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Report to the Chairman, Subcommittee
on Military Personnel and
Compensation, Committee on Armed
Services, House of Representatives

March 1990

DEFENSE HEALTH CARE

Military Physicians' Views on Military Medicine

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United States
General Accounting Office
Washington, D.C. 20548

Human Resources Division

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March 22, 1990

The Honorable Beverly B. Byron
Chairman, Subcommittee on Military
Personnel and Compensation
Committee on Armed Services
House of Representatives

Dear Madam Chairman:

This report, prepared at your request, discusses the factors that most influence military physicians to leave the military and reviews the extent to which military physicians left the service since 1985. In addition, the report illustrates how increasing physician compensation and reducing the time physicians spend performing nonmedical tasks could diminish the likelihood of attrition.

We are sending copies of this report to the Secretary of Defense, the service secretaries, and interested congressional committees. We will also provide copies to the commanding officer at each military treatment facility and to other interested parties on request.

This report was prepared under the direction of David P. Baine, Director, Federal Health Care Delivery Issues, who can be reached on (202) 275-6207 if you have any questions about the report. Other major contributors are listed in appendix IV.

Sincerely yours,

Lawrence H. Thompson
Assistant Comptroller General

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Executive Summary

Purpose

The percentage of military physicians leaving the service increased in recent years, from 13.7 in 1985 to 15.6 in 1988. This has caused concern in the Congress and the military services because increases in the number of active-duty physicians leaving the military may affect the Department of Defense's (DOD) ability to meet combat medical requirements in the event of war and its ability to provide services to beneficiaries in peacetime.

To assist in structuring a long-term solution to the military physician attrition problem, the Chairman, Subcommittee on Military Personnel and Compensation, House Committee on Armed Services, asked GAO to identify the reasons why military physicians are leaving the service in increasing numbers. GAO sent a questionnaire to about 1,500 active-duty physicians to assess

- the likelihood that physicians will leave the military, and
- the factors that most influence physicians' decisions to leave the service.

Background

DOD's \$13 billion per year health care system employs over 13,000 active-duty physicians and serves about 9 million people.

Physician retention has concerned the Congress and DOD for some time. To help reduce attrition, the Congress, in the 1989 National Defense Authorization Act, established a bonus for many physicians who agreed to remain in the service for 2 additional years.

As required by the 1989 National Defense Authorization Act, DOD submitted a report to the Congress that discussed issues affecting retention of military physicians and proposed a pay program to address the compensation gap with the civilian sector. DOD also submitted a follow-on report that examined noncompensation issues.

Results in Brief

Physicians' intentions to leave the service over the next several years parallel DOD's historical attrition rates. Almost one-half of the active-duty physicians indicated at least a 70-percent probability of leaving the service when they become eligible and about two-thirds voiced a 50-percent chance of leaving.

Physicians reported dissatisfaction with many aspects of military medicine. At least one-half were dissatisfied with their compensation, the availability of administrative and health support personnel, hospital

equipment, the ability to provide continuity of care to patients, having to perform excessive amounts of quality assurance tasks, and the opportunities to attend professional meetings and training.

Dissatisfaction with certain factors does not necessarily result in a physician's decision to leave the service. GAO's analysis of several of these factors indicates that active-duty physicians' intentions to leave are influenced by: (1) the time spent on nonphysician tasks, (2) a gap between military and civilian physician compensation, and (3) the lack of opportunity to practice in their primary specialties. The number of hours that initial obligees are required to devote to readiness training also affects their intentions to leave. Physicians who are beyond their initial obligations are influenced by the number of unwanted permanent changes of station. Further analysis suggests that, among these factors, the probability of physicians leaving military service can be most effectively reduced by increasing compensation, by decreasing the time physicians spend on nonphysician tasks, or both.

GAO's Analysis

Many Physicians Will Likely Leave the Military When Eligible to Do So

Table 1: Physicians Planning to Leave the Military Upon Completion of Their Obligation

Figures are percentages

Physician category	Stated probability of leaving	
	70% or greater	50% or greater
Overall	47	62
Army	41	58
Navy	50	65
Air Force	52	63
Obstetricians/Gynecologists	60	74
Surgeons	51	67
Internal medicine	46	64
Primary care	42	56
Support medicine	71	78
Initial military obligation	62	77
Beyond initial obligation	28	42

Physicians Dissatisfied With Several Aspects of Military Medicine

Slightly more than one-half of the physicians said they were dissatisfied with their pay and believed that private sector physicians earned 25 to 100 percent more than they do. Support medicine Physicians, such as anesthesiologists and radiologists, were the most dissatisfied and primary care doctors were the least dissatisfied with their pay. (See p. 22.)

Table 2 shows the extent of physician dissatisfaction with other aspects of military medicine.

Table 2: Physicians Dissatisfied With Certain Aspects of Military Medicine

Aspect of military medicine	Percent of physicians
Too few clerks, receptionists, and secretaries	86
Too few nurses, corpsmen, and orderlies	75
Inadequate equipment in hospitals	65
Unable to provide continuous care	62
Insufficient opportunities to attend professional meetings	63
Excessive quality assurance tasks	63
Too little emphasis on medical proficiency in promotion decisions	60

Factors Influencing Physicians' Intentions to Leave

Because questionnaire respondents identified compensation and the lack of support personnel as primary inducements to leave, GAO's analysis focused mainly on how these two factors affect physicians' probability of leaving. For example, increasing the average salary by \$10,000 for physicians serving under their initial obligations reduces their average probability of leaving by an estimated 14 percentage points. The same salary increase for other obligees causes an estimated 19-percentage-point reduction in their stated probability of leaving. (See p. 28.)

Initial obligees spend, on average, 11.3 hours per week on nonphysician tasks, such as nursing, secretarial, or administrative duties. Other obligees spend, on average, 8.4 hours per week on these tasks. Eliminating the time spent on nonphysician tasks decreases the stated probability of leaving by 5 percentage points for initial obligees and by about 10 percentage points for other obligees. (See p. 30.)

Other factors affect physicians' stated probability of leaving, but their effects are small. For example, reducing the number of unwanted permanent changes of station to 0 achieves a 3-percentage-point decrease in probability of leaving for other obligees. Eliminating readiness training entirely yields a 1-percentage-point decrease in probability of leaving

Executive Summary

for initial obligees. Finally, if physicians' dissatisfaction with their ability to maintain specialty skills was eliminated, the probability of leaving would decrease, on average, by about 1 percentage point for initial obligees and 4 percentage points for other obligees. (See p. 32.)

Recommendations

GAO is making no recommendations.

Agency Comments

As requested by the Chairman, GAO did not obtain written agency comments on a draft of this report. However, the views of responsible DOD officials were sought and incorporated where appropriate.

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Abbreviations

AFHPSP	Armed Forces Health Professions Scholarship Program
CHAMPUS	Civilian Health and Medical Program of the Uniformed Services
	Services
DOD	Department of Defense
GAO	General Accounting Office
GME	graduate medical education
Ob/Gyn	obstetrics/gynecology
USUHS	Uniformed Services University of the Health Sciences

Introduction

The Department of Defense (DOD) health care system has two primary objectives. The first is to maintain the health of the active-duty force of the uniformed services and be prepared to attend the sick and wounded in wartime.¹ The second is to provide medical care to eligible dependents and retirees when space, facilities, and staff are available.

DOD maintains over 500 military treatment facilities, ranging in size from small clinics with limited capabilities to large hospitals with extensive capabilities and medical teaching programs. Military treatment facilities serve almost 9 million beneficiaries: 2.3 million are active-duty members, 2.8 million are dependents of active-duty members, and 3.7 million are retirees and dependents of retired or deceased members.

DOD records show that the estimated cost of medical care at military treatment facilities, exclusive of medical facility construction costs, was about \$10.2 billion for fiscal year 1989. When care is unavailable at military treatment facilities, nonactive-duty beneficiaries may seek care from civilian providers through the Civilian Health and Medical Program of the Uniformed Services (CHAMPUS). CHAMPUS costs in fiscal year 1989 were about \$2.5 billion.

Military Physician Force

To help meet its health care responsibilities, at the end of fiscal year 1988 DOD had approximately 13,000 active-duty physicians: 5,295 in the Army, 3,983 in the Air Force, and 3,929 in the Navy. Each service has a medical department headed by a Surgeon General who is responsible for the activities of the services' medical facilities. The Assistant Secretary of Defense (Health Affairs) is responsible for providing overall supervision and policy guidance for DOD medical care activities.

There are three major ways in which the military services recruit military physicians: (1) the Armed Forces Health Professions Scholarship Program (AFHPSP), (2) the Uniformed Services University of Health Sciences (USUHS), and (3) direct recruitment of trained physicians. For the first two sources, the military services finance the physicians' medical education in exchange for their agreement to practice medicine as an active-duty military physician. In general, the number of years of active duty required matches the number of years of medical training financed by the military for AFHPSP physicians. The minimum obligation is 2

¹The uniformed services include the Army, Navy, Air Force, Marine Corps, Coast Guard, and Commissioned Corps of the Public Health Service and of the National Oceanic and Atmospheric Administration.

years. For USUHS graduates, the active-duty obligation is 21 months for each year, or portion thereof, spent in medical training, except that in no case is the minimum obligation less than 27 months. Therefore, physicians who joined the military either through AFHPSP or USUHS are in obligated status for several years after completing medical school. Generally, physicians' pay-back periods do not start until completion of their post-graduate training, (e.g., residency). Volunteers (those who joined the military as fully trained physicians) do not have an obligated pay-back period.

