherent in dated and deteriorative drugs as well as other areas of medical support planning.

In the pharmaceutical DDSIL, for example, there are a preponderant number of D&D items. Since it is not feasible to stock them in war reserves stocks due to their abbreviated shelf life, they are considered "Deferred Procurement Items". So these items are not stocked and, as the previous section noted, it will require up to two years lead time for the drug industry to reach production capacity for many required items such as vaccines, antibiotics, morphine, and atropine. The drug industry works in established production cycles. The unique military specifications for vaccines, production, drsages, inspections, packaging/labeling, and shelf life add to its inability to rapidly meet the military's needs.

More specifically, there is no significant domestic industrial inventory of dated and deteriorative nor is there a government incentive to correct this inadequacy. Neither PWRMS nor OWRMS include significant levels of the required D&D items. Indeed, because of the high maintenance cost of D&D items there is persistent reluctance to fund the entire WRMS. With low industrial inventories and limited surge capability there will be a problem coming up to stockage levels in the event of a mobilization. Many initiatives have been suggested to ameliorate the D&D problem. Establishment of the Defense Medical Standardization Board (DMSB) was an important first step.

The DMSB was established by combining the Defense Medical Material Board and the Military Field Medical Systems Standardization Steering Group. It is essential to the success of the many efforts made to improve the medical readiness of the Military Services. One of its primary goals is the standardization of medical materiel wherever possible.[27] Since it is responsible for item entry, acquisition, and supportability issues with regard to maintainability, reliability, and availability for all medical materiel it should play a key role in the standardization of DDSIL items.

The DMSB consists of one medical department officer of 0-7 grade level from each of the four Military Services. The Assistant Secretary of Defense (Health Affairs) and the Director, DLA, each have a representative who is a nonvoting observer. Among its many functions, the DMSB is responsible for the following:

a. Providing clinical advice on the allocation and priorities of critical medical materiel assets.

b. Ensuring the availability of standardized medical materiel by the Military Services both for war reserve materiel and peacetime operating stocks.

c. Developing lists of suitable substitute or interchangeable items of medical materiel.

d. Ensuring item entry for all new standardized medical materiel items into the DOD supply system. (Item entry includes evaluation of new or improved items of medical materiel and preparing and updating essential characteristics required to accomplish a specific professional, therapeutic, military or technical function).

e. Ensuring the retention or deletion of standardized medical items in the DOD supply system.

The DOD directive establishing the DMSB required the Military Services to publish an implementing directive within 120 days. Ironically, a draft, Joint Services directive, was developed but was not approved by the ASD(HA) since it did not "...provide specific procedural guidance for directed readiness functions...(nor) align the staff priorities accordingly."[28] In other words, the who, what, and how were missing from the implementing directive.

The ASD(HA) went on to note that the 1965 directive originally establishing the Defense Materiel Board (the predecessor to the DMSB) was outdated by 1974 and that "...for 11 years all attempts at revision were unsuccessful. Agreement could not be obtained as to the missions and functions of the board."[29] It appeared to the ASD(HA) that a "...business as usual mode of operation for the DMSB is (also) intended."[30]

The issue of an appropriate Joint Services directive remains unresolved. This failure to develop the necessary procedural guidance for the DMSB severely limits the ability to achieve medical readiness. Despite the controversy over the legal mandate for the DMSB, the board and DPSC have begun to address the problems of drug and deteriorative management and are slowly working towards a solution. In April 1984, LTC Ferinde of the DMSB wrote a report ("Economic Procurement and Retention of Dated Medical Supplies") that showed recognition of the need to minimize expenditures for the procurement and storage of dated and deteriorative drugs.

The Ferinde report proposes that dated and deteriorative management may be improved by a combination of the following six programs.

(1).Buy all that is needed of the $45 million worth of military unique items where the PWRS requirements are greater than the monthly DPSC usage. Rotate these unique items or extend their shelf life. In addition, buy all the PWRS requirements that have no expiration date for a one-time investment of about $1 million. This proposal has not been resolved.

(2). Buy dated and deteriorativeS at longer than current contract specifications and change the shelf life policy to "not less than sixty months" of procurement made by DPSC. Just doing this would lower yearly replacement costs from $30 million to $18 million.

As previously noted, the Military Services and DLA/DPSC have been reluctant to fund the medical WRMS requirement because of the high cost of maintaining D&D items with short shelf lives. Of the 383 drugs on the DDSIL, nearly 40% can be procured with a shelf life exceeding that of items currently under contract. Some 29% of the DDSIL is available with 60-month shelf life and another 11% of the items can be purchased with more than their present shelf life (although not with a 60-month life). In general current policy requires that D&D items be procured with not less than 36-month shelf life.

It should be pointed out that the FDA does not require that a manufacturer apply for approval of the longest shelf life for a product that the data will support. For example, the data may well

support a shelf life of 60 months but the manufacturer only applies for 24. Hence 24 months is what the FDA approves. In other instances, shelf life expansion is as simple as changing the packaging. For example, by changing to thicker wrapping the shelf life of such items as Ringer's Lactated Injection, Normal Saline Injection, and 5% Dextrose in Water Injection can be extended from 24 months to 36 months.[31]

As is expected, the cost of items with a long shelf life is greater. Yet a test contract for tetracycline with a 120-month shelf life showed a savings of over $1.27 million over a five-year period. While test contracts for guaifensesin and ampicillin were not positive as to savings, they did show the need for a good economic analysis capability is necessary for a successful program.[32]

This increased cost, however, has led to marked disagreement among the Military Services' peacetime health care providers and the wartime health care planners. While supportive of the need for improved readiness, the peacetime providers do not feel that the increased cost for longer potency dates should be borne by them particularly since they have a fixed-base health care budget. Indeed, DPSC would treat the items identically once the longer life items had the same amount of shelf life as those procured for use in the "peacetime system", e.g., a 60-month shelf life item procured for WRMS would be substituted for a like item with a shorter shelf life (36 months) once the WRMS items had 36-month shelf life left. This would be done at the higher unit price.[33]

One solution offered is to have different national stock numbers for the same item in order to indicate the difference in shelf life. Another solution is to have a single national stock number but procure the longer life WRMS items in an off-line or WRMS-unique procedure. Regardless of solution, all require increased management.

As mentioned above, the total amount of savings possible through implementation of this policy is not known, although it is estimated that just the tactic of increased shelf life would save over $12 million. The DPSC has proposed to the DMSB that some 55 to 70 critical DDSIL drug items should have their essential characteristics changed and should be required to be procured with the longest possible shelf life.34

(3). Expand shelf life by implementing a stability testing program. The German army has established a very effective testing program. This alternative to the shelf life extension program was proposed by the FDA in May 1982 and reviewed by the predecessor to the DMSB in December 1982. The proposal dealt with D&D items which are in general such. Some examples are Ringer's Lactated Injected, Clindamycin Phosphate Injection, Gentamicin Sulfate Injection, Kanamycin Sulfate Injection, Oxacillin Sodium, Normal Saline Injection, 5% Dextrose in Water Injection, Sodium Bicarbonate Injection, Rabies Vaccine, Atropine Injection, Morphine Ampules, and Amyl Nitrite Inhalant Ampules.

In the shelf life expansion program DOD would contract with a manufacturer to test selected samples of three lots of a dated item for stability and potency. These tests would occur periodically once

the expiration date was reached. If found to meet prescribed limits (U.S. Pharmacopoeia (USP) standards), such items would be allowed to remain in stock. In addition, the data could be used to expand the shelf life of lots of the same item. Periodic retesting of the original three lots would permit further expansion of the shelf life of all subsequent lots until the original three lots no longer met USP limits.

DPSC has determined which manufacturers are willing to test their products for such a program. Of 32 inquiries, only two firms offered to test materiel and one applied to the FDA for an extension of the shelf life of an item. Of the others, 18 companies said no and 11 offered to replace the materiel or give credit, [34] One has a doubt that those offering to replace material would do so if it involved large dollar amounts.

It is estimated that stability testing would be about $3 million versus $30 million costs for replacement of stock at a 36-month rotation (or $18 million with an 18-month rotation). Ten prototype D&D items have been chosen for study. As an additional step, DPSC needs to add a pharmacist to its staff dedicated to overseeing the D&D program.

(4). Industrial stock rotation program began development in 1982. Offering a savings of $5 to $10 million per year, the program would rotate some 35 items on the medical DDSIL with like items in the inventories of the commercial producers. All 35 items have a high PWRS requirement, low monthly average usage at DPSC, shelf life less than 60 months, and an adequate commercial market for rotation.

The program calls for the items to be available for delivery to the Government within ten days after they are requested with an 18-month shelf life remaining instead of the usual 24 months. As currently planned, these amounts, if rotated, represent an average of 39% of the PWRM requirement or a 20- to 23-day supply. This allows industry an additional three weeks of surge time.[36] Seven items alone (Ringer's Lactated Injection, Clindamycin Phosphate Injection, Sulfadiazine Cream, Penicillin G Benzathine Suspension, Rabies Vaccine, Tetracycline Hydrochloride, and Diazepam Tablets) represent approximately 50% of the total program.

While this program holds great promise, it has been plagued by problems. Despite some 17 months of DLA/DPSC negotiations and review a test contract to rotate 100,000 vials of Succinylcholine Chloride Injection was disapproved for numerous technical and legal reasons. It is understood a new effort will be made to establish a contract for Sulfadiazine Silver Cream which is used in the treatment of burns.[37] When this will take place is not presently known.

(5). DPSC stock rotation is available to the respective Military Services but only on an item-by-item basis. This is feasible when the shelf life is relatively long and the DPSC monthly average usage is higher than PWRS requirements.

(6). Utilization of D&D items after the expiration of the labeled shelf life for mobilization purposes is possible. However, holding expired items would require another stability testing program. Based on testing of all 383 items, there would be a minimum expenditure of $15 to $30 million. Compared to the cost of a

rotational replacement program--$18 to $36 million--this program would offer only short term advantages. This program would have no advantages if all shelf lives were contracted at 60 months.

Actually, for certain military unique items there already is a program shelf life extension program. Such items as morphine syrettes, atropine syrettes, 2-PAM chloride autoinjectors, and water purification tablets do not have a definite shelf life and are tested periodically to ensure they continue to meet USP standards. Other items could be included in the program but the FDA has stated that items cannot be used in the general clinical setting. This ruling creates reluctance to include items in this program.38

For the recommendations of the Ferinde Report to be realistically implemented one must have some means of evaluating the various stocking strategies to find those that have the greatest savings potential, i.e., fiscal reality. Hence, the MITRE Corporation of McLean, Virginia, was contracted to develop such a model for the Military Services, DLA and DPSC.

Known as the MITRE Dated and Deteriorative Medical Logistics Model (D&D MLM), the model was designed to compute the costs of alternative procedures or combination of procedures for the purchase and maintenance of expiration dated medical WRMS. It was also designed to contribute to the justification for expenditures on this particular group of WRMS by providing the means to identify cost effective procedures for supplying and maintaining individual items or cost effective combinations of procedures for all the expiration dated medical WRMS items.

Among other things, the model allows for determining the total monies needed to maintain a WRMS supply of specified items. It allows for the exploration of how costs would change if different conditions were in effect.39

Exported to the Military Services and DPSC in 1983, the D&D MLM has languished because of language problems. The program was written primarily in FORTRAN IV which the developer noted was "...reportedly ...resident of equipment available to the intended users."[40] Unfortunately, DPSC--which is responsible for the maintenance of the data base--has no computers compatable with that language. The Defense Logistics Agency Systems Automation Center attempted to reprogram the D&D MLM but has failed. Although it has been recommended that another reprogramming effort be made, to date no contract has been let by DPSC.[41]

The DLA stated, "The Medical Logistics Pricing Model is not a basis which should be used to determine price reasonableness as it only demonstrates that a price savings can be realized, but that the offered price is reasonable by some function of price analysis."[44?] Either the D&D MLM is not capable of doing such an analysis or DLA is not satisfied with the results. Either way, adequate coordination could have assured that the necessary capability would be included in the model if price analysis is as essential as it would appear to be. The ability to implement the cost savings programs discussed above is seriously compromised without an acceptable operating model.

10.Host Nation Support

If medical industrial preparedness planning is insufficient in providing for all that is required in a realistic, time-phased schedule, then assistance may be requested from the host nation. Where the U.S. Military medical organization existing in other host countries is less than adequate for timely combat medical support, then negotiation for host nation support (HNS) may be deemed necessary. Such medical HNS agreements consist of official commitments made by a host nation to provide civil and/or military health support to U.S. Forces under certain prescribed circumstances.

HNS agreements require extensive negotiation and each agreement becomes quite unique. To date, HNS agreements have been sought for direct medical care in existing host nation civilian or military hospitals; for existing buildings to house U.S. military medical facilities; for land suitable for prepositioning materiel; and for other medical logistical support such as interchangeable equipment or supplies.

Over the years, medical HNS agreements had been established either on an informal or formal basis in many countries of interest. Such support, however, became a program of heightened Congressional and DOD concern in 1980. At this time a survey of HNS needs was made and identified a preponderance of HNS needs in the NATO arena. Thus, the survey resulted in the initiation of a number of additional negotiations for support agreements.

The various nations capable of providing direct care from operating hospitals have carefully analyzed their own anticipated military and civilian wartime requirements. Where possible there

have been some agreements to provide a limited degree of interim, short term direct care to U.S. Forces. These arrangements do not provide for sustained medical care nor do they resolve the ultimate requirement for the establishment of U.S. facilities to provide the necessary medical support after a relatively short respite.

In lieu of direct aid, buildings and land have been requested as proposed sites for U.S. facilities. Some arrangements have been negotiated and others are still underway. While these arrangements have substantial value, the U.S. is still required to supply equipment, manpower, security, and even construction in some cases.

In other words, host nation support is an evolving concept with many agreements concluded. However, any success in these efforts does not preclude meeting the overall strategic requirements for adequate medical industrial preparedness planning.42

Conclusion

The purpose of this paper has been to determine what governmental industrial planning and civilian industrial capability are available to enhance our medical combat readiness to support our forces in the event of mobilization. Certainly, after weighing the seminar's findings against the stated objectives of industrial preparedness planning, there are some favorable trends. However, there are many trends which remain unfavorable. It is evident that medical industrial preparedness planning has suffered universally from key inadequacies which seem to continually prevail. Findings and recommendations from many past reports, such as the RAMP study, have

been only partially satisfied at this time. At the highest levels of decision making, there has been admitted, persistent hesitance in committing money, time, and effort to an all-out implementation of the IPPL.

The question is raised as to why it is so difficult to carry through with such "institutionalized" programs. Is it because all resources, all written policies and plans, and all bureaucracies still do not provide the organizational mortar and bricks necessary for ensuring the longevity of an institutionalized program, such as medical industrial preparedness planning?

Historically, the problem with inadequate follow-through of mobilization planning is persistent. About every other decade, the mobilization "wheel" is reinvented. Through all echelons medical mobilization planning has remained constant prey to hidden agendas and political incrementalism. Our incremental planning process still seems to go no further than the next FYDP or the arrival of the next commander. Recurrent reorganization has slowed the resolution of the fundamental problems in planning and funding.

Recent OASD(HA) support, however, has provided the Military Services with a long overdue opportunity to replenish and refurbish neglected medical hardware. To its credit, ASD(HA) has stood out as a central voice of governmental medical authority in support of the Services' Surgeons General. The fact that DEPMEDS has been so successful, a pilot project indicates that a great deal of effort has been orchestrated at several echelons in laying necessary groundwork for a new major system. The development and assemblage of the DEPMEDS

prototype has been a salutory success with credit to the DPSC task force.

Yet there have been repeated reports that the prototype DEPMEDS facility is very bulky, fuel intensive and technically highly sophisticated. There are questions being raised as to whether it is technologically viable in the conventional combat medical support environment of the NATO scenario. The rapid development and fielding of the DEPMEDS prototype may have been too expeditious, serving more short-term goals than long-term goals. As time passes for more organizational reflection the long-term goals will form and take precedence.

In the rush to add "teeth" we cannot forget the requirement to provide a comparable amount of "tail". Not only do we have to provide spare parts and maintenance capability for new hardware, we must provide "spares and repairs" for the operators of the new hardware. The "production time" for operators as well as their "mean time between failures" is totally unpredictable. Despite these shortfalls, they are essential to the use of the hardware we so anxiously are procuring . Appropriate medical support in combat (and peacetime) is a true "force multiplier" in that it permits the return of experienced troops which in turn reduces the requirement for recruiting, outfitting, training, and transporting replacements.

