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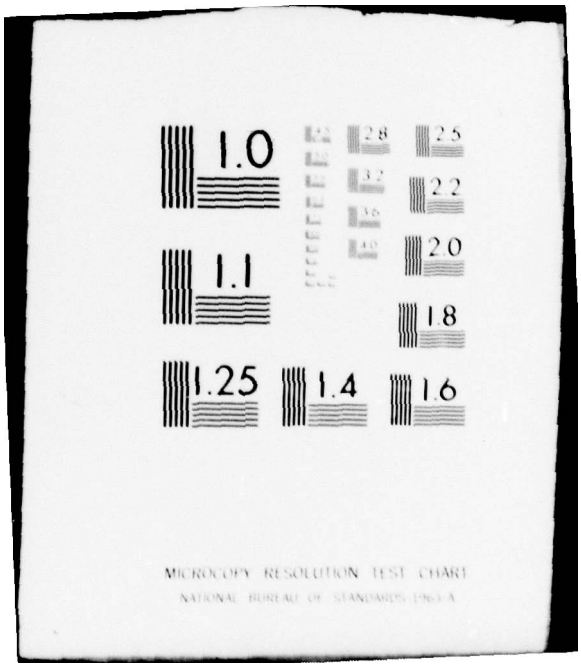
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(6) IMPLICATIONS FOR THE MILITARY HEALTH CARE SYSTEM IN UTILIZING NON-PHYSICIAN PROVIDERS. PART II. THE UTILIZATION AND STAFFING IMPLICATIONS.

by

(10) Bobby Gene Clark

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Thesis Advisor: David R. Whipple

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The thesis begins with an examination of the civilian and military physician's assistant (PA) and nurse practitioner (NP) utilization patterns. Then, to the extent that information was available, staffing models for the non-physician health care provider from the civilian and military sector are discussed. Implications for military utilization of NPPs ~~follow.~~ and staffing implications are then discussed in light of the models examined. Finally, a summary and conclusions chapter attempt to generalize the findings of the literature and draw upon the findings presented by Colfack.

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Implications For The Military Health Care System in Utilizing Non-Physician Providers: Part II -- The Utilization and Staffing Implications

by

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Lieutenant, Medical Service Corps, United States Navy
B.S., The George Washington University, 1977

Submitted in partial fulfillment of the
requirements for the degree of

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Particular appreciation is also given to my wife and family, without whose help, patience, and understanding this study would have suffered.

Finally, a special gratitude is owed to all those individuals who contributed the data and information which allowed the study to be written.

I. INTRODUCTION

This thesis is a continuation of a subject initiated by Lieutenant Brian R. Colfack, Medical Service Corps, U. S. Navy, who approached the utilization of Non Physician Provider (NPP) from the perspective of cost implications (Ref. 1). Colfack also discussed the history of the NPP movement and the present mix of providers in the military sector. That thesis and the present work were undertaken as a part of the Naval Postgraduate School research project entitled "Navy Health Care Systems Professional and Paraprofessional Personnel Mix Study" sponsored by the Office of the Assistant Secretary of the Navy for Manpower.

This thesis will attempt to address the NPP issue in terms of utilization patterns and staffing models available in the civilian and military sectors. The methodology employed will be a literature review. In so doing, Colfack's findings will be drawn upon to the maximum extent possible. It is hoped that these theses considered together, will facilitate the in depth analysis necessary so that valid conclusions can be drawn and implications derived for the military sector.

The thesis begins with an examination of the civilian and military physician's assistant (PA) and nurse practitioner (NP) utilization patterns. Then, to the extent that information was available, staffing models for the non-physician health care provider from the civilian and military sector are discussed. Implications for military utilization of NPPs

follow. Staffing implications are then discussed in light of the models examined. Finally, a summary and conclusions chapter attempt to generalize the findings of the literature and draw upon the findings presented by Colfack.

II. PA UTILIZATION

A. DETERMINANTS OF PA UTILIZATION IN THE CIVILIAN SECTOR

1. Introducing the PA into the health care setting

Little has been documented on how the PA is introduced into the health care setting. However, several authors have posited that the introduction may be traumatic for the physician and the organization as a whole unless properly done (Ref. 2, p. 241; 3, p. 13; 4, p. 502). This introductory phase appears to determine the ultimate utility of the PA (Ref. 5, pp. 88-89). If he id not accepted as part of the health care team, his productivity appears to be diminished (Ref. 4, p. 502). The major elements to be discussed in this section will deal with provider acceptance (in particular, supervising physician acceptance), patient acceptance, and the importance of supervision to overall successful introduction of the PA into the health care setting.

The AMA (Ref. 3) has proposed a set of general guidelines to follow when introducing the PA into the health care setting. The primary emphasis to the other health delivery team members must be on preventing role misunderstandings. This is particularly true when other health deliverers have been functioning as "first assistant" to the physician. The AMA recommends caution in proposing changes so as to not disturb an effective relationship by favoring the new PA over the established providers. There should be a feeling of equality established between the former assistant (usually office nurse)

and the PA. Tasks should not be sharply divided into those for the MD, the PA, and the Nurse. At the opposite end, too much overlap of function will result in no one knowing what is expected of them. To further enhance the introductory phase, the AMA recommends staff meetings with all members present to create group cohesiveness.

Patient acceptance of the PA is also considered essential by the AMA (Ref. 3, p. 14). It recommends that the PA be introduced by the physician to each patient on first contact, with the PA's role clearly identified. Any patient unwilling to see the PA should be seen by the physician. Any patient complaints about the PA's type of quality of service should be investigated. In general, the AMA views initial PA acceptance by coworkers and patients as very important to his overall success. Patient acceptance will be addressed at greater lengths later in this section.

Record and Greenlick (Ref. 2), speaking from the perspective of institutional medicine, view the proper introduction of the PA somewhat differently. They theorize that whether the PA is considered role-elevating or role-threatening for the physician is the basis of whether the physician accepts or rejects the PA which in turn is the primary determinant of success. The basis for this hypothesis is observed differences in successful utilization of Nurse Practitioners and Physician Assistants in the Haiser's HMO delivery system. Record and Greenlick found that PAs were quite successful in blending with the existing organization and being accepted as a produc-

tive member of the health team, while NPs had limited success in integrating their skills with the existing team. The authors believe that the primary reason for this difference in success was accounted for by role strain.

Role strain is implied to represent the amount of conflict introduced between the physician and the NPP. The PA "can be viewed as helping to liberate the internist to assume the occupational role for which the internist is trained," while the NP "posed something of a threat to the role, and therefore to the status or rewards, of physicians in their respective departments" (Ref. 2, p. 243). Because the PA was able to assume a peripheral role in health care delivery which alleviated demands on the physician's time considered less than optimally spent, the PA received role approval from the physician and consequently was successfully introduced into the health care organization. However, the NPs role tended to "center" on the physician's primary role. For example, the nurse midwife can handle all normal pregnancies (the majority of cases). This is the same role assumed by the obstetrician. Hence, there is "role strain." The authors point out that had the PA been assigned to assist a general practice physician instead of an internist, he may have also been considered "role-threatening" instead of "role enhancing," since the PAs skills center on what the GP is trained to do. The essence of Record and Greenlick's hypothesis that physician acceptance of the PA is extremely important to his successful introduction into an organization and that acceptance is based primarily on the

perception of the PA's threat to the physician's role.

Adequate supervision also plays a role in successful PA introduction. Coe and Fichtenbaum (Ref. 3) describe several observed phenomena concerning PA introduction into a group practice and into a small community hospital. The authors observed that the hospital-based PA left the hospital to work in a general practice. This departure led the authors to conclude that the primary reason for dissatisfaction and role definition problems in the hospital stemmed from a lack of any one physician taking a supervisory role. Without the needed guidance, "... the physician assistant's usefulness as a general helper was reduced while those with special skills (working directly for specialty physicians) were able to continue" (Ref. 4, p. 502). Thus, the PA must have a clearly defined supervisor to guide him and ensure that quality care is being provided.

Finally, Golladay, et. al. (Ref. 5) observe that patient attitudes concerning the new PA are dependent on the attitudes of the former health care team. They conclude that a professional attitude is important, and that a clear understanding of patient gains through more available time for the patient must be presented. The authors point out that how the PA is perceived and accepted by the original health care team affects patients' perceptions of the PA. Contrary to AMA advice on loose role descriptions that do not upset former workers, Golladay, et. al. advise "precise job descriptions, detailed statements of responsibilities and reporting and confidence

building all appear to be important devices for reconstructing a health care team" (Ref. 5, p. 89). The authors also see the relationship between the physician and the PA as extremely important with respect to the physician's willingness to delegate risk-bearing to the PA. To summarize the authors' conclusion, the physician must be shown and convinced that the PA has good medical judgment and will seek consultation when presented with problems he is not skilled to handle.

To summarize the findings in the civilian literature, little empirical analysis of what determines successful introduction of the PA into a health care setting has been done. However, several authors have speculated and hypothesized what contributes to this success. It appears clear that a smooth beginning determines the ultimate success of the PA. Former health care members must be involved in the transition to prevent misunderstandings. The PA should be treated as an equal to other health care members and not overly favored. Suggested role statements range from somewhat overlapping with the former nurse (RN) assistant to precise definition of each members tasks. Patient acceptance of the PA can be enhanced by positive acceptance from the health care team. This in turn is influenced by how role-threatening the PA is perceived to be by the physician. It is pointed out that adequate supervision is also a determinant of success. The PA must have a primary physician with whom he can consult when in doubt and to whom he is responsible. It is also observed that patient attitudes toward the PA are influenced by his professional attitude and

how well the patient understands what he will gain in utilizing the PA. The physician's ultimate acceptance of the PA is hypothesized to be dependent on how he perceives the medical judgment ability of the PA in knowing when to seek consultation.

Thus, many factors are hypothesized to influence the successful introduction of the PA into the health care setting. It also appears that, with the exception of how role-threatening the physician perceives the PA to be, no one factor determines success. Introduction must be open and clear to original team members and to the patient if the PA is to be utilized to his utmost.

2. Delegation of Tasks to the PA

Utilization of the Physician's Assistant has been approached in the literature from one of two directions: First, from the medical professional's mecdotcal viewpoint of the PA's delivery of care compared to that of the physician; Second, from the more quantitative task analysis approach of management science, operations research, and economics. Neither approach dominates and both provide some insight into the utilization question regarding physician's assistants. It should also be noted that each approach has certain limiting aspects that are inherent in the studies performed. All of the comparison to a physician studies reviewed have limited generality. Most are written by a medical professional intimately involved with the study site. Whether this produces bias cannot always be readily determined. The task analysis approach studies also

lack universality to some degree. Most have a limited test site that may or may not be representative of the population.

The most prevalent approach has been the anecdotal comparison by tasks performed of the PA to the physician (for example, see References 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, and 20). Articles of this type tend to suffer in differing degrees, from small sampling bias, personal interest, or both. However, because of the extensive amount of articles generated, it is worth noting a few of them to present a flavor of their information value.

In one study (Ref. 18), PA's using protocols for diabetes, hypertension, and related diseases, gathered information from medical records and from histories and physicals they performed on patients over an 18 month period. Care provided by the protocol system was compared to that under a traditional practice where few clinical tasks were delegated. One of the major findings of the study was an increased recognition of pathology through the protocol system because of increased thoroughness in collecting data. The study also found equivalent quality of care in both groups with a 20% savings in MD time when using the PA (time-motion study documented), and that the PA supplemented system used more laboratory tests which resulted in slightly higher costs, although this was "offset" by the recognition of significantly more pathology of greater clinical importance.

In another study (Ref. 19) comparing MEDEX PA's and their preceptor physicians, it was found that quality of care

compared favorably between the two groups. The authors observed that MEDEX PA's are more likely to order appropriate laboratory tests and follow accepted treatment plans than the physicians. The authors concluded that the presence of the PA forces the physician to educate himself so that he can educate the PA.

The Journal of the Medical Society of New Jersey reported a study which compared morbidity of myocardial infraction victims following hospitalization (Ref. 20). Fifty-eight patients were divided into two groups -- a control group receiving conventional care and a study group given extra care through a nurse PA. The PA's extra care was by home visit where the patient was counseled on weight reduction, smoking cessation and aherence to drug and exercise therapy. During the first year of the study, the control group experienced a 50% mortality rate compared to a rate of 18.2% for the study group. The authors attributed the difference in mortality rates to the educational and psychological support of the PA. One aspect of the study not clearly stated was the number of PA's. If the study involved only one PA, little inference should be drawn because the PA studied may have been the exception instead of the rule.

Each of the studies presented for example is typical of the group as a whole. In each case the author was involved in the health care setting or had the motivation for a biased opinion by circumstances. Each of the presented examples involved an isolated case of small sample size that may not

reflect traits of the population. However, notwithstanding the inadequacies of the studies and their less than "empirical" flavor, they are still useful. It can be deduced that the PA enhances medical care and compares favorably in functional competence with the physician. In fact, two of the studies (Ref. 19 and 20) even showed an improvement in care provided to the patient when the PA is utilized. It can also be generally concluded that the PA is a successful member of the health care delivery team, capable of handling the tasks assigned.

In contrast to the anecdotal approach, the task analysis approach to the PA utilization question tends to be much more empirical in its findings. Rather than a loose comparison of the PA's capability with that of the physician, task analysis attempts to define, as precisely as possible, the PA's role in health care delivery in terms of feasible professional activities.

The first step in this process is to define the primary care setting. The number of tasks attributed to a primary care setting tends to vary with the author. Jacobs, et. al. (Ref. 21) found 460 "specific, mutually exclusive tasks which cover a significant portion of the tasks attendant to providing services in a primary care setting," (Ref. 21, p. 340). In contrast to this lengthy number, a different research team identified 263 such tasks (Ref. 22).

Task analysis, once defining the primary care setting, has then attempted to determine which technical tasks can then be delegated to the PA. The decision is usually based on

training received by the PA and the goals and constraints of the organization. Finally, various analytical techniques, such as linear programming or computer simulation, attempt to minimize the cost of care by using the PA (or other health care extenders) or show alternative mixes of health care providers that provide similar levels of care (Ref. 23, p. 7).

There are differences in how task analysis is done. For example, Golladay et. al. (Ref. 22) used medical students to observe urban and rural, group and solo practices in Wisconsin, Vermont, and North Carolina, of which, two practices had a physician's assistant. The 263 identified tasks were then arranged into eight major categories /the specific categories are not mentioned either in this article or another concerning the same study (Ref. 24)/. Jacobs, et. al. (Ref. 21) used ten physician preceptors and their 22 MEDEX PA's to compile their primary task list of 460 items through an activity log kept by the subjects over a two week period during five different periods of time. Thus, less control of recording activities could be assumed. Whether this biased the results is a subject for conjecture. The 460 tasks were divided into 10 categories which were titled as follows: Patient handling, patient instruction, patient examination, patient treatment, treatment planning, handling and preparing medications, laboratory tests and procedures, training, administrative tasks, and record keeping tasks.

Once a primary care practice is defined, the studies then attempt to show either specific tasks or a percentage of

the total tasks that can be delegated to the PA. Golladay et. al. (Ref. 22) found that the PA produced a 74% increase in physician productivity. As the practice expanded in size, delegation to the PA increased to the point where he assumed complete responsibility for certain services (wart treatment, ear wax removal, sore throats, sinusitis, well-child examinations, minor burn treatment, and muscle contusions not involving x-rays) (Ref. 22, p. 465). It was not clear into which of the eight broadly defined service categories the PA's expanded responsibility fell.

Jacobs and others found that the MEDEX BA was more involved in patient examination while being less involved in patient instruction, treatment planning, and administrative tasks (Ref. 21, p. 342). However, differences between physician and MEDEX in all categories, except administrative tasks, held a low level of statistical significance (based on 12 physician MEDEX pairs). With further analysis, the authors concluded that, while both the physician and the MEDEX PA were active in each of the eight aggregated categories, each performed different tasks. An example of one of the eight categorical differences is contained in Table I.

It appears that frequency of task performance will vary considerably from practice to practice, and from practitioner to practitioner. Given any sample, some variance is to be expected. As Stimson and Charles (Ref. 23) point out, "the belief that there is a single set of tasks in primary care that can be used in operations research studies conducted for

Table I

Five Tasks Physicians and Medex Performed Most Frequently Within a Task Inventory Category

Patient Instruction

	Tasks performed most frequently by physicians		Tasks performed most frequently by MEDEX
1.	Counsel and instruct patient in treatment regimen for upper respiratory infection.	1.	Explain, answer questions about physician's instructions.
2.	Listen to patient or family, or both, discuss personal problems.	2.	Same.
3.	Explain, answer questions about treatment procedure by telephone.	3.	Inform patient of procedures required before ordering examination, test, or treatment.
4.	Provide support, reassure family.	4.	Inform patient of progress of therapy.
5.	Explain physiological basis for therapy.	5.	Explain, answer patient's questions about symptoms disease, or treatment.

Source: Condensed from Ref. 21, p. 343.

different purposes is probably incorrect (Ref. 23, p. 8). They cite the trouble experienced by Massey and Whitehead (Ref. 25) in an application of Golladay and others' task list (Ref. 22) to a study of time spent in patient education. The trouble appears to have been in tasks listed by Golladay not being relevant to the tasks found in the Massey and Whitehead study.

Perhaps the only generalized approach to task analysis has been the "national" survey literature that was prolific in 1974 and 1975 (for example, Ref. 26 and 27). The two cited surveys were essentially attempts to define the PA (and NP) populations in many different ways and included a task list of frequently performed acti-ities.

Ford (Ref. 26), in a late 1975 questionnaire survey, sampled 794 PAs located throughout the country with a response rate of 49.4% (392/794). The PAs self-described most frequent tasks are listed in Table II.

Ford's derivation of the major categories of tasks is reprinted as Appendix A. Procedurally, she collapses 89 tasks into one of 35 larger categories which are again collapsed into seven broad categories that are again collapsed in the three categories shown (Ref. 26, p. 124).

Perry performed a similar survey of PAs in late 1974 and early 1975 (Ref. 27). A total of 939 PAs responsed to his questionnaire (response rate 73%). Using these responses, the following frequency of tasks is listed in descending order of occurrence in Table III.

Table II

PA Described Most Frequent Tasks

Major Task Category	Location of Majority of Four Tasks Designated by PA's (f)	Cumulative Percent % (f)
Direct Patient Care Tasks (Technical)[a]	73% (288)	73% (288)
Direct Patient Care Tasks (Non-technical/interpersonal)[b]	.5% (1)	73.5% (289)
Supportive Tasks[c]	4% (16)	77.5% (305)
Direct Patient Care Tasks (Technical) = Direct Patient Care Tasks (Non-technical/interpersonal)[d]	1% (4)	78.5% (309)
Direct Patient Care Tasks (Technical) = Supportive Tasks[e]	5% (19)	83.5% (328)
Direct Patient Care Tasks (Non-technical/interpersonal = Supportive Tasks[f]	.5% (2)	84% (330)
Technical Patient Care Tasks = Non-technical Patient Care Tasks = Supportive Tasks[g]	16% (62)	100% (392)

a,b,c - At least 3 of 4 tasks identified as comprising a substantial portion" of a PA's daily practice activities were located in the major category cited.

d,e,f - Four tasks cited by a PA were equally divided between the two designated major categories.

g - Only three tasks were designated by a PA; the three tasks were equally divided among all three major categories.

Source: Ref. 26, p. 129, Table 4-10.

Table III

PA Described Tasks

	Percentage (N = 939)
Primary Care (diagnosis and treatment of common medical problems of ambulatory patients)	68.5
History taking and physical examination of ambulatory patients	29.3
Emergency Room care	22.9
History taking and physical examination of hospitalized patients	16.3
Assisting in surgery	16.1
Making rounds on hospitalized patients	13.6
Suturing of minor wounds	12.8
Follow-up care	11.2
Nursing Home visits	7.3
Initial screening and evaluation	7.3
Care of hospitalized patients	6.6
Writing hospital discharge summaries	6.6
Taking call during evening and weekend hours	6.1
Writing progress notes for hospitalized patients	5.4
Routine preoperative and postoperative care	5.2
Lab work	5.0
Casting	5.0
Arranging and ordering lab studies	4.5
Home visits	3.4
Counseling and psychotherapy	3.4
Reading electrocardiograms	2.0

Source: Reference 27, Table 8, p. 986.

Thus, using diverse analytical techniques, task analyses of the PA's role in primary care suggest that he is performing the function intended (for a discussion of the intent of the PA movement see Colfack (Ref. 1). He is being used to treat, diagnose, take histories, and perform physical examinations on patients. Specific tasks tend to be divergent apparently depending upon the research methodology and the PA's practice environment.

Stimson and Charles have hypothesized that any technical task identified in the primary care practice can be taught to the PA, making task analysis differences unimportant (Ref. 23) Their argument stems from their definition of "technical task" as any task which lends itself to written instructions. They point out that real differences don't occur at the task level, but in the physician's ability to integrate the information provided by several sources, make a diagnosis, and plan treatment of the problem, which the authors call managerial skills (Ref. 23, pp. 9-10).

If the hypothesis can be accepted, then differentiation among tasks performed by the PA and the physician in primary care will be a function of the PA's ability (or training) and the physician's willingness to delegate the tasks to the PA. It seems clear that if all the task analyses were additive, very little of a "technical" nature could be considered as strictly a task for the physician or the PA. Thus, given training and responsibility, the PA can perform almost all technical tasks of the primary care practice.

3. Patients seen by the PA

The type of patients seen by the PA can be classified in several ways. The actual characteristics of the patients seen will be described using work done by Ford (Ref. 26). The PA practice setting will be examined through an article by Roemer (Ref. 28) and a study by Perry (Ref. 29). Finally, the kind of diagnoses treated by the PA will be viewed through a limited sample performed at Kaiser by Lairson, Record, and James (Ref. 30). Though no one method completely categorizes the type of patients seen by the PA, it is posited that this variety of approaches will assist in understanding the kind of patient the PA is capable of treating.

Ford's 1975 survey of 392 PA's (Ref. 26) found several general characteristics of the PA's patients. All information provided was based on a checklist with which the PA described the type of patient normally seen. Responses (N = 584) surpassed respondents due to a great many PA's indicating that they equally served certain types of patients. Forty-eight percent of the patients were young or middle-age adults, 27% elderly, 14% infants, and 11% adolescents. With a smaller response rate (N = 503), she found racial mix of patients to be 60% White, 24% Black, and 16% other minorities. Male-female numbers were found to be approximately equal. Income division of patients (with n = 538) was as follows:

Less than $5,000	28%
$5,000 - $9,999	41%
$10,000 - 14,999	22%
Greater than $15,000	9%

PA's served Medicaid, Medicare, group health, and private health insurance recipients equally (n = 571). Also based on responses, patients were found to be 39% from rural areas, 33% from urban areas, and 28% from suburbs. Eleven percent of the respondents served specialized groups such as veterans and students (Ref. 26, pp. 112-113).

Roemer (Ref. 28) cites work done by Systems Sciences, Incorporated of Bethesda, Maryland* on the largest nationwide survey of NP's and PA's done at that time. With 451 PA's responding, the following breakdown of practice setting is given:

Work Setting	Physician Assistants (1%)
Solo physician's office	28.3
Medical partnership or group	22.2
Hospital outpatient department	8.9
Hospital inpatient service	9.8
Clinic or health center	18.6
Community and home health agency	0.9
Other	11.3
All settings	100.0

He states that the 50.5% of PA's serving in solo (28.3) and group (22.2) practices are serving a clientele subject to much speculation. However, based on other studies, he believes that "even in private settings, (PA's) are probably serving mainly patients of limited education or medical sophistication" (Ref. 206, p. 552). He cites unpublished information, to serve

*Nurse Practitioner and Physician Assistant Training and Deployment Study, pp. VI-18, 19. Systems Sciences, Inc., Bethesda, Md., July 1976 (processed).

as evidence for this hypothesis, concerning the first 136 Medex Program graduates of the Charles R. Drew Postgraduate Medical School of Los Angeles. Seventy-one percent of the graduates were engaged in "primary care practice" (italics his), of which 87% were in settings with "disadvantaged populations," defined as having a high proportion of Medicaid recipients, high racial or ethnic minority numbers, and dwellers in rural areas (Ref. 28, p. 552)

Perry presents a somewhat similar breakdown of practice settings for the PA as was cited by Roemer (Ref. R-200). In his 1974-1975 study of the PA, he found the distribution of PA practice settings given in Table IV.

He notes that approximately 75% of all responding PA's are providing primary care, compared to only about 50% of the physicians in the United States (Ref. 29, p. 70). Also, when compared to physicians, the PA's were found more likely to be placed in an institutional setting (50.2%) than physicians (27.0%) having a hospital based practice (Ref. 29, p. 72).

Perry was also able to draw some conclusions about the size of the community in which PA's practiced:

Population of Community	% of Physician Assistants (N - 801)
Less than 10,000	27.4
10,000 to 49,999	25.3
50,000 to 249,999	20.3
250,000 to 999,999	14.5
Over 1 million	12.5
	100.0

Source: Reference 29, Table II, p. 73.