Physician Attrition

As table 1.1 shows, between fiscal years 1985 and 1988, the number of active-duty military physicians leaving the services increased by 222 or about 12 percent.² As of fiscal year 1988, DOD had 13,207 physicians on active duty.

Table 1.1: Physician Losses by Service

	Fiscal year				Change 1985-1988
	1985	1986	1987	1988	
Air Force	438	472	472	529	91
Army	404	518	552	511	107
Navy	431	426	448	455	24
Total	1,273	1,416	1,472	1,495	222

Note: Includes personnel released/retired during the reporting period and physicians on inter-service and intra-service transfers, but excludes physicians in GME.

As a proportion of the total number of active-duty physicians, attrition rose from 13.7 percent in fiscal year 1985 to 15.6 percent in fiscal year 1988, excluding physicians in GME programs. Attrition rates increased since 1985 in all three services, but the increases were greatest in the Army and Air Force as shown in table 1.2. The Army's attrition rate rose by almost 25 percent and the Air Force attrition rate by about 13 percent. By contrast, the Navy's attrition rate rose by about 5 percent. Overall, however, the Army's attrition rates have consistently been the lowest among the services.

²These data do not include physicians who were in graduate medical education (GME) programs. GME, sometimes called residency training, refers to the period physicians spend in post-graduate training in a medical specialty.

Table 1.2: Physician Attrition Rates by Service (Excluding GMEs)

	Fiscal Year				Percentage point change	Percent change 1985-88
	1985	1986	1987	1988		
Air Force	15.1	15.5	15.1	17.0	1.9	12.6
Army	11.3	13.9	15.0	14.1	2.8	24.8
Navy	15.2	14.7	15.4	16.0	0.8	5.3
Total	13.7	14.7	15.1	15.6	1.9	13.9

Note: These attrition rates reflect the year-to-year fluctuations caused by new recruitment of physicians as well as by physician losses. They exclude physicians in GME programs.

To encourage more physicians to remain in the military, the National Defense Authorization Act for Fiscal Year 1989 established a medical officer retention bonus. Up to \$20,000 per year is paid to physicians with 8 or more years of military service who agree to remain on active duty for at least 2 more years. The bonus program has been referred to by the Chairman of the Subcommittee on Military Personnel and Compensation, House Armed Services Committee, as a stop-gap measure to retain experienced military physicians.

In addition, as the act directed, the Secretary of Defense reported on the adequacy of the existing compensation package for health care professionals and submitted a proposal for a compensation system linked to earnings of physicians in the private sector. DOD also reported on noncompensation factors affecting physician retention.

Objectives, Scope, and Methodology

On August 19, 1988, the Chairman, Subcommittee on Military Personnel and Compensation, House Committee on Armed Services, asked us to develop and administer a questionnaire to physicians on active duty to elicit their views concerning factors that most directly influence their decision to remain in or to leave the military. The questionnaire we developed elicited information on several issues, including compensation, support staff, time spent on various medical and nonmedical tasks, patient mix, training, professional development opportunities, nonmedical aspects of military life, reasons for entering the military, and the probability of leaving it.

We sent the questionnaire to 1,515 active-duty physicians, about 500 from each branch of service, based on a stratified random sample of all active-duty physicians except those in GME programs. We excluded physicians enrolled in GME because they are several years away from making decisions about their plans to leave or remain in the military. In

consultation with DOD officials and GAO's Chief Medical Advisor we grouped physicians into five strata: (1) obstetrics/gynecology (Ob/Gyn), (2) primary care (e.g., family practice, general medicine), (3) internal medicine, (4) surgical specialties, and (5) support medicine (e.g., anesthesiologists, radiologists). Appendix III provides additional examples of medical specialties included in each strata.

The survey was conducted between November 1988 and January 1989 and achieved a response rate of 85 percent.³ The respondents are representative of military physicians in general and, therefore, their responses can be generalized to all active-duty military physicians.

In order to gain further insight into the factors that influence physicians' probability of leaving the military, we analyzed survey responses using multiple regression analysis. This analysis focused on the correlation between physicians' stated probability of leaving and several independent variables, such as compensation and hours spent on nonphysician tasks. This method also allowed us to predict the change in the probability of leaving that would be associated with a given change in an independent variable, assuming the other factors that might affect probability of leaving were held constant and physicians do what they say they will.

Appendix III describes in more detail the sample selection and data analysis methodologies we used. Our work was performed between August 1988 and September 1989 in accordance with generally accepted government auditing standards.

³On March 16, 1989, GAO testified before the Subcommittee on Military Personnel and Compensation, House Committee on Armed Services, on preliminary results of its survey.

Characteristics of Military Physicians

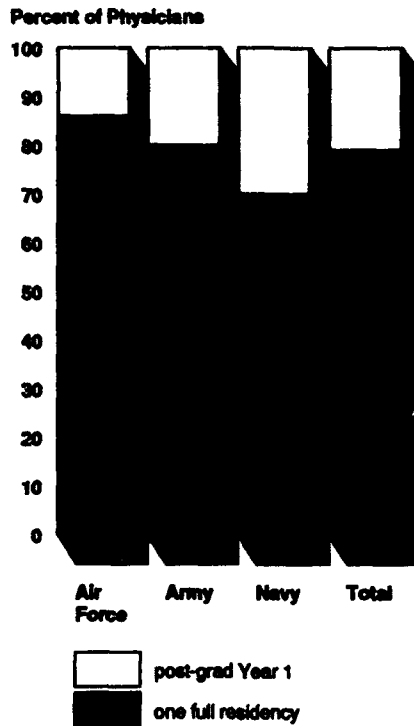
This chapter describes the active-duty physician population and how they spend their time as depicted by the questionnaire respondents. Besides demographic data, information is presented on physicians' medical education and experience, the proportion of physicians in each medical specialty group, how and why physicians entered the military, and the extent to which they practice in their specialty.

Overall, military physicians are relatively young—the median age is 35 years. Eighty-eight percent are male. Nearly all received medical training in the United States and most are certified by medical specialty boards in one or more specialties. The majority of physicians are in primary care specialties. Generally, military physicians reported that they practiced in their specialties or subspecialties and that the primary activity through their career has been to deliver medical care or to engage in clinical activities.

Medical Education and Experience

Nearly all physicians (93 percent) received their medical training in the United States; 7 percent were graduates of foreign medical schools. Figure 2.1 shows the level of professional medical education achieved by physicians in each of the services.

Figure 2.1: Percent of Physicians Who Completed Residency and 1 Year of Post-Graduate Training



About 60 percent of all physicians are certified by medical specialty boards in one or more specialties. Across all services, the largest number of board-certified physicians is in family practice (primary care stratum)—95 percent of all family practitioners are board certified. Emergency medicine physicians (primary care stratum) have the lowest proportion of board certification—27 percent are board certified in their specialty.

On average, physicians in the military have practiced medicine for about 10 years, including post-graduate training. Military physicians, in general, have practiced medicine in a nonmilitary setting for an average of 4 years, including physicians entering through AFHPS who participated in internship and residency programs at civilian medical schools as well as those who joined the service as fully trained physicians. As shown in table 2.1, the total number of years military physicians have practiced medicine varies slightly among the services.

Table 2.1: Years of Experience of Military Physicians, by Service

Figures are percentages

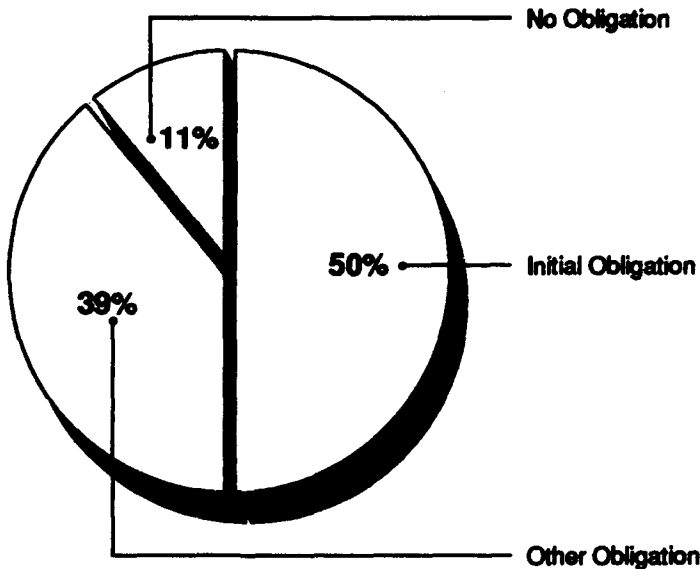
Branch of service	Year of experience				
	Less than 5 years	6-10 years	11-15 years	16-20 years	over 21 years
Army	32	35	18		3
Navy	33	34	16		6
Air Force	41	23	22	12	3

Note: Columns do not add to 100 due to rounding.