While medical support is part of the "tail", it also has its own "tooth to tail" requirements. As we are building deployable medical systems and contracting with the civil sector for stateside hospital beds to improve our medical readiness capability, we are not

completely stocking the deployable medical systems because of the numerous problems with dated and deteriorative items. In some instances, only 10% of certain drugs are required to be on hand with the balance simply planned for but not stocked. Perhaps even more serious is the lack of funding for some 90% of the OWRM requirement. Without this material, industry does not have adequate D-to-P time to respond to mobilization requirements.

The inadequate D-to-P time problem is compounded by the steady and increasing erosion of the medical industrial base through the importation of raw materials, electrical components, medical diagnostic equipment, and surgical and dental instruments. Our continued use of foreign imports may cost less, but they are often of inferior quality and in many instances are subject to interdiction. The use of "A-16" contracts must be increased. As shown in the discussion material, it is doubtful that the medical industry could immediately surge to meet wartime requirements. While none of the manufactureres visited were at full capacity and no manufacturer was working three shifts, the limitation is personnel and profit driven. It is not a machine/equipment problem. The machine capacity is there. However, since the demand is not, the technicians and other skilled labor is absent. No one can estimate how long it would take to hire and train the personnel needed for a long production surge.

Past performance by the Military Services has shown that funding for well documented shortfalls in medical readiness is easy prey to budget cuts. It is not only the Military Services that are

guilty of neglecting medical shortfalls, DLA continues to allow long known medical OWRM requirements to go unfilled. Although there is a world oil glut, DLA continues to put the major portion of its war reserve funds into strategic petroleum reserves.

Medical industrial preparedness planning is a major activity of all Service and supporting agency echelons. However, throughout the DLA-DMSB-DPSC-DCAS/ASPPO axis there has perceived lack of an authoritarian voice. As a result, questions arise as to the effectiveness of the system in promoting reliable medical industrial preparedness, on the one hand, to substantive standardization, on the other. Any lack of credibility stems from an overall lack of systemic follow-through.

The DMSB is essential to the success of any program of improving our medical readiness posture and should have that "voice of authority". The lack of an appropriate implementing directive perpetuates the appearance of "business as usual" mode of operation noted by the ASD(HA). Without such a directive, it is difficult to determine lines of responsibility and authority. It is difficult to determine where there are problem areas that need correction. It is impossible to determine specific responsibilities, staff requirements and necessary staffing studies.

Inadequate staffing by the services and DLA for industrial preparedness planning is a fundamental problem. While DPSC is well staffed for the DEPMEDS Task Force group, the Medical Materiel Directorate of DPSC needs to address its ability to effectively

interface with DLA and the ASPPO's with the shortage of manpower it has. More manpower is needed.

False hopes still remain among planners in the form of the GAO "inventory myth" and industrial surge capacity. The preceding needs to be replaced by a commitment to solve the dated and deteriorative and disposable stockage problems. Funding of that part of the OWRM and the PWRM requirements represented by D&D items depends to some degree on the demonstrated ability to maintain them at a reasonable cost. While it is presumed that long shelf lives, industrial stock rotation, potency date extension, and potency date expansion are efficacious programs, the ability to demonstrate this fact is compromised by the inability to use the MITRE D&D MLM. Failure to vigorously pursue the correction of this deficiency and to implement the various possible means for ameliorating the cost of maintaining adequate WRMS increases annual costs by millions of dollars and is a major stumbling block to the development of an adequate medical readiness capability.

Industry's unwillingness to seek longer shelf lives for pharmaceuticals (even when the data support applying to the FDA for longer potency dates) and its unwillingness to participate in testing programs to develop the shelf life expansion program appears to be self-serving. It is readily apparent that long shelf lives will mean fewer procurements since items will not have to be replaced as often. Even consideration of longer shelf lives for military use only is rebuffed. Although the firms interviewed stated that the DOD procurements amount to only some two or three percent of their total

business, they are apparently reluctant to do anything that will decrease that percentage.

The FDA's policy of not permitting the use of drugs in the shelf life extension program in routine clinical practice seems to aid and abet industry's lack luster pursuit of longer shelf life. The contradictory policy of permitting the use of a drug in wartime but not in peacetime is wasteful and confusing.

The internecine quarrel between the medical planners and medical providers as to who should bear any increase in the cost of medical support interferes with our ability to improve our overall readiness posture. Peacetime health care cannot be separated from wartime health care. One is simply an extension of the other, peacetime health care serving as the base for building the wartime health care capability. If long shelf life and shelf life expansions means increased costs, they should be borne across the board.

The authority to make suitable substitutions and the ability to determine precedence of filling requisitions are essential if DPSC is to have the capability to meet increased requirements with limited resources. None of the preceding is possible without authorized substitution lists and a Priority Allocation Methodology, neither of which exist.

Industry continues to perceive that government is not serious about industrial mobilization planning. In the medical arena that perception may be reduced by DEPMEDS planning activity and by the ongoing efforts to solve the above stated problems of dated and deteriorative items. The latter,indeed, may help to solve a long

standing chronic problem of disconnection between current peacetime procurement and mobilization planning.

An efficient peacetime industrial base capability requires reduction of production lead times, identification of commercial substitutes, and optimization of the size of initial production facilities. Producibility can be enhanced through manufacturing technology and modernization. There is evidence that the domestic medical industrial base is in need of such enhancements, e.g., pharmaceuticals and surgical instruments.

Surge production capability should result in an approximate doubling within six months. Such capability needs to be specifically studied with regards to all 205 planned medical supply producers. Such questions as "Can these producers do it all? Is a rolling inventory required for other than what is being addressed for dated and deteriorative drug industrial rotation?" need to be asked.

The specific problems in management of the IPPL/DDSIL line items highlight the current threats to a real loss of domestic industrial capacity. This threat is symptomatic of the shifts in the federal trade deficit as well as the federal deficit and the national debt. In order to preserve our mobilization industrial base, more federal dollars will have to be spent to subsidize a "warm medical industrial base" as in the case with tetracycline production. Favored nation status will have to continue to be waived to protect domestic contractual arrangements.

The blood program and field laboratory medicine in general are targets for high changes. As a result of committing DEPMEDS blood

and laboratory services to avant-garde high technology, DEPMEDS and combat medical support will have to pay the price of university/teaching hospital sophistication. That price includes increased operational cost, increased training, increased manpower, increased logistical support, increased medical maintenance support, increased calibration, increased equipment fragility, and increased reliance on electric power with an increased heat signature. The use of frozen blood, autotransfusions, and advanced laboratory equipment such as "state-of-the-art" blood-gas analyzers brings with it a litany of high technology problems.

In the analysis of public expenditure, there is a phenomenon known as non-market failure due to internalities. Such "internalities" are secondary to unleashed internal organizational goals. Such an untoward market failure can be illustrated by public (governmental) budget growth or public technological advance. The latter is often committed in the name of "advanced", "modern", "sophisticated", "next generation", and "high tech" with purposeful disregard for practical feasibility based on sound empirical and experimental observations.43

As a related example, the planners have yet to satisfactorily resolve the logistics problem presented by disposable, plastic supplies. A primary example lies in the proposed implementation of the frozen blood program for field deployment in support of DEPMEDS. Questions are being raised by many military blood bankers of the logistical feasibility and practicality of backing up every unit of frozen red cells with separate plastic bags for washed red cells and

platelets, as well as for plasma. In addition, there is a requirement for a plastic bag of 1.5-2 liters of 0.9% NaCl-glucose-phosphate cell washing solution for each unit of red cells. The saline alone will be a sizable logistical complication to an overburdened system.

Further, there is yet to be an answer as to how an adequate volume of plastic syringes, chest tubes, catheters, wound drains, and intravenous infusion sets are going to be distributed to medical battal.ons on the battlefield. The "basic load" requirement of these disposable items provided to the divisional and corps units has been understated. To support the state-of-the-art medical infrastructure, which has already been institutionalized in the field, the Medical Supply and Optical Maintenance (MEDSOM) will have to repetitively resupply the field units with great quantities of materiel. Due to transportation and supply level realities, there will be a "resupply gap" between the Corps MEDSOM and the divisional units very early in the war.

Consequently, there is a need for review, planning, and providing for adequate amounts of disposable plastic supplies on the battlefield since supplementation by glassware is an option no longer feasible by our domestic industrial base.

With regard to support beyond the pale of industrial preparedness planning, host nation support is a concept to be pursued. Generally speaking, medical HNS is perceived by many as a panacea for a significant amount of our combat medical support needs overseas. The fact is that the only nations capable of providing

state of the art direct support already anticipate that all of their own capabilities will be thoroughly put to their own test in the NATO scenario. Consequently, any HNS agreements promise only to be for the interim short term period, 30 to 60 days at the most. Such agreements are fraught with uncertainty.

Other forms of support such as buildings or land for prepositioning facilities and war reserve materiel stock are not always usable for our purposes. Seldom are they the ideal types of facilities and often are at less than ideal locations requiring increased logistical opportunity costs or increase U.S. expense in refurbishment or new construction.

Host nations do not have U.S. medical support requirements budgeted nor are they likely to in the future. If the U.S. demands a contribution from the host nation for medical support, then some other host nation defense capability is denigrated. When a respective host nation's equivalent of Congress learns that its own military is "giving away" medical support assets, it becomes time for cutting the medical support budget or the funds that they might use from the very funds the U.S. has already given in the form of military foreign aid. While the concept of host nation support is laudable, in reality it is quite limited in scope.

Recommendations

Further erosion of the medical industrial base must be prevented. Although it may mean some increase in cost, it is condsidered essential that foreign imports be reduced. Increased use

of the provisions of 10 U.S. Code 2340(a)(16) should be encouraged at every opportunity. Undoubtedly such a move will be looked upon by foreign suppliers as protectionistic; however, it is essential if we are to maintain a viable medical industrial base, particularly in the areas of pharmaceuticals, medical instrument forgings, and finished medical instruments.

If a clear road map of authority and responsibility is to be established, then the implementing directive for the DMSB must be developed and promulgated. If the Military Services are unable to develop such a directive, then it may be necessary for the OASD(HA) to develop a DOD instruction which will expand the policy directive to establishing the DMSB. Along with this, consideration could be given to establishing the DMSB as a field activity under the control of the ASD(HA) if the Military Services cannot reach agreement on how it should operate. Another 11-year wait is unconscionable. In either event, there is a need for a thorough staffing review since it is believed that if the DMSB is to carry out all of the activities of its charter it will require additional staff.

The MITRE D&D MLM is essential to the development of effective stocking strategies required to maintain war reserve stocks at a minimum cost. The DPSC needs to vigorously pursue correcting the model's deficiencies. This should be done in concert with its parent DLA to ensure that the model meets its requirements and is written in the proper program language and that the expectations of all concerned are met. Consideration should be given to contracting with the MITRE Corporation to make these corrections since, as the

original developer, it is most familiar with the intracacies of the model.

The OASD(HA) should request that ASD/Manpower, Reserve Affairs, and Logistics (ASD(MRA&L)) review the present policy of WRMS funding to determine if it is possible to begin to shift some funding to the procurement of stocks to meet the OWRMS requirement. Such a program could begin with those items that do not have expiration dates.

The OASD(HA), in concert with the ASD(MRA&L), should request the FDA to review its policy of excluding drugs in the shelf life extension program from use in routine clinical practice. Dropping the exclusion could permit the inclusion of additional drugs into this program with their rotation into clinical practice if required.

The Surgeons General of the Military Services should issue a policy statement regarding the subject of any increase in the cost of items incurred in the improvement of our wartime medical readiness posture. The statement should advise that we all share in the cost of being prepared for war.

The OASD(HA) should continue to review Military Service programs to ensure that procurement of deployable medical systems continues on the present schedule and is not delayed any further. In the event the Military Services seek to delay procurements, consideration should be given to a requirement for the funds to be fenced for each procurement. Alternatively, consideration could be given to the establishment of a joint procurement office funded to complete the procurement of the deployable systems.

The Surgeons General of the Military Services should insure that the design of the deployable medical systems is not so technologically sophisticated as to be nonfeasible or nonviable in the combat environment, especially from an operator and logistical support standpoint.

A joint DLA/DPSC/DMBS task force should be established to develop the necessary methodologies for implementing the proposed cost-saving programs. It is believed that if it can be demonstrated that stocking of dated and deteriorative items can be done efficiently, the probability of funding the requirement is enhanced considerably.

A joint JCS/Military Services/DPSC/DMSB task force should be established to develop the procedures for implementation of the revised Priority Allocation Methodology program upon completion of the WINTEX/CIMEX 85 trial. Until such time as adequate WRMS is available, this type of program seems to offer the only means of assuring that those with the greatest need will have priority treatment.

The Pharmaceutical Manufacturers Association should be brought up to date with our problems regarding dated and deteriorative items in WRMS with a view toward soliciting their assistance in encouraging readiness which will in turn improve their ability to meet our expanded requirements in the event of mobilization.

Both the Pharmaceutical Manufacturers Association and the Health Care Equipment Manufacturers Association should lobby for increased

use of provisions of 10 U.S. Code 2340(a)(16) to preserve the domestic medical industrial base.

In summation, this report provides an overview of medical industrial preparedness planning as reflected by the current state of our military medical system and national medical industry. Major medical support systems are addressed and explained in relationship to the required equipment and supplies as perceived for the NATO scenario. Current data are presented. Inferences and recommendations are offered.

CHAPTER V

TRANSPORTATION

Introduction

"Can the Department of Defense (DOD) meet the intra- and intertheater evacuation requirements anticipated in the European Scenario given a 15-day evacuation policy?" This is a legitimate and most significant question. As previously stated, a war in Europe will result in large numbers of casualties being returned to the Continental United States (CONUS) daily. This chapter accesses the evacuation requirements and the ability of the DOD to evacuate patients throughout the chain of evacuation. It will focus on the civilian and military lift capabilities available.

However, to be able to answer this question, one must (1) define the number of casualties; (2) examine the current DOD strategic lift assets; and (3) identify any potential chokepoints that may prevent or limit the evacuation of casualties. Only then can recommendations be prepared for DOD to consider when evaluating problem areas as defined in this paper.

Background

The European or NATO scenario is used as a base line for this study analysis in part because of its familiarity to military

planners and in part because Europe is deemed the first priority in the event of global conflict. Any NATO conflict will create a situation in which theater hospitalization capability during the early time frames will only be able to perform resuscitative care for the wounded in action. The current DOD programmed theater evacuation policy of a minimum of 15 days will result in large numbers of patients being evacuated from theater. This policy (established by the Secretary of Defense with the advice of the Joint Chiefs of Staff [JCS] and the theater commander) establishes the maximum number of days that medical and surgical patients may be held within the theater for treatment, in other words, the maximum number of noneffective days in theater. It does not mean that a patient will be held in theater for the entire period of noneffectiveness before being evacuated. In fact, a patient who is not expected to be ready to return to duty within the number of days stated in the evacuation policy will be evacuated to a more rearward area as soon as the treating physicians determine that such a move would not be detrimental to the patient's overall health. The evacuation policy is not a substitute for clinical judgment in the management of individual patients. The ultimate destination for the most critical patients is CONUS. The large number of patients anticipated by all mobilization planners will create a surge throughout the entire chain of medical evacuation. All medical mobilization studies have clearly demonstrated numerous deficiencies in all facets of the evacuation system.

The current DOD mandated 15-day intertheater evacuation policy has certain unavoidable implications for strategic lift requirements. Such a policy places a greater reliance on intertheater aeromedical evacuation because of the limited hospital beds needed in theater. The shorter the policy the fewer beds needed in theater. The longer the evacuation policy the more in theater beds needed and the le s strategic air lift requirements.

Appendix D discusses the chain of casualty evacuation in more detail than will be presented here. The Army has the responsibility for evacuation of casualties from within the combat zone. The Air Force provides tactical aeromedical evacuation from the combat zone to the COMMZ and Zone of Interior. All Air Force tactical and strategic evacuations are accomplished by aircraft in a retrograde mode. Additionally, the Air Force Military Airlift Command (MAC) provides aeromedical evacuations in CONUS for all Services using C-9A aircraft, an aircraft which is exclusively devoted to CONUS aeromedical evacuations.