Table IV

Specialty of Physician Assistants

	N	Percent (N=902)
General Primary Care		
family practice	262	29.1%
general practice	130	14.5
subtotal	392	43.6
Specialty Primary Care		
general internal medicine	166	18.6
general pediatrics	43	4.8
obstetrics and gynecology	16	1.8
emergency medicine	12	1.3
multispecialty primary care	25	2.8
subtotal	262	29.3
Surgery		
general surgery	107	11.9
orthopedic surgery	13	1.4
urologic surgery	13	1.4
plastic surgery	3	0.3
vascular surgery	2	0.2
neurosurgery	7	0.8
cardiothoracic surgery	20	2.2
surgical oncology	1	0.1
otolaryngology	4	0.4
subtotal	170	18.7
Other Specialties		
cardiology	12	1.3
nephrology	4	0.4
endocrinology	4	0.4
dermatology	4	0.4
hematology-oncology	5	0.6
gastroenterology	1	0.1
neurology	1	0.1
industrial and occupational medicine	16	1.8
rehabilitation medicine	1	0.1
pulmonary medicine	2	0.2
multi-subspecialty medicine	8	0.9
aerospace medicine	1	0.1
radiology	4	0.4
pathology	1	0.1
psychiatry	10	1.1
opthalmology	3	0.3
public health	1	0.1
subtotal	78	8.4
total	902	100.0

Source: Reference 29, Table 10, p. 67-68

As Perry points out, over one-half of the respondents were in communities of less than 50,000. He then cites physician shortages in areas under 500,000 population and refers to the data to show almost 75% of the PA's working in areas with fewer than the national average of physicians (Ref. 29, p. 76).

Finally, Lairson, Record, and James (LRJ) (Ref. 30), although with a small sample size, present some interesting information on what types of diagnoses the PA treats in the study site. Using a five percent sample of all patients seen at the Kaiser Vancouver Clinic, from September, 1970, through June, 1971, by six internists and the one PA assigned to that clinic, the authors compare the percent of presenting morbidities seen by the PA to the percent seen by the six individual internists. That comparison is presented as Appendix B (Ref. 30, Table 2, p. 210) of this thesis. The authors found that:

> Over 50% of the PA's practice consists of trauma and burns (27.3%), plus diseases of the skin (26.8%). He is more likely than the internists to see diseases of bones, joints and muscles, and a large portion of his practice is made up of the diagnosis and injection of acute bursitis. The PA sees approximately the same percentage of respiratory problems as the internists, but this fact gives no indication of the complexity of the medical problem. (Ref. 30, p. 211)

LRJ also found that a lower percentage of the PA practice consist of encounters where only symptoms of nondiagnosed disease were recorded. The authors speculated that this might be a result of the PA being more inclined to make a diagnosis. However, since a great proportion of PA treatment falls into the trauma categories, a diagnosis might just be more obvious. LRJ also concluded that the PA handles less

complicated medical problems that may facilitate diagnosis. After discussion of other differences, they summarize the findings by noting that the PA sees more acute medical cases and provides fewer preventive medicine services than the internists while apparently transferring the more serious cases he discovers to the physician.

In an attempt to draw the various viewpoints together, the following similarities are noted. Ford found a higher than expected (based on national average) percentage of minorities (24% Black, 16% other) making up the PA's workload. Roemer's accessed data confirms Ford's finding of high minority mixes of PA patients and also confirms her findings of, at best, a modest income level for this group. Perry and Lairson, Record, and James tend to confirm the type of care sought by the PA's patients. The PA is a primary care provider working mostly in "first contact" areas. His patients tend to have more straightforward diagnoses that tend to be treated with technical proficiency (lacerations, burns, etc.) rather than synthesizing, diagnostic proficiency.

4. Productivity of PAs

Since Colfack (Ref. 1) has addressed the observed time and dollar savings by PA's (and NP's) through numerous examples, this section will review the methodology established for

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* This discussion of economic productivity is derived to a great extent from Marsha G. Goldfarb's paper, Ref. 31.

measuring PA productivity.

In general, productivity of labor must attempt to define at least three issues that are interrelated (Ref. 31). It must be known what the worker produces, how the inputs are organized to product outputs, and the extent of the availability of labor.

Output in a medical/health care environment is quite difficult to define. Not all "output" is provided directly to patients. For example, the PA might order supplies or prepare bills. Even when output is limited to "direct" patient care, not all care is equally labor intensive and not all "direct" care requires patient contact (for example, telephone contacts), depending on how "direct" is defined. Input organization greatly influences the degree of productivity for the PA (or NP). In particular for the NPP, degree of supervision and specialization will influence how much work he is able to contribute to a specified output. Finally, the availability of labor will influence the amount of productivity required of the NPP. The higher the wage commanded, the more productive the NPP must be in order to persuade a physician to hire him.

Goldfarb's study of the economic productivity of NPP's presented the forementioned framework as a guide for examining the issue (Ref. 31). In the study she points out that, without all three measures included, no analysis of productivity can be considered all inclusive of the issue. One attempt at assessing the productivity potential of the PA (defined as PA, NP, or any assistant who performs tasks traditionally reserved for

the physician) cited by Goldfarb is that performed by Zeckhauser and Eliastarm (Z&E) (Ref. 32). Their analysis begins by pointing out the problems encountered in the medical sector when using the more traditional approaches to measuring PA productivity. First, examining other countries' experiences or making comparative studies of support personnel presently in the medical industry might be worthwhile, but only if a significant amount of resources were devoted to their pursuit. Second, marketplace analysis of productivity based on salaries would not be worthwhile because of the noncompetitive elements present in the industry (for example: barriers to entry and monopsonistic hiring practices) (Ref. 32). Due to the forementioned limitations, Z&E's analysis is based on the productive potential of physicians and physician assistants in an urban health center which functions as their paradigm.

Their production function for medical care considers two forms of delivery that separate physician (and physician assistant) inputs from the broader aggregation of all other inputs called support. The production function for non-substituting MD's is represented by: $0 = G(P.S.)$, where 0 = output; P = physician only time input; and S = all other support in dollars (including traditional medical personnel such as nurses and technicians). Support is considered a flow (with stock requirements converted to flows through an interest rate) that measures in dollars the difference between gross and net revenue for the physician. It is the total of all expenditures by the physician except his time (Ref. 32, p. 97). The output

(0) of medical services is measured as a standard medical unit (undefined) and the explicit production function has constant returns to scale.

The alternative production function considers the input of physician assistants (A) which substitute for the physician to some degree and produce an output (N) (Ref. 32, p. 98).

$$N = F(P,A,S)$$

The authors assume that the two production functions are homogeneous and have convex isoquants which allow for substitution of support inputs for labor in both types of health care delivery. To simplify computation, they assume support (S) to be the same, whatever the mix of labor (P or P and A) for the set of fixed prices, that is associated with a given level of output. The authors considered fixed levels of support to underestimate (if it effects it at all) the productivity potential of physician assistants. Therefore, the resulting production functions are:

$$0 = G(P,k0) \text{ [or } 0 = g(P)\text{]}$$

$$\text{and } N = F(P,A,KN) \text{ [or } N = f(P,A)\text{]}$$

The authors next consider what tasks the physician assistant can perform and the time investment in allowing him to do them. The tasks considered delegatable are essentially those mentioned in the utilization section of this thesis. Those considered nondelegatable are the synthesizing, diagnostic, nontechnical type tasks described by Stimson and Charles (Ref. 23). The site selected to measure time savings

(and costs) was an urban health center concentrating in internal medicine and pediatric visits (25,000 and 30,000 visits yearly, respectively, out of a total 60,000 visits). Using an arbitrary 12 minutes per patient contact unit, the visits were grouped into clusters according to contact units by complaint (some visits for the same complaint taking more units) and each complaint was broken into a percentage of total time allowed for patient contact.

Z&E then suggest a methodology for assigning tasks to a physician assistant that considers the net savings in physician time (after adding required supervisory time) over the time required by the physician assistant. The procedure to be used is as follows:

1. Score tasks on amount of physician time required to perform them.
2. Score tasks on amount of PA time required to perform them and the amount of physician supervision time required.
3. Compute net time saved by physician when task is assigned to a PA.
4. Rank all tasks in terms of a PA's comparative efficiency.

$$\text{Comparative efficiency} = \frac{\text{net savings of physician time (PA performing)}}{\text{PA time required to perform the task}}$$

5. Assign tasks to the PA, starting with those having the highest comparative efficiency ratio.

Source: Paraphrased from Ref. 32, p. 104.

To complicate the analysis, they suggest there may exist increasing returns to scale over certain ranges for certain tasks

if the physician assistant becomes more efficient with repetition, learning occurs while doing, or supervisory time declines as more tasks are given to the physician assistant. With increasing returns to scale, Z&E suggest that it may be necessary to consider task assignment on a more aggregative basis. The authors also recognize the problem of nonhomogeneous work force. Not all physician assistants can perform the same tasks because of training differences. Therefore, physician assistant delegation might be enhanced by groups of tasks which show the most promise of efficiency.

Z&E then (on paper) prepare a listing of tasks more efficiently performed by the physician assistant. In each case, the physician assistant takes longer than the physician to perform the task. But, if the increasing returns to scale assumptions are applied, the physician assistant will be more efficient than the physician in straightforward, clinical tasks (implied to be "technical" tasks). Their assignment table also computes a marginal representation of the added physician assistant and the authors conclude a declining marginal productivity in taking over the physician's tasks. As more physician assistants are added, the less productive the last one added becomes (Ref. 32, p. 111). The prepared listing of tasks is reprinted as Appendix C.

When the output of physicians working alone equals the output of physicians and physician assistants the following table was developed:

	Old Delivery Method	New Delivery Method			
Adult Medicine	P = 8	P = 7.5	7.01	6.62	6.27
		A = 1.0	2.00	3.00	4.00
Pediatric Service	P = 7	P = 6.5	6.03	5.65	5.32
		A = 1.0	2.00	3.00	4.00

Source: Reference 32, Table 5, p. 112.

The derived table was for the production function: $C[eP^{d} + (1 - e)A^{d}]^{1/d}$, where e = .78, d = .66, c = 1.3937. The authors calculate this production function to have an elasticity of substitution of 2.94. Although this value is high, Z&E point out that the isoquant does not cut through both axes (physician can work alone, but PA cannot).

Using the production function, they observe that small fractions of physician assistants offer output levels below what would be produced without physician assistants at all. They explain this loss through startup supervisory costs with the addition of any physician assistant.

With the objective of allocating physicians between the two delivery modes to maximize total output (0 + N) using the dictates of efficiency, the following relationship is developed: $h(P_T, A_T) = \max_{P_N} f(P_N, A_T) + g(P_T - P_N)$ where P_T and A_T are total levels of physicians and assistants, respectively. In the study, the authors found the ratio between P_N and A_T maximizing total output to be 5.6 to 1.

The authors conclude that if physician assistants actually earn what they substitute in physicians, as is the observed case, real benefit to society in the short run will

be in use of real resources, not in cost savings. This is based on the production function's estimation of one physician assistant saving one half a physician and a physician assistant salary being roughly at that level of one half the physician's salary. However, society's long run savings will be financial in nature due to a shift outward in the supply curve of medical capability that will reduce scarcity rents. The scarcity rents are not defined but may apply to reduction of prices for services rendered.

This example of a productivity measurement offers some insight into their potential. So long as physicians outnumber the physician assistant by 5.6 to 1, according to the cited study, they will be productive up to one-half a physician per physician assistant.* It must be noted, however, that quality of care was not the maximizing criteria -- only output measured as patient visits. No study reviewed by this author attempted to equate productivity with quality. Surely these two must be equated in any thorough study of productivity. As Kacen points out:

> While physician productivity augmentation is certainly a primary objective of the whole PA movement and an inducement for doctors to hire PA's, an emphasis on increased patient output could result in a deterioration of health care delivery. Since the PA is a salaried employee who is paid by his physician-employer, there may well be an understandable inclination to

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*Given the validity of the assumptions upon which these derived numbers rest.

> recover the salary pait out -- and more. But, if the larger patient volume generated by the utilization of a PA results in a reduction of individualized attention and in an increase in client waiting time, the whole process becomes, from the consumer's standpoint, largely self-defeating. (Ref. 33, pp. 61-62)

5. Supervision of PAs

As discussed in Colfack (Ref. 1), the evolution of the PA movement has made him totally responsible to the physician in all aspects of care rendered. He is credentialed through state medical boards, certified through the National Medical Board of Examiners, and works directly for a physician. Because of his totally dependent nature, he is under the direct supervision of the physician, who in turn, accepts responsibility for the PA's delivery of care.

Supervision of the civilian PA must first be prefaced by legal liability incurred by the employing physician. The two issues are synonymous in the civilian sector. Primarily, the physician is subject to two types of liability when the PA is accused of malpractice. The first, through the doctrine of respondeat superior, which loosely translates to a superior being liable for any act committed through employment by a paid employee. At present, the doctrine is limited to the employer's power of control. It is expected that the employee will follow the employer's directions and it is the employer's duty to ensure such occurs. Thus, under the rule of respondeat superior, the employer is liable for torts of the employee (PA) committed during the course of being employed (Ref. 34, p. 16)

The second type of liability, direct liability, results

from the physician's duty to properly manage the PA. It is considered a direct liability to the physician because it is a result of the physician's negligence if a tort should arise. This negligence stems from inproper selection, improper task delegation, or improper supervision (Ref. 34, p. 25). It is this aspect of liability in the civilian sector that must be remembered when dealing with the issue of PA supervision. For, unlike respondeat superior, which can be applied to any employee's care, direct liability due to mismanagement rather than treatment misadventures do not turn on negligent care. Instead, proof of liability hinges on whether if the physician performed his managerial duties correctly, the injury would not have occurred (Ref. 34, pp. 25-76). This thesis will limit the legal issues discussed at this time to that which constitutes inadequate supervision. Since there are no regulations in this area, the courts must rely on interpretation of licensing laws. The courts do not require more zealous supervision of PA's than a comparable group, such as interns (Ref. 34, p. 28). Usually, courts only see a duty of general supervision that leaves the intensity of supervision applied up to the supervisor (Ref. 34). As can be deduced by this very brief discussion of physician liability, no real guidelines have been developed for what constitutes the physician's duties to supervise the PA without jeopardizing himself through liability to the patient (whether the liability is indirect or direct).

In an article by Charles (Ref. 35), which discusses the issue of legal liability and supervision, the following guide-

lines to obstetricians and gynecologists employed a PR are offered:

> Supervision should be interpreted to mean that the physician knows his assistant's capabilities, and has specifically directed him, in each case, to perform those tasks, within his competence, deemed necessary by the physician. The physician must be immediately available, in terms of physical proximity, to consult and make decisions where necessary. When a difficult task is performed, it would be wise for the physician to examine the patient to assure it was done properly. This procedure is only suggested; as confidence grows (or decreases) between physician and assistant, the form of supervision will undoubtedly be modified. These conditions will be of basic importance in assuring quality patient care, and answering liability claims. (Ref. 35, p. 346)

One solution to this supervision question has been to develop protocols that legally protect the supervisor and attempt to assure some standard of quality care (for example, see Ref. 36). Many states have adopted a requirement for some written procedural guide for PA's to lessen the chance of inappropriate medical practice (Ref. 37, p. 364).

Some states have also addressed supervision in regulations limiting the number of PA's a physician can supervise (Ref. 37, p. 363). For example, seven states permit only one PA per physician, while 14 states allow two per physician (Ref. 37, p. 363). This appears to be a maximum set by fiat to prevent overuse of the PA to the point of risking liability from undersupervision of too many.

Little has been written on how much the PA is actually supervised. Perry (Ref. 29) found that job performance actually improved with less supervision (increased responsibility for

patient care) and an increased level of role support from the physician. Perry speculates that the PA looks at how much responsibility he is delegated as a measure of how well he is doing in the eyes of the physician. This, in turn, creates more job satisfaction and, thus, improved performance. In a survey of 19 rural practice settings in the Northwestern United States, Litke (Ref. 38) found that 52% (10) of the practices listed daily supervision time to be one hour. Three other respondents did not estimate an actual time, but indicated that supervision time decreased as PA (and NP) employment time increased. The highest time listed was four hours (one response). It is noted that even from such a small sample, a wide variation in times devoted to supervision occurs.

To briefly summarize this section, the civilian sector is greatly concerned with supervison of the PA. This concern is linked to the laws of the states which mandate certain supervisory behavior in the form of explicit guidelines for some states or merely the threat of liability in others. Supervision may be in the form of protocols or left up to the physician to find other ways of assuring himself the PA is delivering quality care that diminishes the threat of malpractice. It appears that supervision is difficult to define because of the complexity of the problem. It is an individual thing, between physician and PA, with the courts offering little general guidance on how state laws should be applied. An appropriate manner and time allowance for supervision in one setting would not necessarily be appropriate for another.

Although this section offers little guidance on how the PA is actually supervised, it is hoped that it serves to emphasize the murkiness of the issue. Physicians must strive for an ill-defined level of quality in delivering care through a PA while alleviating any risk of liability.

Yet, even with these apparent drawbacks to utilizing PA's, there are many economic incentives to their employment. As Colfack (Ref. 1) points out, the PA is cost effective for the physician. The PA is also a time efficient investment for the hardpressed group practice or clinic. With few exceptions, the PA has shown an economic reward for the supervising physician. Thus, even with the drawbacks associated with supervising the PA, the physician reaps many economic rewards.

6. Determinants of PA Job Satisfaction

Many things influence how the PA perceives his job and how satisfied he is with it. This section will discuss some of the major factors that lead to dissatisfaction with the PA's job and will identify those things that tend to produce some degree of satisfaction.

As a physician's "assistant," even his title leads to some dissatisfaction. He cannot stand alone; hence, he is an assistant. His role is considered that of a "para-" professional which implies learning only simple, technical, tasks operating on the affective level while true professionals operate on the cognitive level (Ref. 39, p. 117). Tucker and Tucker (Ref. 001) establish the roots of this inevitable conflict and point out the primary factor separating the "para-

professional" from the professional as education, with the bachelor's degree as the dividing line (Ref. 39). That conflict exists is implicitly supported by Perlman in an article describing the merits and demerits of employing a PA (or NP) in allergy (Ref. 40). After listing six merits for the allergy PA (NP), he lists six demerits which hinge on the possibility of an assistant exceeding his competence thus endangering the patient or the medical practice with liability. His final demerit reflects, perhaps, what Tucker and Tucker saw as conflict: "This group of assistants will, as others, develop a strong, militant union with many professional (emphasis added) and sometimes unreasonable demands" (Ref. 40, p. 117). Although the issue of conflict between professionals and assistants has not been established in an empirical manner, it is perhaps reasonable to conjecture that assistants are striving for the status of "professionals" and conflict with the more conservative elements of medicine seems inevitable.

While Perry's survey work, previously noted, did not directly address this issue of conflict, he did find dissatisfying elements of the PA's job (see also Ref. 29). The generalized grouping of these elements could be titled The Future. He found that 59.7% of the respondents (N = 928) viewed career opportunities to be either limited or nonexistent in their current jobs. One-third of the respondents had considered changing their occupation and an additional one-third indicated that they may do so at some future time. Over 22% of the respondents were strongly interested in medical school

and others were interested in other types of additional education (Ref. 27, p. 988). This concern about the future was also brought out in Litke's study (Ref. 38) of PA's and NP's in the Northwestern United States.

> As a group, the PA/NP's do not feel secure. They perceive that federal support for these new professionals is tenuous and that the reluctance of the American Medical Association to fully promote these concepts further threatens their longevity. The validity of this belief is neither confirmed nor denied. (Ref. 38, p. 25)

Perry also found a negative influence of prior education on job satisfaction. The more education the PA possessed, the less satisfied he was with the job (Ref. 41). Perry points out that this is consistent with findings of others in different occupation areas.* A more highly educated person entering a job will have higher expectations of the job and may possess more ability, through training, than the job demands. Since Perry found an upward education trend in PA training entrants, he predicts that job satisfaction will decline if the career opportunities and present PA role remain unchanged (Ref. 41).

Overall, Perry found the PA to be in a highly satisfying occupation. He speculates that the PA is at the top of the allied health professions, earning more salary and having more responsibility than other allied health professionals. The respondents to his survey reflected an elitist attitude with pride in being part of such a group. He also describes the possibility of a "honeymoon effect" resulting from the

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*Kalleberg, A. A causal approach to the measurement of job satisfaction. Social Science Research 13, 299, 1974, as cited by Perry, Reference 41.

newness of the job and its rewards. As one respondent described himself, he is a "pioneer" meeting frustrations and challenges never before met. Perry finally speculates that the study itself may reflect an upward satisfaction bias because 27% of the total surveyed population did not respond, and may have dampened the overall job satisfaction index.

As pointed out above in the supervision section, Perry found that physician role support and level of responsibility for patient care had the largest effect on job satisfaction. Because of the extremely close working relationship between physician and assistant, the PA felt that the quality of this relationship greatly influenced his job satisfaction. Level of responsibility appeared to be related to the PA's training to assume a somewhat autonomous role capable of making independent decisions. If this was thwarted by oversupervision or denial, dissatisfaction resulted. Perry believes that use of knowledge and skills to directly benefit the patient is intrinsically rewarding and possessing responsibility for the patient added to self-worth and "professional identity" (Ref. 41, p. 383).

Although few beside Perry have attempted to empirically establish job dissatisfiers and satisfiers for PA's (for example, see Ref. R-028), it appears clear that PA's want to be considered a valuable part of the health care team in order to reap satisfaction. Perhaps this relates back to Tucker and Tucker's belief that the desire to be labeled and identified as a "proffessional" is high in the list of motivators for PA's. He wants to have a close relationship with the physician and yet still exercise a great deal of autonomy and independence in

caring for the patient. According to Perry's research, he appears to be attaining his desires to a great degree.

B. DETERMINANTS OF PA UTILIZATION IN THE MILITARY SECTOR

1. Introducing the PA into the Health Care Setting

As with the civilian sector PA, little has been documented on the way in which the PA is introduced into the health care setting. It would appear, however, that the introductory phase in the military sector is just as crucial to success as in the civilian sector. If the PA is not accepted as part of the health care team, the effectiveness of the health care delivery system suffers. Few references providing guidance in introducing the PA specifically to the military sector were found by this author in the literature review. The work directed to the civilian sector PA users in this regard is applicable to the military sector as well (See Section II, A.1 above).

The one article found that addressed PA "success" in the military sector deals only with the USN/USAF PA program. In this article, Guadry, Jr. and Nicholas (Ref. 42) briefly discuss three factors leading to successful PA utilization: First, adequate supervision assures good medical care and facilitates on-the-job education; Second, continued medical education must be encouraged as a tool to improve quality of care and as a morale booster and as a way to improve retention; Third, the PA must be allowed continuity in his medical care. The authors state that the PA must be allowed follow-up visits for acute care patients and participation in care provided

the chronic disorder patients. The authors see this as essential for quality of care, patient satisfaction, and PA job satisfaction (Ref. 42, p. 31). These "findings" appear to be the authors' own thoughts, as observation, reference, or other research is not presented to corroborate the validity of success using these criteria.

To recapitulate: the civilian sector literature lists several determinants of PA success when being introduced into the health care setting: The PA's role must be well defined yet not constricting; Staff meetings should be held to clarify the PA's new role; The physician and former staff members, as well as the PA's own professionalism, determine patient acceptance to a great degree; It has been hypothesized that physician acceptance is the key factor in successful introduction and that this acceptance is influenced by how "role-threatening" the PA is to the physician; and, adequate supervision has been emphasized as a determinant of PA acceptance and job satisfaction.

The one military sector PA article on PA success centers on adequate supervision, continued medical education, and continuity of medical practice as the primary determinants of success.

2. Delegation of Tasks to the PA

Task delegation in the military sector must be viewed first from the perspective of written directions on how tasks are to be delegated to the PA in the various branches of the service. Then, to the extent of information available, PA

utilization will be examined by frequency of tasks performed. Other types of task delegation information paralleling that found in the civilian sector literature, such as descriptive anecdotal reports on actual utilization or empirically derived task analyses, were not available.*

Page found that all three Services viewed the PA as a replacement for the General Medical Officer (GMO) in primary care (Ref. 43, p. 9) brought about by increased specialization and a decrease in medical school output of general practitioners. With the end of the draft and a reduction in military physicians, the Services saw the civilian sector utilizing former military corpsmen/medics to solve the same problems. It was a logical step for the Services to start their own PA programs utilizing an internal resource (Ref. 43, p. 3).

The Army Physician's Assistant program is described in Army Regulation (AR) 40-48 which gives the following guidelines:

*The local commander delineates the scope and limitations of practice and designates a supervising physician.

*Practice encompasses limited primary care in designated combat and combat support battalions, troop clinics, and fixed outpatient clinics.

*Scope of practice is limited to being a primary source of medical care, conducting sick call, performing emergency treatment (illness or injury), or any specific procedures as defined by the supervising physician.

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*It seemed reasonable to assume that such studies have been performed since the PA has been a part of military health care since 1973. However, exhaustive efforts failed to identify studies specifically addressing delegation of tasks to the military PA. Possibly the guidelines promulgated by the Services are interpreted as either specific enough to limit any deviation or general enough to cover all circumstances!

