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MILITARY UTILIZATION OF PHYSICIAN'S ASSISTANTS

Susan D. Hosek, Charles R. Roll, Jr.

A Rand Note

prepared for the

OFFICE OF THE ASSISTANT SECRETARY OF DEFENSE FOR HEALTH AFFAIRS

Rand
SANTA MONICA, CA. 90406

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This report discusses the utilization of physician's assistants (PAs) in Air Force outpatient clinics and the applicability of the Air Force's experience to Army and Navy clinics. The authors first summarize the training of Air Force PAs, then describe the Air Force's increasing reliance on PAs to deliver primary medical care. A simple comparison of Army and Navy clinics with Air Force clinics indicates important differences do exist. Air Force use of PAs has been evaluated only in the primary medicine clinics of relatively small facilities. The authors do not recommend extension to other settings in any service without further study.

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PREFACE

This note was requested by Colonel Jack Murphy, OASD (Health Affairs) and Mr. Fred Ippoliti, USAF (Surgeon General). It addresses the issue of the transferability to the Army and the Navy of the Air Force's use of Physician's Assistants in outpatient clinics.

In the past few years, Rand has undertaken several projects on military health care issues. These include (1) the supply of military physicians, (2) the demand for military outpatient services, and (3) the delivery of outpatient medical care (especially primary medicine) in Air Force clinics. This discussion of Air Force utilization of Physician's Assistants, and its potential transferability to the Army and Navy, draws from Rand research on Air Force outpatient care delivery.

SUMMARY

This note discusses the direct transferability of the Air Force's use of Physician's Assistants to the other military departments, which are unable to recruit sufficient numbers of physicians even at high costs. Physician shortages have raised the question of alternative cost-effective ways of providing the quantity and quality of medical care demanded by the potential patient population of the armed forces. The Air Force has recently adopted an innovative approach to providing outpatient care with the use of Physician's Assistants (PAs). PAs are highly trained paramedical personnel who (under the supervision of a physician) can provide many types of routine services which have traditionally been provided by a physician. Utilizing PA services as a substitute for some physician services in the Air Force has raised the question of whether or not the Air Force experience is transferrable to the Army and Navy. More specifically, are Air Force staffing ratios applicable to the Army and Navy?

We are confident that the Army and Navy could borrow from the Air Force's experience with PAs in the primary care setting. The provider requirements shown to work in the Air Force can be applied directly to smaller outpatient clinics, those handling fewer than 200,000 visits annually. Such staffing recommendations may even closely approximate the requirements for somewhat

larger clinics, possibly up to 400,000 visits annually. However, above 400,000 visits, we would hesitate to recommend adoption of the system used in the Air Force's demonstration project without further study of the impact of clinic scale on the efficiency of this system.

With respect to utilization of PAs outside the primary care clinics, the Air Force experience has little direct applicability. The PA is more highly trained than other types of extenders used by the Army and Navy. Consequently, although the PA could perform well in various outpatient settings, the potential efficiency gain from using PAs in these settings depends on the relative costs of alternative provider mixes.

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CONTENTS

I. INTRODUCTION

This paper discusses the direct transferability of the Air Force's use of Physician's Assistants (PAs) to the other military departments. Such a discussion is motivated by the present inability of the military departments to recruit sufficient numbers of physicians even at high costs. This has raised the question of alternative cost-effective ways of providing the quantity and quality of medical care demanded by the potential patient population of the armed forces. The Air Force has recently undertaken an innovative approach to providing outpatient care in peacetime with the use of PAs, highly trained paramedical personnel who (under the supervision of a physician) can perform many of the routine duties of a physician's practice. Such utilization has raised the question of whether or not the Air Force experience is transferrable to the Army and Navy. More specifically, would staffing ratios used by the Air Force be cost-effective in Army and Navy settings?

To summarize our conclusions, we anticipate that the Air Force experience can be transferred to CONUS Army and Navy primary care settings similar in scale to those of the Air Force. Because of the lack of detailed data for further evaluating the comparability of similarly sized Army, Navy, and Air Force clinics, we have refrained from estimating the PA staffing implied by such a transfer. We urge caution with respect to drawing

inferences about the relevance of the successful Air Force experience with PAs to settings other than primary medicine clinics. A variety of utilization patterns are potentially cost-effective, and special training and supervision may be needed to assure that the PAs are effective in these settings. In addition, other types of extenders should be similarly evaluated and compared with PAs. Only then can the services determine which mix of medical care providers is cost-effective in each setting.