Assumptions/Questions

As this portion of the study was approached, several assumptions and questions were raised to guide inquiries in this area. The assumptions are as follows:

* The United States would be engaged in full mobilization in a war which did not involve an attack on United States territory;

* The Armed Services Medical Regulating Office (ASMRO) would regulate the flow of patients from the theater of operation to CONUS metropolitan areas where DOD

facilities would be available (Military hospital, CMCHS, and VA facilities);

* Peak casualties would occur within the first 30 days of the war when the need for strategic lift is greatest to project military assets into the theater of operation.

Areas of concern and questions proposed prior to the study were as follows:

* Sufficient retrograde C-141 aircraft may not be available in the quantity and frequency required for aeromedical evacuation;

* A cargo backhaul penalty may be generated by C-141 aeromedical evacuation missions during surge operations, i.e., the use of C-141 aircraft for aeromedical evacuations may significantly affect the forward deployment schedule of men and equipment;

* Sufficient C-9A aircraft will not be available for the quantity, frequency, and destinations required for the movement of the anticipated numbers of patients from the Aeromedical Staging Facilities to other CONUS facilities.

Discussion

US Army

Modern warfare has generated the requirement for a well-defined and reliable system for evacuating patients over long distances. Long hauls of patients between field sites and divisional medical units to Corps and COMMZ hospitals occur daily. Medical regulators must depend upon the current dedicated air and ground medical evacuation assets in theater to perform these missions. Although patients are regulated to make maximum use of fixed-wing aircraft (as well as helicopters), utilization of fixed-wing aircraft is contingent upon airfield construction, runway length and aircraft availability. Since it is not probable that medical facilities will

be moved to the airfield or that the airfield will be constructed next to the hospital, other Army helicopters not dedicated to medical could provide the service, if available. However, Army helicopters not specifically designated as medical evacuation helicopters are not prepared for (nor do they carry) the necessary equipment to transport patients. Although CH-47 Chinook helicopters have been used in urgent mass casualty situations, they are not routinely used because priority is given to the Chinook's primary tactical support mission. Further, non-medical helicopters used in previous conflicts have not supported the needs of the Army Medical Service in a timely manner. Even urgent medical requirements are often not met in a timely manner due to previously scheduled tactical and tactical support missions.1

The number of beds in theater directly affects the theater evacuation requirements. Currently there is a considerable shortfall of beds in theater to support the programmed 15-day evacuation policy. However, the Army has made significant progress toward standardization and procurement of deployable medical resources. There has been a total redesign of the medical support provided to the combat zone. Although progress has been made, the Army still has shortfalls in meeting their wartime medical requirements. Key initiatives that remain are:

1. Reoganization of the combat zone medical delivery system which would include a medical evacuation battalion consisting of air and ground assets for patient evacuation;

2. Modernization and replacement of outdated field medical equipment;

3. Enhancement of reserve components' readiness.

With respect to these initiatives, the Army is aggressively pursuing the reorganization of its field medical delivery system. An intregal part of this reorganization is the conversion of combat zone hospitals to enhance their flexibility, deployability and sustainability. By the end of 1984, seven active and five Reserve Component combat support hospitals will be converted to either Mobile Army Surgical Hospitals (MASH) or evacuation hospitals. By FY 1985, two more reserve component hospitals will be converted to a MASH. These conversions will significantly increase the surgical intensive care capability in the combat zone.[2] Even with these initiatives there remains a considerable shortage of hospital beds in the European theater. This shortage causes three things to occur. First, patients must be evacuated as soon as possible to provide additional space for other arriving patients. Second, this over-evacuation of patients decreases the number of soldiers who could be returned to duty, which then maximizes a commander's need for inexperienced replacements which decreases the command's potential for future combat. Third, the need to evacuate patients early maximizes the evacuation requirements which severely impedes evacuation due to a critical shortage of air and ground evacuation vehicles in theater.[3]

The availability of adequate numbers of Army air ambulances and their utilization in all areas of the theater of operations heavily influences bed utilization and the success of the total evacuation and treatment system. Currently, only one air ambulance company and four air ambulance detachment--totaling 49 air ambulances--are forward deployed. Four ground ambulance companies are forward

deployed to support the U.S. V and VII Corps. The COMMZ has zero evacuation capability, yet, COMMZ has the responsibility to evacuate patients from the Corps as well as within the COMMZ.

Over 70% of the Army's air ambulance assets are in the Reserve Components. Peak casualties are projected to occur within the first 5-30 days of the war, thus it is not possible with the current shortages in strategic aircraft and the time involved to transport bulk cargo, such as helicopters, via ship to meet the peak evacuation requirements. The bottom line is insufficient air and ground evacuation assets in theater to support the peak predicted evacuation requirements in the early stages of a European war. Further, with the shortage in strategic lift, the evacuation capability programmed will probably not arrive in theater soon enough to close the gap between patient evacuation requirements and capability. Figure 1,

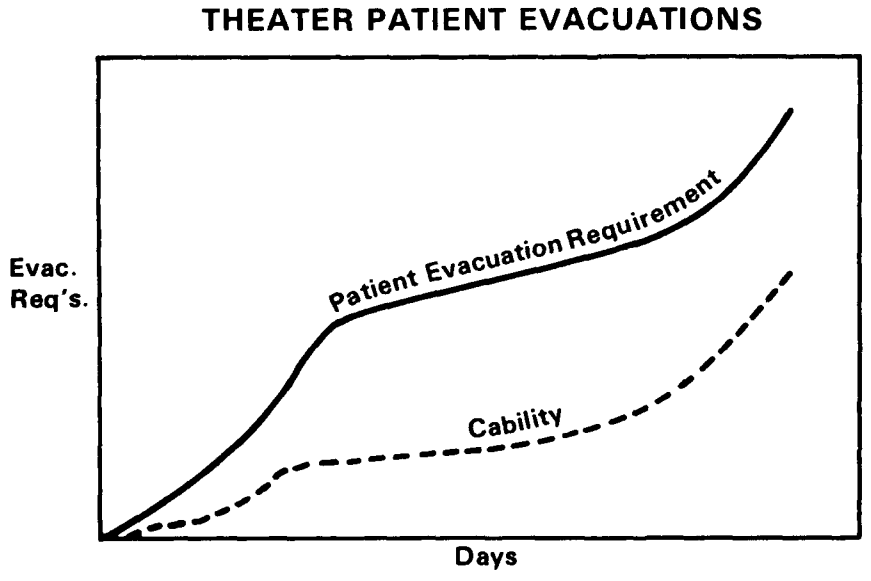


Figure One
(**Source**: 7th, Medical Command; Europe briefing, 28 January 1985.)

simply indicates that the theater evacuation requirements increases rapidly while there is a considerable shortage in theater evacuation capability as well as programmed theater evacuation capability.

The Services must continue to improve their abilities for a rapid evacuation of the patient from as far forward as the tactical situation permits, emergency resuscitative treatment en route, and effective routing of the patient to the physician and hospital most capable of providing the treatment needed. This is essential if mortality and morbidity are to be reduced. "Getting the casualty and the physician together is the keystone of the practice of combat medicine."[4]

US Air Force

Today the United States Armed Forces do not have sufficient intertheater nor intratheater evacuation resources to support the current force structure. At the present time, plans call for meeting the NATO 10 Division D-Day requirement within ten days of the time the reinforcing order is issued.[5] Even while these units are being deployed, the mobility system must began to prepare for movement of follow-on units and tons of supplies. When contemplated in the context of a one and one-half wars scenario or several wars on multiple fronts, it is apparent that one can only hyperbolize the lift requirements. The movement of a Rapid Deployment Force (RDF) of three divisions to the Middle East demands more strategic lift surge than the European scenario. This is because of the shortfall in all categories of cargo capacity, lack of POMCUS equipment and distance.[6]

To transport one 500-bed hospital to a selected overseas location takes 32 C-141 aircraft.[7] Thus it is apparent that the U.S. cannot meet the cumulative strategic lift requirements of a NATO/Persian Gulf scenario as they build up over time, as shown in Figure 2.

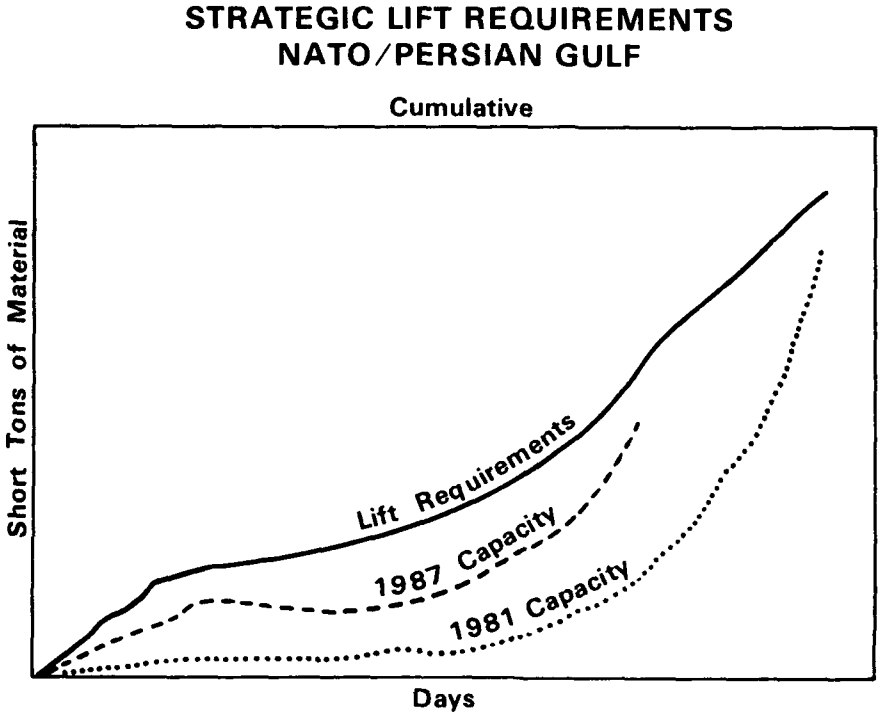


Figure Two

*(**Source**: U.S. Congress, House Committee on Armed Services, Department of Defense Authorization for Appropriations for Fiscal Year 1982, and Department of Defense Supplemental Authorization for Appropriations for Fiscal Year 1981, Hearings before the House Armed Services Committee on H. R. 2970 (H.R. 3519) and H.R. 2614, pt. 4, 97th. Cong., 1st. Sess., 1981, p. 94-95.)*

To compound this problem, the current 15-day European theater evacuation policy would require a daily evacuation to CONUS of 3,000 to 5,000 patients per day,[8] which may significantly affect the forward deployment schedule of men and equipment by generating a large C-141 retrograde requirement. Figure 2 does not take into

account the C-141 retrograde requirement to evacuate patients to CONUS.

At present, the MAC intertheater operational force consists of 70 C-5As and 234 C-141B aircraft. In time of crisis, this fleet is augmented by the Civil Reserve Air Fleet (CRAF) which would provide some 454 aircraft phased in over time. The CRAF aircraft are cargo and passenger aircraft which do not have a litter capability. CRAF will be addressed in the following section of this chapter. Returning to the Air Force assets, the C-141B, which can carry 200 ground troops or 103 litter patients is the only aircraft that is normally used for intertheater aeromedical evacuations. The C-5A or the KC-10 (tanker) does not have a litter capability. However, the C-5A can carry 340 troops which in a surge situation could be used to carry ambulatory patients. However, because of crew limitations and shortages in spare parts, the current C-5A and C-141 aircraft can meet only 62% of the anticipated surge requirements and 57% of the sustained flying hour objectives for the current fleet.[9] The C-130, which can carry 92 troops or 74 litter patients, is normally used for intratheater aeromedical evacuations.[10]

A 1982 Wartime Strategic/Domestic Aeromedical Evacuation Study concluded that the strategic forward deployment schedule of C-141 aircraft would be disrupted by intertheater aeromedical evacuation requirements; that the use and availability of retrograde C-141 aircraft for aeromedical evacuation would be affected by other priority retrograde movements; and that large numbers of litter

patients would further compound these problems as well as adversely impact on MAC's intertheater aeromedical evacuation operations.

The preceding all support the concern we expressed as we started, that sufficient retrograde C-141 aircraft will not be available in the quantity and frequency required for effective aeromedical evacuation to CONUS.

CRAF

As we have demonstrated, the evacuation of casualties from the theater and distribution within CONUS will overload the current military aeromedical evacuation system. An untapped resource that does not seem to be integrated into the overall concept of medical evacuation is the use of the Civil Reserve Air Fleet (CRAF).

The CRAF program is designed to provide the Department of Defense (DOD) with commercial aircraft to augment military aircraft during peacetime and wartime. Established in 1952, CRAF is composed of civil air carriers that contract not only their aircraft but also their operating and support personnel and facilities. The program is economically feasible because it provides DOD with emergency airlift capability without buying the aircraft, paying personnel costs or flying and maintaining aircraft during peacetime.[11] The CRAF program is managed by the Military Airlift Command (MAC).

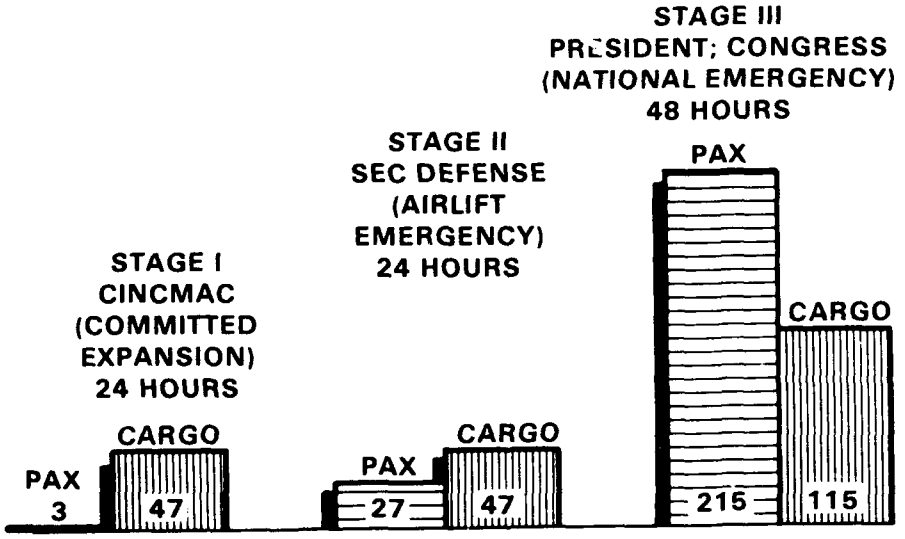
The meeting of airlift requirements for any contingency is the responsibility of MAC. These requirements will be met by MAC's organic resources and CRAF. As stated earlier, the Military Airlift Command operational force consists of 70 C-5As and 234 C-141Bs. In time of crisis this fleet is reinforced by the Civil Reserve Air

Fleet which can provide some 430 aircraft phased in over time.(See Figure 3)[12]

CRAF aircraft can be activated in three stages based upon the contingency requirements. The stages are as follows:

> Stage I, Committed Expansion. This stage is used for meeting increased peacetime airlift commitment. The Commander in Chief or MAC may activate up to 50 aircraft in this stage.
>
> Stage II, Airlift Emergency. Additional aircraft are needed to meet minor contingencies. The Secretary of Defense can call up 74 additional aircraft in this phase.
>
> Stage III, National Emergency. All 454 CRAF aircraft are needed to meet the requirements of a national emergency. The President, after declaring a national emergency, can authorize 330 additional aircraft to be called up during this stage.

CRAF LONG-RANGE AIRCRAFT CONTRIBUTION



(**Source**: "Strategic Mobility, Can we Get There From Here in Time?", AUSA, Special Report, 1984, p. 11.)

Figure 3

Extensive utilization of CRAF should be planned for in both strategic and domestic evacuation plans. Currently there are approximately 54,000 seats available in the CRAF program. Assuming a breakout of 40% ambulatory and 60% litter patients, as many as 2,000 ambulatory patients per day could be strategically evacuated and further evacuated to CONUS.