Obligation Status

Figure 2.2, shows the percent of military physicians serving their initial obligations; that is, "paying back" the military for financing their medical education; the percent of military physicians serving under some other type of obligation incurred as a result of participation in physician special pay programs, additional training, or promotions; and the percent of military physicians serving under no obligation.

Figure 2.2: Percent Distribution of Physicians by Type of Obligation



Physicians under initial obligation are those paying back for their medical education with a comparable number of years of military service.

Figure 2.3 shows the obligation status of physicians by service affiliation.

Figure 2.3: Physicians' Obligation Status by Service

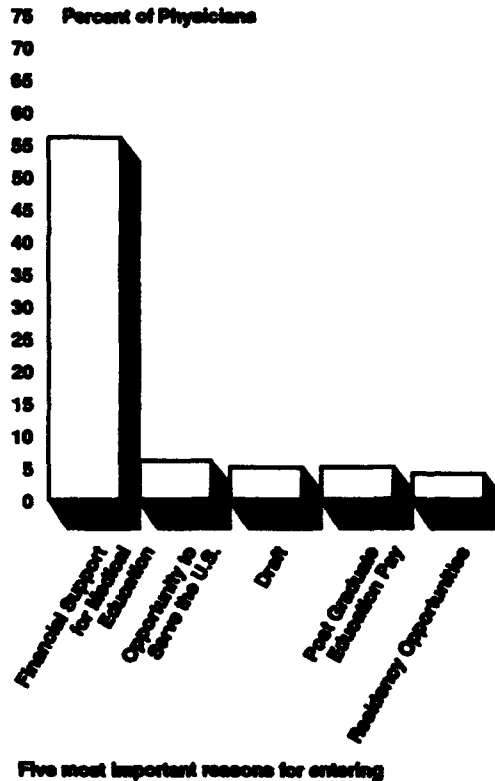


How and Why Physicians Entered the Military

Responses to our questionnaire indicated that about 52 percent of all active-duty physicians entered the military through AFHPSP. About 15 percent entered voluntarily as fully trained physicians. About 5 percent came in through USUHS. The remaining 28 percent of physicians entered as draftees, through other draft-related programs, or joined the military in another capacity and later opted to pursue a military medical career. Figure 2.4 shows the major reasons why physicians entered military service.

One-half of the physicians on active duty were uncertain about whether to pursue a career in the military when they entered. About 29 percent of them said that they had not planned to pursue a career in the military while about 21 percent intended to do so at the time they entered.

Figure 2.4: Five Most Important Reasons for Physicians Entering the Military



Physicians' Primary Activities

For almost three-fourths of physicians (71 percent), the primary activity throughout their career has been to provide medical care or to engage in clinical activities. Of this 71 percent, almost three-fourths responded that providing medical care was their primary area of responsibility. About 17 percent said that management or administration was their primary responsibility, and 12 percent were primarily involved in teaching, research, or other activities. There were virtually no differences among the three services in terms of physicians' primary activities, except fewer Army physicians were involved in management or administrative activities than Air Force and Navy physicians. Table 2.2 summarizes how responding physicians said they spent their time during a typical work week.

Table 2.2: Physicians Saying They Spent Time Performing Certain Tasks

Figures are percentages

Task	Hours per week					Over 40
	0	1-5	6-10	11-20	21-40	
Medical care/teaching	3	5	5	11	46	30
Management/administrative	10	34	24	18	10	4
Research	77	17	4	1	1	0
Quality assurance tasks	17	65	15	3	0	0
Nonphysician health care	33	44	16	6	1	0
Nonphysician administrative	16	53	24	6	1	0

Note: Nonphysician health care tasks are those normally performed by a nurse, orderly, or corpsman. Nonphysician administrative tasks are those normally performed by clerks, receptionists, secretaries, or administrative personnel.

Opportunity to Practice Medical Specialty

About 83 percent of physicians practiced in their primary specialty or subspecialty to a great extent. About 14 percent practiced in their specialty to some extent, and very few (about 3 percent) practiced in their specialty to little or no extent. The extent to which physicians practiced their primary specialty or subspecialty was similar in the Army, Navy, and Air Force.

Extent of Physician Dissatisfaction With Military Medicine

Military physicians indicated a substantial degree of dissatisfaction with various aspects of military medicine. Almost one-half of the respondents indicated that there was a 70-percent or higher probability that they will leave the military when they become eligible. Physicians expressed dissatisfaction with their compensation, the lack of administrative and health support personnel, the inadequacy of military medical facility equipment, the inability to provide continuity of care to patients, and too little emphasis being placed on medical proficiency in decisions to promote military physicians. The lack of support for professional training and travel as well as requirements to perform some quality assurance tasks, which in the physicians' view do not improve quality of care, are also sources of dissatisfaction.

The opportunity to practice their medical specialty was an aspect of military medicine that physicians cited as an inducement to stay in the service. They also expressed general satisfaction with the control they had over choosing their duty stations.

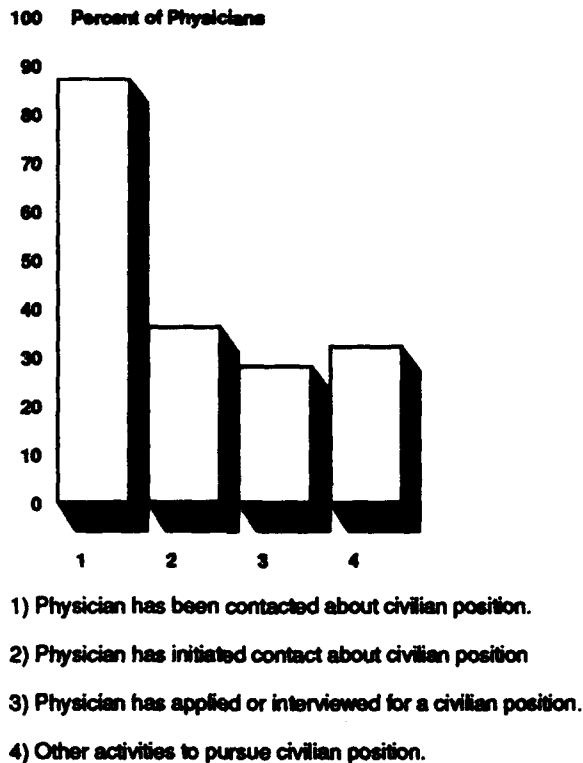
Many Physicians Indicated a High Probability of Leaving the Military

Forty-seven percent of the physicians reported that the probability of their leaving the military when their current obligation expires was 70 percent or greater. Sixty-two percent indicated at least a 50-percent probability of leaving. An estimated 3,000 of the physicians under obligation who report a 70-percent or higher probability of leaving will be eligible to leave before the end of 1992. Attrition at the rate suggested by these numbers would correspond with DOD's actual attrition rates over the last 3 years.

Physicians serving under their initial military obligation reported about twice the probability of leaving as did physicians serving under other types of obligation. A higher percentage of obstetricians/gynecologists and support medicine physicians reported a higher probability of leaving the service than the other medical specialties. Army doctors indicated the lowest probability of leaving. Appendix I shows the stated probabilities of leaving by branch of service, medical specialty group, and type of obligation.

Although we do not know whether physicians will act on their stated intention to leave the military, figure 3.1 shows that many of the respondents to our questionnaire have been contacted about civilian employment and about one-third have taken action toward obtaining civilian employment.

Figure 3.1: Physicians' Interest in Civilian Employment



Physicians Dissatisfied With Their Compensation

Fifty-three percent of the physicians said that they were somewhat or very dissatisfied with their pay and 88 percent said that physicians in the private sector were better off than they were in terms of earnings. More specifically, a majority of the military physicians we surveyed believed that physicians in the private sector earned substantially more than they did.

Dissatisfaction with compensation was similar among Army, Air Force, and Navy physicians. However, physicians' views on pay and on civilian earnings varied considerably by physician specialty. As shown in table 3.1, support medicine physicians were the most dissatisfied with their pay and also were the most likely to believe that their civilian counterparts earned significantly more.

Table 3.1: Physicians Dissatisfied With Pay, by Medical Specialty Group

View/Issue	Ob/Gyn	Surgical specialties	Internal medicine	Primary care	Support medicine	All physicians
Somewhat to very dissatisfied with pay	65	57	66	46	74	53
Dissatisfied with pay and 70-percent or higher probability of leaving	41	27	29	21	52	26
Believed they earned 25 percent less than their civilian counterparts	0	1	2	9	0	5
Believed they earned between 25-100 percent less than their civilian counterparts	39	34	50	71	17	56
Believed they earned between 100-300 percent less than their civilian counterparts	61	65	48	20	83	38

We asked physicians whether a change in their pay that indexed their earnings to comparable specialists in private practice would affect the probability that they would leave military medicine. Thirty-four percent said that a pay package indexed to earnings of physicians in private practice would have little or no effect on their decisions to stay in the military. But 61 percent said that their probability of leaving would be somewhat or greatly decreased if pay were indexed to that of physicians in private practice. With regard to whether a bonus would serve as an inducement to remain in the military, 71 percent of the physicians said that it would provide at least some inducement to remain.