In the following sections we first describe the formulation of the present plan for the Air Force's utilization of Physician's Assistants. We then turn to a consideration of the transferability of this pattern of Air Force utilization. We consider transferability first to Army and Navy medical care settings comparable to Air Force primary medicine clinics, then to non-comparable settings.

II. THE PHYSICIAN'S ASSISTANT IN THE AIR FORCE SETTING

Air Force Physician's Assistants (PAs) usually work in the General Therapy Clinics of hospitals or clinics. These clinics dispense primary medical services to adults and older children. The PAs see all types of patients, including dependents and retirees; under the general supervision of a physician, they diagnose and treat the more straightforward problems presented by these patients. This manner of PA utilization has changed little in the six years since the Air Force first introduced PAs in its clinics. However, as the number of PAs has grown, the intensity of utilization has likewise grown. In this section, we first describe the training and overall utilization of PAs in the Air Force. We then describe more fully a demonstration project in the intensive use of PAs. [1]

TRAINING OF AIR FORCE PHYSICIAN'S ASSISTANTS

Until this year (when three civilian PAs were recruited), all Air Force PAs were graduates of the in-house training program at Sheppard AFB. This program is modelled on the PA training

[1] The demonstration project employed seven primary care nurse practitioners along with PAs. These two types of physician's extenders were used in the same role and, for the most part, performed equally well. However, given the doubtful supply of nurse practitioners in the Air Force, this paper focuses on PAs.

program at Duke University; it requires a year of classroom didactic training and a year of clinical rotation in an Air Force hospital. [1]

To be eligible for admission to PA training, an individual must have at least three years' experience as a corpsman. In addition, he must have accumulated sufficient college credit to obtain a bachelor's degree at the end of his PA training period. Almost all Air Force PAs have taken and passed the national certification examination given by the American Academy of Physician's Assistants. As a group, Air Force PAs rank high in their performance on this exam.

Air Force PA training concentrates heavily on skills needed for the delivery of primary medicine to adults. PAs are taught to evaluate symptoms, diagnose common outpatient conditions, and recognize when referrals to physicians are advisable. For problems not serious enough for referral, they can prescribe treatment.

GENERAL UTILIZATION OF PHYSICIAN'S ASSISTANTS IN AIR FORCE CLINICS

The Air Force medical system consists largely of small "community" hospitals of around 50 beds. These hospitals, although offering a limited range of specialized services, concentrate on basic medical and surgical care. They maintain large outpatient

[1] The program is described in considerable detail in the 1975 Report on "The Military Physician's Assistant," written by the Office of the Assistant Secretary of Defense (Health & Environment).

departments with clinics for general therapy (or family medicine), internal medicine, pediatrics, obstetrics/ gynecology, general surgery and perhaps some more specialized types of care.

With a few exceptions, Air Force PAs have been assigned to the General Therapy Clinics. These clinics provide basic medical services, primarily for adults (and sometimes older children). Since, in addition to active duty personnel, the clinics see dependents and retirees, they closely resemble civilian general practices.

As more PAs have completed training, they have begun to take on a larger share of the primary medicine workload in Air Force clinics. By 1974, Rand data from the primary medicine clinics (general therapy, internal medicine, flight surgeon, and emergency room) in five typical Air Force hospitals showed 14% of the patients in these clinics were being seen by PAs or equivalent nurse practitioners. Early experiences had shown that these extenders were valuable additions to the medical staff in these clinics, but uncertainty remained over how extensively PAs should be used.

RAND STUDY OF MANPOWER ALTERNATIVES (1974)

In 1974, we conducted a study of methods for continued delivery of outpatient care despite the availability of fewer physicians. To attract the number of physicians previously supplied by the draft, the military would have to substantially increase physician pay. Our study looked for less costly

alternatives. We analyzed the delivery of services in a cross-section of nine Air Force outpatient clinics, which handled workloads of 80,000 to 375,000 visits per year. [1] In the absence of pre-existing detailed outpatient data files, we collected data describing the clinic visits made during a two-week period at seven of the nine clinics and during a six-months period at two of the nine clinics. The data showed that, at all facilities taken together, half of the workload was carried by the primary medicine clinics (Table 1).

Table 1

Distribution of Visits by Clinic
(Outpatient Clinics at Seven Air Force Bases, 1974)

PRIMARY MEDICINE CLINICS General Therapy, Flight Surgeon, Physical Exam, Walk-in/E.R., Sick-Call, Medicine	50%
OTHER PRIMARY CARE CLINICS Ob-Gyn, Pediatrics	21%
NON-PRIMARY CARE CLINICS Psychiatry, Surgery, Orthopedics, Physical Therapy, Eye, Other, inc. Subspecialties	29%
n ≃ 30,000	

[1] As we will see, this range encompasses most Air Force clinics, but Army and Navy clinics are often larger.