The domestic aeroevacuation capability of MAC is minimum. There are 11 C-9's in CONUS. The normal configuration of these aircraft is 6 litter and 34 ambulatory during peacetime. These planes could be configured to carry 24 litter and 15 ambulatory patients during contingencies. The evacuation of 3,000 to 5,000 patients per day from the war theater will quickly overload the capability of the 11 C-9's. A fully integrated system using CRAF assets will significantly reduce domestic aeromedical shortfalls. Maximum effort must be made to regulate the evacuation of litter patients to those areas in CONUS that have the greatest capacity for off-loading and treating litter patients. Such facilities should ideally be located where ground transportation assets could easily be used. It is recognized that the military situation, backhaul destinations of C-141's and medical conditions of patients will dictate that an extensive number of patients will have to be moved further by air once unloaded at the initial CONUS aerial ports of entry. The coordination of patient destinations and utilization of CRAF could reduce the problems of evacuation. However, a system has not been designed where there are dedicated CRAF aircraft to evacuate medical

patients from the theater to CONUS nor do CRAF aircraft participate in the redistribution of patients once they arrive in CONUS.

CONUS Distribution and Redistribution

The evacuation of patients must be planned for from the Forward line of Troops (FLOT) to the final destination in CONUS. While there has been much planning and work on the evacuation of patients to CONUS, there still remains significant work to be done on the distribution of patients within CONUS. In February 1983, the Office of the Joint Chief of Staff tasked Headquarters, Military Airlift Command, to conduct a study on the distribution and redistribution of patients within CONUS. The study was to be completed by December 1983. However, the study has yet to be completed. The latest suspense for the completion of the study is now June 1985. Discussions with representatives from the MAC surgeons office, HQ MAC, raise serious doubts as to whether the study will be completed by the revised suspense date. The reason for the delays (as explained by MAC) is that not all of the services have provided the validated number of patients to be evacuated by time frame from the theater. The completion of this study is an essential link to ensure the proper management of patients, which includes patient treatment and patient evacuation. Patient evacuation has two sub-elements, medical regulating and means of movement.

Currently a hub/spoke concept has been developed for the distribution and redistribution of patients within CONUS. The hub will be the various locations which patients will be evacuated to from the theater. The spoke portion of the concept is that the

coordinating military hospital (hub) will designate at the aerial ports of entry which CONUS hospitals the patients will be further evacuated to (spoke). The redistribution hospitals include CMCHS hospitals, VA hospitals and military hospitals.

However, in discussions with representatives from the Armed Services Medical Regulation Office (ASMRO) they expressed concern that they had never fully exercised the system. Using the planning factor that a 15-day theater medical evacuation policy for a conventional war in Europe would generate between 3,000--5,000 patients to be evacuated per day to CONUS, MAC plans for the mix of patients to be evacuated from theater to be 40% ambulatory and 60% litter. ASMRO representatives have never been given a maximum number of patients that will be evacuated per day. It became evident during discussions with ASMRO and MAC that additional coordination is required between ASMRO and MAC to insure that patients are properly and effectively moved during any contingency mission.

US Navy

The subject of strategic sealift evacuation of casualties from any theater takes a back seat to strategic airlift due to the "rapid response" capability of aircraft versus ships. Currently, DOD does not plan to evacuate casualties from any combat zone to CONUS using sealift. Consequently, the Navy has paid little attention to the requirement of transporting casualties by sea. Instead, the Navy has concentrated on increasing its medical readiness at sea. At present, a 1,000 bed Rapidly Deployable Medical Facility (RDMF) is on station in the Indian Ocean in support of the U.S. Central Command. The

staff members needed for these hospitals are identified but not deployed on board. Additionally, Amphibious Assault Ships (LHAs) (general purpose) and Amphibious Assault Ships (LPHs) (helicopter) have been augmented with medical supply blocks. The personnel to support this effort are assigned to Mobile Medical Augmentation Readiness Teams (MMARTs) which are kept on a rotating 48-hour alert at their parent medical facilities.

Two hospital ships, each with 12 operating rooms and 1,000 patient-care beds are under conversion and will be operational within the next three years. These ships will be maintained in reduced operating status ready to deploy in 5 days. One will be stationed on each coast. They will provide a highly versatile and mobile capability to respond rapidly to the area of greatest need.

Evacuation of casualties from shore to ship is a secondary mission of all navy and marine helicopters and landing craft. It is beyond the scope of this study to determine the adequacy of the Navy and Marine Corps evacuation requirements. There should be a concurrent evaluation of the Navy and Marine Corps evacuation needs as well as detailed look at the strategic sealift evacuation requirements in concert with the strategic airlift requirements.

Host Nation Support

In Europe, the Army Medical Department's initiative has been to reduce the evacuation and hospitalization shortfall through the use of Host Nation Support (HNS) Agreements. The ground evacuation capability will be significantly improved by the planned use of German bus ambulance battalions and ambulance trains. While HNS and

mutual support agreements must continue to be pursued, it must be stressed that the assistance offered to date has only minimal impact on the overall evacuation requirements. Furthermore, there is no way to control the quality of the care that may be offered. HNS agreements must not be looked at as the solution to our medical readiness problems in Europe or any other part of the world.

Conclusions and Recommendations

At present the Department of Defense lacks the inter- and intratheater medical evacuation capability as well as the domestic capability to successfully accomplish its wartime medical support mission. It is obvious from the observations made during this seminar as well as the extensive testimony before Congressional Committees that neither the lift capability nor the equipment to meet a large contingency mission is available. The needs of a large and fast-moving war scenario will not be met. The industrial capacity to build the number of airframes required to meet DOD requirements is not the limiting factor. Rather, the DOD budget and priorities within the budget are the limiting factors. Existing medical units will have to bear the brunt of large patient evacuation loads that will result from today's sophisticated weapons' technology and the anticipated intense combat. With this in mind, the following recommendations are made:

1. Program additional air and ground ambulances through the POM process to support the combat zone evacuation requirements.

2. POMCUS sufficient ground ambulance assets in the theater of operation to meet a 15-day evacuation policy.

3. Deploy Active and Reserve Component medical evacuation assets earlier from CONUS to theater.

4. Procure additional air ambulance assets with greater patient evacuation capability that could self deploy and support the corps evacuation requirement, e.g., the JVX aircraft.

5. Develop a comprehensive intertheater evacuation distribution strategy utilizing CRAF and DOD strategic airlift assets.

6. Develop a comprehensive CONUS evacuation distribution strategy and plan utilizing military C-9 aircraft and CRAF to evacuate patients from CONUS aerial ports of entry to airfields supporting military, VA, and CMCHS hospital facilities.

7. DOD modify the CRAF program to utilize civilian aircraft for intertheater evacuation and domestic redistribution of litter patients. The aircraft would have to be modified to accept litter patients.

8. Develop a joint standardized plan for identifying likely modes of transportation by which patients would be transported from airheads to military, CMCHS, and VA hospitals.

9. DOD contract with metropolitan bus companies to modify existing buses or build new buses designed to carry litter patients. To do this, a tracking system similar to the CRAF program would have to also be developed.

10. Develop a closer working relationship between ASMRO and MAC. The capability of MAC and ASMRO to regulate 3,000 to 5,000 patients per day over an extended period of time must be tested.

11. Increased emphasis must be placed on the completion of the JCS Study on CONUS distribution/redistribution of patients.

CHAPTER VI

PREVENTIVE MEDICINE

"An army that does not suffer from 100 diseases
is said to be of certain victory" Sun Tzu

Introduction

The purpose of this chapter is: (1) to identify preventive medicine as being a vital and integral part of overall medical resource mobilization; (2) to look at an expanded concept of preventive medicine in terms of providing support and guidance to military commands; (3) to discuss critical issues affecting current operational readiness and force sustainability; (4) to look at what issues may need support from the civilian community in the event there is a mobilization; and (5) to recommend actions to improve preventive medicine strategies in support of military readiness and various contingency requirements.

The major emphasis of this chapter will deal with the more traditional concerns of preventive medical personnel. However, it is suggested that military medical personnel should recognize their role as preventive medical personnel in the broadest sense of the term. Given the scenarios discussed elsewhere in this paper, one can see that every preventable illness and non-combat injury will be potentially significant.

Background

As opposed to therapeutic or clinical medicine which involves the diagnosis and therapy of damage already done, preventive medicine is the prevention of disease and injury. Compared to clinical medicine, preventive medicine is more community oriented, much less personalized and is relatively inexpensive. Military preventive medicine is based on the broad application of the principles of disease prevention to military conditions. Preventive medicine programs in the military range from water supply and purification, sewage treatment and disposal, chemoprophylaxis, prevention of injury to heat, cold and altitude, communicable disease control to mosquito control. To be effective, however, military preventive medicine requires the complete endorsement and support of the combat commander.

Medical and military historians have repeatedly documented the devastating effect that infectious and parasitic diseases have had on military units. As in the past, military leaders, senior medical officers and military planners often do not fully appreciate the potential threat these diseases present. Add to this traditional view of preventive medicine the preventable problems of environmental trauma, time zone effects, and non-combat trauma due to ignored safety regulations and the contribution of the experienced preventive medicine personnel is substantial. In fact, the Assistant Secretary of Defense for Health Affairs recently stated that preventive medicine efforts are "...critical to our readiness mission, because

disease and non-battle injuries are the greatest source of casualties in wartime, particularly in remote and unfamiliar areas of the world."1

There is, in fact, an alarming resurgence in communicable disease problems throughout the world. Our deployed forces are increasingly threatened by diseases such as dysentary, malaria, dengue, schistosomiasis, leishmaniasis and many others. That threat is greater now than possibly at any other time in recent history. For example, infectious diseases are considered to be a significant threat to CENTCOM forces (based on the projected scenarios for its deployment). In Southwest Asia, attack rates of 1 to 2 cases of malaria per man per year may result under sustained operations. At 30 days convalescence per case, the military manpower requirement could be increased by 8-17% (not counting the need for additional medical personnel and supplies to treat the cases). In East Africa, the situation becomes potentially more serious because of a higher incidence in the disease and an increase in drug resistance.[2] Of equal concern are those diseases which have short incubation periods and a high epidemic potential such as sandfly fever, Rift Valley fever, dengue and diarrheal disease. Few field commanders are aware that exposure to these diseases could severely disable their combat units within the first seven days of action. In fact, the disease casualties alone may approach 50% or more in deployed forces operating in areas endemic for these diseases.

During combat operations, casualties may result from hostile action, disease or non-battle injuries. In contrast to those killed

(KIA) or wounded in action (WIA) are those removed from action by diseases and non-battle injuries (DNBI). Military commanders, planners, and medical officers tend to focus on "casualties" as primarily those losses incurred by direct hostile action. Yet diseases and non-battle injuries have had devastating affects on military operations throughout history. The DNBI category can be broken down into the following four subgroups:3

1. Non-battle injuries such as heat or cold injuries;
2. Infectious and non-infectious diseases such as altitude sickness;
3. Female specific disorders; and
4. Battle stress reactions.

DNBI's have far outnumbered battle casualties in all wars involving the United States with diseases such as malaria, dengue, dysentaries, respiratory infections and others accounting for casualties ranging from 10 to 100 times higher than battle casualties. Vietnam was no exception where 80% of all hospital admissions of US Army personnel were DNBI's.[3] During WW I Navy and Marine Corps admissions for DNBI's were higher than combat casualties by a ratio of 16:1.[4] From 1942-1945, US Army forces sustained over 16.7 million casualties. Over 14 million were disease casualties compared to 0.6 million battle casualties. The former accounted for over 266 million noneffective days or about 70% of all the noneffective days tabulated.[5] In Korea, DNBI's accounted for 82.4% of the 443,163 US Army personnel admissions.[3] During a three- month period at the end of 1965 in Vietnam, a brigade of the 1st Cavalry Division (Air Mobile) suffered 712 battle casualties and 2,126

infectious disease casualties (70% from malaria). This resulted in 48,810 noneffective man-days lost due to disease, which was nearly four times that from battle casualties.[5] During 1968 in Vietnam, 750,000 noneffective days were lost to infectious diseases alone, representing 66% of all U.S. military casualties.[5]

More recent experiences are also of interest. Between 1976 and 1982 several outbreaks of geohelminthiasis occurred among US Forces training at the Jungle Operations Training Center at Fort Sherman, Panama.[6] At the same location in 1984, 16 cases of suspected leishmaniasis were found in mortar platoons of a Puerto Rico National Guard battalion. The soldiers were apparently exposed to the disease while at the mortar firing range. The attack rate for those in the area was 26%.[7] Finally, considerable morbidity and loss of fighting strength due to cold injury occurred in British troops serving in the Falkland Islands campaign in 1982 due to the lack of a good prevention program. An attack rate of 20-30% was reported in the two battalions studied.[8]

Diseases and nonbattle injuries are generally preventable. Effective preventive medicine programs and strategies can eliminate or at least decrease the devastating effect that DNBIs can have on force effectiveness and overall medical workload. For example, during 1958, the gross admission rates for disease in the United States forces in Beirut, Lebanon, approached 1,000 per 1,000 per annum. Fifty percent of that number were gastrointestinal diseases.[2] In 1978, more than 10% of the French Peace-Keeping Forces in Lebanon were affected by Hepatitis A.[9] During the 1982-84 operations in

Lebanon, only 2% of the Marine Corps forces ashore were affected by enteric disease despite the severe unsanitary conditions encountered. The significantly lower morbidity was a result of the on-site presence of Navy preventive medicine teams. Such teams were not there in 1958.

The concentration of large numbers of raw recruits in close quarters is always a source of problems. The potential for epidemics of respiratory disease and meningitis is always higher in such environments. Similarly, forces in garrison are more susceptable to hepatitis, sexually transmitted diseases and enteric diseases. In peacetime such occurrences are a significant burden to medical and frequently require prolonged convalescent care. These problems and their concomitant effect upon combat readiness will only be intensified during a mobilization. The time to plan to prevent them is now.

A sound preventive medicine platform can significantly limit DNBI rates from infectious disease and conserve vital fighting strength. In addition, medical treatment and evacuation requirements can be reduced along with the allocation of resources necessary to sustain a medical support force. Our current military preventive medicine programs and assets cannot, however, support a wide range of military contingencies, be they limited operations to full scale mobilization. Of special concern are deficiencies found in a number of critical areas, including preventive medicine staffing, training, organization, support planning, Research and Development (R&D), medical intelligence and others.

Discussion

The following discusses current preventive medicine program deficiencies and issues which impact in a negative manner upon our current force readiness and sustainability. The material is not presented in a prioritized manner.

1. Organizational Structure.

US Navy preventive medicine organizations for combat support include Preventive Medicine Sections which are organic to the Medical Battalion of each US Marine Corps Field Service Support Group and preventive medicine Mobile Medical Augmentation Readiness Teams (MMART). The latter are task-organized, specialty teams designed to rapidly augment operating forces in support of limited military operations, disaster relief efforts and field exercises. In contrast, the US Army preventive medicine organizational structure is obsolete and cannot meet present operational requirements. Current preventive medicine units are configured after those used in Vietnam and balanced support capability is available only when a large force package is deployed. Smaller, more mobile, field units are required to support a variety of contingency requirements, large or small.10 The Army is currently pursuing the development of "LX Teams" which can provide highly mobile and more flexible support which is required by joint service and small force contingency operations.[11] In the USAF, preventive medicine support is provided by environmental health and bio-environmental engineering personnel assigned to Air Transportable Hospitals (ATH) and Clinics (ATC). These mobile

medical facilities are deployable with squadron and wing-sized Air Force units to bare-base locations worldwide.12

A need has also been identified for a joint preventive medicine service team for deployment in support of unified command and other joint service operations.10

2. Manpower Resources.

There are four Navy Environmental and Preventive Medicine Units (EPMU) throughout the world. During mobilization, these units would be backfilled by one or more of the eight Reserve EMPU's, the latter belong to the Navy Medical Command and have five officer and 20 enlisted billets each. While the billets match the needs of the active duty units, the skills composition of the onboard personnel do not. This is especially true for the enlisted members which seldom have the Navy Enlisted Classification code (NEC) for Preventive Medicine Technicians (8432) or Laboratory Technicians (8501/8506) but rather are General Duty Hospital Corpsmen with an interest in preventive medicine. The reserve officer billets are filled by preventive medicine types but not necessarily with the correct billet-skill match. As currently manned, the reserve EMPU's cannot effectively backfill the active duty units. A policy decision needs to be made, therefore, to determine whether the active duty EMPU's should be backfilled with active duty augmentees or retired personnel. A third alternative would be to establish new Navy NEC's and make the billets generalist in nature with specific training requirements for each.13

Similar problems are also faced by the US Army since a majority of its preventive medicine units are in the Reserve component.[11] With the Air Force, a short-fall occurs at the host unit since the ATH's and ATC's are mobilized using personnel assigned to active medical treatment facilities in CONUS and overseas.[12]

3. Training Requirements

During February 1984, a US Central Command Joint Services Infectious Disease ad hoc Advisory Group Workshop was held to address the major infectious disease risks confronting the US Central Command. The number one priority identified by this group was the need for greater emphasis on individual and unit training in basic field sanitation and personal protection. As reported from the Workshop:

> A common observation in joint field exercises is a general lack of emphasis on the practice of basic field sanitation. There is general inattention to such fundamental requirements as proper construction and maintenance of latrines, provisions of handwashing facilities, systematic mess inspections, adequate treatment and quality control of field water supplies, and solid waste disposal. In some instances, field sanitation teams are neither identified nor employed. Similarly, individuals frequently do not understand the importance of rigorous implementation of personal protective measures as a first-line defense against communicable diseases. For example, it cannot be assumed that personnel will automatically understand the importance of taking malaria chemoprophylaxis, avoiding unauthorized sources of food and water, and avoiding unnecessary exposure to fresh water where schistosomiasis is a threat. These identified deficiencies often reflect a lack of unit and individual training in the principles of field sanitation and preventive medicine and require increased emphasis at all levels of command.[10]

Specifically, field sanitation practices and training in human waste disposal and refuse control have been found to be deficient

during the recent Lebanon and Grenada deployments, and various joint field exercises, including Bright Star and Reforager. In the latter case, the use of portapotties, "TV-style" meals and other modern conveniences does not adequately test our field sanitation capabilities. In addition, preventive medicine teams and the equipment listed in their Table of Organization and Equipment (TOE) is seldom deployed during field exercises for routine training. Finally, during US Army operations in Honduras, many field sanitation teams were found to be inadequately trained and equipped because of poor command emphasis. Training in field sanitation and personal hygiene was especially deficient in health education in gastrointestinal disease prevention.