*Functions are defined as providing:

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-- Limited general medical care

-- Diagnosis, treatment, and prescription under the direction of a supervising physician

-- Preventive medicine by providing information to health and environment personnel

-- Referral and evacuation where greater skills or knowledge is needed

-- Health record entries (with physician verification and countersignature on histories, physicals, narrative summaries, and operative reports)

-- Prescription writing authority as deemed appropriate by the local Therapeutics Agents Board, Credentials Committee, and local commander (excludes controlled substances)

-- Immunization supervision in the event of anaphylactic shock

-- Intra-muscular medications

-- Medical support to confinement/correctional facilities

-- Temporary profiles (unfit for full duty) not to exceed 30 days

-- Requests for X-rays and referrals to appropriate specialty clinics

*Performance is judged by the supervising physician and the local commander

*Responsibility for PA actions is ultimately that of the supervising physician

(Reference 44, condensed from pages 3-1, 3-2)

The Navy Physician's Assistant program is described in Bureau of Medicine and Surgery Instruction 6550.5 which provides guidelines for utilization of PAs in the Navy. Highlights of this instruction dealing with PA task delegation are as follows:

*They should be assigned to primary care (first contact) areas vice specialty clinics.

*They are not granted admission privileges but encourage PA participation in care of hospitalized patients.

*The local commander specifies the supervising physicians.

*No more than two PAs may be assigned per supervising physician.

*Utilization guidelines are to be prepared by the supervising physician and local commander and will include, but not be limited to:

-- type of patient/problem to be seen.

-- when the PA should consult with the supervisors.

-- routine duties.

-- proper response to anticipated non-routine situations.

*Physician countersignature is required on physical exams used for annual, reenlistment, and retirement exams.

*They may not perform confinement physicals.

*They shall be supervised by random review of records.

*They may write prescriptions as approved by the pharmacy and therapeutics committee (local) excluding controlled substances.

*They may write treatment and examination orders to be carried out by other members of the medical department.

(Reference 45, condensed from pages 1-5)

The Air Force Physician's Assistant program is described in Air Force Regulation 160-12, Professional Policies and Procedures. It was unavailable to this author, but according to an Air Force School of Health Care Sciences summary of the regulation and additional utilization guidance the Air Force regulation apparently includes the following:

-- one-to-one ratio of PA and supervising physician

-- local procedures to establish supervision

-- prescription authority delegation through local therapeutics committees

-- utilization in general therapy or family practice clinics of hospitals to which assigned

(Ref. 43, condensed from pp. 11-12)

Page concludes that regulations from all three Services use the PA in the role originally conceived for the PA -- as a health care provider in the primary care setting (Ref. 43, p. 12). The primary difference found among the Services is the practice setting:

> Each service has identified the primary care setting where it is experiencing or will experience its most critical shortage of physician resources. It is into these areas that they have introduced the PA to alleviate the shortage. The literature and communications with PA supervisors all indicate that the PA can and does fill the physician void in the primary care area. (Ref. 43, p. 12).

The actual tasks performed by the PA are addressed in a (tri-service) study by Giauque, et al. (Ref. 46) utilizing responses from 248 PAs (36 Army, 52 Navy, 158 Air Force, and 2 defined as "other"). Overall, 4000 questionnaires (mailed 25 to a command) to various military health professionals received a response rate of 65% (2,591). However, specific response rate of PAs receiving questionnaires is unknown, as the questionnaire was not specifically addressed to any one type of provider (Ref. 46, pp. 56-8). Out of a list of 50 medical tasks, the PA's listed the following tasks (described in Table V) as the most frequently performed:

Table V

Most Frequent PA Tasks Found by Giauque

Rank	Task	Mean (std. deviation) Complexity	Frequency	Competence
1	Otoscopy	2.88 (0.84)	4.90 (0.37)	1.14 (0.53)
2	Acute Otitis Media	3.20 (1.16)	4.69 (0.59)	1.43 (0.85)
3	Acute Otitis Externa	3.00 (1.07)	4.62 (0.60)	1.43 (0.85)
4	Strep Throat	2.38 (0.74)	4.59 (0.78)	1.43 (0.85)
5	Abdominal Pain	4.00 (0.76)	4.53 (0.63)	1.86 (0.86)
6	Treat Diarrhea	3.50 (0.93)	4.50 (0.63)	1.86 (0.86)
7	Examine Retina	3.75 (0.71)	4.44 (0.79)	1.50 (0.85)
8	Chest Pain	4.50 (0.54)	4.43 (0.73)	1.86 (0.86)
9	Prostrate Gland	3.25 (0.46)	4.40 (0.75)	1.57 (0.94)
10	Medical History	3.13 (1.46)	4.34 (0.97)	1.43 (0.85)
	Average	3.34	----	1.55

*Complexity - 1 = very easy, 5 = very complex.

*Frequency - 1 = almost never performed, 5 = quite frequently performed.

*Competency - 1 = can perform, no supervision, 5 = cannot perform.

Source: Reference 46, page 73.

Giauque, et al. found that task complexity was not directly related to frequency of task performance. However, the authors did find task frequency to be significantly correlated to competence for the PA ($r = .5459$, $p < .0005$) Ref. 46, p. 72). This implies that the less competence felt in performing the task, the less frequent it was performed.

Although no other studies specifically addressing task delegation to the military PA were found, Ambrosini, et al. (Ref. 47) attempt to describe the subject of delegation by defining those procedures or treatments specifically requiring a physician, with the remainder left to other health professionals (nurse, corpsmen, PA). The "MD required" procedures, developed through a physician consultant, showed a "conservative" requirement for 26% of first visit patients to be seen by a physician when using data taken from one hospital. Similarly, only one-third of return visit patients and one-third of patients requiring prophylactic procedures were found to require a physician (Ref. 47, p. 21). Therefore, it is implied that the remainder of tasks could be easily delegated to the NPP, corpsman, or nurse. This study will be dealt with to a greater extent in the Chapter relating to military staffing with NPPs.

3. Patients seen by the PA

As with other aspects of military PA utilization, little information was found on the types of patients seen. An exception to this is the study conducted by Perry. In a separate article (Ref. 48) based on the study, the author

compares practice settings and types of care provided by civilian and military PAs. The following is that comparison:

Practice Settings

	Military PA (n = 116)	Civilian PA (n = 754)
Solo or Group Practice (n = 433)	9%	56%
Clinic (n = 189)	47%	18%
Hospital (n = 98)	4%	12%
Clinic and Hospital (n = 150)	40%	14%
	100%	100%

(Source: Reference 48, Table 7, p. 765)

Specialties

	Military PA (n = 115)	Civilian PA n = 754)
General Primary Care (n = 392)	59%	41%
Specialty Primary Care (n = 262)	34%	28%
Surgery (n = 170)	2%	21%
Other (n = 78)	5%	10%
	100%	100%

(Source: Reference 48, Table 6, p. 765)

Perry's comparisons are offered with certain caveats. Practice setting categories were based on the type of setting employing the PA. Specialties were determined by the specialty of the supervising physician with General Primary Care representing general medical officer or family practitioner. Specialty primary care included general internal medicine, general pediatrics, obstetrics and gynecology, emergency medicine, or multispecialty primary care (Ref. 48, p. 765).

Given the paucity of information on the subject, only very tentative conclusions can be drawn. When the military

PA is compared to the civilian PA, it appears that many more PAs are working in the clinic or clinic and hospital settings in the military sector. It also appears that emphasis is placed on surgical specialties for the military PA. Further, given the intentions of the Surgeons General of the three Services, some qualified conclusions may be drawn about the type of patient seen by the military PA. With the Navy and Air Force emphasis on outpatient settings for the PA, the patient mix would probably largely reflect dependent care. This is based on the assumption that the Navy and Air Force Surgeons General have placed the PA according to original intention (Ref. 43, pp. 10-11) and that the PA is treating a representative sample of patients normally seen in an outpatient facility or department (for example, see Ref. 49). Under the same assumptions, placement of the Army PA (Ref. 43, p. 9) in the field units would result in a workload of largely duty personnel.

4. Productivity of PAs

As with the civilian sector PA, no study has attempted to describe all the variables associated with productivity in the labor force. The two studies to be described in this section have approached productivity from different viewpoints but lead to similar conclusions. The first study, offered by Blair (Ref. 43) presents PA productivity as a comparison of cost per productive man-year for the PA procured through enlisted ranks and the general medical officer (GMO) procured through the Armed Forces Health Professions Scholarship

Program (AFHPSP). The second study by Ambrosini, et al. (Ref. 47), used patient contact time to arrive at some estimate of PA productivity.

Blair makes the assumption that:

> Up to a threshold that allows for a minimum corps of physician supervisors, and physicians that perform specific tasks, the replacement ratio is 1:1 and therefore a GMO productive man-year equals a PA productive man-year. (Ref. 43, p. 38)

The term "productive man-year" is not explained any further, but it is implied that productivity is considered equivalent between the two groups. Other assumptions include: active duty only for time obligated; GMO and PA 50% productive last year of training; and AFHSPSP costs are average.

Using the mentioned assumptions, the study compares the cost of procuring a GMO physician through the AFHPSP and a PA through the enlisted structure, the military paying for his education. The results using a worst case analysis (highest cost and lowest payback) revealed the GMO to cost $31,330 per productive man-year while the PA was found to cost $23,015. The study concludes that, realistically, the cost of a GMO per productive man-year would probably be much greater than that used in analysis because DOD would be unlikely to obtain sufficient GMO's at the present salary. Tables VI and VII present results of their analysis, using discounted productive man-years (criteria undefined) and a 10% discounted present value of costs.

Ambrosini, et. al, used patient-measured, patient contact time to assess the time required for a PA (as well

Table VI

PA Cost Per Productive Man Year

Year		Pfod Man-Years	Disc Prod MY	Pay & Allow w/Depns	Tng Costs	Total	10% Disc PV
1	Student Phase I	0			$19440	$19440	$17673
Year							
2	Student Phase II	.5	.4132		12363	12363	10217
3	Productive PA (W1)	1	.7513	$12223		12223	9183
4	"	1	.6830	12223		12223	8348
5	Productive PA (W2)	.5	.3105	6836		6836	4245
	Totals	3.0	2.1580	$31282	$31803	$63085	$49666

Discounted investment ÷ discounted man-years = $ per man-year

$49,666 ÷ 2.158 = $23,015

Source: Ref. 43, Table 14, p. 41.

Table VII

Physician Cost Per Productive Man Year

Year		Prod Man-Years	Disc Prod MY	Pay & Allow w/Depns	Bonus	Educ Costs	Total	10% Disc Pv
1	Medical School	0	0			$7488	$7488	$6807
2	Medical School	0	0			7488	7488	6188
3	Medical School	0	0			7488	7488	5626
4	Medical School	0	0			7488	7488	5114
5	1st Year GME	.5	.3105	$16381			16381	10171
6	Productive GMO (03)	1	.5645	16381			16381	9247
7	Productive GMO (03)	1	.5132	17015			17015	8731
8	Productive GMO (03)	1	.4665	17015			17015	7938
9	Productive GMO (04)	1	.4241	18286	$9000		27286	11572
	TOTALS	4.5	2.2788	$85078	$9000	$29952	$124030	$71394

Discounted investment ÷ discounted man-years = $ per man-year

$71,394 ÷ 2.2788 = $31,330

Source: Reference 43, Table 13, p. 40.

as MD, Nurse, Corpsman, and various "teams" of these health care providers) to provide care based on the judgmentally determined difficulty of making a diagnosis, deciding treatment, and carrying out treatment. The study also found time requirement differences depending on whether it was a first or return visit, as return visits were assumed to not require diagnosis or a decision on type of treatment. A salary cost index was then computed based on the time required for diagnostic--treatment category by those cases not requiring MD referral and those requiring such. (Appendix D presents their results illustrating the differences in time required based on difficulty of diagnosis or treatment and weighted for salary differentials.) The study's conclusion, based on the salary weighted productivity for physicians and extender personnel, was that the most cost effective alternative lay in substituting extender personnel for the general practitioner (Ref. 47, p. 38). Although the authors caution generalization based on this study (data gathered during two weeks in June, 1974, at Robins Air Force Base), it appears that this methodology gives a salary-adjusted productivity value to the PA's work potential that shows promise when compared to a similarly salary-adjusted physician productivity value.

The two studies offer some insight into measurement of PA productivity in the military sector. When viewed in productive man-years, the PA is cheaper to train than the GMO. When the analysis of actual time spent to treat a patient is adjusted for costs to the military in the form of salary, the

PA again shows more productivity for certain diagnoses than the physician.

5. Supervision of PAs

PA supervision in the military sector differs from that in the civilian sector. Unlike the civilian sector, the military sector, being part of the Federal sector, is not required to comply with local state laws or credentialing bodies which mandate (whether explicit or implied) the supervisory duties of the civilian physician for his PA employee. This section will discuss the supervisory requirements within the military sector and show some ways these requirements have been met. A comparison of civilian and military PA supervision will then be presented.

As mentioned in section II. A.2 above, each of the three Services require a supervising physician for each PA be locally appointed in writing. The Navy sets the "PA-to-supervising-MD" ratio at no more than 2:1, the Air Force at 1:1, while the Army does not set a maximum ratio. How the PA is to be supervised is left up to local commanders and supervising physicians with the exception of Navy requirements for random review of records.

Supervision of the PA is only briefly mentioned in the literature. Fitterer and Cochrane (Ref. 50) in a study of 12 Army PAs and four physicians (GMO) over two years at Fort Carson, Colorado, discuss supervision of Troop Medical Clinic (TMC) PAs. The TMCs exceeded even the hospital Emergency Room in outpatient visits (Range 5100-6400 per month

over a 12 month period) during the study, yet the authors felt that reviewing five records per month on each PA was "sufficient to fulfill our records review criteria and to conduct peer review" (Ref. 50, p. 953). Other methods of supervision mentioned included a continuing medical education program to reinforce previous training and having two rotating physicians on call for consultation at the clinic.

In another article concerning Army PAs assigned to the field, Stuart, Robinson, and Reed (Ref. 51) express concern over geographic separation of physician and assistant. This is a particular problem in the Army with the majority of PAs assigned to the field (See Colfack Ref. 1). The authors' solution included close physician monitoring with frequent visits to the field and an audit of records (Ref. 51, p. 229).

The only reference discussing actual USAF/USN PA supervision is an article by Gaudry and Nicholas (Ref. 42). The authors describe the joint service training program (see Colfack Ref. 1 for a description of the program) and offer facets of PA utilization that are important -- one being adequate supervision. The authors suggest that the supervising physician allot time on a regular basis to observe PA capabilities and to conduct careful chart audits (Ref. 42, p. 31).

Although techniques of supervision in the military sector appear to be well defined, there is evidence that the military PA is not nearly so closely supervised as his civilian peer. In the article by Perry comparing civilian and military PAs (Ref. 48), based on his 1974-1975 national PA survey,

significant differences are noted. Closeness of supervision was examined by dividing the estimated percent of work time in providing patient care without direct physician supervision by the total percent of work time devoted to patient care. His results are shown in Table VIII. Military PAs indicated that only 22.9% of their patient care time was in the presence of a supervising physician, while civilian PAs indicated an average of 42.1% of patient care time in the presence of a supervisory physician.

The related job characteristic level of responsibility was obtained by measuring the responses to the following questions:

(1) How much responsibility do you have for patient care?

(2) Do you feel that you are allowed to make decisions about these aspects of patient care for which you received appropriate training?

(3) Do you have much influence on the way your patients are cared for?

Perry found the average scale score among military PA to be (statistically) significantly greater than their civilian counterparts (Ref. 48, p. 764).

The existence of less emphasis on supervision in the military sector is implicitly corroborated by Robinson and Thompson (Ref. 52) in a study of tri-service PAs conducted in 1974. Two hundred eighty-five graduate PAs were sent questionnaires with 163 returned for a response rate of 60%. Response rates or number contacted by service were not provided in the study. Degree of supervison was judged by the

Table VIII

Differences in Job Characteristics
of PAs employed in the Military
and Civilian Sectors

	Military PAs	Civilian PAs
Closeness of Supervision	22.9 (n = 119) (s.d. = 31.74)	42.1 (n = 780) (s.d. = 34.62)
Level of Responsibility	11.1 (n = 121) (s.d. = 1.20)	10.0 (n = 818) (s.d. = 1.86)

Source: Ref. 48, Table 8, p. 766.

following question:

> To your knowledge, does your physician supervisor review your patients health records (either randomly or all)?

Only 3% of the responding PAs indicated that all records were reviewed, 51% indicated random record review, 40% were rarely reviewed, and 6% never had their records reviewed (Ref. 52, pp. 6-7).

Whether the military's lack of legal requirement to comply with state regulatory laws and bodies influences the degree of supervision exercised over PAs is subject to conjecture. Perry speculated that the military's tradition of delegating responsibility for patient care to allied health personnel could be equally applied to the PA (Ref. 29, p. 111). Whatever the underlying reason, it is clear that the military PA is less supervised and maintains more responsibility for his patients than his civilian peers. Although explicit guidance exists for supervising the military PA, actual supervision may not be as explicitly carried out.

6. Determinants of PA Job Satisfaction

This section will describe the satisfiers and dissatisfiers found in the military PA's job environment. The two subjects will be dealt with simultaneously since it is sometimes difficult to separate the two. The first study to be addressed is by Giauque, et al. (Ref. 46) which describes the job satisfiers/dissatisfiers found for the PA in a military-wide survey of 248 PAs. Perry's study (Ref. 48) will be examined to show how satisfiers/dissatisfiers differ between

the military and civilian sector groups of PAs. Finally, other references will be addressed that make note of satisfiers/dissatisfiers for the military sector PA.

Giauque et. al found tht the health professionals surveyed /Physician, PA, NP, Nurse, Corpsman and AMOSIST (Automated Military Outpatient System Specialist)/, the nurse and PA expressed average overall satisfaction but the PA was very dissatisfied with salary, educational opportunities, status, and career opportunities (Ref. 46, p. 99). They suspect that the PA is strongly second career oriented, although satisfied with work content in their present job. The authors also found that the PA placed higher value on technical-functional career traits which would lead the PA to value training and education opportunities to satisfy these career traits as well as prepare him for finding that second career (Ref. 46, p. 105). Satisfaction with educational opportunities varied with the service branch. The Army PA, predominantly stationed in the field reported rare opportunities for education and a sense of isolation ("satisfaction with educational opportunities" received a very low score). Navy and Air Force PAs, stationed predominantly at institutions and clinics, were quite satisfied with educational opportunities (Ref. 46, pp. 105, 107).

The other major area of dissatisfaction found by Giauque, et al. lay in salary and status. Army and Navy PAs were somewhat dissatisfied with Warrant Officer pay and status.

The Air Force PA,* remaining in the enlisted ranks with proficiency pay added to salary, was comparably dissatisfied with salary as the Army and Navy PA. However, status was found significantly below the Army and Navy PA satisfaction level (Ref. 46, p. 107). Table IX depicts the measured satisfaction levels.

Although the PA was found to be dissatisfied to a greater extent than other surveyed NPPs they were generally satisfied with the work itself (as a career) and had a strong feeling of self-worth. This is contrasted to the strong dissatisfaction with status, salary, and promotion (See Table X). Giauque and his colleagues theorize that Hertzberg's theory of motivation (hygiene factors/satisfiers) might apply. So long as the basic hygiene factors are not satisfied (for example, pay, promotion), motivating factors will not bring satisfaction. The authors, in fact, found the PA to be the least motivated of the paraprofessionals (Ref. 46, p. 109). They considered the effect of these hygiene factor blocks experienced by the PA as focusing attention on the job and away from a military career or perhaps toward a second career. The authors offer a second possible reason for career satisfaction and job dissatisfaction. The PA may view the military job as a "vehicle" to help them in their "real" careers after

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*At the time of Giauque's study, the Air Force PA was enlisted. Beginning in 1978 (see Colfack, Ref. 1) the Air Force is commissioning the PA as an 0-1.

Table IX

PA Satisfaction Measured - Armed Forces Compared

Satisfaction with	Mean (std error) satisfaction of Army	Navy	Air Force
Educational Opportunities	2.382 (.264)	3.135 (.180)	2.911 (.113)
Salary	2.061 (.226)	2.173 (.182)	2.019 (.097)
Status	4.000 (.202)	3.288 (.199)	3.070 (.118)

Responses coded by scale 1 to 5 where 1 = very dissatisfied, 5 = very satisfied.

Source: Condensed from Ref. 46, Table 5.24, page 106

Table X

PA Satisfaction, Motivation, and Feelings of Worth

Satisfaction with	Average (std error)
Supervisor	3.980 (.073)
Status	3.256 (.093)
Salary	2.061 (.080)
Work Itself	4.264 (.061)
Education Opportunities	2.894 (.091)
Autonomy	4.297 (.054)
Career to date	3.731 (.082)
Career Opportunities	2.490 (.089)
Overall Satisfaction	3.975 (.072)
*Feelings of self-worth	4.194 (.058)
*Motivation to contribute best efforts	3.785 (.069)

Five-point scale, 1 = very dissatisfied, 5 = very satisfied

*Five-point scale, 1 = to a very little extent, 5 = to a very great extent.

Source: Condensed from Ref. 46, Table 5.25, page 108.

service obligations are fulfilled. The authors speculate that the PA might feel himself in a "career transition" time frame with no motivation or commitment to the military -- although not really dissatisfied with their position (Ref. 46, p. 110).

Perry's study found a significant difference in one aspect of job satisfaction between the military and civilian PA. The respondent's perception of "opportunities for career advancement" in his present position, found the military PA to possess a statistically significantly less favorable view of career opportunities. The following illustrates:

	Military PAs	Civilian PAs
Career Opportunities	2.30 (n = 121) (s.d. = 0.85)	2.65 (n = 807) (s.d. = 1.11)

Scale one to five with 1 = nonextent and 5 = unlimited.

Source: Condensed from Ref. 48, Table 8, p. 766.

Other areas touching on job satisfaction examined by Perry were not found significantly different fro the military and civilian PA groups. These included:

-- perception of professional and personal support

-- perception of level of acceptance by the nurses with whom he works

-- perceived occupational prestige

-- self rating of job performance

-- job satisfaction (as a sub-grouping)

Finally, the study done by Robinson and Thompson (Ref. 52) touches on job satisfaction in the form of attitudes

toward the military in terms of undesirable features relating to retention. The authors found that 70% of respondent PAs intended to stay until retirement (20 or more years) with 20% undecided and 10% intending to exit upon completion of obligated time to pay back education. The respondents listed the following factors in order of greatest positive effect on retention:

-- rank structure
-- pay
-- provision for continuing education
-- clarification of regulations to allow the PA to perform more duties
-- allow option for PA specialization
-- improve working environment
-- allow option for health care administration
-- less paper work

(Ref. 52, p. 7)

The authors derived this rank ordering by listing the above factors and asking the respondents to rank the prespecified factors (Ref. 52, p. 84). This leaves some doubt as to the true validity of the list and number of respondents additionally checking an "other" box were not given in the study results.

To summarize this section, the PA is found to be highly career oriented but very dissatisfied with the certain factors of the job such as status, salary, and promotion. No service group is happy with the current status (Army and Navy Warrant Officers and Air Force enlisteds), while the

Air Force group is the least happy with its lot. Perry's survey found similar factors lending to satisfaction/dissatisfaction for both the military and civilian PA, with the exception of the military PA viewing his career opportunities as less than his civilian counterpart. Finally, Robinson and Thompson, using a prespecified list of dissatisfiers related to retention, found rank structure and pay as the top two detractors for retention -- results similar to Giauque's study. Thus, the PA is overall fairly well satisfied with his job, but wants changes made to the rank structure and pay. He wants the status of his health provider peers.

III. NP UTILIZATION

A. DETERMINANTS OF NP UTILIZATION IN THE CIVILIAN SECTOR*

1. Introducing the NP into the health care setting

The majority of the problems facing the NP are similar to those faced by the PA when she is introduced into the health care setting. For this reason, the comments in Chapter II concerning introduction of the PA apply to the NP as well. However, the NP faces additional problems not encountered by the PA. Because she is not a "new face" in the health care setting, there tends to exist an identity crisis that is crucial for her new role. As Colfack (Ref. 1) has explained, the NP is primarily a registered nurse who returns to an educational setting for specific skill enhancement. Unlike the PA, who is new to the health care setting and who offers unique skills unfamiliar to the health care setting, the NP is still considered first a nurse.

Bullough (Ref. 53), in an exposition on barriers to the NP movement, listed the past tradition of a nurse being subservient to the physician, the sexual discrimination of more demeaning jobs held by women, and the educational process that emphasizes an intellectually subordinate role for the nurse as the major stumbling blocks for the nurse trying to expand her capabilities as a NP. She argues that this past suppression

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*Conclusions to this chapter will be presented in Chapter V and VI. The pronouns she/her are used to represent the female majority of NPs.

of nurses acting on their own judgment has led to gamesmanship, indirect communication, and subtrafuge. Although times have changed and a direct approach may now be more acceptable, the nurse may be reluctant to exert authority due to past punishments that may not now exist (Ref. 53, p. 232).

Record and Greenlick also noted certain barriers that hindered introduction of NPs to the Kaiser System (Ref. 2). Although gender itself appeared to make little difference to acceptance of PAs and NPs by patients, physicians, or peers, it did appear to make a difference in relinquishing the "physician" role.