Our outpatient data included the diagnosis or diagnoses made and/or conditions treated during the visit, the practitioner(s), diagnostic and treatment procedures, disposition, and amount of time spent with the patient by each practitioner. Using these data, we addressed the question: what is the "best" combination of manpower to treat primary medicine patients?

The manpower alternatives were physicians and PAs, with or without corpsmen's assistance. We constructed a simple activity analysis model to identify the most cost-effective mix of providers to treat the conditions seen in primary care clinics. The manpower cost of treating a typical patient with a certain condition is equal to the amount of time the practitioner(s) spends on the case, multiplied by the cost of that time. For PAs, we also included the cost of consultation or referral to physician supervisors when needed. Typically, for similar conditions physicians spend somewhat less time with each patient than PAs [1] but physician time is more expensive. Barring other considerations, outlined below, PAs should treat patients for whom the time a PA would spend with the patient multiplied by the PA's time cost is less than or equal to the time a physician would spend with the patient multiplied by the physician's time cost.

Of course, in evaluating PA utilization, we considered important non-pecuniary factors; foremost are quality of care and patient attitudes. In comparing the cost of physician and PA

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[1] Of course, physicians treat more serious problems.

treatment for a given condition, we are assuming the quality of care received by the patient is unchanged, both objectively and from the patient's viewpoint. Our quality of care analysis indicated that, for the conditions seen in primary medicine clinics, and considering the potential for physician referrals, PA care compared favorably with physician care. Similarly, we found that most patients were comfortable with PA treatment, at least for minor complaints.

The analysis of manpower alternatives yields recommended provider combinations and provider time requirements for categories of similar diagnoses. Total primary care staffing requirements for a given patient population are equal to the sum of the requirements to treat the mix of conditions presented by that population (along with the requirements for administration, inpatient care, time off, etc.). The total number of providers varies with the size and composition of the population, but in general the analysis suggests a ratio of PAs to physicians in the range 2:1 to 3:1. The lower ratio reflects a more conservative policy toward physician referrals by PAs; by conservative, we mean that more patients are thought to need referral.

At the time we presented these results to the Surgeon General, the Air Force had never staffed a clinic with more than one PA per physician. Nor, to our knowledge, had any other primary medical facility (military or civilian) relied so heavily on physicians' extenders. A demonstration project to try the larger mix of extenders to physicians was proposed to test the concept.

DEMONSTRATION PROJECT (1976-1978)

The Air Force staffed the clinics participating in the demonstration project with several provider teams, each including one physician and two or three PAs (or, in some cases, primary care nurse practitioners [PCNPs]). Each team was assigned a panel of patient families, both active duty and retired, to personalize care and promote continuity. Most patients saw a PA at first and, if necessary, were referred to the physician. Of course, because most medical problems seen in the primary medicine clinics are not complex, such referrals were infrequent.

The demonstration project ran for two years at four bases: Dyess AFB, Chanute AFB, Fairchild AFB, and Nellis AFB. [1] These bases are served by small to medium sized hospitals typical of the Air Force; the hospitals operate with 40 to 55 beds and handle 125,000 to 180,000 outpatient visits per year. Table 2 summarizes the population served and staffing at the four clinics. Chanute, a training base with a large number of young single men and women, operated with three PAs on a team; the others used the more conservative 2:1 ratio. [2]

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[1] On its own initiative, the clinic at Charleston AFB also reorganized its primary medicine clinic along the lines of the demonstration project. With available personnel, they were only able to implement a 1:1 ratio.

[2] At three of the clinics, additional primary care providers (especially physicians) were on the staff; they saw patients but were not part of a team.

Table 2

The Demonstration Clinics

	Chanute	Dyess	Fairchild	Nellis
Approximate Population Served	26,400	19,200	19,100	28,30
Number of Teams	3	3	3	4
PA : Physician Ratio	3:1	2:1	2:1	2:1
Primary Medicine Physicians	4	6	6	6
PAs*	8	7	7	8
Approximate Patients Per Provider	2200	1477	1470	2020

* Includes 7 PCNPs.

During the project, we collected and evaluated data on the clinics' performance and on the patients' attitudes. The most important results are summarized in Table 2.

Roles of Practitioners

During the project, more than two-thirds of the primary medicine patients were seen by PAs. In contrast, recall that at five similar bases surveyed in 1974, PAs treated only one in seven patients. While one would have expected this shift in workload from physicians to PAs because of the change in provider ratios, we also found a shift in workload from corpsmen to PAs.