The Army and Air Force have recently published a new pocket-sized version of the "Field Sanitation and Hygiene Manual" (Army FM21-10; AF Manual 161-10) for issue to individual soldiers. A similar pocket-sized field manual should be developed for Naval and Marine Corps use based on the Army's FM21-10 and recent "lessons learned" from operations in Lebanon, Grenada, and Honduras. The manual should contain detailed information and be designed for the training of (as well as the field use by) preventive medicine and engineer personnel.

The military medical community is not adequately trained in epidemiology, prevention, diagnosis, and treatment of infectious disease which may be encountered during troop deployments.10 Medical officers attached to deployed units have often received little, if any, training in basic preventive medicine and are unable to

adequately advise unit commanders on effective countermeasures to be taken against potential infectious disease threats.[14] Presently the basic Combat Casualty Care Course (C4) concentrates only on battle casualties with scant attention given to disease prevention. The C-4A (advanced) course does include 15 hours of preventive medicine instruction. The Uniformed Services University of the Health Sciences (USUHS) has developed a one-week course on deployment medicine for reserve officers.[14] Similar instruction is needed for active duty medical personnel.

Refresher training is needed for medical department personnel to increase laboratory competence in the diagnosis and treatment of malaria and other tropical diseases. Related tri-service technical publications and training manuals are also needed on acute diarrheal disease, schistosomiasis and other infectious diseases.[10]

In the Air Force, there are few physicians with a specialty in preventive medicine. This is somewhat mitigated by the basic preventive and occupational medicine training provided at the USAF School of Aerospace Medicine to all flight medical officers. In addition, a small number of Air Force physicians are given updated, indepth short courses in global (including tropical) medicine.[12]

4. Preventive Medicine Support Planning

Infectious disease problems are receiving comparatively meager attention as an important element of operational planning. As a result, preventive medicine support planning is not adequately coordinated with combat operational planning, training and execution staffs. Specific preventive medicine strategies are, for example,

missing from Annex D of most OPLANS. Preventive medicine scenarios are rarely included in war-gaming exercises. In addition, disease threat assessments and appropriate countermeasures (e.g., heat, cold and high altitude preventive measures, immunization requirements, chemoprophylaxis requirements) are seldom incorporated into OPLANS. If a military operation is to have a positive outcome, the command should be aware beforehand and plan for the diseases of the area, seasonal variations in weather, and environmental impacts upon his troop's abilities.

5. Research

Current in-house research and development (R&D) efforts center primarily on the development of vaccines, drugs, rapid diagnostic techniques, and personal protective devices. Support from the medical R&D community and the Army's biological warfare defense research program are critical because the U.S. civilian pharmaceutical industry does not consider vaccine and drug development commercially feasible against tropical diseases. Furthermore, the civilian industry does not have access to classified biological agents. Thus the military R&D is most appropriate and needs continual, high level support.

However, a better balance in the research effort is needed to ensure that the total inventory of disease prevention and control countermeasures is sufficient. For example, traditional methods of medical treatment and protection against the major infectious diseases are not always viable. Vaccines for malaria and many other infectious diseases are years away from being successfully developed,

tested, and approved for field use. Chemotherapy is not always available or adequate for certain diseases and drug resistance is a serious problem which threatens malaria control programs worldwide.

To achieve a better balance in research efforts, an increased emphasis on alternative methods of prevention and control is required. In the case of the vector-borne diseases, relative short-term research is needed on methods to reduce man-vector contact and to eliminate vector sources. This includes research on insect repellents, impregnated clothing, insecticide resistance, ground and aerial dispersal equipment, area pesticide evaluations, vector-borne disease modeling, disease vector pictorial keys, satellite mapping techniques and vector control strategies.

Although the Reverse Osmosis Water Purification Unit (ROWPU) treatment facility used during Marine Corps operations in Lebanon and Army operations in Grenada is a good example of some of the significant advances that have been made since World War II, many devices and techniques in field sanitation have remained virtually unchanged, to the detriment of acceptable sanitation standards in deployed units. Improved approaches to such problems as excreta and waste disposal, washing and sanitizing of eating and drinking utensils need to be explored.

6. Medical Intelligence

Successful military operations require accurate and current intelligence. There is no less a requirement for detailed and specific epidemiological information concerning the infectious diseases which may be found in a potential deployment area.

Effective military planning as well as prevention and control programs cannot otherwise be initiated. The information required includes the diseases found in a particular area, their principal vectors and their general geographical and ecological distribution, seasonal variations, and vulnerability to actual or potential control modalities (e.g., repellents, impregnated clothing, pesticides, drugs or vaccines). Reliable and sensitive disease surveillance systems are equally vital for those diseases which may adversely affect port visits, coastal landing exercises, and in-country military operations.

In planning for present and future combat operations, the military medical departments must assess the projected impact on theater level forces of naturally occurring infectious diseases. In addition, they must be able to assess the degradation of fighting capability that would be imposed through personnel losses, logistic burdens and the impact on morale. The need for such medical intelligence is a general DOD requirement. But it is absolutely essential to preventive medicine professionals who may be called upon to meet those threats by directing prevention and control programs in the combat zone, postdisaster situations, epidemic disease outbreaks and other such contingencies.

General medical intelligence is currently available from a myriad of sources, including the Armed Forces Medical Intelligence Center, Defense Pest Management Information and Analysis Center,

Epidemiology Consultant Service (EPICON), World Health Organization, Pan American Health Organization, Centers for Disease Control, Foreign Broadcast Information System, the open literature and various reference texts.15 There is, however, no single source of public health intelligence information which provides for the epidemiological assessment of disease threats for a specific area and satisfies local requirements for individual or unit-size personal protective measures. Such information is clearly critical to ships deploying to the Indian Ocean with port calls in malarious areas, the landing of troops in Grenada and Honduras or the fielding of disaster relief teams to the Caribbean. Because of its charter, the Armed Forces Medical Intelligence Center should be recognized as the ultimate source for that information and should be provided the resources to effectively accomplish that mission.16

A critical deficiency in medical intelligence is the availability of current qualitative and quantitative data for use in developing risk assessments in potential deployment areas. The gathering of such information can best be accomplished by experienced professionals trained in epidemiology, environmental health and medical entomology. Because of their mission, world-wide locations and public health oriented facilities, the Navy EPMUs and the Navy Disease Vector Ecology and Control Centers are uniquely qualified to fulfill this need as resources allow. USAF preventive medicine support is also available overseas at the Environmental Health Laboratory, Wiesbaden Air Base, Germany, and at Operating Location AD, USAF Occupational and Environmental Health Laboratory, Clark Air

Base, Philippines.12

The medical research presence in areas of interest should be exploited for the purpose of obtaining needed medical intelligence. For example, several Army and Navy CONUS and OCONUS research laboratories are devoted to the study of exotic and tropical diseases. As reported earlier, epidemiologically-related information concerning these diseases is not utilized fully for assessing potential casualty rates in deployed personnel.5 This effort could also be enlarged if epidemiologists and preventive medicine officers were assigned to the overseas units for the purpose of generating specific disease incidence and prevalence data.

Limited computer simulation of vector populations and disease incidence has been successfully demonstrated by the U.S. Department of Agriculture. Additional research is needed to further develop this tool for

(1) Establishing disease risk assessments in field situations;
(2) Predicting potential vector-borne disease casualties;
(3) Determining the proper timing of control operations;
(4) Conducting logistical planning for insecticides and drug requirements for deploying forces.

The preceding is also important since the current DNBI rates are based on historical models and are not relevant to all situations. Specific scenarios need to be evaluated and new DNBI rates determined, utilizing the best and most current figures available, based upon recent and past experiences with similar deployments and operations.17

7. Logistical Support Requirements.

As found during Bright Star and other field exercises, basic supplies such as pesticides, handsprayers, chlorine comparators often do not arrive with field sanitation teams due to low-lift priority.[11] During U.S. "Urgent Fury" operations in Grenada, the only preventive medicine supplies and equipment which arrived during the first week were those that a solitary Environmental Sciences Officer personally brought with him. The officer was deployed as part of the advance element of the 18t Airborne Corps Headquarters Surgeon's Office. Other preventive medicine personnel and supplies adequate to provide support to the maneuver battalions were detained in Barbados with the 5th MASH while utilization plans were being made. A potentially severe health crisis was avoided only because serious health threats were not encountered. An exception was hookworm infections which occurred in approximately 25% of the troops of one battalion.[18]

The determination, procurement and stockpiling of basic loads of preventive medicine supplies and equipment within service AMALs needs to be assessed to ensure support for a wide range of military contingency operations. In addition, current TOE's do not contain state-of-the-art techniques such as rapid viral diagnosis capabilities.[14] Some preventive medicine TOE items are in common use and will present fewer problems in procurement and stockage during mobilization. Others such as vaccines for tropical disease prevention are military unique and will present severe logistical problems during mobilization.

Pesticide dispersal equipment in TOE inventories is often outmoded, not reliable, not repair parts supportable, not maintainable, and not easily moved into a combat zone. What is needed is light, portable, quiet and maintenance-free equipment that can be backpacked or carried in a land vehicle. Additionally, the equipment development and acquisition system does not adequately keep pace with the state-of-the-art items. The system is cumbersome and does not allow for the timely fielding of critically needed equipment.[19]

Neither the chemical industry nor major formulators have contingency plans to provide a steady and adequate supply of pesticides to meet DOD's mobilization needs. Stockpiles of materials are, for example, generally limited to one season's use. Liaison between industry and DOD needs to be established to develop a coordinated contingency program for pesticide supplies in the event of mobilization.[20] DOD does not have an adequate supply of pesticides prepositioned, stockpiled or in proper condition to meet mobilization requirements.[21]

8. Aerial Dispersal of Pesticides

Maximum sustainability of deployed forces in combat areas endemic for vector borne diseases will require insecticide dispersal by both fixed wing and rotary aircraft. The operational requirements for large-area aerial spray capability in combat has been affirmed recently by the Commander in Chief, US Central Command in a letter to the Secretary of the Air Force.[22]

The USAF Reserve Aerial Spray Branch is the only unit of the military services with large, fixed-wing aircraft dedicated to the aerial dispersal of pesticides. The Spray Branch is part of the 907th Tactical Airlift Wing, a Military Airlift Command gained unit. The Spray Branch was given a mobilization requirement in FY 1985 and its large area, aerial spray capability is an invaluable resource for protecting staging bases, lines of communication and similar areas from arthropod borne diseases, e.g., malaria. Four UC-123K aircraft are dedicated to this mission. However, the Spray Branch is converting to C-130 airframes in 1986 since the C-123's cannot be adequately supported in overseas combat operations.[23]

Critical needs of the Spray Branch include development of contingency doctrine for aerial spray, development of a roll-on/roll-off dispersal unit for the C-130, determination of the status of war reserve pesticide stocks suitable for aerial dispersal, development of methods for effective jungle canopy penetration and "standoff spraying" techniques for treatment of forward battle positions.[23]

Both the Army and Navy have limited capabilities for aerial dispersal of insecticides by rotary-wing aircraft. This is a critical capability for treatment of bivouac and other small areas not feasible for large, fixed-wing aircraft. Field testing and deployment of spray systems for rotary wing use also needs to be expanded.

The feasibility of using pilotless aircraft to apply concentrate insecticides for vector control is an important new concept. It has

the advantages of no risk of life, use of less costly aircraft and does not tie up manned aircraft needed for more critical missions.

9. Interface With NATO Countries

There is an obvious need for an increased dialogue with our various allies, including the NATO countries. Recent interviews revealed that there is a marked increase in medical awareness among the various policy committees in NATO. However, at this time there are no plans to include preventive medicine as a priority item. NATO does not have the power to dictate policy to a sovereign nation. As such, while NATO may recommend, ultimately each country must establish their own contacts and agreements (See Chapter IV for more discussion).

Summary and Conclusions

If morbidity is the primary determinant of medical workload in a theater of operations, then preservation of manpower is absolutely essential. This is especially true for forces which may (1) be rapidly deployed; (2) have long logistical tails; (3) have minimum initial medical support; (4) be exposed to diseases having short incubation periods and high epidemic potential.

The critical shortage of certain national health resources, the resulting limited military medical support and the potential threat from infectious and parasitic diseases dictates the need for a comprehensive and practical preventive medicine platform. Because of deficiencies in preventive medicine planning, staffing, training, logistics, organization, and R&D, current preventive medicine assets

cannot adequately support our military contingency operations, be it limited operations to a full mobilization. If such a platform is not developed, operational readiness and force sustainability will be jeopardized because of preventable morbidity.

The strategic and tactical significance of mission-abortive disease on combat operations is often forgotten or underestimated by military planners and operational commanders. While the mission of the Service Medical Departments is to support the combat elements, that support must include not only casualty care but the prevention of both disease and non-combat trauma. This chapter has stressed the need to keep preventive medicine in the forefront of our overall planning for medical support of any military mission, be it a "Grenada" or a full-scale war in Europe.

Recommendations

The following are recommendations for resolving the current deficiencies and improving our strategies in military preventive medicine:

1. Organizational Structure

a. Restructuring of field preventive medicine units along the lines of the Navy's preventive medicine MMART team concept (i.e., the Army's proposed "LX" team concept) should be pursued and implemented at the earliest possible date.

b. A joint quad-service preventive medicine team should be formed for use during unified and joint command exercises.

2. Manpower Resources

A complete review of active duty and reserve billets which will be needed to meet the preventive medicine mobilization mission for the Navy and Marine Corps should be accomplished.

3. Training Requirements

a. Training programs on basic field sanitation and personal protection measures for forces at large need to be reviewed and upgraded.

b. Increased command emphasis is needed to ensure that troop personnel receive instruction on basic field sanitation and personal protective measures prior to deployment.

c. Active duty and reserve medical personnel should receive increased training in deployment medicine and field preventive medicine.

d. Field preventive medicine should be incorporated into the C4 training course.

e. Field sanitation and preventive medicine topics currently taught at the US Army enlisted and officer basic and advance courses should be placed at a high priority to ensure their survival if courses were to be cut due to funding or during a mobilization.

f. Preventive medicine training should be incorporated into leadership schools and service colleges. Medical can be a force multiplier but only if both the Line and the Medical Officers communicate.

g. Refresher training courses for laboratory personnel in the diagnosis of malaria and other parasitic diseases should be established.

h. Active duty and reserve preventive medicine units, personnel and TOE equipment should be regularly tested by active participation in field exercises.

i. A pocket-sized field sanitation manual should be developed for the Navy and Marine Corps. It should be based on the US Army's FM21-10 and reflect recent experiences in Lebanon, Grenanda, and Honduras. Quad-service technical publications and training manuals should also be developed for those infectious diseases felt to be military "mission stoppers".

j. Current field sanitation devices should be evaluated in light of the experiences in Lebanon, Grenada and Honduras to determine if new designs are required.

k. Field exercises should be more realistic and employ current field sanitation devices.

l. Only physicians who have successfully completed basic preventive medicine training should be assigned to deploying combat units. Such training should make it very clear to the medical officer the type of asset the command is expecting him to be.