> That the PAs were men may help, on the other hand, to explain the relative ease with which their institutional role was defined, and the breadth of the role, in the medical department. For, although the male physician may have been more comfortable with female auxiliaries, role concession was perhaps another matter. If he were to surrender a part of his heretofore almost exclusively held rank and privilege as a physician (as opposed to his higher role as internist), it may have been easier for the MD to share them with other men, thereby avoiding an implicit threat to his maleness. (Ref. 900, p. 243)

However, although gender may have had an influence, Record and Greenlick found that, by far, the most important aspect of NP introduction was role strain (Ref. 2, p. 243). The first PA introduced at Kaiser worked on the perifery of the physician's (in this case an internist) role and "allowed" the specialist to do that for which he had been trained relieving him of the more common, mundane tasks. However, the NPs hired by Kaiser (a certified nurse-midwife and a pediatric nurse practitioner) were viewed as threats to the role and

status of the physicians in their respective departments (OB/GYN and Pediatrics). Both the NPs were trained to treat the same type of patients as their respective specialist supervisors. Thus, the OB/GYN and pediactric physicians viewed their respective NPs more as threats to their occupations than as assistants willing to do the peripheral tasks that would allow the physicians to move toward their desired roles. In summary, Record and Greenlick perceived that the PA was considered role enhancing to the internist while the two NPs were viewed as role threatening. Had the PA worked for a general practitioner, the authors felt that a fate similar to the NPs' may have resulted.

When introducing the NP into a health care setting, it seems clear that the measures associated with the introduction of the PA are applicable (See Chapter II above). However, there are additional considerations which must be recognized. Because of the tendency of the NP to suffer from a stereotyped role as a nurse subservient to the physician, sex discrimination appears to be a problem for them to relinquish traditional, male, physician roles. But, more importantly, the NP can be viewed as a threat to the supervising specialist by nature of the type of patients she is trained to treat. The specialist must be reassured as to the NP's role in the setting. Record and Greenlick note in a postscript that the pediatric nurse practitioner finally gained greater acceptance. But they also point out that her role had been restricted to "phases of the child care cycle from which physicians are most likely to wish to be relieved" (Ref. 2, p. 246), thus resulting in under-

utilization of the NP. The authors concede that this hypothesis of role strain must be accepted with caution and that causation may be too complex to identify real factors of acceptance. They also point out that attitudes change, and this problem of NP acceptance may disappear with time (Ref. 2). But for the present, factors identified by Record and Greenlick and Bullough must be recognized and considered when introducing the NP into a health care setting.

2. Delegation of Tasks to the NP

The literature addressing NP utilization in the health care setting parallels that of the PA. In broad categories, the literature: Has a predominantly small sample basis (with the chance of bias) and is applicable to a unique setting (for example, see Ref. 54-66); Describes a specific job type in very general, ideal terms (for example, see Ref. 67-70); or relates specific job task (or aggregated task) analysis that may be biased by a wide range of sample sizes (for example, see Ref. 26, 71-78). To broaden the range of perception of NP utilization, in this section we present a representative sample of each type of the literature. Those types can be referred to as those presenting unique settings, narrative presentation, and task analysis.

a. Unique Settings

Dungy (Ref. 54) reports on the success of the Child Health Associate Program of the University of Colorado to place graduating associates in rural, medically underserved areas (10 to 23 graduates or 43%). He uses the Sangre de Cristo

Clinic, an outlying, rural clinic, as an example of what the associate does. Due to their training and the latitude of the supervising physicians, the associate performs complete physical examination on pediatric patients, psychosocial, dietary, and safety counseling to families, speech and hearing screenings, and gynecological examinations (40-50% of all pelvic exams and Pap smears) for the clinic population. In addition, substations of the clinic, having no physician coverage, are attended by a team headed by the associate. The associate sees 10 to 30 pediatric patients a day, referring diagnostic or management problems to the physician staffed main clinic. One month's experience of the associate at the main clinic is presented as an example (May 1973). During that month, 82 pediatric patients were seen as well as an unknown number of pediatric patients seen in another clinic and adult pelvic examinations performed. Five of the 82 patients were referred to the physician. The author justifies the associates existence in claiming high quality pediatric care in an area with too little volume to warrant a physician (Ref. 54, pp. 33-34).

Voltmann reports a similarly unique role for NPs in describing a Jamestown, New York, Medical Clinic System (Ref. 56). Using six full-time equivalent NPs supervised by one physician, the NPs have absorbed 50% to 75% of the physicians tasks (Ref. 56, p. 303). Using patient-history, problem-oriented charting methods, the NP is responsible for establishing patient data bases through NP performed histories and physicals. With the exception of male rectal and genital

exams (performed by the physician), the NP does the entire physical exam and composes a problem list to include medical, psychological, and socioeconomic factors. Then, with the physician, she develops an action plan and implements it. She is responsible for initial treatment, patient education, and follow-up treatment. It is of interest to note that all patients are "seen" by the physician on each visit, although this visual contact is rather brief. After two visits, each patient undergoes a multiphasic screening exam (Ref. 56, p. 305).

The physician in this setting is viewed as a consultant with all initial contacts going through an NP. The author notes that strong patient loyalties to a particular NP develop rather quickly and some patients are upset when forced to see another NP (because of the "full-time equivalent" shift-work). The author notes that after only two years of existence in 1973, the clinic saw 80 patients a day and provided care to a total of 4,875 patients with visits totaling 20,266 (Ref. 56, p. 304). The author concludes that utilizing the NP in this manner has expanded care to the community and alleviated the need to use emergency rooms for care during office hours which had apparently been the case prior to opening the clinic due to an extreme physician shortage.

As a final example of this type of literature, Stone describes her practice as a Family Nurse Clinician in the General Medical Clinic at Vanderbilt University Hospital (Ref. 63). From September, 1973, through August, 1974, the Clinic had 19,350 patient visits of which she saw 1,424, or

7%. She now has a practice with 400 patients from 15 to 98 years old. She lists the 10 most common patient problems seen by her, which are predominantly chronic conditions or diseases (for example: hypertension, gastrointestinal, diabetes, and cardiovascular problems were the top four) (Ref. 63, p. 619). She has found that caring for the chronically ill allows her to assume a responsible role that exceeds her role in other patients with complex diagnoses or with problems beyond her expertise (Ref. 63, p. 619).

Ms. Stone has each patient visit checked by a physician for the collection of a data base, performing a physical exam, assessing the patient's condition, and proper disposition. The physician also signs off and has the final responsibility for all prescriptions. This check-off" procedure becomes quite involved when working for several physicians. Thus, Ms. Stone has attempted to limit herself to working under the supervision of two to three physicians in order to expediate the "check-off" and get back to patients. She indicates that physicians have begun to realize the worth of a clinician's complemental practice (Ref. 63, p. 620).

b. Narrative task descriptions

Chow, in her article advocating the exploration of new modes of health care delivery (Ref. 67) describes the "PRIMEX" (primary care extender) family nurse practitioner as rendering the following types of service:

(1) preventing the onset of illness or disability,
(2) maintaining good health, and

(3) providing continuing evaluation and management of early symptoms, problems, and intractable aspects of chronic disease.

(Reference 207, p. 323)

Thus, her idea of a primary care extender nurse practitioner encompasses more than acute care.

This broadened role of an NP is also brought out by Schwartz (Ref. 68) who believes that the PRIMEX NP brings the best of both medicine and nursing to her role. Medicine provides learning of physical and development-assessment and health history taking skills as well as laboratory, diagnostic, and treatment knowledge. Nursing provides philosophy and content that enables the nurse to assess community resources and health needs. Schwartz views the PRIMEX NP as a stabilizing influence for the patients who seek primary care (Ref. 68, pp. 403-4).

Ostergard, Gumming, and Marshall (Ref. 69) further emphasize the "whole patient" approach that the NP must take. In describing the nurse practitioner women's health-care specialist (WHCS) they give the following dialogue on what the NP does.

> Taking a blood pressure or a Pap smear is part of patient care, but it is not caring for the patient. Caring for the patient implies an interest in and a concern for the whole patient, not just a limited task. This interest and concern -- this continuing personal responsibility for the whole patient -- provides recurrent positive feed back to the practitioner and stimulates quality of performance . . . Allied health personnel must be responsible for whole patients, not just for isolated tasks. (Ref. 69, p. 1030)

Kinsella (Ref. 70), in an article written in 1973 dealing with the clinical nurse specialist, summarized the NP

role, as it was known then, as that of a patient advocate using the skills of medicine to enhance nursing. She is looked on as the teacher of advanced skills by other staff members. She makes decisions about nursing problems and accepts responsibility for them (Ref. 70, p. 76). Clearly, the NP has advanced in role since 1973. Today, she deals with a much broader spectrum of care provided than that of a "super nurse." As Zubkoff, Reynolds, and Zubkoff found (Ref. 76), the NP (in this case family nurse practitioner) is providing those kinds of care related to a general or family practice (Ref. 76, p. 719). Thus, the NP is not limited to merely nursing care. She now approaches the broad spectrum of care provided by her supervising physician with the added bonus of nursing knowledge and experience.

c. Task analysis

Task analysis of the nurse practitioner occupation naturally varies depending upon the location and type of practice. The most general analysis located was done by Ford in late 1975 (Ref. 26). In that study a total of 717 NPs were contacted with 378 responding (usable response rate 52.7%). When asked to list their most frequent tasks, a summary of task type (Table XI) was developed. As noted in the section dealing with PA utilization, Ford compiled a list of 89 different types of tasks based on the responses of the NPs. These 89 were aggregated into one of 35 more general categories which in turn were aggregated into seven even more general categories, and finally the seven were condensed into three.

Table XI

NP's "Most Frequent" Tasks
(NP Respondents)

Major Task Category	Location of Majority of Four Tasks Designated by NP's % (f)*	Cumulative Percent % (f)*
Direct Patient Care Tasks (Technical)[a]	55% (209)	55% (209)
Direct Patient Care Tasks (Non-technical/interpersonal)[b]	3.5% (13)	58.5% (222)
Supportive Tasks[c]	4% (16)	62.5% (238)
Direct Patient Care Tasks (Technical) = Direct Patient Care Tasks (non-technical/interpersonal)[d]	8% (30)	70.5% (268)
Direct Patient Care Tasks (Technical) = Supportive Tasks[e]	3.5% (13)	74% (281)
Direct Patient Care Tasks (Non-technical/interpersonal) = Supportive Tasks[f]	0% (0)	74% (281)
Technical Patient Care Task = Non-technical Patient Care Tasks = Supportive Tasks[g]	26% (97)	100% (378)

a,b,c, - At least three of four tasks identified as comprising a "substantial portion" of a NP's daily practice activities were located in the major category cited.

d,e,f, - Four tasks cited by a NP were equally divided between the two designated major categories.

g - Only three tasks were designated by a NP; the three tasks were equally divided among all three categories.

*(f) = frequency of response.

Source: Reference 26, Table 4-20, p. 174.

The three final categories dealt with technical patient care, non-technical patient care, and supportive tasks (Ref. 26, p. 169). (A copy of the tasks, disaggregated; is reprinted in Appendix A).

In an article relating the Family Nurse Practitioner's duties in a physician-nurse clinic in Washington State, a listing of the most common diagnoses seen by the NP was half acute and half chronic diseases (Ref. 79, p. 20). This would further imply that the NP does not limit herself to acute, episodic, care. This is further amplified by the following list of common tasks performed independently by the NP based on a study of 52 nurse clinicians who trained at the Wichita State University Branch of the Kansas University Medical Center:

1) Obtain and record patient histories.
2) Conduct adult and child well-care physical examinations, including GYN and breast exams on women.
3) Organize information for presentation to the physician.
4) Make initial assessment of emergency cases.
5) Educate patients in nutrition, special diets, and preventive and emergency measures for high risk conditions.
6) Determine need for, order, and perform throat cultures.
7) Perform visual screening procedures and immunizations.
8) Conduct pre and post natal checkups, well-baby physicals, and child care education.

(Reference 77, p. 555)

Thus, the NP in this instance contributed to acute, chronic, and preventive health care.

Tasks have also been analyzed for applicability to education received. The following is extracted from a report by Yankauer et. al (Ref. 73) on the Bunker Hill Health Center

of the Massachusetts General Hospital. The educational program teaches registered nurses to become pediatric nurse practitioners. Using a list of 15 tasks considered by the authors to be essential to primary pediatric care, the practicing pediatric NP graduates were surveyed (1971) as to whether the skills taught were applied. The results are from the 66 responding NPs having 6-20 months experience after graduation.

Activity - Task	% of all PNP's Performing Activity - Task (N:66)/Resp Rate 66/73 or 90.4%/
Developmental screening	87
Family - social history	100
Past medical history	95
Present illness history	95
Int history, well child	95
Int history, sick child	83
P.E., well child	94
P.E., sick child	71
Phone advice, well child	97
Phone advice, sick child	98
Office advice, well child	100
Office advice, sick child	88
Case management	98
Hospital visit	61
Home visit	74

(Source: Reference 73, Table 3, p. 350.

In a January 1975 study (Ref. 78) of training applicability to tasks performed, 44 graduates of the pediatric NP program through the University of Iowa (27 responding, or 61%) were asked to indicate their opportunity to function on a list of 16 tasks - activities similar to the one developed by Yankauer and others (Ref. 73). They found that 70% of the respondents utilized knowledge of growth and development and over 75% used skills gained in training, such as history

taking and physical assessment (Ref. 78, p. 401).

d. Summary

This section has attempted to show the variety of information available on what tasks are delegated to the NP. It appears that tasks vary by setting to a great degree. It also appears that the NP is a much more "versatile" NPP when compared to the PA.

NP versatility is reflected in the variety of tasks she can assume. She not only has medical treatment and diagnostic training that is directed toward the specific illness, she also has training in nursing which emphasizes care and consideration of the patient as a whole. Thus, she is not limited to a clientele of episodic acute care. Instead, her practice includes acute, chronic, and preventive care.

It must be realized that the conclusions arrived at in this section are drawn from a variety of sources that do not equally lend themselves to generalization. However, the literature is somewhat overwhelming in its emphasis that the NP is not just a PA with another title. The NP is a nurse bringing nursing care training to the medical (physician) profession with the capability of integrating the best of both care functions.

3. Patients seen by the NP

The type of patients that are seen by the NP, as with the PA, can be classified in several ways: Patient characteristics will be described through the work of Ford (Ref. 26); Types of practice in which the NP is utilized will be examined

through a report by Levine on an HEW, Division of Nursing Study (Ref. 80) and work cited by Roemer (Ref. 28); Finally, the types of complaints presented and diagnoses treated will be shown in articles written by Lewis and Linn (Ref. 81), Stetson (Ref. R-79), and Zubkoff, Reynolds, and Zubkoff (Ref. 76). It must be realized that because of the proliferation of more specialized services offered by the NP, it is difficult to generalize regarding type of patients seen. Unlike the PA, who normally treats only acute care problems wherever he is located, the NP tends to focus as much in specialty primary care (for example, pediatrics and obstetrics) as she does in general primary care (for example, adult medicine). This author will attempt to point out the focus of care as appropriate.

a. National Survey literature

Ford's 1975 survey of 378 NPs (Ref. 26) used a checklist to provide information on several general characteristics of the NP's patients. Responses (n = 486) surpassed respondents due to many NPs indicating that they equally served certain types of patients. Fifty-four percent of the patients were infants, 16% adolescents, 21% young and middle-aged adults, and 9% were elderly. Using a larger response number (n = 511), she found racial mix of patients to be 50% white, 31% black, and 19% other minorities. Female patients (58)) outnumbered male (42%) (Ref. 26, p. 156). The income level of patients (with n = 517) was as follows:

Less than $5000	43%
$5,000 to $9,999	35%
$10,000 to $14,999	17%
Greater than $15,000	6%

(Source: Ref. 26, p. 156)

NPs served Medicare, group health, and private health insurance recipients equally. However, Medicaid recipients amounted to approximately 38% of the NPs' practices (Ref. 26, p. 156). NP responses also indicated that 46% of their patients came from urban areas, 29% from rural areas, and 25% from the suburbs. Ten percent of the respondents served specialized groups such as veterans and students (Ref. 26, p. 156).

b. Reports on NP Practice Setting

Practice setting, as the second approach to defining the types of patient seen by the NP, is first presented through work done by Levine (Ref. 80). In a survey of NP graduates (apparently conducted through HEW Division of Nursing, Bureau of Health Manpower) in 1973, the following practice settings were found (N not clear, but implied to equal 753):

Employment Setting of NP Graduates

Employment Setting		Percent Employed
Hospital practice		7.0
Inpatient	5.8	
Emergency	1.2	
Ambulatory		63.4
Private practice	14.2	
Prepaid group practice	4.0	
Hospital based clinic	20.4	
Community based clinic	23.2	
Other	1.6	
Nonhospital institutions		16.2
Nonhospital community settings		10.0
School of Nursing		.4
Other		1.6

(Source: Condensed from Reference 80, p. 1800)

Roemer (Ref. 28) cites work done by Systems Sciences, Incorporated of Bethesda, Maryland,* on the largest nationwide survey of NPs and PAs done at that time. With 1070 NPs responding, the following breakdown of practice setting is given:

Work Setting	Nurse Practitioners (%)
Solo physician's office	8.1
Medical partnership or group	6.0
Hospital outpatient department	18.9
Hospital inpatient service	4.2
Clinic or health center	37.8
Community and home health center	13.8
Other	11.2
All settings	100.0

(Source: Condensed from Reference 28, Table 1, p. 552)

As can be seen in the two presented descriptions of NP practice sites, the NP tends to be more heavily concentrated in the institutional setting than in the private practice setting. Ford corroborates this with the finding that NP's tend to be classed as working with "institutionally-employed physicians in institutionally-based urban group practices providing direct patient care out in the community and having few (if any) supervisory responsibilities for other staff members" (Ref. 26, p. 133).

c. Type of patient treated by diagnosis or complaint

As well as practice setting, the type of patient seen by the NP can also be described by chief complaint or diagnosis. Lewis and Linn (Ref. 81), using a small sample

*Nurse Practitioners and Physician Assistant Training and Deployment Study, pp. VI-18, 19. Systems Sciences, Inc., Bethesda, Md., July 1976 (processed) (as cited by Roemer).

(N = 30) of PRIMEX nurse practitioners (PRIMEX = Primary Care NP: for example, adult care) in 1973 through 1974, attempted to break down "problems" seen by health care setting. The following table is based on their encounter data collected 12 months after the PRIMEX NPs started preceptorship:

"Problem"	Organization Setting % HMO	Hospital	Health Dept	All 30 Primex (%)
1. General medical exam	14.2	4.0	3.8	6.8
2. Progress visits	7.9	5.9	5.0	6.5
3. Well-baby exam	3.0	5.0	12.0	6.0
4. Cold/sore throat	3.6	3.3	4.4	5.8
5. Pregnancy exam	3.0	7.0	5.4	5.1
6. Others (not codable)	1.6	5.0	2.8	4.9
7. Physical exam (required)	2.2	13.0	1.3	4.6
8. High blood pressure	4.1	2.3	2.8	3.1
9. Other respiratory symptoms	3.3	1.7	4.1	2.9
10. For medication	6.0	2.0	1.6	2.8
11. Gynecological exam	3.8	1.7	2.5	2.6
12. Allergic skin reaction	1.6	1.3	4.7	2.2
13. Abdominal pain	1.1	1.3	1.9	1.9
14. Other symptoms referrable to male reproductive tract	0.3	1.0	4.4	1.6
15. Medication-counseling	-	0.3	5.7	1.6

(Source: Refernce 81, Table 3, p. 264)

When the authors compared the most common causes for visits to the PRIMEX NPs with a national survey of family physicians, they found that the NP performed more routine examinations of all kinds. Although some of the top 15 problems seen by the physician (for example, back pain) did not appear in the top 15 of the PRIMEX NP, others (such as abdominal pain, hypertension, upper respiratory tract infections) were seen with almost equal frequency. The authors also found that the 10 most common problems accounted for only 34% of the physicians visit reasons. The PRIMEX 10 most common complaints accounted

for 43% (HMO), 55% (hospital) and 46% (Health Dept.) of their practice (Ref. 8, pp. 264-5).

Stetson (Ref. 79), reporting on her own NP practice, found that the top twenty diagnoses seen by her included both acute and chronic care. She presents the 20 most frequent diagnostic categories for 1974 and 1975 to compare. Generally the two years are comparable, with upper respiratory tract problems leading both lists (Ref. 79, p. 20).

1974	1975
URI	URI
Pharyngitis/Sore Throat, acute	Bronchitis, acute
Bronchitis/Bronchiolitis, acute	Pharyngitis/Sore Throat, acute
Sore Throat, streptococcal	Uti
Menstrual Disorders	Abdominal Pain
Urinary Tract Infection	Hypertension, essential
Diabetes Mellitis	Vaginitis/Vulvitis
Hypertension, essential	Exam, Normal/General
Exam, Normal/General/Routine	Menstrual Disorders
Obesity, exogenous	Viral Infection, unspec.
Viral Infection, unspec.	Headache
Abdominal Pain	Obesity, exogenous
Disturbances, transient, situational	Fatigue
Vaginitis/Vulvitis	Back Pain
Headache	Diabetes Mellitus
Chest Pain	Chest Pain
Fatigue/Weakness/Asthenia NOS	Ulcer
Vasomotor Rhinitis/Hay Fever	Disturbances, transient, situational
Stomach Disorder, functional	Rash
Back Pain/Ache	Vertigo/Dizziness

Finally, Zubkoff, Reynolds, and Zubkoff (Ref. 76) refer to the practice of an "independent generalist" Family

Nurse Clinician (FNC) in Red Boiling Spring, Tennessee.* The authors are unclear as to how the NP was supervised, but they imply it was either by visits or telephone, with the FNC providing first contact care essentially on her own (Ref. 76, p. 719). The following is a list of the most frequent complaints cared for by the FNC in Red Boiling Springs during a six month period (1973):

Complaint (Care)	Number	Percent of Total
Ear - nose - throat	732	45.3
Preventive	200	12.4
Wounds	98	6.1
Respiratory	80	4.9
Gynecological - breasts	59	3.6
Skin	59	3.6
Abdomen - gastrointestinal	58	3.6
Musculoskeletal	58	3.6
Other*	273	16.9
Totals	1,617	100.0

*Other includes: dental (.4%), cardiac (1.5%), vascular (1.9%), liver-kidney-biliary (.1%), gastro-urinary (2.5%), nervous system (.2%), psychological (2.4%), obstetric (1%), blood-lymphatic (.3%), endocrine metabolic (1.2%), unclassified (5.5%).

(Source: Reference 76, Table 2, p. 720.

In summary, the majority of NPs work for institutionally employed physicians in group practices based in institutions. Predominantly, they provide direct patient care to the community. As brought out in the section dealing with NP utilization, NPs are seeing not only acute care patients, but

*The authors cite work done as presented in a paper by Miller, M., Whitaker, C., Dennis, C., et al.: Utilization of a Family Nurse Service Clinic. Paper presented at APHA Annual Meeting, November, 1973.

also chronic and preventive care patients as well. Thus, the NP is appealing to more types of patients than the PA.

4. Productivity of NPs

Colfack (Ref. 1) addressed the productivity of the NP in terms of cost and time savings. Primarily, NPP productivity has been, as an increase in patients seen, overall cost savings, or physician time saved to devote to other endeavors (such as leisure, more seriously ill patients, or more complex diagnoses). As pointed out above in the section dealing with PA productivity, measuring productivity entails more than time or money saved. Following Goldfarb (Ref. 31), it is best defined as an interrelation of what the worker produces, how the inputs are organized, and the extent of the availability of labor. This argument equally applies to the NP as well as the PA.

Zeckhauser and Eliastam's definition cited in the PA productivity section also applies to the NP since their definition of "physician assistant" includes not only PAs and NPs but also any health assistant in the more traditional sense (Ref. 32, p. 97). Their conclusion that physician assistants are productive to society if they earn what they substitute in physicians implies an overall ratio of 5.6 to 1 physicians to assistants. The overall substitution ratio is one assistant for every one-half physician saved. As previously noted, output, measured as patient visits, was the maximizing criteria. With any measurement of productivity, quality of care appears to have been ignored. As Kacen points out (Ref. 33) produc-

tivity is fine, so long as patients are not sacrificed in the process by hurried care in order to assure a greater return on investment.

One other study dealing with NP productivity deserves mention. In a study started by Rosenberg (Ref. 82) in 1974, an attempt was made to develop a weighted professional productivity formula for the NP delivering emergency/ambulatory service in a hospital setting. During four calendar weeks in July and August, 1975, data was accumulated on 597 consecutive cases that reflected 16 days work (Monday through Thursday) for the emergency room. Two physicians, one working an 8 hour day and the other a 4 hour day, and an NP were the providers of care during this time. After classifying the data as to medical problem class and process of care (subjective, objective, assessment, plans through diagnostic order, treatment, or patient education), a weighted productivity (P) was developed which

$$P = \underline{/}\overline{(1.86 \times D) + (1.34 \times I) + (1.15 \times T) + (1.00 \times F/U) + (0.87 \times M)}\underline{/}/H$$

(Source: Reference 82, p. 287)

Where D = number of cases classed as DISEASE
I = number of cases classed as INFECTION
T = number of cases classed as TRAUMA
F = number of cases classed as FOLLOW-UP
M = number of cases classed as MISCELLANEOUS
H = total number of hours worked

The calculated productivity index for the NP and two physicians was as follows:

NP		1.23
MD	B	3.32
MD	A	3.25

(Source: Derived from Ref. 82, Fig. 9, p. 294)

Rosenberg was able to conclude, regarding the NP's productivity and work pattern, that: First, the NP selectively sought out the easiest cases while the physician to whom she was teamed (MD B the majority of the work day) sought out the more complicated problems; the NP could not perform all the physician's functions and should not be considered as a physician when staffing an emergency room. He contents that his formula incorporates the terms to be considered when evaluating productivity. They are medical expertise, problem complexity, time, and patient volume per unit of time. He also contends that the relative productivity indexes need much more study before any conclusions about the NP's productivity compared to that of the MD can be made (Ref. 82, p. 295).