The use of more PAs apparently limited the independent treatment of patients by corpsmen.

Initially, patients were not formally triaged to physicians or extenders, but the team practice did result (as expected) in a sorting-out of patients by complexity of problem. The majority of patients with serious problems saw physicians while over three-quarters of patients with minor problems saw a PA or PCNP. The demonstration project did conserve the relatively more scarce physician time for the more serious cases.

One area of uncertainty regarding heavy utilization of PAs has been their need for supervision. Supervision of too many extenders could exhaust the physicians' time, preventing them from carrying out other duties. During the demonstration project, the PAs consulted with their supervisors on 6% to 7% of visits; this figure includes cases where the physician saw the patient or spoke with the PA about the patient's problem, but excludes consultations for countersignatures on prescriptions. The extenders referred an additional 9% either to their supervisors or to other physicians; however, the referral rate for physicians was also 9%. The extent of supervision observed during the course of the project should not seriously detract from physician performance of other duties.

Interviews with physicians and PAs participating in the demonstration project suggested that supervision is enhanced by the physician's ongoing observation of the PAs and the contacts

resulting from the two types of providers working together. In essence, the supervisors can perform a teaching role when they are in continuing contact with their teams' PAs.

Quality of PA Care

A major criterion for evaluating the demonstration project was quality of care. [1] With PAs caring for the bulk of the primary medicine patients, we were concerned that the quality of the care be maintained.

We evaluated quality of care with simple, straightforward "technical process of care" criteria. These criteria make sense in the outpatient setting where there is a relatively clear connection between process of care and outcome.

An example of a "process of care" criterion is as follows: a patient diagnosed as having infectious otitis media (ear infection) should, in the usual case, have an appropriate antibiotic prescribed on the first visit. For several reasons, one would not expect 100 percent compliance with this or other criteria by any of the medical providers. Therefore, we evaluated the PAs' performance against the standard set by the primary medicine physicians in the same clinics. We calculated the rates of compliance, according to each criterion, for physicians, PAs, and

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[1] A detailed description of the quality of care analysis can be found in R-2436-AF, Physician's Extenders in Air Force Primary Medicine Clinics: Quality of Care, George A. Goldberg and David G. Jolly, The Rand Corporation, forthcoming.

PCNPs, and we measured the statistical significance of observed differences.

The quality of care analysis employed 62 "process of care" criteria, some of which were variations of the same basic criterion. These criteria encompass aspects of the care received by about 40% of the patients in the primary medicine clinics. Table 4 summarizes the results of the quality of care analysis using the 42 criteria that are non-redundant. We grouped these criteria according to: (1) whether they referred to a diagnostic procedure, a therapeutic procedure, or a visit disposition, and (2) whether they stipulated the action should be taken or should not be taken. The table shows the number of specific criteria in each category for which the two types of extenders equalled ("PA/PCNP equal" columns) or exceeded ("PA/PCNP better" columns) the physicians' compliance rates. [1] Overall, the PAs and PCNPs participating in the demonstration project clearly equalled the standard maintained by the physicians. The few cases of inferior PA or PCNP performance are scattered across categories and do not appear to be serious. [2]

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[1] For each criterion, we concluded that the PAs' and PCNPs' performances differed from the physicians' performance only when the differences in the measured compliance rates were statistically significant.

[2] A detailed medical discussion of many of the criteria is presented in an appendix of R-2436.

Table 3

Summary Comparison -- Quality of Care In Primary Medical Settings at Demonstration Bases - 1977

Action	PA Better	PA Equal	PA≥MD *	PCNP Better	PCNP Equal	PCNP≥MD *
Desirable Diagnostic Action	1/11	+ 10/11	= 11/11	1/11	+ 10/11	= 11/11
Undesirable Diagnostic Action	0/5	+ 4/5	= 4/5	1/5	+ 3/5	= 4/5
Desirable Therapeutic Action	2/10	+ 7/10	= 9/10	1/10	+ 8/10	= 9/10
Undesirable Therapeutic Action	1/11	+ 10/11	= 11/11	0/11	+ 10/11	= 10/11
Desirable Disposition Action	1/5	+ 3/5	= 4/5	0/5	+ 3/5	= 3/5
TOTAL ACTIONS	5/42	+ 34/42	= 39/42	3/42	+ 34/42	= 37/42

* Complied at an average rate greater than or equal to the physician average rate.