4. Preventive Medicine Support Planning and Exercises

a. Specific preventive medicine strategies including disease threat assessments and appropriate countermeasures should be incorporated into OPLANS.

b. The following sources of information should be used in obtaining medical intelligence during preventive medicine support planning: Armed Forces Medical Intelligence Center, Defense Pest Management Information and Analysis Center, Armed Forces Epidemiological Board, Uniformed Services University of the Health Sciences, Navy Environmental Health Center and its subordinate commands.

c. Annual, well-planned field exercises using deployed preventive medical gear should be established for preventive medicine personnel and other deploying medical personnel.

d. Preventive medicine should be given greater visibility and emphasis at DOD and Headquarter's organization and military planning elements. Experienced preventive medicine professionals should be included at the highest operational planning levels of the JCS and established at all appropriate echelons of command.

e. A group of experienced preventive medicine professionals should be trained as medical planners and then utilized in appropriate staff billets to provide for comprehensive preventive medicine planning.24

5. Research

a. Development of drugs, vaccines and rapid field diagnostic capabilities in potential deployment areas should continue to be a top priority undertaking.

b. A better balance in current medical research is needed by increasing the emphasis on shorter-term projects dealing with alternative methods of disease prevention and control.

c. Relatively neglected areas of research include personal insect repellents, impregnated clothing, insecticide resistance, ground and aerial dispersal equipment, area pesticide evaluations, vector-borne disease modeling, disease vector pictorial keys, satellite mapping techniques, and vector control strategies.

d. Greater R&D efforts should be directed towards general field sanitation techniques, facilities , and methods.

6. Medical Intelligence

a. A high priority on the gathering and synthesizing medical intelligence should be established for developing accurate risk assessments. Rather than alphabetical lists of diseases, the reports should address the issues in terms of "How might this information affect a combat mission?"

b. Such data should be used in establishing DNBI rates for use in determining medical force structure requirements and developing preventive medicine strategies and countermeasures.

c. Better use should be made of epidemiological information already available from Army and Navy research laboratories on disease threat assessments.

d. Preventive medicine officers and epidemiologists should be assigned to overseas research laboratories for the purpose

of enhancing the gathering and processing of pertinent medical intelligence and to directly support operational needs.

e. Medical intelligence information should be used in assessing the nature of infectious disease threats unique to a specific deployment area, determining vulnerability to that threat and identifying suitable countermeasures for personal protection.

f. DOD medical activities such as the Navy Environmental and Preventive medicine Units and Disease Vector Ecology and Control Centers should be given priority support in the on-site collection and assessment of medical intelligence information.

g. Predictive computer modelling research should be expanded to ensure the development of this new tool for the rapid prediction of vector and disease dynamics relative to military operational planning.

7. Logistics

a. The priority for basic preventive medicine supplies and equipment must be increased to ensure arrival with deployed preventive medicine teams.

b. Preventive medicine TOE's must be updated continually and given a high priority for procurement

c. TOE ground dispersal equipment must be upgraded. Development of more effective, quieter, lighter and reliable equipment should be initiated.

d. Liaison between the Armed Forces Pest Management Board and chemical manufacturing associations (e.g., the Chemical Manufacturing Specialties Association and the National Agricultural

Chemical Association) should be pursued to develop a contingency pesticide program.

8. Aerial Dispersal of Pesticides

a. Slippage of milestone dates for the conversion of the C-123 to the C-130 airframes (and the appropriate spray systems) should not be allowed.

b. Service doctrine needs to be developed for use of aerial spray in the control of disease vectors under various contingencies.

c. Standoff (high altitude release drift) techniques should be developed for control of disease vectors in areas too hazardous for direct spray operations.

d. Research is needed on the most effective technique for vector control in heavy jungle environments using aerial dispersal by fixed- and rotary-wing aircraft.

e. War reserve and prepositioned stocks of pesticides need to be assessed to ensure that adequate supplies and types are available to meet aerial spray needs during mobilization.

f. Spray systems and insecticide formulations for different environmental conditions must be evaluated.

g. The feasibility of using remote pilotless vehicles for delivering concentrate insectides should be pursued with a high priority.

9. NATO

a. NATO is not presently the proper forum for pursuing Host Nation Support policies on preventive medicine. The function of

NATO is to study options and discuss policies. Such visibility can be helpful, but as such NATO does not make plans or agreements between countries.

b. The DOD should continue to pursue, one on one, preventive medicine agreements with our various allies in NATO. All that has been discussed above would apply to a Host Nation Agreement.

c. When operational plans come back from the NATO joint commands for review by DOD, there should be an experienced preventive medicine team to address the preventive medicine issues within the OPLANS.

CHAPTER VII

SUMMATION OF CONCLUSIONS AND RECOMMENDATIONS

As discussed in Chapter I, the inability of the military services to medically support military contingency operations has been known a long time. Numerous studies have indicated that our nation's ability to provide medical support has been found wanting in all but the most meager of scenarios. There are a wide spectrum of "war stopping" inadequacies, ranging from inadequate supplies and equipment to inaccessibility to the medical system from the battlefield. Lack of adequate numbers of deployable medical systems, insufficient war reserve stocks of medical supplies and equipment, lack of industrial preparedness, and too few qualified medical personnel are only some of the problems.

Recognizing that these and other medical mobilization issues directly affect the mission of our Armed Forces, this research seminar set out to examine not only the medical resource shortfalls in the Department of Defense (DOD) medical organization and contingency plans but also the ability of the civilian health care industry to support military mobilization needs. Using the conventional war in Europe Scenario, the seminar sought to answer such questions as what is available now, what is needed, and what

are the shortfalls; what is the most effective utilization of the civilian health care industry.

The following material highlights some of the key issues discussed in the five functional areas of this research: Manpower (Chapter II), Facilities (Chapter III), Logistics (Chapter IV), Transportation (Chapter V), and Preventive Medicine (Chapter VI).

Chapter II, deals with one of the essential medical manpower problems that the DOD faces, having the right skill mix with sufficient support personnel in the right place at the right time to effectively care for the anticipated casualties. Presently there are not sufficient numbers of health care providers on active duty or in the reserves to meet the requirements that mobilization will impose upon the system.

There are sufficient civilian health care personnel to more than meet any anticipated need. However, given the short warning preceding an actual mobilization and the current prohibition against a peacetime draft, it is not likely that the Selective Service will be able to identify, induct, and deliver the needed professional skill mix and support personnel that will be required by the Services.

To effectively deal with these shortfalls some difficult decisions are required.

The problems discussed in this paper are not insoluble nor have they been ignored by the various Service leaders. However, given the

importance of medical readiness the issues raised are deserving of special attention.

With the preceding in mind, recommendations are as follows:

(1) That DOD join with the Selective Service in proposing a reinstitution of a peacetime health care manpower draft or, at a minimum, a preregistration of health care manpower as a means for eliminating the shortfall in active and reserve units;

(2) That DOD develop programs of financial and educational inducements as a means for attracting health care manpower into Reserve Units;

(3) That DOD explore the possibility of contracting with civilian health care manpower and health care facilities to provide health care in the CONUS to civilian dependents, newly inducted trainees, and returned battle casualties during wartime;

(4) That the United States seek to enhance Host Nation Support Agreements, involving helping the U.S. meet the medical requirements during the early days of a conflict, and that the U.S. seek to develop similar agreements with those allies with whom the U.S. does not currently have such agreements; and

(5) That the Armed Services must seek to increase efforts to improve interservice cooperation and standardization of equipment and procedures pertaining to health care issues.

Not only are there not enough medical personnel, hospital care facilities, i.e., hospital beds, they are severely limited. In Chapter III, attempts to resolve the 60,000 plus deficit in military hospital beds is discussed. As an initial resolution, the Civilian-Military Contingency Hospital System (CMCHS) was devised. Now there are plans to merge this program into the National Disaster Medical System (NDMS).

As a result of such programs, a very critical hospital bed shortage in CONUS is resolved. However, how to get the patient to

the bed is a major chokepoint in the whole system. The inadequate numbers of beds overseas remain significant. Presently a 15-day Peak Evacuation Policy cannot be supported. The need to preposition facilities and supplies is evident. The need for Host Nation Support of hospital beds during the initial days of a conflict is presently a must.

Since the largest problems noted have to do with disposition of the patient, it is recommended that:

(1) The DOD dedicate aircraft for the Armed Services Medical Regulating Office (ASMRO) to use for patient disposition;

(2) The CHMUS and VA system improve the system for identifying what bed mix is availablei.e., surgical, medical, psychiatric, etc.;

(3) The evacuation system must develop alternate methods for transportation from the airfields (usually CONUS) to hospitals participating in CMCHS;

(4) The Military Airlift Command should consider not reassigning all personnel assigned to an Aeromedical Staging Facility when a mobilization is called; and

(5) The DOD should delay entering into NDMS until certain that it will work effectively.

Medical Readiness is more than just personnel and hospital beds. As Chapter IV demonstrates, the logistical problems associated with medical equipment, supplies, and pharmaceuticals are severe and sobering. After studying the status of medical industrial preparedness planning in support of U.S. Military medical capability, it is apparent that many previously identified problems have been compounded by the increasing erosion of the medical industrial base.

The shortage of deployable medical systems seems to have been resolved with the Services procuring over 50,000 beds configured in some 150 deployable medical facilities. All of these facilities are to be procured by 1990; however, the Services have never hesitated in the past to delete them when there are required budget cuts. Strong leadership from the OASD(HA) has prevented such action so far but the Military Service programs must be scrutinized carefully to ensure that the Defense Resources Board's decision is adhered to.

Erosion of the industrial base is most prevalent in the manufacturing of surgical instruments. Increasing imports of inferior surgical instruments from countries such as Pakistan, Germany, and Japan have resulted in sharp reductions in our ability to forge and finish instruments. Since 1980 to the present, there has been a 64% reduction in the capability to produce forgings with a 39% reduction in our ability to produce finished instruments. Three producers have stopped producing surgical instruments. Schilling Forge, the single largest domestic medical instrument forger, is considering discontinuation of their surgical instrument production. With renewed government interest and contractual support this dangerous trend may be on the verge of reversal.

Increased internationalization, movement of research efforts to overseas, subsidiaries, and increased competition from overseas have all impacted the pharmaceutical industry. Domestic vaccine production is now limited to five companies, one of which is Canadian owned. Lederle, a major producer of tetracycline, was ready to close its fermentation plants due to foreign competition. It has agreed to

stay open for two years as the result of a 10 U.S. Code 2304 (A)(16) approval by DLA to buy only domestic tetracycline. It is worthy to note that there are limited items in the national strategic stockpile and lack of any agreement with the DEA to permit increased production of morphine and other opiates. If these critical industries are to be preserved, greater use must be made of 10 U.S. Code 2340 (A)(16) and the new Competition and Contracting Act.

While WRMS will be improved with the addition of the deployable medical systems, the overall picture is not good. Two reasons appear to be the root causes, lack of funding (especially with OWRMS) and the high cost of maintaining dated and deteriorative items. Defense Guidance requires the Military Services to maintain PWRMS at the 60-day level; medical simply does not do it due to the high costs. Yet failure to stock and maintain WRMS (both PWRMS and OWRMS) deny the domestic medical industries the "D to P" time they must have if they are to meet our mobilization surge requirements in a timely manner.

Several methods have been proposed for the management of dated and deteriorative medical items, which include procurement of items with longer shelf lives, expansion of shelf life through periodic testing,and rotation with industry stock. While all agree that savings of several millions of dollars annually could be realized if all the PWRMS were stocked, no one has resolved which program to use to manage the dated and deteriorative items. The need to reprogram the medical logistics computer model discussed in Chapter IV is critical to the success of managing the problems of WRMS.

Other areas of concern dealt with in this portion of the study have to do with logistically supporting the increased sophistication and technology of DEPMEDS. In addition, the threat of plastic disposables to the medical supply line was discussed and also the roles of OASD(HA), DMSB, and DPSC, with emphasis placed on the need for (and apparent absence of) clear lines of authority and support.

In summary, then, the following recommendations are offered in this vital and complex arena of medical mobilization:

(1) To maintain a viable industrial base in such industries as medical instrument forgings, pharmaceuticals, and medical instrument finishing increased use of the provisions of 10 U.S. Code 2304 (A)(16) should be encouraged by both the DOD and the various national associations dedicated to these industries;

(2) A joint DLA/DPSC/DMSB task force should be established to develop the necessary methodologies and policies for implementing the proposed cost savings programs with regards to medical WRMS;

(3) The Pharmaceutical Manufacturers Association should be more involved in assisting DOD with such issues as dated and deteriorative items and overall medical readiness;

(4) The ASD(HA) should continue to review Military Service programs to ensure that the procurement of deployable medical systems continues as scheduled. Consideration should be given to the establishment of a joint procurement office, funded to complete the program, if the program is again unjustifiably delayed;

(5) The ASD(HA) should request that the ASD(Manpower, Reserve Affairs, and Logistics) determine, if it is possible, to shift some funding to the procurement of stocks to meet the medical OWRM requirement, perhaps starting with those items having no expiration date;

(6) The Surgeons General of the Military Services should insure that the design and support of the deployable medical systems is not too technologically sophisticated to survive in the combat environment.

If all of the planning is to be successful, then it is critical to be able to get those in need of care to the medical support assets. As shown in Chapter V, the Department of Defense presently lacks the inter- and intratheater medical evacuation capability as well as the domestic capability to successfully accomplish its wartime medical support mission. It is obvious from the observations made during this seminar as well as the extensive testimony before Congressional Committees that neither the lift capability nor the equipment to meet a large contingency mission is available. The needs of a large and fast-moving war scenario will not be met. The industrial capacity to build the number of airframes required to meet DOD requirements is not the limiting factor, rather, the DOD budget and priorities within the budget are the limiting factors. Existing medical units will have to bear the brunt of large patient evacuation loads that will result from today's sophisticated weapons' technology and the anticipated intense combat. With this in mind, the following recommendations are made:

1. Develop a comprehensive CONUS evacuation distribution strategy and plan utilizing military C-9 aircraft and CRAF to evacuate patients from CONUS aerial ports of entry to airfields supporting military, VA, and CMCHS hospital facilities.

2. DOD modify the CRAF program to utilize civilian aircraft for intertheater evacuation and domestic redistribution of litter patients. The aircraft would have to be modified to accept litter patients.

3. Develop a joint standardized plan for identifying likely modes of transportation by which patients would be transported from airheads to military, CMCHS, and VA hospitals.

4. Increased emphasis must be placed on the completion of the JCS Study on CONUS distribution/redistribution of patients.

Chapter VI raises fundamental issues too often overlooked by military planners. If morbidity is the primary determinant of medical workload in a theater of operations, then preservation of manpower is absolutely essential. This is especially true for forces which may (1) be rapidly deployed; (2) have long logistical "tails"; (3) have minimum initial medical support; (4) be exposed to diseases having short incubation periods and high epidemic potential.

The critical shortage of certain national health resources, the resulting limited military medical support and the potential threat from infectious and parasitic diseases dictates the need for a comprehensive and practical preventive medicine platform. Because of deficiencies in preventive medicine planning, staffing, training, logistics, organization, and R&D, current preventive medicine assets cannot adequately support our military contingency operations, be it limited operations to a full mobilization. If such a platform is not developed, operational readiness and force sustainability will be jeopardized because of preventable morbidity.

The strategic and tactical significance of mission-abortive disease on combat operations is often forgotten or underestimated by military planners and operational commanders. While the mission of the Service Medical Departments is to support the combat elements, that support must include not only casualty care but the prevention of both disease and non-combat trauma. This chapter has stressed the need to keep preventive medicine in the forefront of our overall

planning for medical support of any military mission, be it a "Grenada" or a full scale war in Europe.