This section contains little information divergent from the section on PA productivity, and it is of interest to note the paucity of thought on the subject. With the exception of Goldfarb's review of the subject (Ref. 31) and Zeckhauser and Eliastam's (Ref. 32) attempt to develop a methodology for assistant productivity, little of substance has been accomplished.

5. Supervision of NPs

The NP, in contrast to the PA, is not as bound to the physician in performance of her duties. For, unlike the PA, she has the advantage of not having to acquire recognition of her profession or depend on the physician to assure her licensing or legitimization. As a registered, licensed, nurse under state nurse practice acts, she is not a new health

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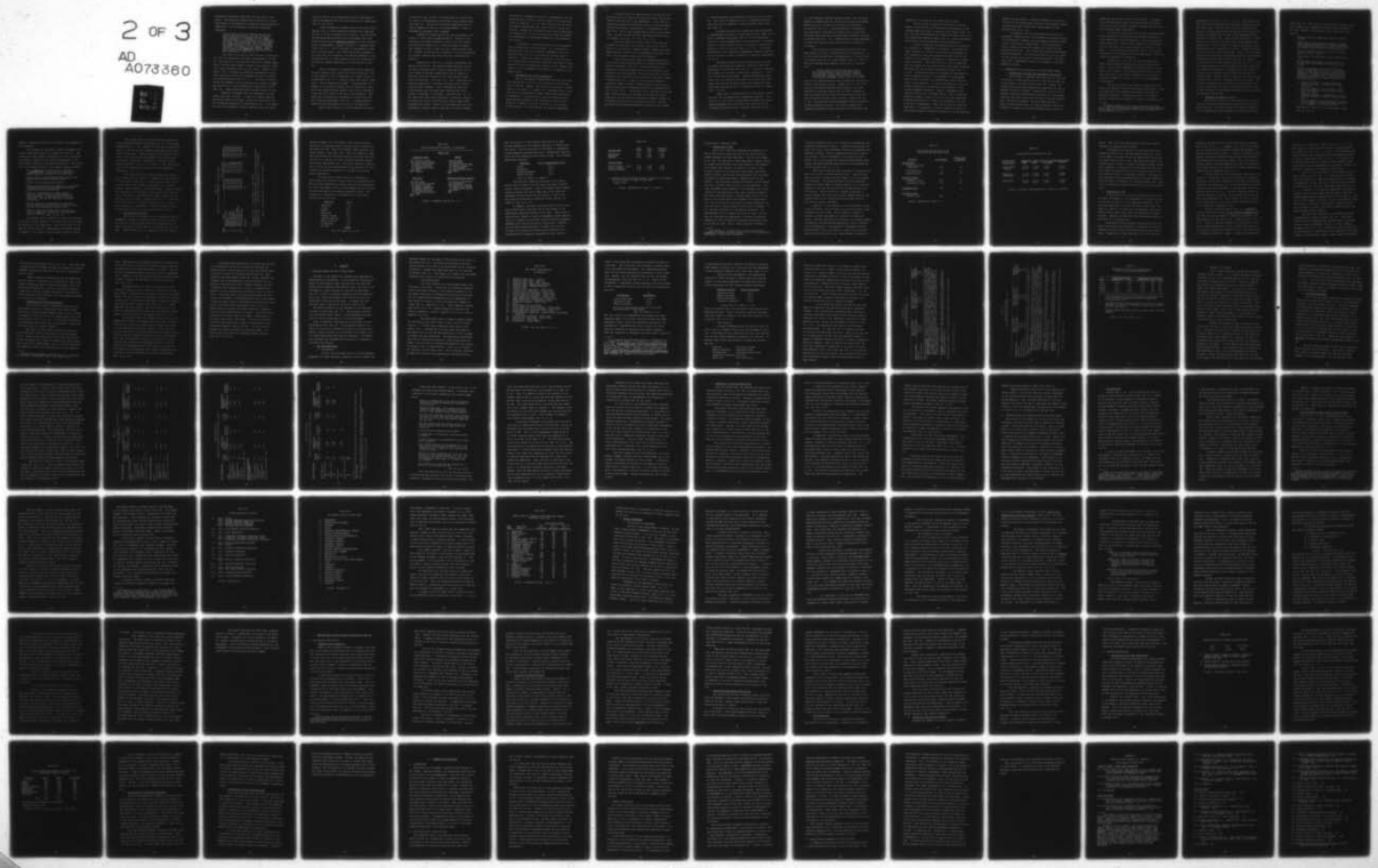

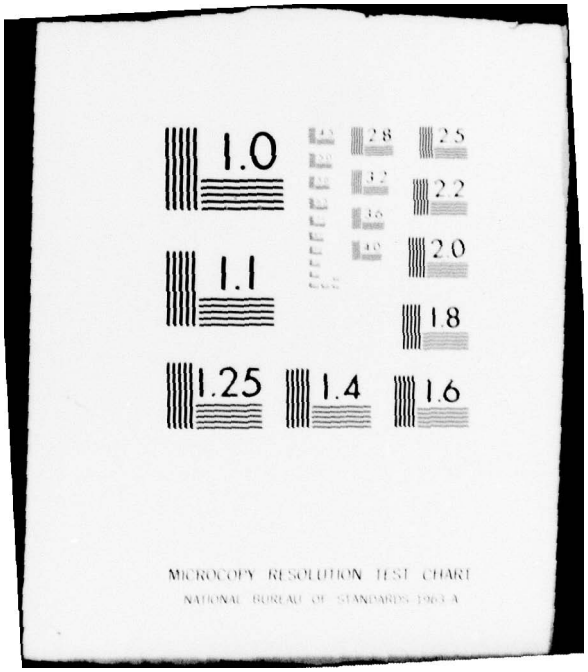
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professional requiring recognition from the state or the public. The distinction between the NP and the PA in their relationship to the physician is important when discussing NP supervision. As the AMA House of Delegates stated the difference:

> A major point of friction arises from the tendency of the physician to look upon the nurse who functions in an expanded role as a "physician's extender." In contrast to the physician's assistant, the nurse practitioner is an independent health care professional who practices nursing (emphasis theirs) under her own license and is legally accountable to the consumer. She perceives her role as consulting (emphasis added) with the physicians rather than functioning under their supervision. (Ref. 83, p. 4)

Ford (Ref. 26) points out that reliance on nurse practice acts for credibility has been a mixed blessing for the NP. The majority of the state acts have had to undergo amendment to include areas formerly thought to be limited to "medicine" such as diagnosis (Ref. 26, pp. 298-9). However, as of August, 1977, 39 states had enacted such amendments to their nurse practice acts which has broadened the range of permitted nursing functions (Ref. 83, p. 5). The state of Virginia, rather than amending its nurse practice act, amended its medical practice act to allow delegation of functions to the NP (Ref. 26). Other states have since followed Virginia's lead.

Physician involvement with the credentialing of NPs varies from state to state. At least four states, Maryland, New Mexico, Oregon, and Nevada, provide for no official role for the medical profession in regulating the NP. At the opposite end of the spectrum, Virginia requires rules and regula-

tions for the NP to be promulgated jointly by the boards of nursing and medicine and joint certification of NP applicants (Ref. 26, pp. 303-4).

While the medical profession may not have the totally dominant role in the NP sanctioning process as it does with the PA, it is still concerned with liability. As with the PA, the employing physician may be held accountable for NP employee actions through respondeat superior or direct liability through mismanagement, improper selection, or improper supervision (Ref. 34). This is discussed to some degree in Chapter II of this thesis. Even though the NP has attempted to pull away from the influence of the medical profession on how she performs her job, there appears to be little distinction in this area between supervision of the PA and the NP (Ref. 34).

Actual time spent or methodologies used to supervise NPs have received little recognition in the literature. Due to the tendency to view NP employment in a manner similar to PA employment (Ref. 34), it appears likely that similar supervision time and methods would apply. As was pointed out in Chapter II in the section dealing with PA supervision, Perry found that supervision was viewed by the PA as an indication of how well he is doing in the eyes of the physician. Less supervision indicated more confidence in his abilities and led to improved performance (Ref. 29). It appears equally likely that this phenomena also occurs in NP supervision.

Actual time devoted to PA and NP supervision was set

at one hour a day for 52% of the physicians in a survey done by Litke of 19 Northwestern United States rural practice settings (Ref. 38). The survey found three respondents that indicated supervision time not to be quantifiable -- that it decreased as employment time increased.

Methods for supervising NPs can also be assumed to be similar to those used to supervise the PA. Because of the uncertainty surrounding physician liability for NPP actions, protocols would appear to be a convenient method to assure some standard of care in case of a tort claiming damage (Ref. 37). However, as pointed out in Chapter II, actual methodology for assuring adequate supervision may vary from practice to practice.

Supervision of the NP is a personal area between the physician and the NP. The physician seeks assurance that he is facing a minimum risk of liability when employing the NP. The NP seeks the maximum responsibility she is capable of handling, given her training and the legal sanction under which she practices. Ford (Ref. 26, p. 305) conjectures that physician supervision is probably the worst form of public accountability available. This is because she feels that nurse practice acts and other legal vehicles make the NP directly accountable to the public. Weisfeld (Ref. 34), on the other hand, sees little difference in physician liability for actions of the PA or NP and treats them as equals when discussing the issues. Surely it can be speculated that this difference of opinion leads to some sort of conflict between

the NP who is attempting to practice "independently" and the physician who is trying to protect himself from a perceived threat of liability. It is of some interest that the literature search conducted by this author failed to reveal this conflict. Perhaps the introductory quote from the AMA House of Delegates (Ref. 83) is the closest the medical profession will acknowledge the difference between the two professions of PA and NP.

To summarize, the NP feels that she is not dependent upon the physician for her existence. Yet, the employing physician must treat her as another "assistant" if he is to satisfy himself that he is incurring the minimum risk of liability. Although not implicitly stated in the literature, it is assumed that the physician takes the same steps he would take with the PA in avoiding the liability risk. Whether this leads to conflict between NP and physician is speculative but appears likely.

6. Determinants of NP Job Satisfaction

Many of the aspects of employment that were satisfiers and dissatisfiers for the PA also influence the NP's perceptions of her job. However, the fact that the NP has a "second" career to fall back on -- namely, as a registered nurse -- and that the NP is predominantly female creates some differences in perceptions. This section will deal with the satisfiers/dissatisfiers suggested in the literature for the civilian sector NP. However, we do not claim that it is inclusive in an area defying, to a great degree, the analytic approaches.

In Ford's (Ref. 26) questionnaire to 378 NPs in 1975, she found four main reasons for satisfaction with the NP role cited by more than 60% of the respondents. First, they enjoyed the challenge and stimulating nature of the work (80%). Second, they related a large amount of independence in the work (79%). Third, they enjoyed dealing directly with people (78%). Fourth, the NPs felt that they were providing a service needed by society (63%) (Ref. 26, p. 140).

With the exception of Ford's work, little else was discussed in searching the literature dealing with factors leading to satisfaction. However, several authors have noted dissatisfaction, which could be interpreted as satisfier origins if the mentioned factors could be remedied.

Some of the factors leading to dissatisfaction have their roots in the physician-nurse role concept originated by Florence Nightingale (Ref. 53). As Bullough points out, Nightingale forced the subservient role on the nurse to gain acceptance from the physician. Bullough feels that this subservience is so ingrained in the nurse that, when they attempt to expand their role, a type of "anticipating withdrawal" occurs that leads to the NP to expect negative reactions and therefore hold back on exercising authority and responsibility (Ref. 53, pp. 231-2). On the macro level, the author cites the model "nurse practice act" prepared by the American Nurses Association in 1955 which was subsequently adopted verbatum by 15 states and by others with slight modification. The subservience and anticipatory withdrawal syndrome led the nurses

to include diagnosis and prescribing as above any act of nursing. Thus, with the expanded NP role, a tremendous amount of effort must now be expended to legally recognize their function (Ref. 53).

The physician-nurse role concept has also contributed to gamesmanship and sexist attitudes toward the NP (Refs. 53, 2). This is presented by Bullough (Ref. 53) as the nurse being unwilling to take responsibility for her decisions -- resorting instead to feminine charm, hints, or flattery to convince the physician it was his decision (Ref. 53, p. 230). The author believes that this traditional gamesmanship approach leads the NP to reluctance in making a decision or accepting responsibility for it.

The sexist problem with NP job satisfaction can best be viewed from Record and Greenlick's previously mentioned experiences at Kaiser with NPs (Ref. 2). The authors reported that gender may have been a "significant determinant" of how well the NPs and PAs succeeded. Record and Greenlick speculated that role definition was easier for the men (PAs) than women (NPs) because the predominantly male physicians would more readily relinquish role to another male than to a female (Ref. 2, p. 243).

Other areas of dissatisfaction include salary, status and role, and disincentives for independent practice. Ford (Ref. 26, p. 161) found an approximate difference in average salaries between PA and NP to be $1,500 lower for the NP ("Average" PA salary $14,521; "average" NP salary $13,087).

In a 1977 Physician Extender Workgroup Report (84), the group reports on research done for the HRA Policy Board that showed median salary for the NP as $13,500 while PA salary was $14,000 (Ref. 84, p. 74). This difference is justified by using the median "time spent in patient care" to show that PAs spent around nine more hours per week in patient care than do the NPs (Ref. 84, p. 74). Whether the NP is being improperly utilized nine hours per week more than the PA is subject to conjecture.

Role definition and organizational status have also been reported as areas of dissatisfaction and frustration. In a 1974 article written about the experiences of a nurse clinician entering practice in a large hospital (Ref. 85), she recalls the problems faced because of the lack of a definite role:

> ... She was tired of fighting and was looking for a place where she could just work (quietly) with patients without being accused of practicing medicine, inciting nurses to riot, or having other devious purposes in mind. (Ref. 85, p. 1996)

Lack of role understanding was also perceived to contribute to the NP's acceptance by nurses. Theiss (Ref. 86), in a 1975 study at the Veterans Administration Hospital, San Diego, California, found that some of the (30 total) subjects in each job classification within the nursing service believed that the RN and LVN would view the NP as a threat (Ref. 86, p. 88). The study also found disagreement regarding what the NP should actually be doing. The author suggests that a cleaner role definition would alleviate this uncertainty and

perception of a threat to the nursing staff's jobs.

Status is also a source of frustration for the NP. However, unlike the PA, the NP has more legitimization to her elevated status by virtue of education and licensure (Ref. 39). But, when the two professions are treated as equal, such as the 1975 Comptroller General's Report (Ref. 87), surely frustration must arise in the more educated and more versatile NP.

Finally, frustration and dissatisfaction are generated by inhibitors to "independent" NP practice. The greatest of these inhibitors is refusal of third party reimbursement for care rendered by other than physician provider (with the exception of care rendered "incidental to a physician's professional services"). Ford found that 51% of her surveyed NPs were not eligible for any type of direct third party reimbursement while 35% did not know if they were eligible (Ref. 26, p. 162). Physicians are able to side-step the requirement of hands on physician care as a requirement for reimbursement when the NPP is working in the same office, during the same hours, as the physician. So long as the physician "sees" the patient, technically, the physician has rendered the care, although somewhat indirectly. However, independent nurse satellite clinics are a different matter. With no physician physically present, there is no way to avoid the requirement of physician treatment -- leading to ineligibility for most third party reimbursement. Thus, the NP must work under the supervision of a physician in order to expand the amount of third party coverage eligible to reimburse her or her physician

sponsor for her services. Richard and Miedema cite the failure of a NP run nursing home as resulting from several reasons, one being the lack of third party reimbursement for her services (Ref. 88, p. 12).

To summarize, the NP is satisfied with her work in providing a needed service to the community and working directly with patients. However, she faces several sources of frustration and potential dissatisfiers. One is the stigma of being a former nurse who must compete as a female for predominantly male roles. She is paid less than her predominantly male PA counterpart. She lacks role definition and is viewed as just another nurse trying to practice medicine. Finally, third party reimbursement acts as a disincentive to her role expansion process.

B. DETERMINANTS OF NP UTILIZATION IN THE MILITARY SECTOR

1. Introducing of the NP into the Health Care Setting

The majority of problems facing the military sector NP are similar to those faced by the PA in both the military and civilian sector, and the civilian sector NP. However, the NP does face certain added problems not experienced by the PA, whether civilian or military. In particular, she is not considered a new health care provider since she is a nurse whose functions have been around since the time of Florence Nightingale. Because of tradition, the NP has been observed, at least in the civilian sector, to face an identity crisis that forces her to break out of this stereotyped role in order to

assume her new duties as a health care provider. Although little has been written about this subject dealing directly with military NPs,* several pertinent findings from the civilian literature appear applicable.

As with the civilian NP, the military NP faces barriers to her successful utilization through the past tradition of nurse subservience, sex discrimination, role strain, and the nursing educational process itself emphasizing a subordinate role for the nurse, as we have discussed in Section II. A.1 above. To recall Record and Greenlick (Ref. 2), the NP may be perceived by the physician as "role threatening," while the PA may be considered role enhancing.

Giauque et al. (Ref. 46) of various non-physicial health care providers throughout the military health care sector. Using 324 NP respondents (36 Army, 52 Navy, 158 Air Force, and 2 "others"), the authors found the critical problems encountered to be gaining acceptance as a nurse with a new role, attempting to clarify that role, and development of a career path.

The NP role suffers from conflict created by contradictory and opposing direction from their working peers. Nursing supervision may contradict the direction given by the physician supervisor. This places the NP in the middle -- having to decide which direction to follow at the expense and

---

*A notable exception is the study conducted by Giauque, et al. (Ref. 46) which briefly addresses the problems encountered by military NPs and speculates that they are analagous to the civilian NP (p. 137).

frustration of the other (Ref. 46, p. 111). The authors found that the Air Force was most clear with role definition and the Navy least clear. Navy NPs described their introduction as having to initially prove their own and their role's worth by accepting the supervisory and peer groups' expectations and definition of the NP role. After proving their worth, the NPs moved to a role more in line with their own perceptions and expectations. Conflict stems from supervisory and peer group expectations being unacceptable to the NP. Giauque found this to be the case with many military NPs. Many of the role expectations from the outside groups require the NP to violate their professional ethics, subvert their education, or require a role different from their expectations (Ref. 46, p. 11). Thus, the authors describe a situation where the NP must forego her own standards, principles, or perceptions of role in order to initially gain acceptance by the groups with whom and for whom she works. However, she will gradually try the move that original role to one more congruent with her own ideals. The NP being introduced into the health care setting must recognize the limitations that tend to be thrust upon her in order to gain acceptance by supervisors and peers having conflicting perceptions of the NP role.

2. Delegation of Tasks to the NP

As with the military PA, task delegation to the military NP is initially determined by regulations issued by the three Services. The Army is guided by a message released in 1973 in establishing task delegation for the NP at the local

level (Ref. 89). The following guidelines were excerpted from that document and a supplementing guidance model developed to aid local commands in establishing NPs at their health care facility:

*Mandatory written command policies are required for NPs.

*There must be individual NP evaluation to determine competency and granting clinical privileges by the physician supervisor for medical skills and the Chief, Nursing Service for nursing skills.

*Once privileges are granted, physician countersignature are not needed.

*Peer review is accomplished through sample record audit.

*An additional requirement of record audit is to be performed through Medical Record Audit Committee.

*Clinical guidelines (also referred to as protocols or parameters of practice) must be established for each specialty area to include each diagnostic or patient category where the NP has primary care responsibility. Guidelines should be established jointly by physician supervisor and NP to include:

-- Subjective aspects - typical presenting picture and items to be obtained on medical history

-- Objective aspects - what portions of physical exam should be done and what studies should be ordered

-- Assessment aspects - interpretation of findings and indicators of when to seek consultation

-- Planning aspects - drug prescription authority, how to dispose of patients, patient education to be presented, and follow-up plans

*Prescription authority is to be determined locally

(Ref. 89, pp. 1-5)

Specific utilization guidance is contained in the message for each specialty.

Navy guidance is contained in Bureau of Medicine and Surgery Instruction 6550.4 of 17 March 1975 (Ref. 90). The instruction offers general considerations for NP utilization and specific guidance for the three NP specialties in the Navy (OB/GYN, Pediatric, and Family Specialties). The following is an excerpted version of the general guidance offered:

> *It is imperative that the NP not be assigned independent duty. There must be a physician of similar specialty assigned to same work area.
>
> *Direct lines of communications should remain open between the NP and the Nursing Service.
>
> *The NP may initiate patient referral.
>
> *There is provision for local approval of the extent of prescription authority excepting controlled substances which are prohibited.
>
> *There is a requirement for random review of patients records to meet the requirements of Joint Commission on Accreditation of Hospital Standards. Peer review committees also should include NPs.
>
> *NPs are expected to participate in continuing medical education and should be allowed to attend at least one professional meeting a year.
>
> *The NP's scope of practice should include functions in diagnostic, preventive, and therapeutic areas of medicine. (Ref. 90, pp. 1-2)

The complete range of specific utilization guidelines for the Navy OB/GYN, Pediatric, and Family Nurse Practitioners are contained in the instruction. Air Force guidance is the same for the NP as the PA. Those general provisions related in Chapter II. B.2 above for the PA equally apply for the NP.

The Giauque study is the same reference identifying actual tasks performed by the military NP. In it they asked responding NPs (n = 324, response rate unknown by methodology used) to list the ten most frequently performed tasks from a list of fifty tasks. Table XII presents the results of that study. The study found task frequency to be significantly correlated to competence (judged by 112 trainers of paramedical personnel) (with an r of .6794, $p < .005$) which means that the more complex the task, the less the competence judged (Ref. 46, p. 72).

Few conclusions can be drawn from the small amount of data reviewed in this section. It appears that the military NP is performing tasks that are acute care in nature as well as tasks that can be classed as preventive (e.g., Medical History, General Physical, Teach Breast Exam). Although chronic care appeared to be prevalent in the civilian sector NP this is not confirmed in task performances when reviewing the one military study available. Giauque (Ref. 46, p. 71) does, however, state that the NP tends to specialize in all types of care (primarily for dependents). This would imply a chronic care practice as well as acute and preventive services.

3. Patients seen by the NP

Two sources of information will be presented that have attempted to describe the patients seen by the military NP. The first is an Army document which gives aggregate patient type by diagnostic category seen by the NP specialties in the Army. This document (Ref. 91) compiled by the Army Health

Table XII

Military NP: Most Frequently Performed Tasks

Rank	Task	Mean (dtd. dev.) Complexity*	Frequency*	Competence*
1	Medical History	3.13 (1.46)	4.03 (1.22)	1.00 (0.00)
2	Otoscopy	2.88 (0.84)	393 (1.56)	1.00 (0.00)
3	Treat Diarrhea	3.50 (0.93)	3.41 (1.51)	1.17 (0.41)
4	Abdominal Pain	4.00 (0.76)	3.39 (1.42)	1.17 (0.41)
5	General Physical	3.75 (0.46)	3.37 (1.68)	1.00 (0.00)
6	Strep Throat	2.38 (0.74)	3.35 (1.65)	1.17 (0.41)
7	Acute Otitis Media	3.00 (1.16)	3.33 (1.75)	1.17 (0.41)
8	Acute Otitis Externa	3.00 (1.07)	3.25 (1.72)	1.17 (0.41)
9	Throat Culture	1.50 (0.54)	3.23 (1.38)	1.00 (0.00)
10	Teach Breast Exam	3.00 (0.76)	3.23 (1.67)	1.00 (0.00)
	Average	3.01	----	1.09

*Complexity Code - 1 = very easy, 5 = very complex.

*Frequency Code - 1 = almost never perform, 5 = quite frequently performed.

*Competency Code - 1 = can perform, no supervision; 5 = cannot perform.

Source: Extracted from Ref. 46, Table 5.7, page 73.

Sciences Command, Fort Sam Houston, Texas, gives quarterly statistics of aggregate types of patients seen as reported by the practicing NPs. Table XIII presents these categories for fourth quarter, fiscal year 1978. Table XIII appears to imply that the military NP gives much less acute care than the military PA (e.g., see Ref. 46) while offering much more chronic and routine (preventive) care. The only NP specialty offering acute care to any significant degree is the Pediatric NP (44%), although this might be expected in a clientele having few chronic complaints.

The only other available source of information on the military NP's patients is again found in the Giauque study. Here the study addresses the patient type from the perspective of, first, percentage of NP's in each subspecialty and, second, by status and needs of the patient treated by the NP. The following is a breakdown of the specialty mix found among military NPs in the study:

Specialty	NP (%)
Psychiatry	2.2%
Surgery	0.6
OB/GYN	28.1
Pediatrics	29.0
Chronic Illness	9.3
Internal Medicine	2.5
Family Practice	13.0
No specialty	6.8
All Else	8.5
	100.0

(Ref. 46, Table 5.3, p. 66)

Table XIII

Army NP Workload by category of outpatient

Type of NP

Ambulatory Care		OB/GYN	
68%	Chronic Illness	20%	Pre-natal
12%	Acute Minor Illness	8%	Post-natal
2%	Health Counseling	28%	Routine Pelvic Exam
4%	Routine Physical	3%	Family Planning
8%	Prescription Refill	17%	GYN Problems
5%	Other	14%	Prescription Refill
100%	(approx).	10%	Other
		100%	

Pediatric		Psychiatric/Mental Health	
29%	Well Baby	11%	Crisis Intervention
44%	Acute Minor Illness	16%	Assessment
2%	Chronic Illness	25%	Preventive Therapy
4%	Health Counseling	30%	Restorative Therapy
4%	Newborn Physicals	8%	Prescription Refill
7%	Routine Physicals	10%	Other
4%	Prescription Refills	100%	
6%	Other		
100%			

Source: Condensed from Ref. 91, p. 1.