The strong and consistent performance of the PAs when they are responsible for a high proportion of patient care is very encouraging. We also believe it demonstrates the high quality of the Air Force's in-house training program for PAs.

Patient Attitudes

We surveyed active duty and retired personnel served by the demonstration clinics to elicit their attitudes toward the clinic changes. Did they like the new system and did they accept the PAs?

The patient survey asked the respondents to compare the "panel system" of the demonstration project with two alternatives (Table 4). The first alternative was "the way things used to be" at the clinic; the vague wording was designed to accommodate variations in the prior situations at the clinics. Very few people wanted to return to the pre-demonstration system. The second alternative, an approximation to the draft era system, hypothesized that the patient would always see a physician, but not necessarily the same physician each time. This alternative was more attractive than the first, so more people preferred it. But a clear majority of respondents preferred the panel system to either alternative. The highly favorable attitude of patients is explained by their acceptance of the PAs and the improved access to the clinics achieved by the project.

In the civilian medical community, uncertainty about patient acceptance has impeded widespread use of PAs. In the context of the demonstration project, we wanted to see if increased exposure to PAs would erode acceptance. We found good patient acceptance of PAs, and also PCNPs (Table 5). Still, a minority of patients -- slightly larger among spouses than military personnel -- remained unfavorable toward PAs.

Table 4

Patient Evaluation of Panel System
(Regular Users of Demonstration Clinics)
Fall 1977

Patients' Preference	Active Duty	Retired
Panel Versus "Way Things Used To Be"		
-Prefer Panel	61%	51%
-Like both about the same	30%	34%
-Prefer "way things used to be"	9%	15%
	100%	100%
	(n=1156)	(n=768)
Panel Versus "Any MD" System		
-Prefer panel	63%	54%
-Like both about the same	18%	21%
-Prefer "any MD" system	20%	26%
	100%	100%
	(n=1225)	(n=815)

On more detailed questioning, however, many in the unfavorable group were confident of the PA's ability to handle simple problems (60% said they felt a PA could handle a cold); their concerns centered on possible PA treatment of more serious problems. To allay these concerns during the project, team physicians would usually accommodate patients who were uncomfortable about seeing PAs.

Prior to the demonstration project, Rand had also evaluated patient acceptance of the limited numbers of PAs then in service. A comparison of patient attitudes over time with increased exposure to PAs has indicated no erosion of acceptance.

Table 5

Patient Attitudes Toward Physician's Assistants
(Regular Users of Demonstration Clinics)
Fall 1977

ATTITUDE	ACTIVE DUTY	SPOUSE
Favorable	56%	50%
Neutral/Not Sure	29%	29%
Unfavorable	15%	22%
	100%	100%
	(n=1289)	(n=901)

	RETIREE	SPOUSE
Favorable	66%	60%
Neutral/Not Sure	23%	25%
Unfavorable	11%	15%
	100%	100%
	(n=885)	(n=725)

Summary of Results

The Air Force has clearly shown that it can continue to deliver high quality primary medical care by employing physician's extenders in an organized fashion. The Surgeon General plans to phase the panel system into all CONUS Air Force clinics.

We estimate that employment of the panel system throughout CONUS would require 265 primary medicine physicians and 562 PAs. The Air Force has nearly enough well-trained physicians, but falls about 200 short of the PA requirement. Prompt expansion of

the physician's assistant training program would allow conversion of all CONUS primary medicine clinics to the panel system in the next several years.

At this point, we should note that our evaluation of Air Force PAs has covered utilization in only one setting: primary medicine clinics in fixed medical facilities. As a result, we have not considered PA performance or staffing under a variety of other circumstances, including:

-- Outside hospital clinics, not under the direct and continuous supervision of a physician.

-- In emergency medicine.

-- In large facilities.

-- When the PAs are not graduates of the Air Force in-house training program. (We have, of course, evaluated a limited number of PCNPs, whose training and background differ slightly).

-- Outside the CONUS

-- During wartime

Army and Navy utilization of extenders, discussed in the following section, occurs to some degree under all of these circumstances. We will describe questions one should consider before generalizing the Air Force experience to noncomparable settings.

III. THE TRANSFERABILITY OF AIR FORCE EXPERIENCE TO ARMY AND NAVY PRIMARY MEDICINE CLINICS

Two issues must be addressed when considering the transferability of the Air Force's use of PAs to the other military departments. The first is productivity. Can PAs do the job defined by both quality and workload? The second is cost. Are there less expensive types of extenders who can do the job? Putting productivity and cost together, will the Air Force provider mix be the most cost-effective approach to the provision of primary care in the Army and Navy settings?