This portion of the seminar developed several in-depth recommendations. To effectively perfect this vital portion of military medicine, one must effect changes in the following arenas:

> (1) Organizational Structure; (2) Manpower Resources; (3) Training Requirements; (4) Preventive Medicine Support Planning and Exercises; (5) Research; (6) Medical Intelligence; (7) Logistics; (8) Aerial Dispersal of Pesticides; (9) NATO.

This seminar has clearly demonstrated the complexities and interrelated issues of enhancing medical combat support. Were the country to mobilize, the military medical system will be heavily dependent upon Host Nations, the Reserves, and civilian health care facilities and personnel. While none of the problems discussed are insoluble, they are significant. To be successful the solutions will require National resolve, adequate funding, an involved business community, tri-service cooperation, and enlightened leadership.

APPENDIX A: RESEARCH SEMINAR AGENDA

The twelve seminars dealt with the following topics:

S1	An overview of the U.S. Health Care Industry
S2	Health Care Facilities
S3 & S4	The Military Health Care System--Current and Mobilization Functions and Requirements.
S5	The Health Care Equipment Industry
S6	The Federal Role in Health Care; Deregulation and Competition
S7	Health Manpower--Present and Future Supply
S8	The Pharmaceutical Industry
S9	The VA Health Care System
S10 & S11	Selected Foreign Military and Civilian Health Care Systems and Mobilization Plans

The Domestic Field Trip consisted of the following agenda:

1. Briefings by the 375th. Aeromedical Airlift Wing.
2. Briefings by the American Medical Association.
3. Briefing and tour of Rush St. Lukes Hospital, Chicago, Illinois.
4. Briefing and tour of Cook County Hospital, Chicago, Illinois.
5. Briefing by the American Hospital Association
6. Briefing and tour of American Hospital Supply Company, Evanston, Illinois.
7. Briefings and tours of the medical equipment section of General Electric Company, Milwaukee, Wisconsin.
8. Briefings and tour of Smith, Kline & Beckman, Pharmaceutical Division, Philadelphia, PA.

The International Field Trip consisted of the following agenda:

1. Briefings by the 7th. MEDCOM, USEUCOM, and the Ministry of Health, Bonn, Germany.
2. Briefings and tour of Pirmasens Medical Depot and Landstuhle Hospital.
3. Briefings by Siemems AG, a Worldwide Corporation and tour of both their factories and their Research and Development complex.
4. Briefing and Tour of Hoechst AG (largest chemical company in the world) Pharmaceutical Manufacturing Facility.
5. Visit and a Brief by the Belgium Army. Visit to the Beligium Army Medical Hospital.
6. Interview with Military Mission at NATO Headquarters, Belgium.

APPENDIX B: AN ANTHOLOGY OF RECENT INDUSTRIAL COLLEGE OF THE ARMED FORCES' MEDICAL MOBILIZATION RESEARCH STUDIES

These studies indicate that our nation's ability to provide military medical support has been found wanting in all but the most meager of scenarios. Lack of adequate numbers of deployable medical systems, insufficient war reserve stocks of medical supplies and equipment, lack of direction and national will, insufficient appropriations, unwillingness to spend money on dated and deteriorated consumables, and lack of industrial preparedness are only some of the problems discussed in these papers. Each contributed to a more meaningful understanding as this portion of the seminar was approached.

1982

1. Llewellyn, Hansen, Vermillion, Kerchner, Hurst, and Hamako: Wartime Strategic/Domestic Aeromedical Evacuation and Distribution of Patients.

2. Guess and Mullan: Evaluation of the FY1983 National Emergency Repatriation Exercise and National Emergency Repatriation Planning.

3. Swope, Drill, and Chappell: Dated and deteriorative Drugs; A Mobilization Rubik's Cube.

1983

1. Scotti, Jr.; Administrative Barriers to Medical Mobilization

2. Durry, Ryan, and Sadler: Military Health Professional Needs for Mobilization.

1984

1. Stetson and Smith: Enlisted Medical Personnel for Mobilizing the Armed Forces.

2.Casey, Cleary, Hayes, and Letourneau: A Descriptive Evaluation of the Planning for the National Disaster Medical System

APPENDIX C: EVOLUTION OF INDUSTRIAL PLANNING IN THE UNITED STATES

A major aspect of a broad study such as this is medical supply and the interface between military planners and industrial producers. The interface is known as the Industrial Preparedness Planning Program. In order to better appreciate the current system, the following material is presented to give an in-depth historical review of the evolution of industrial preparedness planning. The goal of such planning is to achieve industrial base and reserve objectives with maximum efficiency, a goal which we seldom seem to attain.

The United States has been historically famous for its tendency to pay pre-war industrial preparedness short shift. Prior to World War I, there was no organized plan or anticipated need for control. In those pre-war years supply responsibilities had become divided among eight separate bureaus (quartermaster, engineer, signal, ordnance, medical, construction, chemical warfare, and aircraft production). None of their activities were well coordinated.

As WWI approached, there was a scurried attempt to make up for lost time. The National Defense Act of 1916 established the Council of National Defense, comprised of the Secretaries of War, Navy, Interior, Agriculture, Commerce, and Labor. Subsequently three coordinating bodies were formed in 1917. First, the National Defense Advisory Commission (NDAC) was formed as advisors to the Executive Branch. It was comprised of prominent industrial, scientific, and labor leaders. Next, in an effort to coordinate the buying of munitions by the separate Service Bureaus, the General Munitions Board (GMB) was formed. Within months the GMB was superseded by a seven-man War Industrial Board (WIB). The WIB was hampered by the Military Services who retrained a great deal of authority and more often than not wielded power against producers in a noncoordinated

fashion. However, limited authority was eventually attained by the WIB under the leadership of Bernard Baruch.

In spite of such reorganizations, lack of coordination, mismanagement and poor weather combined to allow movement of fuel, materials, and finished goods to reach a critical lull in the winter of 1917-1918. As a result, the War Department established its own Inland Traffic Service. The National Railroad Administration was also created at this time. In addition, the Shipping Board established its counterpart control machinery in the form of the Shipping Control Committee in February 1918. The traffic crisis was gradually resolved but the residual setback to industrial mobilization was severe as evidenced by an initially sharp reduction in the output of steel.

At the same time, the War Department was reorganizing under the guidance of the National Defense Act of 1916. As a result, in April 1918, the General Staff established the Purchase, Storage and Traffic Division. This Division absorbed the functions of the Quartermaster Corps for fiscal control, supply, storage and transportation, and supervised the activities of six of the eight supply bureaus.

Slowly, however, the controlling agencies and reoganizations began to bear fruit. Progress in industrial mobilization was at last being seen. First, an inventory of manufacturing facilities and a statistical data-processing system were developed by the spring of 1918. A system of production priorities went into effect in July 1918. Steel was brought under control in July 1918 after passenger car production was finally curtailed. Likewise, during this period, coal rationing and price regulation ensued. Labor conciliation and mediation was also facilitated.

American governmental control and industrial production eventually responed to the crisis. The United States and her allies won the "Great War" and our country had shown a great industrial capacity. However, many lose sight of the fact that peak production was never fully realized before being superseded by the Armistice. Pre-war industrial preparedness had been ostensibly nonexistent and thus very costly to remedy. The materiel requirements for one and a

half million men had required one to two and a half years lead time before peak wartime production was approached. Did we learn our lesson?

In 1922 the Army-Navy Munitions Board (ANMB) was created as a joint industrial mobilization study and planning agency. The ANMB established the first cogent outlining of national mobilization requirements in the form of an Industrial Mobilization Plan in 1931, revised in 1933,1936, and again in 1939. The ANMB strongly recommended the creation of a civilian superagency to implement the plan in the event of mobilization. It further recommended that the superagency be given a mandate similar to (but broader than) that given Bernard Baruch's War Industrial Board of 1917. In addition, the ANMB laid further foundations for industrial preparedness by requiring the two major Military Services to compute up-to-date mobilization requirements and to determine critical production problem items. They were to also prepare critical item specifications and coordinate interservice allocations.

In 1939 the need for mobilization was once again seen to be imminent. The ANMB, being the only industrial mobilization organization, was ordered to report directly to President Roosevelt. A War Resources Board (WRB) was appointed to study the Industrial Mobilization Plan. Comprised of leading business and industrial civilian leaders, it resembled the national Defense Advisor Commission of 1917. However, the WRB fell into political disfavor and was dissolved before making any meaningful contributions.

A limited national emergency was declared but formal implementation of the Industrial Mobilization Plan was stalled due to Congressional antipathy. The ANMB had to fill the void. Aided by the Strategic Materials Act of 1939, it continued to identify further mobilization requirements. The board also managed to increase stockpiles of munitions as well as sales to our allies.

In spite of antipathy, FDR's attempt to create a mobilization superagency had begun. Acting upon the aged (but still effective) Military Appropriations Act of 1916, he reinstituted the Council of National Defense (CND) in the spring of 1940. Made up of Cabinet

members, the new council served its purpose by establishing its advisory group, the National Defense Advisory Commission (NDAC). The new NDAC (like the War Industries Board of 1917) was comprised of industrial, labor, agriculture, transportation, and consumer representatives. It finally became the first successful mobilization superagency of the World War II era. Although the CND still lacked the total central control and power it desired, it clearly recognized the numerous needs of the day. The council reestablished the prioritization and stockpiling of scarce strategic materials. It effected the prioritization of the delivery of raw materials, the building and expanding of defense plants, the revitalizing of the machine tool industry, and the controlling of contractual agreements.

In the mid-1940's, Stimson, Patterson, Knox, and Forrestal were appointed as Secretaries and Undersecretaries of War and the Navy, respectively. The Undersecretaries were delegated industrial mobilization and procurement responsibilities for their respective Services. With this surge of defense planning there was a concomitant surge in defense funding.

By Presidential design, the NDAC was superseded by a stronger Office of Production Management (OPM) in January 1941. Declaration of unlimited national emergency was made in June 1941. However, the establishment of the Office of Price Administration and Civilian Supply as well as the Supply Priorities and Allocations Board removed many of the responsibilities of the OPM. The lack of total central control over the industrial mobilization under one agency and one leader persisted.

Then came Pearl Harbor, December 7, 1941. Using the authority of the First War Powers Act of 1941, the War Production Board (WPB) was established in 1942. For the first time there existed a superagency under the direction of a mobilization "Czar", chairman Donald Nelson. Armed with the experience gained from NDAC and OPM, the War Production Board had the Executive authority and machinery to assert the chairman's will over the other agencies in all matters pertaining to war production, procurement and mobilization, including development of a Controlled Materials Plan. Contract supervision was

another key to effective mobilization. The procedures adopted by the ANMB in the 1922-1933 era were found to be effective and served the new agency well.

By September 1942, the WPB had shouldered more and more of the civilian responsibilities of ANMB. In a similar manner, the Army Service Force and the Naval Office of Procurement and Materiel had taken ANMB's military responsibilities. By November 1942, the recently developed Controlled Materials Plan had become the central program in the control of the wartime economy. When World War II ended in 1945, the United States had an exceedingly fine-tuned industrial mobilization program institutionalized. It was largely disbanded.

During the Korean War, an unlimited national emergency was declared. By the authority of the Defense Production Act of 1950, the Office of Defense Mobilization was established. It was the equivalent of the WPB of WW II. This was a time of limited mobilization with preparations to change to full scale war production at a moment's notice.

The United States left the Korean War with the "mobilization base" as a new concept of industrial preparedness. Ideally such a base is an on-hand industrial capacity ready to expand military and essential civilian production rapidly to achieve sufficiently high levels of wartime production. Such a base would alleviate beginning from a standing start and provide minimal lead time delay, the "D to P" concept as it was (and is) called. The objectives were to avoid conflicting stockpiles and production capability. It was planned that the United States would be able to fight on D-day (when fighting begins) with reserve supplies geared to sustain the fighting forces until P-day when the production output would reach consumption rates.

However, since the Korean War and the drain of Vietnam, such industrial preparedness measures have never been adequately thought out nor funded. This includes needed medical support measures.[1]

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[1]Timothy D. Gill, Industrial Preparedness, (Washington, D.C., National Defense University), 1984.

APPENDIX D: CHAIN OF CASUALTY EVACUATION

This appendix explains the chain of casualty evacuation from the forward most military theater to medical facilities in the Continental United States.

Transportation in medical terms denotes medical evacuation of patients by air, ground or sea. Medical evacuation of patients follows basic U.S. doctrine, which governs the medical evacuation of patients from the most forward facility of the system (the Battle Aid Station or Field Site) to the hospital bed in CONUS.

There are three zones in the medical evacuation system: first, the combat zone which, includes a forward and a rearward area; second, the communication (COMMZ); and, third, the zone of the interior (CONUS). The Army is responsible for evacuation of patients within the combat zone. For additional means of evacuation, coordination must be effected with the particular service controlling aircraft and ships or in the case of ground transportation (locomotives, etc.) the transportation command. The primary means of evacuation for the Army within the combat zone is the helicopter air ambulance.

Patient evacuation is organized into five levels extending rearward in an integrated and continuous system. Each level, from unit to COMMZ, provides a greater treatment capability than does the preceding level.

The organization of medical support is flexible and will be influenced principally by the tactical situation. Composition will vary widely with different situations and operational environments. The five levels of medical support are as follows:

(1) Unit level, which is an integral part of the division level support;

(2) Division level medical support;

(3) Corps level medical support;

(4) COMMZ level medical support;

(5) Zone of Interior (CONUS).

Unit level medical support is the first level and is organic to the division. These small medical units (platoons or sections) perform three primary functions. The first is to provide aid men to the infantry, armor, or mechanized company of the battalions. The second is to establish and operate the company aid post and battalion aid station.

The division level medical support is the second level and is provided to the entire division by its organic medical battalion or forward support battalion. The medical battalion operates the division clearing stations and evacuates the patients from the forward battalion aid station.

The third level of medical support is corps level. The corps employs air and ground medical evacuation assets to evacuate patients from the divisional medical clearing stations to the hospitals located in the divisions to the rear and the

COMMZ. Although patient evacuation flows from the point of injury through the various levels of increasingly complex treatment, any medical treatment facility at any level may be bypassed when the condition of the patient warrents it. This bypassing of medical treatment facilities does not alter the principles of patient management but rather exploits the available air and ground evacuation means to the advantage of the patient and his specific injury. This is an essential factor in rapidly moving the patient to the medical facility and physician best suited to treat the type of injury sustained by the patient.

The fourth level of medical treatment and evacuation is the COMMZ. All medical units in the COMMZ are assigned to a medical command. Patients are evacuated from the corps using ground and air ambulances. Rail and Air Force tactical aircraft are used in time of war. These patients are moved to general, station, evac or field hospitals within the COMMZ.

The final level of support involves movement of patients from the COMMZ to the zone of the interior--CONUS. This level of evacuation utilizes Air Force strategic aircraft and ships depending upon the nature of the conflict and the assets available.

FOOTNOTES

CHAPTER I

[1]Henry Mohr, "Will America Be Able to Treat Its Battlefield Wounded?" Heritage Backgrounder, December 18,1984, p.2.

[2]U.S. Congress, House, Committee on Appropriations, Subcommittee on Defense, May 1, 1984.

[3]U.S. Congress, House Committee on Appropriations, Subcommittee on the Department of Defense, Medical Activities, Hearings (Washington: U.S.Govt. Print. Off., 1984), p.776.

[4]Ibid., p. 718.

[5]Ibid., p. 731.

[6]Ibid., p. 738.

CHAPTER II

[1]Interview with Vance Gordon, Assistant for Planning and Programming, Office of Policy and Program Coordination, Office of the Assistant Secretary of Defense, Health Affairs, Washington, D.C.: 13 December 1984.

[2]Interview with Col. John Morrison, Director, Manpower Personnel and Training, Office of the Deputy Assistant Secretary of Defense/Medical Readiness, Office of the Assistant Secretary of Defense/Health Affairs, Washington, D.C.: 13 December 1984.

[3]Major General Henry Mohr (U.S. Army Retired), "Will America Be Able To Treat Its Battlefield Wounded?", Backgrounder, The Heritage Foundation, December 18, 1984, p.4.

[4]Fiscal Year 1983 Readiness Assessment of the Reserve Components, (Washington: 1983) p.100;

[5]Ibid., p. 112.

[6]U.S.Congress, Medical Activities, Hearings, 1984,p. 721.