Inadequacy of Support Staff

Nearly all military physicians were dissatisfied with the number of health or administrative personnel available to support them. The responses to our questionnaire regarding inadequacy of support resources closely parallel our February 1989 report on the extent to which military physicians perform administrative and clerical tasks.¹

Generally, physicians indicated that the number of health personnel staff, such as general duty nurses, physician assistants, X-ray and laboratory technicians, and corpsmen was insufficient to support their work. Table 3.2 shows the percentage of physicians who indicated either moderate or extreme dissatisfaction with current levels of health support personnel.

¹DOD Health Care: Extent to Which Military Physicians Perform Administrative Tasks (GAO/HRD-89-53, Feb. 13, 1989).

**Chapter 3
Extent of Physician Dissatisfaction With
Military Medicine**

Table 3.2: Physicians Who Believe Health Staff Is Insufficient

Type of staff	Percentage of physicians
Surgical nurses	37
Nurse anesthetists	27
Nurse practitioners	41
Nurse midwives	16
General duty nurses	74
Physician assistants	45
X-ray technicians	47
Laboratory technicians	58
Corpsmen/orderlies	76

As shown in table 3.3, physicians also expressed concern about insufficient administrative and clerical support.

Table 3.3: Physicians Who Believe Administrative Support Personnel Is Insufficient

Type of personnel	Percentage of physicians
Administrative officers	30
Medical records clerks	65
Secretaries, clerks, receptionists	86

Anecdotes provided by our respondents illustrate the problem of lack of secretarial/typing support. One physician wrote:

"Give me a receptionist/secretary to help out in the office. (I have to do all my typing. I have no typing support.)"

Another physician stated:

"I type all my own correspondence, call all my own patients, and do much more secretarial work than is necessary."

And another:

"Finally a comment on the lack of secretaries, etc. No problem, thanks to the Army I've learned to type close to 80 words/min. and I'm expert at using the Mackintosh System. I've purchased my own system (\$3,000) and my troubles are solved."

There are no significant differences of opinion among Army, Navy, and Air Force physicians with regard to the adequacy of the current levels of administrative support personnel. When segregated by specialty groups, physicians viewed shortages of support personnel differently. Because different medical specialists require different types of health

support staff, variations exist among the types of staff they consider to be in short supply. Appendix II shows these variations by specialty groups.

Physicians' Views on Other Aspects of Military Medicine

About 65 percent of the physicians surveyed indicated dissatisfaction with the way military treatment facilities are equipped; 62 percent were dissatisfied with being unable to provide continuity of care to their patients; and about 60 percent were dissatisfied because they felt that too little importance is placed on medical proficiency in promotion decisions.

Over one-half of all military physicians indicated that they were somewhat to very dissatisfied with quality assurance requirements. About 63 percent considered they spent more time than needed performing tasks associated with these requirements and about three-fourths also believed that these tasks did not improve the quality of patient care.

Seventy-two percent of all military physicians believed that civilian quality assurance requirements are less stringent than those in the military. Very few (about 7 percent) believed the requirements were more demanding in the private sector and about 22 percent thought that requirements were comparable in both sectors.

Another aspect of military medicine with which physicians reported dissatisfaction was the inability to attend as many professional conferences and seminars as their colleagues in the private sector. About 63 percent of all physicians are somewhat to very dissatisfied with the amount of time and travel funds for professional activities the military provides. Although 89 percent reported receiving time off or travel funds for this purpose at least once in their career, the average number of professional events physicians attend each year is slightly over one. About 70 percent believed that the military's support for their professional development was less than adequate.

When asked to identify the most important inducements to remain in the military, the most frequently cited reason was the opportunity military physicians have to practice their field of medicine/surgery or, if trained in more than one field, the opportunity to practice the field of medicine they prefer to practice. About 50 percent of the physicians said that the opportunity to pursue a medical specialty was an inducement to remain in the military. Almost 60 percent said that ability to maintain proficiency was also an inducement to stay. Other inducements to stay in the

military include a desire to help assure that members of the Armed Services receive quality medical care and the fact that military physicians do not have to concern themselves with the patients' ability to pay for care.

On the whole, physicians are satisfied with the control they have over choosing the locations to which they are assigned. Only 11 percent of all physicians indicate that they are dissatisfied with the location of their duty station.

Most physicians (about 84 percent) had undergone a permanent change of station. On average, physicians changed stations about three times during their military career but were generally willing to move. Forty-three percent of all physicians had no preference about remaining in their previous assignment or moving.

Deployments—being stationed for an extended period of time in an operational setting—occurred with about one-third of all physicians. The remaining two-thirds had never been deployed. The average duration of deployments was related to service affiliation. The average duration of Army and Navy deployments was about 5 months compared with 3 months for the Air Force. Approximately 75-percent of all Army and Air Force physicians had never been deployed compared with 41 percent of Navy physicians. In general, physicians do not express dissatisfaction with the frequency of deployments in any of the services.

Factors That Most Influence Physicians' Plans About Military Service

Although many considerations are likely to affect an individual physician's decision to leave the military, some are more important than others. To identify the relative importance of various factors, we used multiple regression to analyze the responses of the physicians we surveyed. In this way, we estimated the change in the stated probability of leaving associated with a given change in each of the independent factors we considered.¹ Our analysis identified several factors that have a statistically significant impact on a physician's stated probability of leaving. Lower probabilities are associated with

- higher levels of military pay (relative to civilian compensation),
- less time spent on nonphysician tasks,
- the ability to maintain proficiency in a medical specialty,
- less time spent on combat readiness training, and
- fewer undesired permanent changes of station.

The analysis was performed separately for physicians serving under their initial obligation and for other obligees.² The two groups were analyzed separately because they are likely to differ in their taste for military life and, consequently, this may affect not only the probability of leaving the military, but also the individuals' responsiveness to factors such as military pay or combat readiness training. On average, physicians who serve beyond their initial obligations may be expected to have a greater predilection for military service than physicians still serving

¹In its 1988 Pay Study, DOD reported that increases in military pay are associated with measurable reductions in attrition rates, although DOD's estimate of the magnitude of the pay effect is smaller than our estimate. In general, DOD's approach, both in terms of methodology and variables considered, is similar, but not identical, to the approach used in this report. One important difference between the two studies is that DOD's data contained information on actual attrition rates, whereas our study measures the impact of various factors on physicians' stated intentions to leave the military.

²At 5 to 6 years of service, most military physicians face the first stay/leave decision. This point marks the end of the "pay back" period required by the agreement to serve as a military physician for a number of years in exchange for having received a medical education from the military. In this report, all grade O-4 physicians who responded "yes" to the question "Are you currently serving under your initial obligation" are included in the initial obligees category.

Those physicians who do not leave the military at the end of their initial obligation incur additional obligations by virtue of promotions, eligibility for certain special pays, permanent changes of station or additional education. The length of this additional commitment varies. For this report, we included in the other obliges category all grade O-5 and O-6 physicians and all those grade O-4 physicians who responded "yes" to the question "Are you serving under any other type of obligation."

About 10 percent of the survey participants responded that they are under no obligation, including some who at the time of our survey were eligible for retirement. These physicians are included in the other obligees category. Physicians under no obligation were not analyzed separately because the sample size is too small to provide statistically meaningful results.

under their initial obligation—many of whom will decide to leave the military at the end of that obligation.

Three factors were statistically significant influences for both groups of physicians: military pay, the number of nonphysician hours, and ability to maintain proficiency. For initial obligees the stated probability of leaving is also affected by the number of hours per month spent on readiness training. Among other obligees, the intentions to leave are affected by the number of undesired changes of duty station.

Of all the factors considered, military pay and nonphysician hours appear to be the most important in achieving meaningful reductions in physicians' intentions to leave the military. While other factors are statistically important, even the complete elimination of the difficulty in maintaining proficiency, unwanted changes of station, and hours per month spent on readiness training result in minor reductions in the probability of leaving.

Impact of Pay on Stay/Leave Decision

Physicians' responses to questions about the earnings of civilian physicians point to the importance of pay for the stay/leave decision. In general, military physicians stated a higher probability of leaving if they thought that their civilian counterparts were much better off financially. For example, 83 percent of the medical support specialists believed their civilian counterparts earned at least 100 percent more than they did and 71 percent indicated a high probability (70 percent or more) of leaving the military when eligible to do so. Conversely, only 20 percent of primary care specialists believed their civilian counterparts earned at least 100 percent more than they did and only 42 percent indicated a 70-percent or higher probability of leaving when eligible.

The regression analysis shows that when civilian compensation and other factors are held constant, both initial and other obligees' stated probability of leaving decreases as military pay increases. This inverse relationship between military pay and intentions to leave is statistically significant. (Statistical significance is discussed and regression coefficients are shown in appendix III.)

Estimated Effect of a \$10,000 Salary Increase

Table 4.1 shows the estimated impact of a \$10,000 increase in pay on the stated probability of leaving for initial and other obligees earning the mean salary.

Chapter 4
Factors That Most Influence Physicians'
Plans About Military Service

Table 4.1: Estimated Effect of a \$10,000 Salary Increase on Initial and Other Obligees' Stated Probability of Leaving the Military

Average military pay	Current percent probability of leaving	Estimated percent probability of leaving after \$10,000 increase	Percentage-point decrease in probability of leaving
\$73,259 (Initial)	88.5	74.2	14.3
\$84,257 (Other)	52.7	33.9	18.8

Note: The source for salary data in this table is DOD's Report to Congress entitled: *Health Professionals Special Pays Study*, December 1, 1988. Salary figures are based on mean initial and other obligees salaries using Fiscal Year 1989 regular military compensation plus variable special pay, additional special pay, board-certified pay, and incentive special pay for eligible specialties.