PAs are trained specifically to treat patients in an outpatient clinic under the general supervision of a physician. They are well suited to the military General Therapy Clinic, which provides primary medicine services to adults. Therefore, the Air Force has employed PAs almost exclusively in General Therapy Clinics, and our past study has been limited to the primary medicine setting.

However, PAs could potentially expand their roles both within the clinics and in other medical care settings. Because different issues are involved in transferring Air Force utilization patterns to comparable and non-comparable settings, we have separated our discussion into two sections; this section covers Army and Navy primary medicine clinics, and the following section covers other medical settings in all three services.

A major difference between the Air Force medical system and the Army and Navy systems is scale. Table 6 shows for each service the distribution of clinics by annual workload; it includes only those CONUS clinics located in hospitals. Three quarters of Air Force hospitals treat fewer than 200,000 patients in a year while only one quarter of Army clinics are that small. Recall that the four demonstration clinics handle from 125,000 to 180,000 visits per year. For several reasons, we urge caution in transferring the demonstration project concepts, shown to work well in small to medium sized clinics, to large facilities.

Small medical facilities rarely see sufficient numbers of any type of condition to support specialists. This holds true for physician's extenders as well as physicians. The PA, by virtue of his extensive training, is a generalist; he is competent to handle a wide range of medical conditions. However, there are other types of extenders, with more limited and specialized training, who can be efficiently utilized in larger clinics. Depending upon the depth of their training, these specialized extenders may be less expensive to train and to employ.

Table 6

Size of Army, Navy, and Air Force Outpatient Clinics and Distribution of Clinics by Number of Annual Visits*: CONUS FY1976

NUMBER OF VISITS	ARMY	NAVY	AIR FORCE
<100,000	0%	11%	37%
100,000 - 200,000	25%	22%	36%
200,000 - 400,000	22%	26%	22%
400,000 - 1,000,000	44%	33%	3%
>1,000,000	8%	7%	1%
TOTAL	100%	100%	100%
Number of Clinics	36	27	67

NOTE: Data provided by OASD (HA).

* Only clinics located at hospitals.

As an example, the Army has developed a type of practitioner thought suited to their large clinics, called an AMOSIST. The AMOSIST is a corpsman given 12 weeks training in following diagnostic and treatment algorithms for 30-40 common ambulatory problems. Five or six AMOSISTs, each seeing 20-25 patients per day, work under the full-time direction of a physician. Because AMOSISTs' training is limited, they should only see patients with the problems for which there are algorithms. A large outpatient clinic treats enough patients to keep a team of AMOSISTs busy.

Since the PA can provide services an AMOSIST cannot, a large clinic might employ both types of extenders.

Clearly a PA is more highly trained than an AMOSIST and could easily perform all the tasks required of an AMOSIST. Therefore, the issue of provider mix is one of cost-effectiveness. First, for the conditions they treat, do AMOSISTS provide care comparable to PA care in quality but at a lower cost? Second, in these large clinics is the scale of work great enough to justify substitution of these less highly trained, and therefore less expensive, providers (AMOSISTs) for more highly trained providers? In smaller clinics, we doubt that the work-load would permit AMOSISTs to be cost-effective.

We hesitate to recommend the transfer of the Air Force physician/PA staffing mix to the Army and Navy's larger clinics for another reason: the primary medicine casemix may be affected by the presence of specialty clinics. The casemix may be more complex in large clinics if patients with serious problems first visit the General Therapy Clinic before being referred to a specialist; in areas served by small clinics not offering specialty care, these patients might prefer a civilian practitioner. On the other hand, some patients who would be referred to a specialist in a large clinic are satisfactorily treated in the primary medicine clinics when the specialist is not available. Depending on the resulting casemix, fewer or more PAs are needed in large clinics.

The differences in casemix along with the availability of alternatives to the PA imply caution in applying staffing ratios designed for the Air Force to the Army and Navy as a whole. However, there are direct analogs to the demonstration clinics in both the Army and Navy. Referring back to Table 10, about one-quarter of Army clinics and one-third of Navy clinics carry a workload in the range of the demonstration clinics (fewer than 200,000 visits per year); another 22% in the Army and 26% in the Navy handle fewer than 400,000 visits annually and are therefore not far out of the range of facilities we have studied. We see no reason why these small to midsize primary medicine clinics could not be staffed with physician-PA teams as the demonstration clinics were.