Thus, the majority of care given by NPs would be to those patients seeking care in an OB/GYN, Pediatric, or Family Practice Clinic. This is reinforced in the number of respondents claiming specialty training who gave an "appropriate" specialty clinic for that training as their place of work. The following results were obtained:

Specialty	NP's in appropriate clinic
OB/GYN	96.7%
Pediatrics	84.0
Internal Medicine	62.5
Family Practice	81.0

(Ref. 46, Table 5.4, page 67)

The study also revealed information on the type of patient seen in terms of military status and type of patient need by class of diagnosis. Table XIV presents those findings. Giauque concluded that the NP spent most of her time with dependents devoting nearly the same amount of time to the three general categories of complaint (acute, chronic, and check-up) (Ref. 46, p. 71).

In summary, the study found that the NP's offer a much more diverse type of care than the PA (who focused on non-specialized, ambulatory setting, acute care). Their areas of specialization tended to cluster in dependent related specialties or in chronic care and their practice tended to emphasize dependent care over active duty or retired care. Combined with the Army's work statistics, it seems clear that the military NP is treating a diverse group of patients with a broad spectrum of complaints representing acute, chronic,

Table XIV

Patient Type	Army (79)*	Navy (44)*	Air Force (162)*
Active Duty	4.03	4.51	3.89
Dependents	2.31	2.05	1.93
Retired	3.59	3.44	4.04
Patient Needs			
Acute Illness - Injury	3.52	3.05	3.16
Chronic Illness	3.27	3.29	4.05
Routine Check-Up	3.39	3.26	2.89

(1 = Numbers reflect average estimate of amount of time spent All of the time, 5 = None of the time).

*(Sample size)

Source: Reference 46, Table 5.6, page 70.

and preventive (check-up) needs.

4. Productivity of NPs

Very little literature addresses the productivity of NPs in the military sector and none of the work to be discussed addresses the issue completely.* An article by Soper, et al. (Ref. 92) describes an Army experiment to monitor chronic illness utilizing NPs as the first source of care conducted at DeWitt Army Hospital, Fort Belvoir, Virginia, using patients referred by the hospital's physicians, they established a Chronic Care Program, staffed by NPs with the referring physician maintaining medical responsibility for the patient. Once the patient entered the Program, the NP assumed the role of primary "health monitor" for the physician. The study discusses various aspects of care provided, but of most interest is the time-motion study used to establish appointment time length and project a maximum panel size for the NP. During a five month period from November 1972 through March 1973, two in the Chronic Care Clinic collected information on time involved in treating patients with chronic illnesses. In all, data was collected on 1,700 patient encounters. New patients were found to require 100 minute of time -- 60 minutes for interview and examination, 2 minutes for physicial consultation, and 38 minutes for administrative matters such as filling out forms. Return visits required 32 minutes if

*See Chapter II, Civilian Sector PA Productivity for a discussion of Marsha Goldfarb's paper (Ref. 31) on productivity measurement of physician's assistants.

a routine, scheduled visit, and 12 minutes if unscheduled (most frequently prescription refills). Physician consultations required for return visits averaged 6 minutes and telephone calls required 5 minutes. Table XV summarizes the study's time motion results. Using an assumption of six-hours of direct patient care activities per day and seven weeks between return visits, the study projected most NPs could follow between 300 and 400 patients (Ref. 92, p. 774).

The Giauque Study provides information on patient workload in the form of patients seen per shift. Table XVI presents the study's findings and its comparison to PA and physician workloads. The authors speculate that the difference between the higher number of patients seen by the Air Force NP compared to the Army and Navy NP might be explained by practice setting. The Air Force NP is normally stationed at smaller medical facilities where patient numbers might be more important than at the larger institutions where the Army and Navy NPs are normally stationed.

Table XVI is also indicative of the difference in type of care provided. The PA focuses on acute care allowing rapid treatment and high volume. The NP, however, focuses on a variety of care-giving modes not conducive to quick turnaround. She must take detailed histories, give lengthy counseling sessions, and perform many psychosocial tasks avoided by the PA and physician. The physician's intermediate patient workload might reflect his ability to defer acute care problems to the PA and chronic care, time-consuming, problems to

Table XV

Clinic Related Time Data of the
Ft Belvoir Chronic Care Clinic

Activity	No. Studied	Average Time (minutes)
New Patients		
Patient Interview and Exam	128	59
MD Consultation	34	2
Administrative	128	38
Return Patients		
Scheduled Visits	400	32
Unscheduled Visits	123	12
Telephone Calls	367	5
MD Consultation (Return visit)	209	6

Source: Reference 92, page 773.

Table XVI

Average Patient Workloads for NPs

Medical Role of Provider	Average No. (Std. Error) of Patients per Shift			
	Army	Navy	Air Force	Overall
Nurse Practitioners	18.787 (1.079)	18.476 (1.108)	23.453 (.494)	21,275 (.446)
Physician Assistants	31.292 (2.001)	26.320 (1.358)	30.361 (.635)	29.584 (.566)
Physicians	25.920 (1.213)	23.017 (.874)	24.623 (.563)	24.749 (.439)

Source: Extracted from Reference 46, Table 5.5, page 69.

the NP. Thus, he is left with patients taking more time by complexity of diagnosis and treatment.

To summarize this section, no study has directly addressed NP productivity. The two studies cited yield clues to the number of patients the NP can theoretically follow and the number she can see in a day. The theoretical panel is of limited use as it fails to consider cost-effectiveness, particularly compared to a physician or PA performing the same work. The average daily workload is also of limited use due to the self reporting nature of information gathered. The amount of bias introduced cannot be measured since no actual time-motion study was done to corroborate the reported patient load. Thus, little of substance is known in the area of military NP productivity.

5. Supervision of NPs

NP supervision in the military differs from the civilian sector NP because of the requirements to minimize the risk of liability on the part of the supervising physician. The physician supervising a military NP need not worry about the threat of liability (at least from NP employment) because the federal system, being above state laws, absorbs this responsibility. However, all three Services have issued guidance on how the NP is to be supervised.

Supervision by Army standards entails individual evaluation of each NP by the supervisor to determine the level of competency so that clinical privileges may be granted accordingly. "Supervisor" by Army definition is in this case the

physician for medical skills and the Chief Nurse for nursing skills (Ref. 89, p. 3). It appears that conflict could ensue with two supervisors from separate disciplines attempting to evaluate the functions of the NP. Control is exhibited by the hospital credentials committee which reviews the evaluations and authorizes the practice privileges. Once a privilege is granted, however, the Army suggests that the NP be allowed to work without physician countersignature (unless cosignature is required by the committee) (Ref. 89, p. 3).

Further supervision of NP functions in the Army is contained in a requirement that the NP's records be reviewed by the medical record audit committee and the peer review mechanism within the hospital as well as the requirement for written clinical guidelines established in each specialty area of NP practice (Ref. 89, pp. 3-4). The area guidelines should contain the diagnostic or patient category where the NP has primary care responsibility. The NP appears to be well defined in the Army setting by the record review procedures and specific guidelines on appropriate care.

The Navy guidelines specify that "It is imperative that the nurse practitioner not be assigned independent duty but work in an area covered by a physician qualified in the same specialty as the practitioner" (emphasis theirs) (Ref. 90, p. 2). Thus, all Navy NPs theoretically are working in their area of specialization with a similar specialized physician. At no point in the Navy's guidelines do the words "supervisor" or "supervising physician" appear. Instead, the physician is

referred to as "consultant" (Ref. 90, Encl. 3, p. 1). However, specific guides to what the NP can and cannot perform are listed (Ref. 90, Encls. 1, 2, and 3). The guidelines also require medical record committee audit and suggest inclusion of the NP in peer review (Ref. 90, p. 2). To reiterate, the NP has been given specific guidance on what duties or functions can and canot be performed, but no mention is made of to whom she is answerable in performing these duties.

Finally, Air Force guidance on NP utilization is the same as that for the PA (Ref. 93). Both the NP and PA work under the direction of a specified physician who is ultimately responsible for their delivery of care and practice within limits specified by the local credentials committee (Ref. 93, p. 1). In addition to the specific supervision and practice guidance, the Air Force offers detailed types of care considered appropriate and inappropriate for the NP and PA. Thus, the Air Force guidance is similar to that of the Army's in the specificity of supervision and practice. However, the Air Force guidance is unique in the area of grouping NPs and PAs under the same general category.

The only study found that at all addresses military NP supervision is that by Giauque (Ref. 46). The authors found that the NP expressed the strongest need for autonomy of any of the roles examined (MD, PA, NP, Nurse, SMOSIST, Corpsman) (Ref. 46, p. 104). Whether this need is satisfied by the relaxation of supervision is not reported in the study. However, NPs were found to report overall general satisfaction

with their work environment (Ref. 46, p. 114). This could lead to speculation that perhaps the need for autonomy is at least somewhat satisfied as indicated by the overall satisfaction with her work.

Other literature addressing military NP supervision was not located. The paucity of information can lead to few general conclusions about NP supervision except to note the differences between Army - Air Force guidance on physician "supervision" and Navy guidance on physician "consultation." Whether the Navy NP has achieved more of the desired autonomy is a subject for conjecture.

6. Determinants of NP Job Satisfaction

The military NP earns a respectable salary and has considerable status as a commissioned Nurse Corps Officer. While salary and status were generally lower for the civilian NP compared to the civilian PA, the reverse seems true in the military sector (Ref. 46, p. 40). The NP enjoys the benefit of commissioned status while the PA is placed in a lower rank and salary class as a Warrant Officer.*

Once again, the only study located that deals with NP satisfaction in the military sector is that by Giauque, et al. Although the survey used in the study found the NP to be well satisfied, the authors did identify two career issues that could mar NP effectiveness. First, the study identified the situation in which role conflicts exist in the organiza-

*Warrant status applies to Army and Navy PAs. Air Force PAs now enjoy commissioned status (see Colfack, Ref. 1).

tion. They describe the problem by defining an individual's "role set" which is the group of influential people that must be dealt with in day-to-day performance of duties. Role set varies in importance depending upon the need for interdependence. However, if the individual performs his duties contrary to what is expected by the role set, conflict is invited (Ref. 46, p. 111).

The authors point out that the NP is placed in the position of having to make a choice as to which role set she must please. As mentioned in the section on military NP supervision, the chief nurse may participate in defining one aspect (nursing care) of the NP's practice while a supervising physician defines another (medical care) (Ref. 89, p. 3). When these two role sets disagree, the NP is faced with not only having to work with both role sets, but also having to choose sides in how she carries out her duties (Ref. 46, p. 111).

The authors overlay this problem of what the role set expects with the NP's own expectations of her role. Giauque found the Air Force role as most clearly defined (equivalent to a PA) and the Navy the least defined. Interviews found the Navy NPs having to convince other health providers of their worth by initially complying with the role set in performing their job, but eventually evolving to a different role that was their own perception of what should be done. Conflict results from the expectations of the role set violating the NP's views of her professional code, seeming incongruent with training, or as being different from internal expectations (Ref. 46, p. 111).

The second issue identified in the study was the lack of influence held by the NP to assure her existence as a separate entity (career practice) and still be promoted without having to return to an administrative position. When judged by the study sample of MDs, PAs, Nurses, AMOSISTS, and Corpsmen, the NP was perceived to be only slightly more influential than the PA or nurse in medical matters, but less influential than the physician or nurse in administrative matters (and only slightly more influential than PAs in this area). The authors point out that decisions about the NP's future will be based in the administrative area of the Bureaus of Medicine where the NP is considered uninfluential when compared to the other health professions (Ref. 46, p. 112). Giauque notes the various strategies employed to compensate for this lack of administrative influence. The Navy NPs have joined with the Nurse Corps in the hopes of establishing an NP career option within that Corps. The Air Force NPs have joined with the physicians in hopes of establishing a paraprofessional medical division for NPs. The Army NPs have attempted to keep both nurses and physicians happy. The authors state only time will determine the best strategy (Ref. 46, p. 112, 114).

IV. STAFFING

A. STAFFING MODELS FOR THE CIVILIAN SECTOR

This part of the Chapter will address three approaches to determination of PA staffing. In the course of conducting research for this thesis, these three were the only ones discovered which address the NPP staffing issue. The first to be discussed is a model developed by the State of New Jersey (Ref. 94) in order to generate interest in the PA concept for that state. While the attempt failed (the PA is still not authorized to practice by the State), it remains the only available model to deal with the NPP on a macro level.

The second methodology to be discussed is that developed by Kaiser at their HMOs (Ref. 95). While primarily dealing with cost-effectiveness issues, it also addresses the substitution of PAs for physicians in a clinic environment.

Third, a simulation technique will be discussed that was developed by Glenn (Ref. 96). The hypothesis posed by the author is that as more extenders are added to the health care setting, certain provider role and patient flow changes occur in a predictable manner that must be recognized. The simulation technique also addresses the limitations of extenders in the health care setting.

1. The New Jersey Model

a. Introduction

In 1975, the New Jersey Office for Health Manpower Department of Higher Education, prepared a study to explore the

potential demand for and supply of NPs and PAs in the state of New Jersey (Ref. 94). The study was motivated by the then current status of the laws of the state which did not authorize PA practice. Present New Jersey laws still do not authorize PA practice (Ref. 97). This thesis will discuss only the demand findings as an indicator of potential NPP utilization.

b. The Questionnaire

The study examined only office-based primary care delivered in the state. Information was gathered by questionnaires distributed randomly to 2273 physician members of the New Jersey Association of Osteopathic Physicians and Surgeons. The 2273 questionnaires represented half the membership in each specialty category to which the Association members belonged (Ref. 94, Appendix B, p. B2). Total responses received were either 546 or 547 (listed differently on pages 26 and Table B1, Appendix B) giving a response rate of 24.1% (Ref. 94, Appendix B, p. B-1).

The questionnaire was an attempt to measure demand for Non-Physician Providers (NPPs) of care, under the conditions of: 1) current legal constraints using actual labor inputs; and 2) a hypothetical situation where the physician was legally able to hire any NPP desired and a 10-20% increase in patient load was experienced. The questionnaire approached the issue by listing 24 services for which the physician was asked to list his own and non-physician personnel time required to produce a "unit" of each service. "Unit" was not defined but implied to be one office visit. The 24 services (reprinted as Table XVI) listed in the questionnaire were derived from a

Table XVII

New Jersey Questionnaire:

24 Services

1. Pediatric Well Care: Infants
2. Pediatric Well Care: Ages 1-5
3. Pediatric Well Care: Age 5 and up
4. Physical Exam: Abbreviated Physical
5. Physical Exam: Complete Physical
6. Prenatal Care
7. Urinary Tract Infections: First Visit
8. Urinary Tract Infections: Return Visit
9. Gastrointestinal Disorders: First Visit
10. Gastrointestinal Disorders: Return Visit
11. Acute Respiratory Disease: First Visit
12. Upper Respiratory Infections: First Visit
13. Desensitization and Immunization Shots
14. Infectious Disease: First Visit
15. Warts
16. Hypertension: Routine Check
17. Otitis Media and Otitis Externa: First Visit
18. Otitis Media and Otitis Externa: Return Visit
19. Musculoskeletal Disorders: First Visit
20. Musculoskeletal Disorders: Return Visits and Chronic Problems
21. Injuries and Contusions: First Visit
22. Injuries and Contusions: Return Visit
23. Lacerations: First Visit
24. Lacerations: Suture Removal

Source: Ref. 94, Table 1, p. 18.

group of 35 such services developed by Golladay and Smith in a cited work.* The 24 services were estimated to comprise about 72% of the weekly service demand. All respondents provided input for the current situation and estimates of current labor time. However, only 274 supplied input for both the present and hypothetical situation (Ref. 94, p. 26). Below are the percentages of respondents actually employing the various types of NPP's considered (recalling that PAs were not authorized to practice):

Professional	All Respondents
Nurse Practitioner	2.6% *
Registered Nurse	16.0%
Medical Assistant	14.3%

*In 1975 it was estimated that only 75-100 NPs were practicing in New Jersey.

(Ref. 94, Table 4, p. 33)

When the category "All Respondents" was divided into those responding only to the current practice situation and those responding to both current and hypothetical situations, the "hypothetical" respondents were found to employ all three assistant categories of personnel with greater frequency. These two categories of physicians were also found to differ by

*It is assumed that the study refers to an article by F. L. Golladay, M. F. Hansen, K. R. Smith, E. J. Davenport, and A. M. Over, The Empirical Study of Efficient Health Manpower Utilization, unpublished paper, 1975, cited initially in the study on page 17. However, another study including Golladay and Smith as authors (F. L. Golladay, K. R. Smith and M. F. Hansen, Operations Manual: Manpower Utilization in Ambulatory Care Practice, Health Economics Research Center Report Series, Univ. of Wisconsin, Madison, 1973) is also cited.

a statistically significant degree on the amount of physician time required to perform the 24 services with the respondents to both situations reporting lower times (Ref. R-060, p. 31).

Using only the respondents to the hypothetical situation (a 10-20% increase in patient load and unlimited access to allied health personnel) the physicians chose to utilize assistants with the following average frequencies:

Manpower Category	Average Percentage
Registered Nurse	25.3%
Medical Assistant	25.3%
Nurse Practitioner	25.1%
Physician's Assistant	13.0%

Source: (Ref. 94, Table 6, p. 35)

They also estimated their own time spent in performing the 24 specified services. Overall, the study found that the physicians would spend an average of 45% less time producing a unit of service (Ref. 94, p. 35).

c. Their Analysis

A linear programming model was then run using the data in both the present situation and the hypothetical situation. The optimal solution identified the least cost combination of labor inputs required to produce the 24 services. Ten possible labor inputs were allowed to produce each service. They were:

physician	nurse practitioners
medical assistant	registered nurse
lab personnel	licensed practical nurse
physician's assistant	nurse aid
other time	X-ray technician

The study valued each input at its minute/unit market price. Given the input (e.g., number of work hours available) and output (e.g., minimum number of services that must be produced) constraints, the method arrived at a total cost amount for the least cost production method able to produce the volume of service specified. Tables XVIII and XIX contain these results for the year 1975. Table XVIII shows the most efficient utilization of providers under the current constraints (i.e., not utilizing PAs). Table XIX shows the most efficient utilization of providers under a modified hypothetical situation (i.e., with PAs allowed but with no increase in demand).

Future demand for primary care and the resultant demand for physicians and NPPs were projected by regression analysis. The cross-sectional regression model used was an internally developed single equation model relating number of physicians by county to the independent variables of income, population size, average age, and hospital utilization (Ref. 94, p. 22). Two assumptions were made to use the already developed model: One, that the rate of increase in demand for primary care physicians would be at least as large as that for all physicians; and two, that the percentage change in demand for physician services was due to a change in demand for physician manpower. Table XX reprints the results when the least cost combination of personnel is utilized for the projected demand in 1975, 1978, 1980, and 1985. On one side the provider mix is under the current (non PA) practice while the other side depicts demand under the hypothetical situation (PAs allowed).

Table XVIII

New Jersey Model Results:
Current Practice Constraints : 1975

Manpower Category	Total # of Minutes Required for 24 Services Per Week*	Adjusted Weekly Office Hours Required for Total Primary Care**	Manpower Requirement (FTEs)***
Physicians	3,711,595	224,130	4,294
Nurse Practitioners	1,200,585	46,319	1,158

**The following adjustments were made to estimate manpower requirements to meet total primary care demand:

a. Physician Manpower: Assuming a 52.2 hour work week for physicians 20 hours (or 38.3%) of which are spent in direct patient encounters, and given the estimate that these 24 selected services represent 72% of total primary care, we estimate (.72 x .383 = 276) that 27.6% of physician time is spent on the production of the 24 selected services each week. Therefore, weekly office hours required for total primary care is calculated as follows: (i) 3,711,595 ÷ .276 = 13,447,807, the number of minutes of physician time required for total primary care per week; (ii) 13,447,807÷ 60 = 224,130 or weekly office hours required.

b. NP Manpower: Assuming a 40 hour work week for NPs, 60% of which is spent in direct patient encounters we estimate that (.72 x .60 = 432) 43.2% of NP time is spent on the production of the 24 selected services each week.

***Physician FTEs are based on a 52.2 hour work week; NP FTEs are based on a 40 hour work week.

Source: Ref. 94, Table 7a, p. 39.

Table XIX

New Jersey Model Results:
Hypothetical Practice Constraints : 1975

Manpower Category	Total # of minutes Required for 24 Services Per Week*	Adjusted Weekly Office Hours Required for Total Primary Care **	Manpower Requirements (FTE)***
Physicians	2,210,543	133,487	2,557
Nurse Practitioners	584,120	22,535	563
Physician's Assistants	570,167	18,855	471

** The following adjustments were made to estimate manpower requirements to meet total primary care demand:

a. Physician Manpower: Assuming a 52.2 hour work week for physicians 20 hours (or 38.3%) of which are spent in direct patient encounters, and given the estimate that these 24 selected services represent 72% of total primary care, we estimate (.72 x .383 = 276) that 27.6% of physician time is spent on the production of the 24 selected services each week. Therefore, weekly office hours required for total primary care is calculated as follows: (i) 3,711,595 ÷ .276 = 13,447,807, the number of minutes of physician time required for total primary care per week; (ii) 13,447,807 ÷ 60 = 224,130 or weekly office hours required.

b. NP Manpower: Assuming a 40 hour work week for NPs, 60% of which is spent in direct patient encounters we estimate that (.72 x .60 = 432) 43.2% of NP time is spent on the production of the 24 selected services each week.

c. PA Manpower: Assuming a 40 hour work week for PAs, 70% of which is spent in direct patient encounters, we estimate that (.72 x .70 = .504) 50.4% of PA time is spent on the 24 services each week.

*** Physician FTEs are based on a 52.2 hour work week; NP and PA FTEs are based on a 40 hour work week.

Source: Ref. 94, Table 7b, p. 41.

Table XX

Physician, NP, and PA Projected Demand
With the New Jersey Methodology

Year	Current Practice+		Hypothetical Situation		
	Physicians	NPs	Physicians	NPs	PAs
1975	4,294	1,158	2,557	563	471
1978*	---	---	2,941	647	542
1980**	5,453	1,471	3,247	715	598
1985**	6,925	1,868	4,124	908	759

* The 1978 projections reflect manpower requirements after a 15% increase in primary care service demand has occurred since 1975.

** The demand projections developed by the Office for Health Manpower indicate a 27% increase in primary care demand per five year period.

\+ Optimal demand estimates based on current usage of health manpower.

Source: Ref. 94, Table 8, p. 44.

d. Analysis of the Model

Use of linear programming implies the existence of constant returns to scale. If it takes a physician 20 minutes to perform one unit of a specified service, it will take him 80 minutes to perform four such units. There is no implied time savings by increasing the amount of units produced -- hence, the linear relationship. In actuality, a linear relationship rarely exists, as some savings are bound to be realized by successive repetition of the same function even if the only savings is in the form of utilizing the same instruments, in place from examination of the first patient. However, even though linear programming may not accurately determine the exact number of NPs, PAs, or other health providers necessary to meet a specified demand, it can indicate the potential money and time savings realized when utilizing physician substitutes in lieu of physicians.

Although the methodology used to analyze the survey data may have merit, the survey itself has several deficiencies. The sample is so small (547 physician respondents from a queried sample of 2273; response rate 24.1%) that bias must be assumed due to small sample size. Further, the nature of the questionnaire leads one to doubt even more the representativeness of the sample. It would appear that those physicians already employing NPs or other sanctioned health providers and those expressing interest in the NPP movement would be more inclined to answer the questionnaire than those not involved in the issue. The study points out this anomaly by the statist-

ically significant difference in estimated service unit time reported by the physician responding only to the current situation compared to the physician responding to both current situation and hypothetical situation questions (Ref. 94, Table 3, p. 32). That the latter group also employed more assistants is further evidence of their enthusiasm toward the issue. Thus, that the survey is biased in an upward direction of NPP utilization can probably be assumed.

2. The Kaiser Experience

One of the more recent studies to be conducted by Kaiser deals with the cost effectiveness of PAs at the Kaiser-Permanente HMO in Portland, Oregon (Ref. 95). The study addresses the PA/physician substitution capability under which all patients seen in an outpatient clinic are triaged into three categories: A for patients seen only by a physician; B for patients seen only by a PA; and C for patients seen initially by PAs with physician consultation. The cost effectiveness issues found by the study have been analyzed by Colfack (Ref. 1, p. 102) along with a comparison of cost savings over this original study by a PA maximum substitution model developed by the same authors (Ref. 98). Therefore, this thesis will emphasize the substitution methodology employed by Kaiser (Ref. 95).