By increasing the compensation of initial obligees \$10,000, a decrease in the probability of leaving in the range of 11.0 to 17.7 percentage points can be achieved, depending on individual salary levels. Similarly, a 7.1- to 20.3-percentage point reduction can be obtained for other obligees.

If physicians act in accordance with their stated intentions, at current reported salary levels we expect that approximately 877 out of 1,000 physicians under initial obligation would leave the military while 123 physicians would stay. After a \$10,000 pay increase, we expect that approximately 735 would leave and 265 physicians would stay. This represents an expected gain of 142 physicians. For other obligees, we expect that 538 of 1,000 physicians would leave the military while 462 would stay. After a \$10,000 increase, we expect that 375 would leave while 625 would stay. This represents an expected gain of 163 physicians.

Estimated Effect of a \$10,000 Salary Increase by Medical Specialties

Table 4.2 shows that initial obligees who are primary care physicians are most influenced by a \$10,000 salary increase and those who are Ob/Gyn's or in support medicine specialties are influenced the least.

Table 4.2: Estimated Effect of a \$10,000 Salary Increase on Various Specialists' Probability of Leaving the Military (Initial Obligees)

	Ob/Gyn	Surgery	Primary	Internal medicare	Medical support
Average (mean) Military pay	\$78,568	\$77,754	\$68,768	\$68,568	\$76,061
Current probability of leaving (percents)	90.0	86.5	72.5	82.9	90.7
Probability after salary increase (percents)	78.1	71.6	48.1	62.9	79.0
Decrease in probability (percentage points)	11.9	14.9	24.4	20.0	11.7

Table 4.3 shows that among other obligee specialists, internal medicine and medical support physicians appear to be the most influenced by a \$10,000 salary increase. The predicted effects of this increase do not, however, differ very much between specialties.

Table 4.3: Estimated Effect of a \$10,000 Salary Increase on Various Specialists' Probability of Leaving the Military (Other Obligees)

	Ob/Gyn	Surgery	Primary	Internal medicine	Medical support
Average (mean) military pay	\$94,861	\$95,764	\$80,842	\$82,615	\$87,783
Current probability of leaving (percents)	52.9	45.8	31.8	50.4	60.8
Probability after salary increase (percent)	36.0	29.8	17.1	31.6	42.4
Decrease in probability (percentage points)	16.9	16.0	14.7	18.8	18.4

Impact of Nonphysician Tasks on Stay/Leave Decision

Responses to our survey also suggested that physicians' intentions to leave the military are affected by the number of hours they spend on nonphysician tasks. Physicians were dissatisfied with the number of administrative and health support personnel and the number of hours they spent performing nonphysician tasks. Eighty-seven percent of the physicians who were dissatisfied with the number of administrative and health support personnel available indicated a 70-percent or higher probability of leaving the military.

The regression analysis results confirm that the number of hours spent on nonphysician tasks has a statistically significant impact on both initial and other obligees' stated probability of leaving (see app. III). Specifically, as the number of hours per week spent on nursing, clerical, and administrative support tasks increases, the stated probability of leaving also increases.

Table 4.4 shows the estimated impact that nonphysician hours have on physicians' intentions to leave the service. Specifically, the table shows how much the probability of leaving would decrease if nonphysician hours were reduced to zero.

Chapter 4
Factors That Most Influence Physicians'
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Table 4.4: Estimated Impact of Eliminating Nonphysician Tasks on Initial and Other Obligees

Average number of hours per week spent on nonphysician tasks	Current probability of leaving (percent)	Decrease in probability of leaving (percentage points)
11.3 (Initial)	88.5	5.2
8.4 (Other)	52.7	9.5

For initial obligees, 863 physicians (of 1,000) reported working between 1 and 20 hours per week on nonphysician tasks. Of these, 764 would likely leave the military while 99 would likely stay. By eliminating nonphysician tasks for physicians, an estimated additional 44 physicians would likely stay in the military—an increase over the original 99 of 44 percent.

For other obligees, 869 physicians out of 1,000 reported spending between 1 and 20 hours per week on nonphysician tasks. Of this number, 456 are likely to leave the military while the remaining 413 are likely to stay. If nonphysician tasks were eliminated, an estimated 81 additional physicians would likely stay in the military—an increase over the original 413 of about 20 percent.

By medical specialty group, the average reduction in the probabilities of leaving caused by eliminating nonphysician tasks ranges from 4.1 to 9.5 percentage points for initial obligees and from 7.6 to 9.8 percentage points for other obligees (see table 4.5).

Table 4.5: Estimated Impact of Eliminating Nonphysician Tasks on the Probability of Leaving the Military, by Medical Specialty Group

Medical specialty group	Initial obligees		Other obligees	
	Current probability of leaving (percent)	Decrease in probability of leaving (percentage points)	Current probability of leaving (percent)	Decrease in probability of leaving (percentage points)
Ob/Gyn	90.0	4.8	52.9	9.8
Surgery	86.5	5.9	45.8	9.5
Primary	72.5	9.5	31.8	7.7
Internal medicine	82.9	7.2	50.4	9.4
Medical support	90.7	4.1	60.8	9.0

Ability to Maintain Proficiency in Area of Specialization

In our questionnaire we asked physicians whether it was difficult to maintain proficiency in their specialty given the number, diversity, and complexity of the cases encountered. Physicians who believed the case mix encountered in the military made it difficult or very difficult to maintain proficiency in their area of specialization stated a higher probability of leaving the military. While only 40 percent of all physicians reported difficulty maintaining proficiency, the regression analysis shows a statistically significant relationship between probability of leaving and being able to maintain proficiency in a specialty.

Specifically, the regression shows that, holding constant all other factors influencing physicians' intentions to leave, there is a significantly higher probability of leaving for those physicians who said that they had difficulty maintaining their specialty skills as compared with those who did not have any such difficulty. If it were possible to entirely eliminate difficulty maintaining proficiency, initial obligees would be minimally affected in their decision to leave (a decrease of 1.2 percentage points in probability of leaving). The effect would be stronger on other obligees, (a 4.2-percentage-point decrease in probability of leaving) but this group reports a less than even chance of leaving the military.

Combat Readiness Training

We estimated the effect of combat readiness training and field exercises on the physicians' stated probability of leaving. Results of this analysis indicated that for physicians serving under their initial obligation there was a statistically significant relationship between the number of hours spent on readiness training and the probability of leaving. Specifically, as the number of hours spent on readiness training and field exercises increases, the probability of leaving also increases. Reducing the number of hours spent in readiness training to 0, however, only changes the average probability of leaving by 1 percentage point. In any case, elimination of combat readiness training for military physicians is not consistent with the primary mission of military medicine, which requires physicians to provide care for the sick and wounded in combat situations.

Permanent Changes of Station

We asked physicians how many permanent changes of station they considered to be undesirable and we estimated the effect of this factor on their stated probability of leaving. The regression analysis results indicate that as the number of unwanted changes of station increases there is a statistically significant increase in the stated probability of leaving.

This relationship is true for other obligees only. For example, eliminating unwanted changes of station would reduce the average probability of leaving by about 3 percentage points. However, it would be difficult, if not impossible, for DOD to completely eliminate unwanted changes of station.

Summary

The probability of leaving stated by physicians is affected by several factors as shown in table 4.6.

Table 4.6: Impact of Potential Personnel Policies on Retention of Military Physicians

Figures are percentages		
	Initial obligees	Other obligees
Current stated probability of leaving	88.5	52.7
Percentage-point decrease in the stated probability of leaving when:		
Salary is increased by \$10,000	14.3	18.8
Nonphysician tasks are eliminated	5.2	9.5
Obstacles to maintaining proficiency are removed	1.2	4.2
Combat readiness training is eliminated	0.9	•
Unwanted permanent changes of station are eliminated	•	3.2

Our analysis of these factors indicates that this probability can be reduced most substantially by increasing salaries and/or by decreasing hours spent on nonphysician tasks. Other factors, such as ability to maintain proficiency, unwanted changes of station, and readiness training, show statistically significant effects but are impractical or difficult for DOD to address given its wide-ranging peacetime and readiness missions.

Physicians Planning to Leave the Military Upon Completion of Their Obligation

This analysis contains statistics showing by service, by medical specialty group, and by type of obligation the percentage of physicians stating certain probabilities of leaving the service upon completion of their obligation. Two stated probabilities of leaving are shown, 70 percent or greater and 50 percent or greater.