While the Air Force staffing ratios probably come close to describing provider requirements in similar Army and Navy clinics, several considerations may dictate that these ratios be modified. These include casemix and patient acceptance of PAs; casemix in turn depends on climate, population characteristics, and clinic size. Data which would allow a comparison of the Army and Navy to the Air Force in these respects do not exist. Likewise, we do not have data on current staffing of Army and Navy clinics. Therefore, we have not attempted to estimate the numbers of physicians and PAs (numbers of provider teams) which would be needed to operate smaller Army and Navy clinics in a manner comparable to that of the demonstration clinics.

IV. THE TRANSFERABILITY OF THE AIR FORCE EXPERIENCE OUTSIDE PRIMARY MEDICAL CLINICS

Currently, all three services use PAs outside primary medicine clinics. In theory, PAs can handle an even greater variety of assignments. For example, the shortage of physicians is keenly felt in emergency rooms; where the workload is light and consists largely of walk-in patients, the use of PAs provides an attractive alternative. Similarly, PAs could probably be employed in certain specialty clinics. Finally, the Army and Navy deliver a considerable volume of medical services in troop clinics and on ships. The Army employs PAs in their satellite clinics, but the Navy does not. We will discuss expanding PA roles first in the outpatient clinics, then in other medical settings.

UTILIZATION IN OTHER OUTPATIENT CLINICS

While PAs may be best suited for primary medicine, other types of outpatient clinics may also be able to productively employ PAs. The two other clinics giving primary care, obstetrics/gynecology and pediatrics, could use PAs but are unlikely to do so because they have an ample supply of nurse practitioners specifically trained to work in these clinics. Therefore, expanded employment of PAs might instead occur in the emergency room and some specialty clinics.

In January 1979, the Air Force began to test the assignment of PAs as Medical Officer on Duty (MOD) in a few of their emergency rooms. One hospital is participating from each command. The PA is backed by a physician who must remain within 10 minutes of the hospital.

The rationale for using PAs on MOD is demonstrated by the occurrence of only one true emergency in the first three months of the test. Air Force emergency rooms, at least in smaller hospitals, operate largely as walk-in general therapy clinics. Most of the presenting conditions can be easily handled by a PA. In a larger hospital, the PA may be able to assist the physician MOD, but the larger number of emergencies would probably prevent the PA from actually replacing the physician as MOD. This raises the issue of what provider mix is the most cost-effective, given emergency room caseloads.

If the PA is going to provide care in the emergency room, the adequacy of his emergency medicine training and also of the supervision afforded by the physician on call needs to be reviewed. We have not considered the PA's ability to deliver emergency care, nor have we evaluated PAs not working under the direct supervision of a physician. The Air Force's PA training program does include instruction in emergency medicine. We would urge consideration be given to whether PAs assigned to MOD should receive additional training.

The physician back-up to the PA exists primarily to cover emergencies the PA is not trained to deal with. Because the physician is not physically present while the PA delivers routine care, and the on-call position rotates, the PA is not closely supervised for non-emergencies. In some hospitals, the emergency room sees a large number of patients who find use of the regular clinics less convenient. Policies to discourage misuse of the emergency room would decrease provider requirements, and also limit the usefulness of PAs in this area.

PAs might also be productively used in the clinics delivering specialty care, particularly the subspecialties of internal medicine. Some PAs have already expressed an interest in specializing as their careers progress. Such clinics as urology, dermatology, and cardiology do see some patients with relatively routine problems. In a larger hospital, these patients might be sufficiently numerous to justify adding PAs to specialty clinic staffs on the basis of cost. In smaller hospitals, the PAs might spend only part of their time seeing "specialty" patients in either the primary medicine or appropriate specialty clinic. Indeed, it is probable that the providers in a clinic tend to match themselves with the patients they find interesting. A more formal use of specialist PAs, however, would again raise the training issue. Some form of continuing education program would probably be needed to assure that PAs obtain the skills necessary for providing high quality specialty care. In addition, as in

the primary medicine clinics, supervisory responsibility would have to be clearly assigned.

UTILIZATION OUTSIDE OUTPATIENT CLINICS

As we have indicated, we believe PAs can be utilized under the current organizational structures existing in the Army and the Navy, based on the Air Force experience with PAs during the recent demonstration project. The direct transferability of the Air Force experience is limited to practitioners, facilities, and operations similar to the Air Force primary medicine clinics. All three military departments presently are either considering using or actually using PAs in other settings. Because of the potential utility of PAs in a variety of settings, one must also consider the major issues raised by utilizing PAs in a non-fixed base or in other modes less supervised than that of the demonstration project. The questions that must be answered to estimate staffing ratios in different settings relate to the quality, quantity, and cost of care that will be provided as one substitutes different mixes of providers for the pure physician mode of practice. As a consequence, training and supervision are again among the key issues. These issues can be highlighted by recalling the Air Force test of PAs in the emergency room and by considering Navy utilization afloat, and Army utilization of PAs as battalion surgeons.