The first measure obtained by the study was physician and PA provider time by morbidity. Using trained observers over a total of 12 weeks (equally divided periods during November, 1974, February-March, 1975, and May-June, 1975)

the activities of 14 physicians and 5 PAs were monitored for clinic half days. A total of 2681 Office Visits (OVs) were recorded for 160 clinic half days for physicians and 81 clinic half days for PAs. Actual contact and noncontact time (those portions of the OV devoted to actual patient care and to peripheral activities respectively) were determined through the use of observation methods, by morbidity category, with a resultant ratio developed for each category to "weight" the actual contact and noncontact time (Ref. 95, p. 12). To their resulting estimate of annual hours required to produce the primary outpatient services were added regularly scheduled activities (e.g., administrative duties) and non-scheduled activities (e.r., making hospital rounds) to arrive at an annualized provider year. The substitution (written) policy used at Kaiser was rejected as a methodology to accurately reflect PA activity. Instead, the study used the empirically observed PA practice as a definition of the extent to which the PA could substitute for the physician (Ref. 95, p. 15). This was determined in the observation phase of the study. OVs were divided into those triaged only to MDs and those triaged only to PAs with the PA patient load subdivided into those that could be handled alone and those requiring consultation.

The study found that 12% of the PA OVs required consultation (Ref. 95, p. 18). Table XXI presents the observed differences in production modes by category of patient and provider input. The physician was found to be the appropriate mode for all categories of output, while the PA was appropriate for only Category B (PA-Appropriate OVs).

Table XXI

Comparisons of Production Modes, by Output Categories:
Kaiser Experience

Type of Appointment	Initial Visits			Continuing Visits		
	Average Provider Time	Annualized Frequency (5% Sample x 20)	Observation Frequency	Average Provider Time	Annualized Frequency (5% Sample x 20)	Observation Frequency
Category A (MD-Requisite)						
MD Mode						
Without appointment	8.9	1,890	14	8.8	3,670	33
15-Minute Regularly Scheduled	9.7	1,830	19	8.4	18,050	247
30 Minute Regularly Scheduled	18.2	12,970	135	21.7	2,560	35
Contact time to total time 42%*						
Category B (PA-Appropriate)						
MD Mode						
Without appointment	6.6	54,590	455	7.4	16,370	127
15-Minute Regularly Scheduled	9.9	14,840	133	8.2	31,570	439
30-Minute Regularly Scheduled	17.3	14,010	122	17.5	5,070	41
Contact time to total time 50%*						

Table XXI (Continued)

Comparisons of Production Modes, by Output Categories

Type of Appointment	Initial Visits			Continuing Visits		
	Average Provider Time	Annualized Frequency (5% Sample x 20)	Observation Frequency	Average Provider Time	Annualized Frequency (5% Sample x 20)	Observation Frequency
PA Mode						
Without appointment	5.8	54,483	507	7.4	16,370	64
15-Minute Regularly Scheduled	8.7	14,597	60	10.0	31,570	58
30-Minute Regularly Scheduled	13.5	13,764	56	9.5	5,070	10
Triage Error**	2.0	596	3			
Contact time to total time	42%*					
Category C(PA-Appropriate with Consultation)						
MD MODE						
Without appointment	6.1	6,060	189	7.2	2,660	51
15-Minute Regularly Scheduled	10.3	1,470	60	8.0	3,900	94
30-Minute Regularly Scheduled	17.7	1,220	111	14.5	1,040	7
Contact time to total time	46%*					

Table XXI (Continued)

Comparison of Production Modes, by Output Categories

Type of Appointment	Initial Visits			Continuing Visits		
	Average Provider Time	Annualized Frequency (5% Sample x 20)	Observation Frequency	Average Provider Time	Annualized Frequency (5% Sample x 20)	Observation Frequency
PA-MD JOINT MODE						
Without appointment						
MD	3.6	5,501	59	8.9	2,418	10
PA	9.9	5,501	59	15.6	2,418	10
Regularly scheduled						
MD	4.5	2,466	11	6.3	4,940	9
PA	14.9	2,466	11	11.1	4,940	9
Triage Error						
MD	6.9	1,025	8			
PA	13.9	1,025	8			
Contact time to total time						
MD	46%*					
PA	38%*					

*The Contact time to total time percentage applies to all visits within the production mode for that output category.

NOTE: The output frequencies for Category A are overstated because certain subspecialty visits could not be separated from the primary care visits. The number appears to be small.

Source: Ref. 95, Table 1, pp. 68-69.

Costs were next examined. Since Colfack (Ref. 1) has addressed the cost-effectiveness aspects of the study, only highlights of the study's assumptions and findings appear below:

*Study of overhead cost of PA and MD revealed no difference (including malpractice insurance at time of study).

*Variable costs were: 1972 average physician salary $47,626 compared to average PA salary $14,612 (both figures include fringe benefits).

*PA costs were adjusted to include the differential cost of using less skilled assistants than the MD (-$3,177) and MD time used to supervise PA (+$3,729).

*MD consultation cost was charged directly to the OV category when the PA required MD consultation.

*X-ray and lab differences were ignored.

*A determined 1% triage error rate was included in costs.

*No real difference in appointment-failure rates were discussed.

*Joint PA-MD treatment was determined not to be time savings for the MD and therefore not cost effective since it tended to only lose the cost of the PA's time.

*Overall PA total annualized cost ($15,164) was about 35% of MD annualized cost ($47,626), but, PA hoursly cost was 49% of MD hourly cost due to difference in work week (33.54 hours vice 52.70 hours)

*Clinic portion of work week was determined to be 93.5% for PA and 50% for MD.

(Ref. 95, pp. 18-26)

Once time required for an OV and cost per minute of PA and MD time was obtained, the various OV categories were examined to determine the most cost effective provider. The

final calculated costs were 16¢ (15.7¢) per PA minute and 32¢ per MD minute; the PA/MD cost ratio equalling .49 (Ref. 95, p. 28). Thus, in category B, which is the category of OVs normally seen by the PA, the PA was more cost effective if his contact time in minutes multiplied by .49 was less than the MD time. The study found the PA to be much more cost effective in all classes listed in Category B. For Category C OVs, the PA-MD joint mode was found cheaper than the MD alone only for scheduled initial visits. Other classes in Category C found the MD alone cheaper (Ref. 95, p. 28).

Of particular interest to this thesis was the study's calculation of substitution ratios of PAs for MDs. The mix of providers with the lowest level of total cost was 30.16 PAs and 37.13 MDs. The 30.16 PAs represented a substitution of 51.20 MDs (required without PAS) minus the remaining 37.13 MD, or 14.07 MDs (51.20 minus 37.13). Thus the MD/PA substitution ratio equals 14.07/30.16 or 0.47 (Ref. 95, p. 44). The study points out the sensitivity of the ratio to the PA and MD work years. If the PA work week increased, fewer PAs would be needed in the least cost combination to treat the OVs triaged to them and fewer MDs would be required due to less hours needed for supervision. Thus, the ratio is sensitive to the PA work year up to the point where the MD and PA work year are equal -- an unrealistic situation according to the study. However, given the hypothetical situation of equal work years, the PA could substitute for 76% of a physician (substitution ratio increasing from .47 in the present work year to .76) (Ref. 95, pp. 44-46).

Constraints on PA substitution other than work year which were examined included the legal requirement of a 1:1 MD to PA ratio which was calculated to frustrate about 59% of the overall potential dollar savings while physician preference in OV morbidity case mix represented a 10% frustration to overall dollar savings (Ref. 95, pp. 48-50).

In a discussion of the findings the study concludes that the ultimate limiting factor in regards to PA substitution for MDs may be physician preference. It is pointed out that the physician makes the determination of whether the PA should be hired and what duties will be performed. The study's observed response to a questionnaire regarding preferred OV morbidity led to the speculation that a least-cost combination of PAs and MDs would pose a threat to the physician to the point of losing control of his work content (Ref. 95, p. 63). The other area of physician discontent forecast in the study was PA supervision. Given the legal requirement of a 1:1 ratio, many physicians (81%) would end up doing nothing but supervising PAs -- obviously not a career rewarding job for such highly skilled personnel (Ref. 95, p. 64).

The study appears to be a straightforward, well documented, attempt to measure the cost effectiveness, and in the process, the substitutability of PAs for MDs. It recognizes certain constraints as realities in an attempt to maximize substitution to achieve least cost. It also shows the importance of the physician in the PA utilization process as the key to any savings attempt. Without the physician, the PA issue is moot.

3. Simulation of Practice Modes Study

Glenn and Goldman (Ref. 99) describe the results of a study performed by Glenn in 1973 (Ref. 96) which dealt with the microlevel issue of how physician extenders are actually utilized in the practice setting. Physician extender was defined as either a PA or NP. Of primary concern was alternative patterns of patient flow through the office.

The authors identified eight practice sites using physician extenders, all of which had at least one year's experience in using extenders with a physician physically located at the site. The sites were chosen purposely to have a variety of medical specialties, type of physician extender, and organization. However, all sites tended toward primary care, operating on a fee-for-service basis (Ref. 99, p. 251). As a "reference point," one additional site was selected that did not utilize extenders and practiced more "traditional' medicine with the physician delivering the majority of care.

The authors found three distinct patterns of patient flow and practice at the eight sites employing extenders. The patterns were labeled "series," "parallel," and "consultative." Series flow (observed at two sites) was found to be the least divergent from the more traditional practice of the physician seeing all patients. Series flow involved the extender screening the patient, consulting with the physician, and then either the physician seeing the patient alone or with extender assistance. All appointments were made with the physician and the

bulk of care was delivered by the physician (Ref. 99, p. 252).

In parallel flow (observed at four sites), appointments were made with either the extender or the physician. Flow originated through the two providers with the extender having the option of treating without physician consultation, treating with consultation, referring the patient to the physician for joint treatment, or referral with physician treatment only (Ref. 99, p. 252).

Finally, the consultative flow (observed at two sites) booked all appointments with the extender -- no appointments were booked with the "consultant" physician. Several extenders, with one physician as consultant, treated the patient allowing for the same options of patient flow as found in the parallel mode (excepting physician contact without first seeing an extender) (Ref. 99, pp. 252-253).

A comparison of productivity among the three extender modes and traditional mode of practice was accomplished through computer simulation of the four patient flows (Ref. 99, p. 254). The traditional mode was constructed as representative of a high-paced family practice clinic seeing an average six patients per physician hour. Expansion beyond that average was not possible. Using the same pace as that of the traditional practice, one extender increased productivity up to a maximum of 9.5 patients per physician hour (using a parallel mode of flow), or a 58% increase over the traditional mode (Ref. 99, p. 254). The series and consultative modes with one extender found the same and less productivity respectively. The

authors conclude that the first productivity increase derived from extender utilization is through the partitioning of patients into either first contact being with extender or physician, with physician retaining the option of contact if consultation is needed. The second observed savings is through patient management delegation (Ref. 99, p. 255).

The authors also project changes in the physician role once the parallel, one extender, mode is surpassed with multiple extenders. They view the various patient flow modes observed in the study as "points" along a time continum. The physician role evolves from a "care provider" to "consultant" as more extenders are added and changes to the flow of patients are required to enable the physician to serve as a consultant and supervisor (Ref. 99, pp. 255-256).

Glenn points out that the primary determinant of increased productivity is patient management delegation. He found that it was not the basic flow pattern that effects productivity, but the delegation (Ref. 96, p. 112). As more delegation was allowed, the flow pattern was a natural evolution.

The significance of the study lies in the fact that increased staffing with PAs may effect the type of practice role established for the physician. While the Kaiser Study (Ref. 95) determined physician resistance to a change in role and patient morbidity with PA utilization, the extent of the role change was only known for utilization of small numbers of PAs. With extensive PA substitution, the role change appears

appears significant based on Glenn's work (Ref. 96).

Insofar as staffing implications can be implied from Glenn's model, it can be seen that the ultimate determinant of the extent of productivity increases utilizing NPPs will be the physician. Thus, staffing with NPPs will not only depend on the amount and type of tasks they are capable of performing, it will also depend upon the physician's willingness to alter his role on the health care delivery team.

B. STAFFING MODELS AND TECHNIQUES FOR THE MILITARY SECTOR

This portion of the chapter will focus on the models and techniques available to the military to enhance the staffing process. Three techniques will be covered. First, the Rand Model for Air Force clinic staffing utilizing PAs will be briefly mentioned with an appendix presenting Colfack's (Ref. 1) analysis and implications for the U. S. Navy. Second, the Navy Occupational Task Analysis Program (NOTAP) will be discussed and an example of the type of information available from this system will be presented. Although not a staffing model itself, NOTAP is the basis for other staffing standards. Third, a description and analysis of the Medical SHORSTAMPS staffing standards will be presented. This program is the only shore staffing methodology currently used in the Navy. The first medical subsystem, Orthopaedic Standards, will be presented and analyzed. The purpose of this presentation is to provide the reader some knowledge of the way in which the military approaches the staffing problem and to identify the weaknesses and strengths of this approach.

1. The Rand Model

Colfack (Ref. 1, pp. 132-150) analyzes the Rand Corporation Air Force medical staffing model (Ref. 47) in detail. In his analysis, Colfack presents the methodology used by Rand and the analytical model to which the data is applied. He also attempts to duplicate the Rand results with limited success. The model is updated from the original 1973 cost estimates and assumptions to 1978 costs (with the physician's marginal salary escalated by the CPI for medical practice charges and the PA salary reflecting the recent Air Force decision to commission the PA as an 0-1). In the final portion of the analysis, Colfack uses the Air Force model to estimate gross PA requirements for the U. S. Navy, given that assumptions of the basic model hold for this extrapolated application. Since Colfack's analysis has focused primarily on the cost implications of the Rand Model, this analysis will be devoted to the staffing methodology employed in arriving at the staffing mix.

As with the New Jersey Model, the Rand Model uses linear programming to determine the least cost mix of primary care providers to staff an outpatient clinic. The Model uses the time required by each provider or provider team,* the demand for care as measured by patient visits, and the marginal salary

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*"Team" in the Rand Model refers to the chain of providers rendering care -- not an organized, communicating, preselected mix of providers. Ref. R-100, p.) The "times required" spoken of was determined during a period of observation and data collection at the site clinics, as discussed below.

of each provider to determine the cost of the patient visit. Once patient visit cost is determined, the Model determines the least cost team of providers.

Two solutions are given by the model: one assumes "perfect triage" with the patient's diagnosis known before the first visit; the other assumes an unknown first visit diagnosis with each provider team seeing a "fair share" of patients in each diagnostic category ("random assignment").

Rand's Model is based on data obtained at Robbins Air Force Base during a two week period in June 1974. The data was collected on four of 14 clinics which provide primary care (the four clinics provide 50% of total outpatient visits) through observations of provider time devoted to each diagnostic category. The diagnostic categories were grouped on three aspects: degree of difficulty in making the diagnosis; difficulty in deciding on a treatment plan; and difficulty of implementing the plan. Each aspect was rated either "hard," "intermediate," or "easy" for that particular diagnosis.

The Model assumes each provider devotes four hours per day to patient contact, working a five day week, 48 weeks a year. Assumptions on marginal salary cost (cost of procuring one additional provider) was treated as 1973 Regular Military Compensation (RMC) for the PA, corpsman (CP), and nurse (NU). Physician marginal salary was considered the civilian market price, $55,000, to acknowledge a significant increase in physician requirements could not be met using the present salary.

Appendix D presents the results of applying the model to the data with a "random assignment," and a "perfect triage" for first visits. Based on the results, the study concludes that significant manpower savings could be recognized through the optimal use of inputs and that the physician shortage could be alleviated to a great degree by substitution of PAs for the primary care physician.

2. Navy Occupational Task Analysis Program (NOTAP)

NOTAP is the U. S. Navy's proposed solution to the development of personnel classification systems and standards. It accomplishes this through discovery of the tasks which are actually being performed in each Navy job through interview, observation, and questionnaire sampling of an occupation. Once the actual tasks are collected, they are used to develop personnel classification systems and standards as they effect manpower management, personnel administration, and training. It is noted that NOTAP does not measure quality, only functions, measured as tasks performed (Ref. 100, p. 1).

NOTAP is of particular importance for this thesis in respect to its technique of task analysis. It is to be emphasized that the technique employed is only one approach to the subject.* Chapter II. A.2 has addressed several other techniques available in the civilian sector.

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*Through informal sources it has been learned that NOTAP data on Hospital Corps specialties has been rebuffed by the Naval Health Sciences Education and Training Command, Bureau of Medicine and Surgery, due to its incompleteness. The Bureau is currently developing their own methodology to validate NOTAP findings.

NOTAP is dynamic in nature reflecting the needs of an everchanging Navy. Thus, once initial task analysis is completed, each category of personnel must be reviewed again by successive interactions of the process (Ref. 100, pp. 1-2). The actual data collection procedure consists of a preliminary phase, an observation and interview phase, and administration of a task inventory. First, all appropriate documents and personnel are interviewed to ascertain what the rating should be doing. Then a team of observers and interviewers query senior enlisted personnel on aspects of the rating to aid in preparation of a questionnaire of appropriate tasks for that rating. Finally, the questionnaire is administered, wherever possible by a NOTAP team to a sample representing 18-28% of the rating. (The sample is stratified by fleet, ship category, paygrade, sex and Navy Enlisted Classification (NEC) which equates to subspecialization within the rating).

NOTAP data is used to develop the initial curriculum for Navy schools, to validate the appropriateness of what is covered in training, and as a revision to the occupational standards which determine the training needed to advance in rate (Ref. 100, pp. 6-7). It is also supposed to be used to support the SHORSTAMPS shore manning requirements and the Joint Interservice Training Committee which makes recommendations on the training of skills utilized in all Services. [SHORSTAMPS will be discussed in the next section of this chapter.] However, this relationship is not at all clear.

The primary subject for NOTAP analysis to be addressed in this thesis is the Hospital Corps rating (HM). By November-December 1978 thirteen different subgroupings of 22 NECs had been completed. Those groupings are contained in Table XXII. All groupings were given the same questionnaire, containing (among other things) 385 tasks to rank in order of appropriateness and frequency. These task statements were developed through the procedure mentioned above. Tasks are aggregated into 25 categories listed in Table XXIII.

Of particular interest for this thesis is Category 1 personnel with primary NEC of 8424 or 8425 -- generally referred to as the "independent duty" hospital corpsman. This subgrouping within Category 1 is considered the most "medical care" oriented of the Hospital Corps. Preparation for this NEC (with 8424 first awarded then 8425 awarded after six months of independent duty) usually includes at least four years time in service, advanced hospital corps schooling, and a screening for maturity and judgment. Advanced training stresses diagnostic and pharmaceutical prescribing skills. Thus, for the equivalent of a PA, the 8424/8425 NEC hospital corpsman would probably come the closest.*

An example of NOTAP's ability to measure tasks performed by the 8424/8425 hospital corpsman is condensed from

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*As mentioned in Colfack (Ref. 1), the planned education of Navy inservice procured PAs will consist of two phases of training. The first, awarding the enlisted NEC 8424/8425 will function as the "pool" of applicants for the advanced PA training -- creating a ladder for advancement and training.

Table XXII

NOTAP Groupings of HM NEC's

#1.	0000	AFLOAT
	8402	NUCLEAR SUBMARINE MEDICINE TECHNICIAN
	8407	NUCLEAR MEDICINE TECHNICIAN
	8424	MEDICAL SERVICES TECHNICIAN
	8425	ADVANCED HOSPITAL CORPSMAN
#2.	8404	FIELD MEDICAL SERVICE TECHNICIAN
#3.	8452	X-RAY TECHNICIAN
#4.	8477	BIOMEDICAL EQUIPMENT TECHNICIAN, BASIC
	8478	BIOMEDICAL EQUIPMENT TECHNICIAN, X-RAY
	8479	BIOMEDICAL EQUIPMENT TECHNICIAN, ELECTRONIC
#5.	8485	WARD CORPSMAN/NEUROPSYCHIATRY
	0000	ASHORE
#6.	8432	PREVENTIVE MEDICINE TECHNICIAN
#7.	8482	PHARMACY TECHNICIAN
#8.	8463	OPTICIAN TECHNICIAN
#9.	8501 8506	MEDICAL LABORATORY TECHNICIAN
#10.	8406	AEROSPACE MEDICINE TECHNICIAN
#11.	8444	OCULAR TECHNICIAN
	8446	EAR, NOSE & THROAT TECHNICIAN
#12.	8483	OPERATING ROOM TECHNICIAN
#13.	8408	CARDIO-PULMONARY TECHNICIAN

Source: Reference 101.

Table XXIII

HM Summary Groups of NOTAP Tasks

A. MANAGEMENT
B. ADMINISTRATION GENERAL
C. TRAINING
D. SUPPLY
E. TECHNICAL ADMINISTRATION (REPORTS
F. TECHNICAL ADMINISTRATION
G. NUCLEAR MEDICINE ADMINISTRATION
H. DIAGNOSIS (GENERAL)
I. TREATMENT (GENERAL)
J. DIAGNOSIS (DENTAL)
K. TREATMENT (DENTAL)
L. PATIENT HANDLING/TRANSPORTATION
M. NURSING CARE, GENERAL
N. MEDICATION
O. NURSING CARE, SPECIAL
P. EMERGENCY FIRST AID AND MINOR SURGERY
Q. X-RAY
R. LABORATORY
S. PHARMACY
T. PREVENTIVE MEDICINE
U. STERILE TECHNIQUE
V. DISASTER CONTROL
W. RADIATION HEALTH
X. ATMOSPHERE CONTROL
Z. MILITARY

Source: Reference 101.

the Category 1 personnel in Table XXIV. As can be readily seen, the Independent Duty Hospital Corpsman is to a great extent performing diagnostic tasks, nursing care tasks, emergency care tasks, and administrative duties. With the exception of administrative duties, the mix of tasks could as easily hold for the PA.

Thus, NOTAP tends to confirm that the independent duty hospital corpsman is near the equivalent of the PA on a much smaller scale (usually the "patient panel" being a destroyer or smaller ship having no physician aboard). It also confirms the fact that this corpsman is as oriented toward tasks of an administrative nature as those of a medical/diagnostic nature.

Also readily apparent (from even as small a sample as that chosen for the Table) is the change in duties experienced as the corpsman advances in rate from E-5 through E-7. Thus, the job appears to not be constant over a long period of time but tends to require different tasks, with their requisite skills, as the corpsman progresses through the rates.

The implications of this small section of NOTAP data appear to be that this hospital corps specialty requires a variety of tasks to perform the job and that these tasks tend to vary over time. Thus, the immediate indicator provided by NOTAP is where to concentrate the training and how to best prepare the corpsman for advancement to a higher rate.

It appears clear that NOTAP offers a variety of staffing and personnel related information for the Navy. It is only

Table XXIV

NOTAP Summary of Percent of NEC 8424/8425 Members Performing Each Task

Duty/ Task	Duty/Task Title	Stratified Sample: (n = 3) E5 8424/8425	(n = 43) E6 8424/8425	(n = 34) E7 8424/8425
A	Management	100	98	100
B	Admin. General	100	100	100
C	Training	67	100	100
D	Supply	67	95	100
E	Technical Admin.(Reports)	100	93	100
F	Technical Admin.	100	98	100
G	Nuclear Medicine Admin.	0	37	25
H	Diagnosis (General)	100	98	100
I	Treatment (General)	100	98	100
J	Diagnosis (Dental)	33	70	76
K	Treatment (Dental)	33	77	76
L	Patient Handling/ Transportation	100	98	97
M	Nursing Care, General	100	98	97
N	Medication	100	93	85
O	Nursing Care, Special	100	65	62
P	Emergency First Aid Minor Surgery	100	98	97
Q	X-Ray	33	9	21
R	Laboratory	67	91	94
S	Pharmacy	67	95	97
T	Preventive Medicine	100	95	97
U	Sterile Technique	100	95	94
V	Disaster Control	67	95	94
W	Radiation Health	0	49	41
X	Atmosphere Control	0	12	12
Z	Military	100	98	97

Source: Condensed from Ref. 101, p. 1.

through such forms of information as this that the Navy will improve the ability of its personnel by better preparing them for the job.

3. Medical SHORSTAMPS

a. Introduction to SHORSTAMPS

The Navy's Shore Requirements, Standards, and Manpower Planning System (SHORSTAMPS) is its one and only shore manpower planning system. It is the sixth attempt at such a system since World War II (Ref. 102). The other five attempts were lost to higher priorities. Until SHORSTAMPS, Navy Manpower justification was primarily a "best guess." However, during the Program Objectives Memorandym for Fiscal Year 1978 (POM-78) review, the Senate and House Armed Services Committees realized that manpower costs exceeded 50% of the Navy's total budget. It was at this time that a requirement was placed on the Navy to establish an adequate manpower planning system for both military and civilian manpower and to have it operational within two years (Ref. 102). The final operational date has been extended to June, 1979, at which time Navy manpower appropriations will be returned if the planning system is not adequate and operational in the view of Congress.

SHORSTAMPS is one subsystem of the overall projected Navy Manpower Planning System (NAMPS) (Ref. 103). NAMPS is also comprised of a fleet requirement subsystem established in 1966 /Ship Manpower Document (SMD)/ and an Air Force requirement subsystem established in 1969 /Squadron Manpower Document (SQMD)/. Since this thesis addresses only one sub-

system of the NAMPS, no further mention of the SMD and SQMD will be included except in this paragraph. It is important to note that by rigid organization and mission statements, the SMD and SQMD have been able to take advantage of many standardized industrial work measurement techniques not applicable to the shore establishment.