Table I.1: Physicians Planning to Leave the Military Upon Completion of Their Obligation (By Service)

Figures are percentages

Probability of leaving	Air Force	Navy	Army	All Physicians
70 percent or more	52	50	41	47
50 percent or more	63	65	59	62

Table I.2: Physicians Planning to Leave the Military Upon Completion of Their Obligation (By Medical Specialty Group)

Figures are percentages

Probability of leaving	Ob/Gyn	Surgical specialties	Internal medicine	Primary care	Support medicine	All physicians
70 percent or more	60	51	46	42	71	47
50 percent or more	75	68	65	57	79	62

Table I.3: Physicians Planning to Leave the Service Upon Completion of Their Obligation (By Type of Obligation)

Figures are percentages

Probability of leaving	Initial obligation	Other obligation	All physicians
70 percent or more	62	28	47
50 percent or more	77	42	62

Physician Views on the Adequacy of Health and Administrative Support Personnel

This appendix shows the variations among the five medical specialty groups regarding the adequacy of health and administrative support staff. We asked the physicians to specify whether they had more than, fewer than, or as many as needed of the type of staff required to support their work. Physicians viewed shortages of support personnel differently because certain specialists require different types of health support personnel. However, all physicians indicated there are fewer administrative support personnel than they need.

Table II.1: Internal Medicine Physicians' Views on Adequacy of Support Staff (Percent)

Figures are percentages

Type of staff	More than needed	Fewer than needed	As many as needed	Do not need this type of staff
Health support personnel				
Surgical nurses	0	23	1	75
Nurse anesthetists	0	17	3	80
Nurse practitioners	1	40	6	53
Nurse midwives	1	9	5	85
General duty nurses	1	72	5	22
X-ray technicians	0	42	30	47
Corpsmen/orderlies	2	69	16	18
Physician assistants	2	36	7	55
Lab technicians	1	70	11	18
Administrative support personnel				
Administrative Officers	14	40	29	17
Medical Records Clerks	1	66	15	18
Secretaries, Clerks, Receptionists	1	91	8	0

Note: Percents may not add to 100 due to rounding.

**Appendix II
Physician Views on the Adequacy of Health
and Administrative Support Personnel**

**Table II.2 Obstetrician/Gynecologists'
Views on Adequacy of Support Staff**

Figures are percentages

Type of staff	More than needed	Fewer than needed	As many as needed	Do not need this type of staff
Health support personnel				
Surgical Nurses	1	74	23	2
Nurse Anesthetists	1	57	39	3
Nurse Practitioners	0	78	19	3
Nurse Midwives	2	60	16	22
General Duty Nurses	1	92	6	2
X-Ray Technicians	0	55	35	10
Corpsmen/Orderlies	0	84	14	2
Physician Assistants	2	36	20	42
Lab Technicians	0	77	15	9
Administrative support personnel				
Administrative Officers	26	26	44	4
Medical Records Clerks	0	77	21	1
Secretaries, Clerks, Receptionists	0	94	5	0

Note: Percents may not add to 100 due to rounding.

**Table II.3: Primary Care Specialists'
Views on Adequacy of Support Staff**

Figures are percentages

Type of staff	More than needed	Fewer than needed	As many as needed	Do not need this type of staff
Health support personnel				
Surgical Nurses	0	23	7	70
Nurse Anesthetists	0	17	11	72
Nurse Practitioners	1	44	17	38
Nurse Midwives	1	15	3	81
General Duty Nurses	1	71	11	17
X-Ray Technicians	1	42	30	28
Corpsmen/Orderlies	1	78	6	16
Physician Assistants	1	49	15	35
Lab Technicians	1	56	25	18
Administrative support personnel				
Administrative Officers	18	30	40	13
Medical Records Clerks	1	85	25	10
Secretaries, Clerks, Receptionists	2	84	12	3

Note: Percents may not add to 100 due to rounding.

**Appendix II
Physician Views on the Adequacy of Health
and Administrative Support Personnel**

**Table II.4: Medical Support Specialists'
Views on Adequacy of Support Staff**

Figures are percentages

Type of staff	More than needed	Fewer than needed	As many as needed	Do not need this type of staff
Health support personnel				
Surgical Nurses	0	46	9	45
Nurse Anesthetists	3	34	17	47
Nurse Practitioners	1	13	6	80
Nurse Midwives	1	7	4	88
General Duty Nurses	1	52	4	44
X-Ray Technicians	1	58	16	24
Corpsmen/Orderlies	1	56	10	33
Physician Assistants	1	16	5	78
Lab Technicians	1	32	9	59
Administrative support personnel				
Administrative Officers	12	36	20	32
Medical Records Clerks	2	53	12	33
Secretaries, Clerks, Receptionists	2	87	9	3

Note: Percents may not add to 100 due to rounding.

**Table II.5: General and Other Surgical
Specialists' Views on Adequacy of
Support Staff**

Figures are percentages

Type of staff	More than needed	Fewer than needed	As many as needed	Do not need this type of staff
Health support personnel				
Surgical Nurses	0	74	11	15
Nurse Anesthetists	1	56	26	17
Nurse Practitioners	2	32	20	46
Nurse Midwives	2	15	10	73
General Duty Nurses	1	87	7	5
X-Ray Technicians	1	62	24	13
Corpsmen/Orderlies	1	80	17	2
Physician Assistants	2	52	17	29
Lab Technicians	1	61	26	13
Administrative support personnel				
Administrative Officers	31	24	38	7
Medical Records Clerks	2	68	25	6
Secretaries, Clerks, Receptionists	0	88	11	1

Note: Percents may not add to 100 due to rounding.

Survey and Data Analysis Methodology

This appendix describes the sampling design and data collection technique we used, as well as survey response rates. Because the data we report about military physicians are estimates that are based on a sample of all physicians, this appendix also presents the sampling errors associated with these estimates. Further, this appendix describes the regression model we used to gain further insight into the factors that influence the probability of physicians leaving the military.

Sampling Design

We surveyed a random stratified sample of about 500 physicians from each branch of the service who were on active duty as of July 1988. We excluded all those whom the military considered interns or in graduate medical education programs because they were several years away from making a decision about their plans to leave or remain in the military. About 3,600 physicians were in these programs, leaving a remaining universe of approximately 9,600 physicians. We divided the remaining physicians into five groups, or strata, based on their military-designated medical specialty as shown below.

Five Medical Strata and Examples of Medical Specialties Used in GAO Survey

Obstetrics/Gynecology

Surgeons

- Orthopedic Surgery
- General Surgery
- Neurosurgery

Internal Medicine

- Rheumatology
- Gastroenterology
- Endocrinology

Primary Care

- General Medicine
- Family Practice
- Psychiatry

Support Medicine

- Anesthesiology
- Radiology
- Nuclear Medicine

Officials from the services' Offices of the Surgeons General and the Office of the Assistant Secretary of Defense for Health Affairs and GAO's Chief Medical Advisor assisted us in grouping specialties. By stratifying our sample in this way, specialties with relatively few physicians were better represented in our overall sample than they would have been if we had drawn a simple random sample from each service.

Table III.1 shows the total number of physicians in the universe in each stratum by branch of service, and the number of physicians we randomly sampled and surveyed from each stratum.

Table III.1: Random Sample Selection—
By Service and Stratum

Stratum	Number of physicians in universe (As of July 1988)			Number of physicians sampled (As of July 1988)		
	Army	Navy	Air Force	Army	Navy	Air Force
Ob/Gyn	233	105	155	85	70	75
Surgeons	833	435	580	110	120	120
Internal medicine	2,295	1,818	1,881	115	140	140
Primary care	558	153	215	105	80	85
Support medicine	298	210	210	85	90	85
Total	4,217	2,721	3,041	500	500	505

For each service, this sampling methodology allows us to project data from our survey to all active-duty physicians in each stratum as well as to all active-duty physicians. In general, estimates are for active-duty physicians who had completed their internship and were not graduate medical students as of July 1988.

Questionnaire
Development

We developed a standardized mail questionnaire to collect information from our sample of physicians. We pretested the questionnaire with two physicians from each branch of the service. Based on the results of these pretests and comments from officials in Health Affairs and each of the services and the GAO Chief Medical Advisor, we revised the questionnaire before mailing it out in November 1988. A follow-up mailing was conducted in December 1988. The questionnaire elicited information on several issues, including

- satisfaction/dissatisfaction with the number of hours worked;
- satisfaction/dissatisfaction with types and variety of patients treated;
- time spent on clinical, research, management, administrative, or other activities;
- frequency with which physicians practice their primary specialty;
- sufficiency/insufficiency of health, administrative, and clerical personnel;
- amount of time spent on quality assurance tasks;
- opportunities to attend professional conferences and seminars;
- satisfaction/dissatisfaction with compensation; and
- reasons for entering the military and probability of staying or leaving.

Survey Responses

Of the 1,505 questionnaires we sent, 1,272 were returned, for an overall response rate of about 85 percent. Of the 1,272 respondents, 52 either indicated that they were no longer active-duty physicians or did not answer the question. Our overall study objective was to describe the experience, opinions, and attitudes of active-duty military physicians. Therefore, the estimates in this report are based on responses from the 1,220 known active-duty respondents. These respondents represent an estimated 9,616 active-duty physicians out of the 9,979 physicians in our original universe.

Because we are estimating the characteristics of military physicians based on a sample of those physicians, there is an error or imprecision associated with each of these estimates. This imprecision is usually expressed as a sampling error at a given confidence level. Sampling errors for estimates from this survey were calculated at the 95-percent confidence level. For example, based on responses to our questionnaire we estimate that 90 percent of all military physicians are currently under some type of obligation to remain in the military. At a 95-percent confidence level, the sampling error for this estimate is plus or minus 2 percentage points. This means that the chances are about 19 out of 20 that the actual percentage of physicians currently under some type of obligation is between 88 and 92 percent.