[7]Ibid., p. 732.

[8]Ibid., p. 739.

[9]FY 83 Readiness Assesment, p. 105,113-116.

[10]Interview with Colonel William N. Vance, Special Assistant for Reserve Affairs, Office of the Deputy Assistant Secretary of Defense/Medical Readiness, Office of the Assistant Secretary of Defense/Health Affairs, Washington: 13 December 1984.

[11]Ibid.

[12]U.S. Department of Health and Human Services, Health Resources and Services Administration, Report to the President and Congress on the Status of Health Personnel in the United States, (Washington: 1984), Tables B-1-27 and B-1-28.

[13]Ibid., Table B-1-31.

[14]Letter from Vernon McKenzie to Thomas K. Turnage, 03 October 1983.

[15]Report to the President and Congress on the Status of Health Personnel in the United States, 1984, p. A-1-10.

[16]Fiscal Year 1983 Readiness Assessment of the Reserve Components, Washington, D.C., 1983.

[17]Report to the President and Congress on the Status of Health Personnel in the United States, 1984, Table B-1-2.

[18]Ibid., Table A-1-2.

FOOTNOTES

CHAPTER III

[1]C. Vance Gordon and Jay C. Bisgard, "Medical Readiness Planning: Identifying Critical Elements and Aggregate Requirements," Military Medicine, February 1983, p. 103.

[2]Health Care Financing Review, HCFA, Baltimore, MD, Spring 1984, Volume 5, Number 3.

[3]Louis E. Mahoney, et al., "Planning a National Disaster Medical System," Military Medicine, December 1984, p.658.

[4]U.S. Congress, House, Committee on Appropriations, Subcommittee on the Department of Defense, Medical Activities, Hearings, (Washington: U.S. Govt. Print. Off., 1984). pt. 3, p. 709.

FOOTNOTES

CHAPTER IV

[1]U.S. Dept. of Defense, Defense Guidance--FY85-89 (Washington: 1983), (U) Para IIB4. SECRET

[2]U.S. Army Management Engineering Training Activity, Industrial Preparedness Management (Washington: Dept. of Defense, 1972).

[3]U.S. Dept. of Defense, Department of Defense Program Review FY86-90 (Washington: 1984), p. B-35.

[4]U.S. Dept. of Defense, Secondary Items War Reserve Requirements Development, Dept. of Defense Instruction 4140.7 (Washington: 1984), p. 2.

[5]U.S. Dept. of Defense, Management of War Reserves, Dept. of Defense Directive 4140.2, (Washington: 1974), Encl.1.

[6]Fleet Marine Force, Pacific, Talking Paper on Annual Maintenance Cost of Dated and Deteriorable AMAL Consumables, (Camp Smith, Hawaii, 1984),p. 2.

[7]Message from Commandant of the Marine Corps to all Marine Corps Commands, 31 July 1981.

[8]U.S.Marine Corps, War Reserve Policy Manual, MCO P4400.39E. (Wahington: 1984), p. 7-4.

[9]Letter from Commander, U.S. Army Medical Material Agency, Frederick, Maryland to Surgeon General of the Army, 15 November 1983.

[10]Interview with Major John C. McElfish, USAF, MSC, Mobilization Readiness Liaison Officer, DPSC, Philadelphia, PA: 03 January 1985.

[11] Ibid.

[12]U.S.Dept.of Defense, Report of the Defense Science Board, 1980 Summer Study Panel on Industrial Responsiveness,(Washington: 1981), p. 58.

[13]U.S. Dept. of Commerce, U.S. Industrial Outlook 1984, (Washington: 1984), p. 36-1.

[14] Ibid., p. 36-2.

[15] Ibid., p. 36-2 and 36-5.

[16] Ibid., p. 147.

[17]U.S. Dept. of Commerce, U.S. Industrial Outlook, 1984,(Washington: 1984), p. 36-1.

[18] Ibid., p. 36-2 to 36-6.

[19]U.S. Dept.of Defense, Defense Personnel Service Center, Medical Industrial Planning Preparedness List, (Philadelphia, PA, 1984).

[20] Ibid.

[21]Interview with CDR Glenn Otterman, MSC, USN, Head, Technical Control Branch, DPSC, Philadelphia, PA: 03 January 1985.

[22]Interview with LCOL John Ferinde, MSC, USA, Chief, Pharmaceuticals and Pharmaceutical Supplies Branch, Defense Medical Standardization Board, Fort Detrick, Maryland: November 19[illegible].

[23]Interview with Mr. Natahan Gerwertz, Industrial Preparedness Planning Branch, DPSC, Philadelphia, PA: 03 January 1985.

[24]Interview with LTC James Kirkpatrick, MC, USA, Disease Control Consultant, Office of the Surgeon General, U.S. Army, Pentagon, Washington: 21 March 1985.

[25]U.S. Dept. of Defense, Defense Personnel Support Center, Justification for Authority to Negotiate Under 10 United States Code 2304(a)(16) (Washington: 1984), p. 2-3.

[26]Gary B. Clark and Burt Kline, "Impact of Oil Shortage on Plastic Medical Supplies," Public Health, March-April, 1981, p.111 and 115.

[27]U.S.Department of Defense, DOD Medical Standardization Board, DOD Directive 6430.2 (Washington: 1984), p. 3-4.

[28]Memorandum from the Assistant Secretary of Defense (Health Affairs) to the Chairman, DOD Medical Standardization Board (DMSB), 16 November 1984.

[29]Ibid.

[30]Ibid.

[31]Otterman, Ibid.

[32]Defense Medical Material Board. Ibid., Encl. 1, Tab C.

[33]McElfish, Ibid.

[34]Otterman, Ibid.

[35]Defense Medical Material Board, Ibid., Encl. 1, Tab D.

[36]Defense Medical Material Board. Ibid., Encl. 1, Tab E.

[37]Otterman, Ibid.

[38]Otterman, Ibid.

[39]The MITRE Corporaion, The MITRE Dated and Deteriorative Medical Logistics Model, Vol. I. McLean, VA: 1982, p.3.

[40]MITRE, Ibid.

[41]McElfish, Ibid.

[42]Interview with Mr. Rod Hoots, Office of the Assistant to the Secretary of Defense for Health Affairs, Pentagon, Washington: 13 March 1985.

[43]Charles Wolf, Jr., "A Theory of Non-market Failures", The Public Interest, 55: 114-133, 1979.

FOOTNOTES

CHAPTER V

[1]Operational Report on Lessons Learned--Vietnam, Report of 68th. Medical Group, 30 April 1967.

[2]U.S. Congress, House, Committee on Appropriations, Department of Defense Authorization for Appropriations for 1985, Hearings, (Washington: U.S. Govt. Print. Off., 1984), p. 718-720.

[3]LtCol. Patrick Hiu, Briefing, 7th. Medical Command, January 1985.

[4]Major General Spuregeon Neel, Medical Support of the U.S.Army in Vietnam, 1965-1970 (Washington : Department of the Army, U.S. Govt. Print. Off., 1973), p. 60.

[5]"Strategic Mobility, Can We Get There From Here in Time?", AUSA Special Report, 1984, p.4-5.

[6]Ibid.

[7]U.S. Congress, House, Committee on Appropriations, Department of Defense Authorization for Appropriations for 1985, (Washington: U.S. Govt. Print. Off. 1984), p. 738.

[8]"Wartime Strategic/Domestic Aeromedical Evacuation and Distribution of Patients," ICAF, April 1982, p. 1.

[9]U.S. Congress, House, Committee on Appropriations, Department of Defense Appropriations for 1982, Hearings,(Washington: U.S. Govt. Print. Off., 1981), p. 299-300.

[10]"Strategic Mobility, Can We Get There From Here in Time?", AUSA Special Report, 1984, p.4-5.

[11]Comptroller General of the United States. The Civil Reserve Air Fleet--An Effective Program to Meet Defense Emergency Airlift Requirements. Washington, D.C., 07 December 1978.

[12]Perkins, Stuart L., Global Demands: Limited Forces. U.S. Army Deployment, Washington, D.C., 1984.

FOOTNOTES

CHAPTER VI

[1]U.S. Congress. House. Committee on Appropriations. Subcommittee on the Department of Defense. Department of Defense Appropriations.Medical Activities. Hearing, (Washington: U.S. Govt. Print. Off., 1984)

[2]Walter Reed Army Institute of Research. Proceedings of the Workshop on Infectious Disease Threats to the Rapid Deployment Force: Preventive Strategies. Washington, D.C.: 14-15 July 1981.

[3]James, J.J., Frelin, A.J. and Jeffrey, R.J., "Casualty Estimation Sub-study: Disease and Nonbattle Injury Rates (DNBI)." HCSD Report #81-011. U.S. Army Academy of Health Sciences, Texas: August 1981.

[4]Hoeffler, D.F., and Melton, L. J., "Changes in the Distribution of Navy and Marine Corps casualties from World War I through the Vietnam Conflict." Mil. Med., November 1981, p. 776-779.

[5]Daily, O.P., "Infectious Disease Casualties in Military Operations." Joint Perspectives, Spring 1981, p. 62-69.

[6]Takafuji, E.T., Kelley, P.W., Wiener, H.A., McGreevey, P., Pappas, M.A., and Peters, A., "Eosinophilia and soil-transmitted Helminthiasis related to jungle training in Panama." Epidemiology Consultant Service Report. Division of Preventive Medicine. Walter Reed Army Institute of Research. Washington, D.C., 17 October 1984.

[7]EPICON UPDATE. Number 85-1. Division of Preventive Medicine. Walter Reed Army Institute of Research. Washington, D.C., January 1985.

[8]Craig, R.P., "Military cold injury during the war in the Falkland Islands 1982: An evaluation of possible risk factors." J. R. Army Med. Corps., 1984, p. 89-96.

[9]Herbold, J.R., Wolfe, W.H., and Wright, J.A. "Health Risk Assessment for Worldwide Deployment of Air Force Personnel." Mil.Med., February 1984, p. 82-86.

[10]U.S. Central Command. Memorandum for the Record. Subject: Recommendations to the Command Surgeon, U.S. Central Command, McDill AFB:27 March 1984.

[11]Interview with LCOL J. Kirkpatrick, Preventive Medicine Consultant,Office of the Surgeon General, U.S. Army, Washington, D.C. 04 January 1985.

[12]Telephone converssation with LCOL R.A. Lombard, USAF, BSC, Office of the Surgeon General, U.S. Air Force, Washington, D.C., 01 April, 1985.

[13]Telephone conversation with CDR D.E. Sciarrini, MSC, USN, MEDCOM-OOR, Navy Medical Command, Washington, D.C., 07 February 1985.

[14]Armed Forces Epidemiology Board. Memorandum for the Assistant Secretary of Defense (Health Affairs). Sugject: Epidemiologic and Preventive Medicine Capabilities Regarding Potential Worldwide Trouble Spots. Washington, D.C., 29 October 1984.

[15]Santana, F.J. "Medical Entomology Information Sources", IN:Proceedings, 1983 DOD Operational and Research Pest Management Workshop, Armed Forces Pest Management Board, 31 January-04 February 1983, p. 103-108.

[16]Armed Forces Epidemiology Board. Memorandum for the Assistant Secretary of Defense (Health Affairs). Subject: Availability and Quality of Epidemiological Data Relevant to Readiness Related Issues Regarding the Incidence and Prevalence of Diseases Worldwide. Washington, D.C., 29 October 1984.

[17]Office of the Under Secretary of Defense for Research and Engineering. Memorandum for the Command Surgeon, Rapid Deployment Joint Task Force. Subject: Infectious Disease Workshop Summary and Recommendations of the Steering Committee. Washington, D.C., 22 November 1982.

[18]Telephone conversation with COL N.J. Thompson, MC, USA, Army Environmental Hygiene Agency, APG, Maryland, 12 March 1985.

[19]Pierce, P.E. "Equipment", IN: Proceedings, 1983 DOD Operational and Research Pest Management Workshop, Armed Forces Pest Management Board, 31 January-04 February 1983, p.85-92.

[20]Preiss, F.J., "Chemical Industry's Development of Pesticides." IN: Proceedings, 1983 DOD Operational and Research Pest Management Workshop, Armed Forces Pest Management Board, 31 January-04 February 1983, p. 98-102.

[21]Evans, E.S., "Pesticides", IN: Proceedings, 1983 DOD Operational and Research Pest Management Workshop, Armed Forces Pest Management Board, 31 January-04 February 1983, p. 93-97.

[22]Letter from General R.C. Kingston, USA, Commander in Chief, US Central Command, to the Honorable Verne Orr, Secretary of the Air Force, 21 January 1985.

[23]Letter from CPT R.J. McKenna, USAF, BSC, to CAPT L. Sholdt, MSC, USN, 04 February 1985.

[24]Letter from CDR T. H. Dickens, MSC, USN to CAPT L. Sholdt, MSC, USN, 27 March 1985.

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GLOSSARY

WORD/ACRONYM	DEFINITION
AABB	American Association of Blood Banks
AMAL	Authorized Medical Allowance List
ARC	American Red Cross
ASD(HA)	Assistant Secertary for Defense/Health Affairs
ASF	Aeromedical Staging Facilities
ASMRO	Armed Services Medical Regulating Office
ASPPO	Armed Services Production Planning Officer
ASWBPL	Armed Services Whole Blood Processing Laboratory
AVF	All Volunteer Force
C4	Combat Casualty Care Course
CHCHS	Civilian-Military Contingency Hospital System
COMMZ	Communication Zone
CONUS	Continental United States
CRAF	Civilian Reserve Air Fleet
D&D	Dated and Deteriorative
D&D MLM	Dated and Deteriorative Medical Logistics Model
D+6	D-day plus six months
DDSIL	D-Day Significant Item List
DEA	Drug Enforcement Agency
DEPMEDS	Deployable Medical Systems
DLA	Defense Logistics Agency
DMMB	Defense Medical Materiel Board
DMSB	Defense Medical Standardization Board
DNBI	Disease and Non-Battle Injuries.
DOD	Department of Defense
DPSC	Defense Personnel Support Center
DRB	Defense Resources Board
DRG/PP	Diagnostic Related Groups and Prospective Payment
EMT	Emergency Medical Technician
EPMU	Environmental and Preventive Medicine Unit
FDA	Food and Drug Administration
FY	Fiscal Year

FYDP	Five Year Defense Plan
GAO	Government Accounting Office
GMO	General Medical Officer
GMRAR	General Mobilization Reserve Acquisition Requirement
GNP	Gross National Product
HMO	Health Maintenance Group
HNS	Host Nation Support
ICAF	Industrial College of the Armed Forces
IMM	Inventory Maintenance Manager
IPP	Industrial Preparedness Plan
IPPL	Industrial Preparedness Planning List
ITRO	Interservice Training Review Organization
JCS	Joint Chiefs of Staff
JOC	Joint Operations Center
KIA	Killed In Action
LHA	Amphibious Assault Ships (general purpose)
LPHs	Amphibious Assault Ships (helicopter)
LPN	Licensed Practical Nurse
LVN	Licensed Vocational Nurse
M-day	Mobilization Day
MAC	Military Airlift Command
MAF	Marine Amphibious Force
MASH	Mobile Army Surgical Hospital
MEDSOM	Medical Supply and Optical Maintenance
MFMSSSG	Military Field Medical Systems Standing Steering Group
MMART	Mobile Medical Augmentatin Readiness Teams
MMRS	Medical Mobilization Research Seminar
MSP	Mobilization Studies Program
MTF	Medical Treatment Facility
MUST	Medical Unit Surgical Transportable
NATO	North Atlantic Treaty Oraganization
NDMS	National Disaster Medical System
NEC	Navy Enlisted Classification (Code)

OASD(HA)	Office of the Assistant Secetary for Defense (Health Affairs)
OWRMS	Other War Reserve Materiel Stocks
POM	Program Objective Memorandum
POMCUS	Prepositioning of Material Configured to Unit Set
POR	Processing for Overseas Requirements
PPBS	Program Planning and Budgeting System
PPG	Preferred Provider Group
PWRMS	Prepositioned War Reserve Materiel Stocks
R&D	Research and Development
RAMF	Review of Army Mobilization Planning
SAMMS	Standard Automated Materiel Management System
TOE	Table of Organization and Equipment
USP	United States Pharmacopoeia (Standards)
VA	Veterans Administration
WIA	Wounded In Action
WRMS	War Reserve Materiel Stocks