Current Navy practice on those ships where no physicians are assigned is to use the Advanced Hospital Corpsman (AHC), an enlisted rating who receives forty weeks of formal classroom training, and who then is assigned to a ship. The AHC is trained to handle routine sick call, to spot emergencies, and to stabilize trauma. For problems the AHC cannot treat, the patient is evacuated. Medical supervision and consultation are provided by radio communications. Depending on the type of ship, mission and other factors, evacuation time could be measured in minutes or in days. During peacetime the types of problems seen by the AHC would most likely be those seen among the active duty population by the Air Force PA. During a war, however, the casemix would change drastically. Unlike the Air Force PA, who would continue to see the same routine problems but with an increased workload, the AHC would potentially be faced with casualties and markedly increased uncertainty concerning the availability of medical supervision, consultation, and evacuation capability.

The AHC presently constitutes Navy use of "extenders" in a non-fixed facility. The Navy has just begun to assign PAs to aircraft carriers, where their mode of practice in peacetime would be similar to that of the Air Force PA; namely, under the direct supervision of a physician. Although in the past Navy PAs were graduated from the Air Force training program (after the original Navy program was terminated), current Navy plans for training PAs are different. Navy PAs will be drawn from the pool

of AHCs and will be given an additional 20 weeks of classroom training and 32 weeks of clinical experience. The Navy does not now plan to assign PAs to independent duty on ships.

The Army, unlike the Navy, extensively uses PAs in the field as "Battalion Surgeons." These PAs are assigned directly to battalions. They take routine sick call for the active duty population and refer problems to the base hospital. Army PA training is very similar to Air Force PA training. In fact, the Army course at Fort Sam Houston has been closed and the current class of Army PAs is being trained by the Air Force.

Peacetime use of Army PAs bears some similarity to Air Force use of PAs at Lackland Air Force Base. At Lackland PAs are stationed in satellite clinics geographically distinct from the main base clinic. These PAs see the routine problems presented by the active duty population at Lackland and of course consult with and refer to physicians at the base clinic. There is a difference between Army and Air Force utilization, however. The Air Force PAs are not permanently assigned to the satellite clinics, but rotate through the base clinic, thus using the full range of their skills and training. Such rotation increases job satisfaction and, most important, leads to skill retention. The Army also tries to rotate its PAs through fixed clinics. However, the Army has too few PAs relative to its requirements to guarantee meaningful rotations for those PAs in the battalion surgeon posts. During mobilization and war the Army PAs are expected to

go with the unit. Of course the casemix and mode of practice faced by the Army PA in this situation changes abruptly.

Currently the three services employ PAs and other types of extenders in a variety of medical settings, suggesting a future potential for expanded use of PAs. Our study has little that directly bears on these different patterns of utilization. We have not studied the quality of care or manpower costs under these circumstances. Clearly, training, supervision, and mode of practice all interact to produce patient care of a certain quality and quantity. The PA is more highly trained than either the AMOSIST or the AHC. Consequently, the PA could certainly perform either role. However, because the PA's training is more costly he may not be cost-effective. We are therefore left with some unanswered questions. For the same level of patient care, do economies of scale at large facilities render the AMOSIST program less costly than a mix of physicians and PAs? In the Navy case, is the care provided by the AHC acceptable? Futher, if AHCs provide acceptable levels of care, why should PAs treating an active duty population on aircraft carriers be so closely supervised by physicians? Well-trained PAs can perform in various settings, but the most cost-effective mix of providers for each setting has yet to be determined.

V. CONCLUSIONS

We are confident that the Army and Navy could borrow from the Air Force's experience with PAs in primary medicine clinics. The provider requirements shown to work in the demonstration project can be applied to the smaller Army and Navy clinics, those handling fewer than 200,000 visits annually. The staffing recommendations may even closely approximate the requirements for somewhat larger clinics. However, above 400,000 visits annually, we would hesitate to urge adoption of the system tried out in the Air Force's demonstration project without further study of alternative provider mixes and their cost-effectiveness.

With respect to utilization of PAs in settings other than the primary medicine clinics, our study has little direct applicability. Clearly the PA is more highly trained than either the AMOSIST or the AHC, and thus can perform in either role. Consequently, utilization of PAs in various medical settings should be determined by the levels of care required and the costs of alternative mixes of providers.