While some of the estimates in this report pertain to all military physicians, others are presented according to branch of service and/or specialty group. At a confidence level of 95 percent, the sampling error for estimates for physicians across all services are generally less than plus or minus 4 percentage points. When estimates are for the physicians in the single service, sampling errors are generally plus or minus 7 percentage points or less.

Estimates for specialty groups generally have sampling errors of plus or minus 6 percentage points or less. Sampling errors for estimates involving a specific specialty within a service do not exceed plus or minus 11 percentage points.

Totals in tables throughout the report do not always add to the estimated universe of physicians (9,616) because not all respondents answered all the questions. Percent totals in tables do not always add to 100 due to rounding.

Multiple Regression Model and Analysis

To account for differences in physicians' stated probability of leaving, we developed a model that contains many factors plausibly related to the probability of leaving. We estimated the model using multiple regression, a standard statistical technique that quantifies the relationship between a dependent variable and a set of independent variables.

Our dependent variable, described in detail on page 45, is closely related to the probability of leaving that physicians stated in their questionnaire responses. The independent variables include such objective factors as military and civilian compensation, medical specialty, the number of hours spent on nonphysician tasks, and hours per month in combat training, as well as proxies for tastes or preferences—gender, career plans at time of enlistment, and so on. The regression procedure related the variation between physicians in their stated probability of leaving to the variation in each of the independent variables, and estimated the effect on the dependent variable of a given change in each independent variable (holding the other independent variables constant).

Based on the regression results, we calculated the change in the probability of leaving that would be associated with a given change in one independent variable, if the others remained unchanged. For example, we calculated the change in the probability of leaving associated with a \$10,000 increase in military pay, assuming that the nonpay and personal characteristics variables remained unchanged. We also calculated the change in the probability of leaving that would occur if the time physicians spend on nonphysician tasks were eliminated, assuming that the other independent variables (including pay) were held constant.

The Model of Physicians' Probability of Leaving

After conducting bivariate analyses of our survey responses, we hypothesized that independent variables related to the physicians' stated probability of leaving would fall into four categories:

1. Personal and demographic characteristics of the individual physician.
2. Military and civilian compensation.
3. Noncompensation characteristics of the practice of military medicine.
4. Medical specialty.

All the variables in the regression model and their definitions are listed in the following pages.

Our four categories of independent variables resemble categories drawn from the standard economic theory of labor supply and occupational choice, these categories are:

- compensation of military physicians and their compensation alternative in the civilian sector,
- nonpay characteristics of both military and civilian medicine, and
- tastes or preferences of the individual physician.

Because the categories from economic theory are rigorously derived as well as comprehensive, they provide a benchmark for assessing the adequacy of our model.¹ In addition, the theoretical categories provide a precise, economic interpretation of several of our independent variables. For example, the medical specialty variables in our model can be interpreted as reflecting nonpay characteristics of military medicine that are included explicitly as independent variables—specifically, the working conditions peculiar to practicing a given specialty in the military.² The personal characteristics variables provide another example: they can be

¹Two deviations of our model from the theoretical benchmark are noteworthy: first, economic theory dictates including nonpay characteristics of both the current occupation (military physician) and the alternative occupation (civilian physician), but we have data on nonpay variables only for the current (military) occupation. Second, economic theory calls for including a civilian pay variable that measures—for each military physician—the compensation that would be earned by a civilian physician with the same specialty, training, work history, and ability as the military physician in question. Lacking such refined data, we used data on the average pay of civilian physicians in the same specialty and at the same rank as the military physicians. (See p. 45 for more detail.)

²The medical specialty variables may also reflect differences by specialty in civilian physician compensation, because our measure of that pay concept (CIVPAY) is not perfect.

interpreted as proxies for differences in tastes that influence a physician's evaluation of the objective features, both pay and nonpay, that typify military medicine and civilian medicine.

Definitions of Variables Used in Regression Model

MALE = 1 if male
MAR = 1 if married living together
DPND = number of dependents
CAR = 1 if planned military career when entered military
MILPAY = ln (military pay), where military pay is estimated by DOD specialty and active duty grade
CIVPAY = ln (civilian pay), where civilian pay is estimated by DOD specialty and academic rank
NONPHYS = ln (hours per week spent on nursing, clerical, and administrative tasks)
MIX = 1 if difficult to maintain proficiency with case mix
PRSP = 1 if able to practice in specialty
CT = hours per month spent in readiness or combat training
DEP = average number of months deployed per year
PCS = number of unwanted permanent changes of station.
INT = 1 if specialty is an internal medicine specialty
PRIM = 1 if specialty is a primary care specialty
SURG = 1 if specialty is a surgery specialty
OBGYN = 1 if specialty is obstetrics/gynecology
SUPPORT MEDICINE used as reference group

Personal and Demographic Variables

This category contains several demographic characteristics—gender (MALE), marital status (MAR), and number of dependents (DPND), as well as a more direct indicator of personal preferences—whether the physician planned on a military career when he or she entered the military (CAR).

Military and Civilian Compensation Variables

We chose, as our measure of military pay, the average salary for military physicians by specialty and grade level (MILPAY).³ The source for these average salary data is DOD. As our measure of the pay that alternative positions in civilian medical practice might offer military physicians, we selected the average salary of teaching physicians by academic rank—assistant professor, associate professor, and full professor

³MILPAY is expressed as the natural logarithm of the dollar salary, as is our measure of civilian salaries (CIVPAY).

(CIVPAY). DOD treated these ranks (Health Professions Special Pays Study) December 1, 1988) as comparable to military physicians at pay grades O4, O5, and O6 (Army and Air Force: Major, Lt. Colonel, and Colonel; Navy: Lt. Commander, Commander, and Captain). We excluded pay grade O3 physicians from our regression analysis, because we lacked DOD data on physicians with active duty grade O3 (Army and Air Force: Captain; Navy: Lieutenant).

Academic salaries are not a perfect substitute for earnings in the private sector (which has nonteaching physicians in clinical and administrative roles). In addition, teaching medicine may not be the typical civilian alternative for the military physician. Nonetheless, we used academic salaries as a proxy for civilian earnings for two reasons. First, academic salaries were the best civilian salary data readily available that pertained to civilian positions comparable to military physicians' duties and experience. Second, review of research on military physicians' retention and pay suggests that academic salary information provides a measure of civilian physician compensation that is roughly as good as information on nonacademic salaries. Specifically, a Congressional Budget Office study, which used information collected by the American Medical Association on both academic and nonacademic salaries, found effects of civilian pay on military physicians' attrition that are similar to a DOD study that used data only on academic salaries. Although information is lost by using data only on academic salaries, evidently the academic data vary sufficiently with civilian physician pay in general to permit meaningful analysis of the relationship of pay to military physicians' retention.⁴

Nonpay Variables

For the category of nonpay characteristics of the job of military physician, we chose variables that either are associated exclusively with the practice of military medicine or apply to anyone in the military. These variables include the adequacy of support personnel, measured by the logarithm of the number of hours spent on nonphysician tasks (NONPHYS); adequacy of case mix (MIX); whether physicians are able to

⁴Measurement errors, such as those affecting our civilian pay indicator, may cause the coefficient estimate on CIVPAY to be biased toward zero. Also, this so-called "errors in variables" problem also causes coefficient estimates to be less statistically precise than otherwise. This problem may explain in part why the coefficient on CIVPAY is insignificant in the other obligees equation and why the coefficient for civilian pay is substantially smaller than that for military pay in all equations. Accuracy in civilian pay may be more important for other obligees than initial obligees, because the civilian opportunities for more experienced physicians (other obligees) may be more heterogeneous than for less experienced physicians (initial obligees).

practice in their area of specialty (PRSP); hours per month spent in military readiness (i.e., combat) training (CT); average number of months deployed per year (DEP); and number of unwanted permanent changes of station (PCS).

The Dependent Variable and Probability of Leaving

We formulated the dependent variable as the natural logarithm of the odds ratio, $(\text{Prob}/(1-\text{Prob}))$, where "Prob" denotes the stated probability of leaving. The probability of leaving would be more intuitive as the dependent variable, but it is prone to a statistical problem: a regression model may predict a probability of leaving that exceeds 1 or is less than 0—a result that contradicts the meaning of probability. To avoid this difficulty, it is conventional to define the dependent variable as the logarithm of the odds ratio.

Initial and Other Obligees Analyzed Separately

We performed the regression analysis separately for physicians serving under their initial obligation (initial obligees) and for those serving under some other form of obligation (other obligees). Analysis of the physicians' questionnaire responses revealed that these two groups stated substantially different probabilities of leaving the military (on average).

In addition, the two groups are likely to have, on average, different tastes or preferences for military life and military medicine, objective factors (pay, etc.) aside. Other obligees have, by accepting one or more obligations beyond their initial obligation, revealed a preference for military life and military medicine.⁵ By contrast, the group of initial obligees contains both those physicians who will eventually incur a second obligation and those physicians who will, when their initial obligation is up, leave the military. Consequently, it is reasonable to assume that the initial obligees have a lesser taste for military medicine, on average, than other obligees have. In addition, initial obligees and other obligees may evaluate the particular objective features of military medicine (e.g., unwanted permanent changes of station) differently. Given these considerations, economic theory suggests that the two groups be analyzed separately.⁶

⁵At the end of their initial obligation, other obligees faced the same pay and nonpay characteristics of military medicine as their colleagues who chose to leave the military. This strongly suggests that other obligees have a greater taste for military life and military medicine than those who leave the military.

⁶In economic terms, if the preference functions of the initial obligees differ from those of other obligees, then the derived functions for probability of leaving will differ between the two groups as well.

Results of Regression Analysis

We estimated the regression models for initial and other obligees by the method of ordinary least squares. Table III.2 presents the estimates of the regression coefficients for the two models of initial and other obligees' intentions to leave the military. The table also contains information on the statistical precision (standard error and T-statistic) of each coefficient estimate. An estimate is considered statistically significant if the probability is low that the true value of the coefficient is 0. We chose as our criterion a significance level of .10; that is, we required that the probability of the true coefficient being 0 is no greater than .10.

Table III.2: Estimates of Regression Equations for Initial and Other Obligees

Dependent Variable=LN(Prob/(1-Prob))

Independent variable	Coefficient		Standard Error		T-Statistic		Mean	
	Initial	Other	Initial	Other	Initial	Other	Initial	Other
MILPAY Military pay	-7.71	-6.91	4.98	2.01	-1.55	-3.45	11.22	11.37
CIVPAY Civilian pay	1.33	0.87	0.98	1.16	1.35	0.75	11.51	11.68
NONPHYS Nonphysician hrs.	0.07	0.06	0.04	0.03	1.82	1.98	1.64	0.90
MIX Case mix	0.26	0.44	0.20	0.22	1.30	2.00	0.44	0.38
PRSP Practice specialty	-0.26	-0.17	0.27	0.35	-0.96	-0.50	0.83	0.89
CT Readiness training	0.02	0.00	0.01	0.01	1.90	-0.25	4.10	3.94
DEP Deployments	0.01	-0.14	0.12	0.13	0.10	-1.12	0.29	0.36
PCS Permanent change of station	0.12	0.14	0.12	0.09	1.02	1.45	0.46	0.94
MALE Male	0.01	-0.42	0.31	0.45	0.03	-0.95	0.86	0.94
MS Marital status	-0.14	-0.34	0.29	0.34	-0.47	-1.01	0.85	0.87
DPT No. dependents	0.01	0.05	0.07	0.07	0.18	0.76	3.34	3.94
CAR Planned military career	-0.74	-0.10	0.25	0.29	-2.97	-0.35	0.19	0.17
INT Internal medicine	-0.97	-0.62	0.47	0.39	-2.08	-1.57	0.18	0.24
PRIM Primary care	-1.62	-1.52	0.51	0.43	-3.19	-3.51	0.10	0.24
SURG Surgery	-0.41	-0.07	0.28	0.35	-1.47	-0.20	0.29	0.23
OB Ob/Gyn	0.29	0.35	0.36	0.44	0.79	0.78	0.20	0.13
Constant	73.47	69.07	48.51	12.02	1.51	5.75		
Adjusted R-square	0.08	0.13						
F-Statistic	2.61	4.78						
Significance level of F-Statistic	0.001	0.000						
No. of observations	294	405						

Note: "Prob" denotes physician's stated probability of leaving military service. The adjusted R-square measures the proportion of the variation in the dependent variable that is accounted for by the variation in the set of explanatory variables. The F-statistic permits testing for the statistical significance of the observed association between the dependent variable and the set of explanatory variables.

The sign of the coefficient indicates the direction of the estimated effect. For instance, the negative sign on MILPAY indicates that an increase in

military pay results in a decrease in the stated probability of leaving. The "T-statistic" permits the statistical significance of the effect to be tested. Roughly, if the T-statistic is greater than 1.65 (1.28 for one-tailed tests), the effect is considered "statistically significant" at the 10-percent level.

As the T-statistics in table III.2 reveal, three variables—military compensation, number of hours spent on nonphysician tasks, and case mix—have a statistically significant effect on the dependent variable (and, therefore, on the probability of leaving) for both initial and other obligees. Military pay is statistically significant, and has the expected negative effect on the physicians' stated probability of leaving.⁷ That is, as military pay increases (holding civilian pay and other variables constant), the stated probability of leaving decreases. The number of hours per week that a physician spends doing nursing, clerical, and administrative tasks has a statistically significant, positive coefficient. As non-physician hours (NONPHYS) increases, the stated probability of leaving increases. Finally, the coefficient on case mix is statistically significant and positive. Physicians who said that they had difficulty maintaining proficiency in their specialty also stated a higher probability of leaving.⁸

The regression results also indicate that initial obligees' intentions to leave are affected by several variables that do not affect other obligees' intentions. These variables are: hours spent on readiness training (CR) (positive effect), civilian pay (positive effect), and "planned a military career at time of enlistment" (CAR) (negative effect).

One variable that does not affect initial obligees' intentions does, however, influence the intentions of other obligees. That variable—the number of undesired changes in permanent station—has a negative effect.

Issues of Interpretation

The multiple regression methodology that we have employed has the virtue that it provides quantitative answers to questions that are of central importance to policy regarding retention of military physicians. In particular, the survey data and regression estimates presented in chapter 4 and in this appendix provide guidance on the effects of military

⁷The appropriate statistical test is one-tailed, because the alternative to the null hypothesis of no effect was that the true coefficient is negative.

⁸In addition to these three variables, the set of medical specialty variables is statistically significant for both initial and other obligees.

pay. This guidance is the best we can provide given the general state of knowledge and the resources devoted to the study. As in any similar study, however, care and caution are called for in the interpretation and application of our results. This section discusses the principal qualifications and problems of interpretation that users of our study should be aware of.

First, it should be emphasized once more that our dependent variable relates to the stated probabilities of leaving the service that military physicians expressed in response to our survey. The overall picture provided by their responses is reasonably consistent with actual experience, and many specific features of our results—such as the higher separation probabilities indicated by initial obligees—are quite plausible. Nevertheless, we have not established a direct link between the probabilities stated in the survey results and the actual decision of military physicians to stay in the service or not.

Second, our estimates of the effects of the various independent variables are relatively imprecise. In particular, although we have established, by conventional statistical standards, that military pay does affect physician retention, the standard errors reported in table III.2 indicate that we have not succeeded in measuring the strength of these effects with precision. For example, it is roughly an even odds bet whether the estimated value of the MILPAY coefficient for other obligees (-6.91) is within ± 1.36 of the true value. Nonetheless, in our view, the figures presented in chapter 4 on the effects of a \$10,000 salary increase are a reasonable basis for policy decisions. They do not, however, obviate the need for further study or for close monitoring of the results if an attempt should be made to address the retention problem through a salary increase.

Third, it is possible that our estimates are systematically biased away from the true values. We have already noted that the explanatory variables provided in our data set are less than ideal from the viewpoint of economic theory (page 44, footnote 1). Regarding civilian pay, we have explained the sort of bias that might result (page 46, footnote 4). Other possible sources of biased estimates might be adduced. We believe, however, that any theoretically plausible analytic framework would yield similar results if applied to the same data or to better and more extensive data of the same type.

In assessing the confidence of our conclusions, we paid particular attention to the following plausible argument suggesting that our estimates of the effect of military pay might be too high: physicians whose tastes

lead them to prefer military practice and life to the civilian alternative tend both to remain longer in the military and to report lower probabilities of leaving, compared with physicians who lack such a preference. Because military pay generally rises with years of service, military pay and "taste for military life" would mean an estimate of the pay effect that is too high; part of our measured effect of higher pay would be attributable to a stronger taste for military life.

Before evaluating this argument, we note that it illustrates a general point about the type of analysis we have done. The Congress could raise pay, but it presumably cannot raise physicians' taste for military life at the same time. It is precisely for this reason that we employed multiple regression analysis to attempt to assess (among other things) what the effect would be if military pay and nothing else were changed. In pursuing this objective we attempted to control for taste effects by (1) dividing our sample into two categories (initial obligees and other obligees) that are very likely to differ on average in their taste for military life, and (2) introducing a variable (CAR) into the model that indicated whether a physician, upon enlistment, intends to pursue a military career.

Recognizing that these efforts to control for taste factors might have fallen short, we performed further analysis of the data on other obligees to determine whether years of service in the military might have something to do with the relationship between pay and retention. We did find some suggestions in the data that the physicians with more than 12 years of service (roughly one-half the sample) have lower stated probabilities of leaving and are less responsive to pay than physicians with fewer years of service. However, these indications are not so strong as to lead us to reject at standard significance levels the hypothesis that there is no difference between the groups with high and low years of service. In addition, although physicians with more years of service collectively report lower separation probabilities on average, they are quite comparable to their colleagues in terms of the (large) amount of variability around that average. Thus, it is far from the case that all long-tenured military physicians have simply decided that they are staying in the service. Also, physicians with fewer years of service appear to be, if anything, more responsive to military pay effects than we have estimated. Overall, it seems clear that our estimate of the pay effect is not merely an artifact associated with taste variables for which years of service provides a proxy. And while it remains plausible that long-tenured physicians are less responsive to pay than short-tenured physicians, our data do not provide decisive support for this view.

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