Because of the mix of types of facilities, their diffuse mission statements, geographic and demographic differences, and output variation, shore based activities do not lend themselves well to industrial measurement techniques for measuring manpower requirements. These differences led to a two subsystem structure within SHORSTAMPS to measure manpower needs. To measure variability among facilities, the Shore Required Operational Capability (SHOROC) subsystem was developed as a tasking language that enabled each shore activity to list its own functional requirements and workload. It insures the activity's own determination of its requirements instead of centrally assigned tasks. The SHOROC has the ability to show: projected changes; contract manpower tasks; functions performed for other services, agencies, and foreign governments; function priority as to mission essential, mission related, possible areas that could be deferred, and mission areas that are not currently possessed by the activity; and mobilization tasking (Ref. 102).

The other subsystem of SHORSTAMPS is the Navy Staffing Standards, which is designed to relate tasking decisions to manpower equivalents. Staffing standards development consists

of actual observation of work performed, operation audit of historical workload, and work sampling (Ref. 102). Based on these three methods of work determination, work/task variables associated with manhours required are correlated through regression techniques to identify indicators of manpower requirements. Once identified, the indicators are measured at a sample of activities having similar functions in order to develop an aggregate for work and a corresponding aggregate for manpower required. Then, workload indices are broken back down to the activity level to enable determination of manpower at the individual unit level.

Through the "marriage" of SHOROC task requirements and Navy Staffing Standards to determine manpower for a specific task over a broad range of workload, the SHORSTAMPS-based shore manpower document will be produced and maintained for the individual activity and input will be provided at the major manpower claimant level for planning in relation to individual activity information, aggregated data, and specific query (e.g., civilian/military substitutability, potential manpower costs/savings, capability losses/gains with changes in manpower, etc.). It is assumed that NOTAP task analysis information also enters the decision process at this time, but neither SHORSTAMPS nor NOTAP are specific on this link (Ref. 102 and 100).

It is important to note that the SHORSTAMPS program was established because shore-based activities were not homogenous in (among other things) organization or mission.

However, the basis for the staffing standards subsystem depends on aggregation of work that may be similar but not necessarily homogenous.

This thesis will address one segment of SHORSTAMPS -- the Staffing Standards for the Orthopaedic Service of the Medical Subsystem. A description of that procedure will be presented and an analysis of that system will follow.

b. The Orthopaedic Staffing Standard

Much work has been done in the civilian community in an attempt to discover "the" answer for the problem of manpower requirements determination for medical facilities. In their research, Bentley and White (Ref. 104) review the five major techniques used to determine, specifically, physician requirements. The methodology of each is outlined and advantages and disadvantages listed. All of the research and proposed methods may be classified under one or a combination of these five approaches, the SHORSTAMPS program appearing to be a combination of the industrial engineering and the historical approaches. The Navy Medical Department, as one mission area identified under the program, has begun study on many subsystems within the department. Several of these have been completed and many are still in one of the three phases of study. The first subsystem to be completed and approved, the Orthopaedic Service will serve as an example in this discussion (Ref. 105).

The methodology used in development of the staffing standards for the Orthopaedic Service is that specified

in U.S. Navy Manpower Requirements Program, Guide to the Preparation of Staffing Standards, OPNAV 12P-8. The Guide refers to the way in which time-motion studies are to be conducted and analytical tools available for interpreting the studies.

The scope of orthopaedic work covered by the study includes that performed in providing orthopaedic care (inpatient and outpatient care, surgery, casts, and clerical support), work provided in conjunction with rehabilitative treatment (patient evaluation, exercises, electromyograms, and support functions), and orthopaedic care provided not only at hospitals but also outlying dispensaries. The standard assumes two weeks per year for continuing medical education and an additive which provides time for staff physicians to attend and conduct formal training for orthopaedic residents. Areas not covered in the standard include duty time and podiatry and occupational therapy service functions (Ref. 105, pp. 1-1 to 1-2).

The sample of Naval Hospitals (NHs) and Naval Regional Medical Centers (NRMCs) used to conduct the time-motion study consisted of 50% of an arrayed and stratified universe of treatment centers containing at least one orthopaedic surgeon. The arrayed and stratified universe excluded four overseas activities due to travel fund constraints. Four of the five largest treatment centers containing from 9-27 orthopaedic surgeons were consciously included in the survey because of their space limitations and differences in physical layouts. The remainder of the sample was chosen at

random from the stratified universe making a total of 16 hospitals/medical centers sampled out of a universe of 25 (Ref. 105).

The measurement techniques used to gather data consisted of Group Timing Technique (GTT) and Operational Audit. Physician workload was measured by a modified GTT technique where one recorder worked with one physician, supplementing the readings with operational audit when GTT was infeasible or incomplete in measurement. GTT measured a minimum of five days with a maximum of nine days at sites where it was performed. Documents used to extract additional data included:

*BUMED 11010/1 Personnel Loading Plan population (gives a rough figure for catchment population of the medical facility)

*NAVMED 6300/1 Medical Services and Outpatient Morbidity Report (historical inpatient and outpatient workload measured as inpatient admissions and patient days, and outpatient visits)

*BUMEDINST 5450.4C Organizational Manual for Naval Regional Medical Centers and Naval Hospitals (outlines functional responsibilities for care delivered)

*Various local logs and reports.

The dependent variable that the study chooses to describe output is total measured manhours per month required to provide Orthopaedic Services. /It is of some interest to note that manhours is not a real measure of output, but instead, a measure of one input to producing some output. It appears clear that most accepted output measures such as

admission rate, discharge rate, length of inpatient stay, outpatient visits, costs applied, or surgical procedures rendered are manipulable -- but so is manhours per month. Whether manhours per month is a valid output measure will be discussed later in this section.[7]

Prior to statistical analysis, three adjustments were made to the data. First, 1,026 manhours per month were removed from analysis of the National Naval Medical Center, Bethesda, Maryland (331 hours due to the orthopaedic service utilizing their own transcription service as opposed to a centralized pool utilized by all other medical services; 695 hours due to the "unique" services offered such as treatment of members of Congress, Executive Branch, and Diplomatic Corps, as well as functioning as a source of Navy wide and inter-service consultation). No explanation is given for the exclusion of transcription service devoted exclusively to the orthopaedic function from the workload manhours of Bethesda. Those excluded manhours are then treated as additive to the Bethesda equation.

Second, the study recognizes required added manhours by staff physicians in teaching orthopaedic residents. The sites affected were the NRMCs at Bethesda, Oakland, Portsmouth, and San Diego where 346.08, 245.56, 209.15, and 296.00 manhours were removed respectively. These manhours were then treated as additive in those four NRMC equations.

Third, 80 manhours per year are added for each physician considered board eligible or board certified by

the American Academy of Orthopaedic Surgeons to meet the requirements for continuing medical education. Those manhours are additive to the overall equation based on the number of physicians fitting the category.

The variables analyzed during computation of the work center standards included:

X_1 = Patient visits to outpatient clinic

X_2 = Orthopaedic occupied bed days

X_3 = Surgical cases

X_4 = Eligible population

X_5 = Orthopaedic admissions

Source: (Ref. 105, pp. 2-13)

The workload factor having the greatest correlation with total manhours was X_4, Eligible population. Not mentioned in the study is any explanation for so high a correlation of manhours with eligible population, a correlation which varied from .9489 to .9834, depending on the form of the equation chosen for X_4 (Ref. 105, pp. 2-16, Figure 2-2). One conjecture might be that initial physician assignment to various facilities uses an assignment model based on the BUMED 11010/1, Personnel Loading Plan, thus assigning physicians by active duty population in the area. A correlation between manhours (in the form of physicians) assigned will be utilized instead of the implied correlation that manhours needed to render care will be worked. A second reason for the high r value might be the data used. With 16 hospitals and 5 predictors, a high r is not difficult to obtain because of the smaller degrees of freedom.

It is also of interest to note that, except for X_4, eligible population, the four remaining variables used in analysis are manipulable by the physician. The physician can control the number of outpatient visits and their return rate (X_1), the occupied bed days a patient accumulates (X_2), the number of surgical cases (X_3) (particularly in the form of elective surgery) and the number of admissions (X_5) (by deciding whether to treat the patient as an inpatient or an outpatient). Thus, the physician could, theoretically, manipulate the workload (within limits) to justify an inappropriate number of orthopaedic surgeons.

The final equation arrived at utilizes X_4 (eligible population), X_3 (average monthly surgical cases), and X_1 (patient visits to outpatient clinic). The final format is as follows:

$$Y_c = 0.2393\ X_1 + 14.39232\ X_3 + 6.2697\ X_4$$

where Y_c = total physician manhours required. The study gives a step-by-step procedure for applying the equation to a facility. Then, using the physician manhours obtained, how to derive the staffing mix and amount based on the study's staffing table. The staffing table breaks down required manhours into physicians, cast room technicians (by rate), and administrative support needed in the form of clerical and secretarial help (Ref. 105). It is important to note that physician manhours drive the ultimate mix of providers, although the actual methodology of deriving the provider mix

is unclear. The staffing table is presented without explanation.

Final comments on the study deal with the methodology applied. The model hinges on regression analysis of the manhours observed during the site visits. Thus, the actual observations from other time periods may fluctuate to a great extent around the fitted line. For justificaiton of an aggregate amount of orthopaedic manpower, the model seems ideally suited -- as more requirements are laid on the ortho function system-wide more manhours may be needed to complete the work, with more physicians then justified. However, the model is not intended for this use. Instead, it is a method of justifying individual facility staffing. Regression analysis suffers in this type of application because individual facilities may need to be above or below the fitted line of manpower needs due to demographic and geographic influences, the size and condition of the plant (economies and diseconomies of scale), and variation in the quality of care provided by different facilities not being included in the factors influencing the staffing standard. The model also does not reflect actual demand on the individual facilities, only manhours worked which is more of a supply variable. Some sort of variable should have been included in the workload analysis to account for those patients turned away due to overbooking and those referred to CHAMPUS (Civilian Health and Medical Plan for the Uniformed Services) due to nonavailability of services needed. The model does not justify "optimal" health care, only "what is."

The product identified as final output (manhours worked) is actually a measurement of one input in the health care process. It appears not so much indicative of product but, instead, may have been so chosen because of its ease of measurement. Thus, the staffing standards developed for the Orthopaedic Service may be no more reliable or valid than the former method of justification by human judgment.

V. IMPLICATIONS FOR THE MILITARY UTILIZATION OF THE NPP

A. UTILIZATION IMPLICATIONS

1. Preparing the Organization

Based on the literature findings, it appears clear that the civilian sector has recognized that in introducing the NPP into the health care setting there may exist some difficulties. It is not clear that the military sector has recognized this. That this may be due to the uniqueness of the military setting is only a partial answer -- while it is speculated that the other part is a failure to address the same problem experienced in the civilian sector.

An advantage enjoyed by the three Services is that the military NPP is predominantly from "within." The PA is almost exclusively recruited from the enlisted ranks. That the incumbent "knows the system" may offer extreme advantages when introducing him to the other health care team members. This internal recruitment is also practiced to a great extent with the NP. Sex discrimination problems might be lessened due to the higher number of military nurses being male.* Thus, the NP may not be treated as so much of a threat to the male physician role because the nurse role is not so predominantly female. The role threatening effect of competing for the same patients

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*Actual figures were not available although it has been estimated that male nurses may be as high as 20% of the military nurse corps while the civilian nurse sector may be as low as 1% male.

may also be lessened with the military's shortage of physicians. However, even with these advantages over the civilian sector, it appears unlikely that NPP introduction is as uneventful as the lack of military literature would lead one to believe.

The civilian literature has confirmed that the successful introduction of the NPP is largely a function of the supervising physician. If the physician supports the NPP through direct and indirect actions, the introductory phase will be less traumatic. The direct actions must be in the form of staff meetings to clarify the NPP's role, initially introducing the NPP to all patients, and treating the NPP as a professional with a reasonably well defined role. Indirectly, the physician must support the NPP in dealings with physician colleagues. Other office staff should be given the impression that the physician has complete confidence in the NPP's ability to render care.

One further direct action exhibited by the civilian sector physician in support of the NPP is the very act of hiring. This is perhaps the most influential act of all to health care workers and patients. It immediately lets others know that the physician believes in the NPP -- otherwise, why hire? Even the Kaiser HMO settings hire NPPs on the recommendation of the physician (Ref. 95).

This act of commitment is nonexistent in the military health care setting. With no investment in the NPP, it is difficult to generate commitment to the process. Since no

guidance is found for introducing the military NPP and no financial incentive exists, it appears that the successful NPP introduction is largely dependent on the whims of the physician who has no real stake in the matter unless it is an internalized need to help the NPP.

Thus, at the very least, it would appear that military NPP introduction could be enhanced through careful screening of supervising physicians to assure their commitment to the success of the program. Further, specific guidance should be given to the physician on how and why he should show his commitment. Although these steps would not guarantee success, they would surely increase its probability.

2. Enlarging the NPP's functions

Basing any conclusions about function enlargement for the NPP on the basis of the literature reviewed is tenuous at best. Superficially, the military and civilian sector NPPs appear to be doing the same types of tasks. However, this is qualified by a number of "experimental" practice settings reported in this thesis for the civilian sector chosen to show the extent of NPP use. General acceptance of this new wave of practices is not to be implied. However, on the basis of these isolated projects, it appears clear that the military should at least experiment to a greater degree with new modes of practice utilizing the NPP to a much greater extent. The only military sector innovation found in the literature was the utilization of NPs in a chronic care clinic where the NP assumed complete follow-up responsibility for the patient (Ref.

42). Surely there exist other areas of expanded NPP utilization worthy of experimental consideration.

The tenuousness of the civilian literature is further qualified by the interaction of NPP utilization variables that do not exist in the military sector. The most significant difference between the two sectors is the legal status of the NPP. To a great degree the civilian NPP is utilized to the legal extent allowed. Because of legal sanctions and the murky issue of physician liability for the acts of the employed NPP, a relatively conservative approach to the NPP must prevail. More innovative approaches appear to be a function of state laws although this has not been firmly established in the literature or in this thesis. It can only be speculated that this relationship exists. Thus, the military may be following the civilian sector lead with false constraints placed on the delegation of medical tasks to the NPP. If this is the case, further delegation would be in order.

The final implication concerning task delegation flowing from this research is that the extent of delegation seems to also rely on how much the physician is willing to relinquish. Unlike the military sector, the civilian NPP is hired either directly by the physician or on his recommendation. Thus, the physician supervisor has a "stake" in the successful utilization of the employee. Hiring implies either a direct or indirect liability in the form of the NPP's salary. The more the NPP can be utilized, the more cost-effective he becomes. The military sector <u>physician</u> does not have the

direct option of hiring or firing the NPP. Assignment is made by a centralized authority. Since the literature has stressed the relationship between the NPP and the physician as a key indicator to successful utilization, it appears in the military that this is a random arrangement that may or may not be enhancing.

Experience related by Kaiser (Ref. 95) has also shown that the physician may not want enhanced NPP utilization because of the ultimate effects on his own job. If the physician is forced to forego a part of his practice or totally give up his role as a care provider in order to supervise the expanded NPP, he may consider the cost too great. Not all physicians are willing to change role or practice patient mix in order to enhance the NPP's role. Thus, extreme caution must be practiced in widespread expansion of the NPP's tasks. The backlash in the form of physician dissatisfaction and possible attrition must be weighted in any decision of this sort.

3. Satisfiers/Dissatisfiers for the NPP

The civilian and military literature seem to be fairly close to agreement on what serves as satisfiers and dissatisfiers for the NPP. However, these factors vary in their importance from sector to sector.

Of particular concern for the civilian and the military NPP is the future. This concern appears much more evident in the PA than in the NP profession because of the PA's almost

complete dependence on the whims of the physician. The PAs and NPs concern for the future has been demonstrated in their strong feelings about being a professional. They want to be accepted as an entity in their own right, with the NP to date being more successful in breaking away from the physician's dominance. The PA has been less successful because of the unwillingness of physicians to advocate independent licensure or a less subservient status. The military PA suffers even more than his civilian counterpart in this respect due to his lower status (Army and Navy) as a Warrant Officer with less pay, particularly when compared to the commissioned officer status enjoyed by the NP.

Thus, salary in the military appears inverted when compared to the civilian sector. The military NP enjoys considerably more salary than her civilian counterpart while the military PA may be underpaid, compared to his civilian counterpart. The implication for the military sector seems to be the necessity of reassuring the NPP that he is appreciated and has a future. Appreciation could be in the form of more equivalent salary or status, however, appreciation cannot be separated from assurance of a future. If status for the PA is to be increased to the commissioned officer level, an adequate career path must first be developed. Implicit in the literature is the linking of the two needs for both professions.

4. NPP Supervision

The civilian literature is replete with examples of how the NPP is to be supervised -- primarily in an attempt to

satisfy the state laws requiring such supervision. Compared to the military sector, the civilian sector NPP appears to be fettered to a much greater degree by supervision (for example, see Perry, Ref. 29). Whether this difference is totally explained by the legal requirement that does not exist in the military is unclear. However, it must be considered a dominant influence.

Whether this difference in supervision has affected the quality of NPP care has not been addressed in the literature. Surely greater supervision would tend to assure better adherence to some standard of care. But the trade-off would be less care rendered. Such a trade-off would be difficult to quantify in any finite sense. If the assumption can be made that the quality of care rendered is essentially the same in both sectors, the obvious implication is that the states may be too restrictive in requiring supervisory duties above those practiced by the military.

Thus, the overall implication for the military concerning supervision of NPPs is that supervision presently is not as rigid as in the civilian sector and that supervision practiced by the military may be adequate (based on perceptions of the NPPs and the supervisors). This is based on the assumption that care is not compromised in the process. If this is the case, the military sector may be better utilizing the NPP because of less required supervision.

5. Productivity and the mix of NPPs

Productivity research on the NPP appears incomplete

in the literature available. Attempts to measure the substitution potential of NPPs for physicians have met with limited success.

One study has suggested that the NPP can substitute for one-half a physician, so long as the overall ratio of physicians to NPPs remains at 5.6 to 1 (Ref. 33). This has been corroborated by Kaiser in a study which estimated the substitution ratio to be 1:.47 (one NPP equates to .47 physicians). Kaiser's qualifier is much more implicit than an overall physician/NPP ratio -- the maximum substitution depending on the physician's willingness to adapt his health care function to accommodate the NPP. This maximum substitution criteria is further verified by Glenn (Ref. 96) who simulates the productivity of the NPP with the underlying constraint being the physician's willingness to forego his role as a care provider and become a care supervisor/consultant.

With the emphasis in productivity research being primarily on output, little has been said about the quality of care provided. At least one criticism has been made that if the increased volume of patients leads to reduced individual attention or an increase in patient waiting time, the NPP movement becomes self-defeating from the patient's view (Ref. 33).

Thus, the implication for the military sector is that productivity must be weighed against its effects on the patient. If quality can be assured by some maximizing criteria, NPP productivity should be encouraged up to that

level of substitution. Perhaps the maximizing criteria for the military is the same as that found by Kaiser and Glenn -- the willingness of the physician to change his role in response to more supervisory and consultative requirements. If this is the case, the military must find the incentives to the physician that promote such modification of his job.

B. STAFFING IMPLICATIONS

1. Implications of the New Jersey Model

Given the inherent weaknesses of the research methodology which spawned the model and assuming that assumptions used in the study hold for the military, an analogy to the military sector can be drawn. First, it must be assumed that the 24 services used in the study to determine the extent of NPP usefulness also account for 70% of the primary care rendered in the military. Second, the times reported to perform the service under the present and enhanced setting must be assumed to be comparable to the military. Finally, it must be assumed that the military physician will welcome the NPP with as much enthusiasm as the sampled New Jersey physician.

Drawing from Colfack's (Ref. 1, pp. 50-63) description of the makeup of the military physician populace, two versions of the number of physicians rendering primary care can be deduced. First, the services themselves list the following number of physicians devoted to primary care (Table XXV). Table XXV thus shows an aggregate of 2993 physicians devoted to primary care.

Table XXV

Services Listing of Primary Care Physicians

Navy	Army	Air Force
641[a]	1,530[b]	822[c]

a: Flight surgeons, submarine medicine, emergency medicine and is thought to contain general medical officers.

b: General medical officers and flight surgeons

c: General Medical Officers, aerospace medicine, and emergency medicine.

Source: Extracted from Ref. 1, pp. 62-63.

The second method to arrive at the primary care physician-force is to use the categories of physician sampled by the study (Ref. 94, pp. 16-17). When these are extracted from the military physician populace, Table XXVI shows that primary care physicians total 5775 (1483 Navy, 2770 Army, 1522 Air Force).

If the second method is to be accepted as the one more compatible with the New Jersey Study, the military's total primary care physician count of 5775 compares to the study's methodology applying to 5231 New Jersey primary care physicians (Ref. 94, Table 2, p. c7).

Colfack (Ref. 1, pp. 69, 72-75) found that the total number of NPPs in the military was 1637 (NPs 619, PAs 1018). The study found that with 1975 demand for care, the least cost mix of practitioners contained two solutions. If only NPs were allowed to practice (as was the case in New Jersey), 4,294 physicians and 1,158 NPs were required. Allowing PAs brought the number of least cost providers down to 2,557 physicians, 563 NPs and 471 PAs (Ref. 94, pp. 39, 44). If it can be further assumed that military physicians are not utilized in a least cost manner, the total number of required military physicians would drop to 2822, with 621 NPs and 519 PAs. This is calculated as a simple ratio of the original findings of the New Jersey Study (2557 MDs efficient/ 5232 MDs actual = .489). The ratio predicted for NPs/MDs and PAs/MDs are applied to the military physicians to derive the projected needs for military NPs and PAs.

Table XXVI

Military Physicians Devoted to Primary Care
(New Jersey Model Criteria)

Category	Navy*	Army*	Air Force*
General	637[a]	1403	278
Family	230	181	302
OB/GYN	178	186	196
Internal Medicine	221	414	238
Pediatrics	217	271	250
Geriatrics	---	---	---
General Surgery	---	315	258
Osteopathy	---	---	---
Total	1483	2770	1522

*Includes those trained and in training.

[a]Labeled "Primary Care"

Source: Ref. 94, pp. 16-17 and Ref. 1, pp. 54-63.

It is of interest to note the similarities in numbers for MDs and NPs needed for the military using the simplistic assumption of the numbers being in the same ratio. Perhaps not so surprising as initial inspection would imply is the predicted number of PAs being about half the number actually utilized. It must be remembered that the New Jersey physicians surveyed to predict their utilization of PAs had never actually employed them. Thus, their prediction could only be a "best guess." Further, it could be assumed that the lack of legal sanction for the PA might have tempered the physicians' judgment.

2. Implications of the Kaiser Experience

The Kaiser Experience has tended to confirm the findings of Glenn in the respect that the ultimate productivity and substitution of (in this case PAs) NPPs are a function of the physician's desire to modify his role (Ref. 95, pp. 63-65). This modification of role, from care giver to supervisor of care givers, is a major consideration. The ethos of the physician is to heal. If he must forego this aspect of his job to any significant degree, it will be accepted in differing degrees depending on the particular physician. Thus, not all physicians will readily accept the NPP.

The other important aspect of Kaiser's findings is the substitutability of NPPs (PAs only) for physicians. Given that legal and physician preference constraints could be ignored, the study found that the MD/PA substitution ratio was .47 (Ref. 95, p. 44). In other words, using Kaiser costs for

physicians and PAs, the PA could cost-effectively substitute for .47 physicians up to some undefined maximum.

The implications are twofold for the military. First, the military must recognize that increased utilization of NPPs will effect the physician and his role in health care delivery. He will no longer be able to choose the patient morbidity mix that he desires if the NPP is to be used to maximum potential. Second, the substitution of NPPs for physicians will clearly lead to cost savings by reduction of the number of physicians needed.

3. Implications of the Simulation Model

The simulation model deals with the micro issue of the willingness of the physician to utilize the NPP. Not only is this important for the civilian sector, it has equal importance for the military sector. Glenn points out that the physician decides how many NPPs he will utilize in the civilian sector based in large part on his willingness to modify his role in health care delivery toward that of a supervisor instead of solely a care provider (Ref. 96). This deicison to modify his role by the physician ultimately determines the extent of productivity achievable by the NPP and, in the process the type of patient flow to be experienced in the practice.

In the military sector, with central assignment and justification for the NPP, more frustration may result, particularly if the physician does not want to change his role. Whether this leads to more physician dissatisfaction is speculative at best, but appears logical and possible. Therefore

the military physician must be somehow involved in the NPP hiring and assignment process. Further, the physician must understand that working with an NPP (or several NPPs) must affect the physician's role if maximum productivity is to be attained. How the physician is to become involved is beyond the scope of this thesis, but central authority should recognize this obligation if NPP productivity is to be maximized.

VI. SUMMARY AND CONCLUSIONS

A. INTRODUCTION

This section is an attempt to generalize the findings of this thesis. Wherever possible, the implications found for the military sector will be reemphasized. Given that the civilian literature is quite broad in scope but generally "shallow," and the military literature has been sparse, the conclusions reached in this thesis are speculative at best. Perhaps the amount of literature itself leads to a general conclusion that the civilian sector has worried over, segmented, and analyzed the issue to the point of distortion. On the opposite end, until recently the military has devoted scant resources and evidenced little interest in the issue. Thus, the first general conclusion is that the military sector should continue to explore the NPP issue to a greater extent, especially given the lack of legal and practice constraints enjoyed vis-a-vis the civilian sector. The apparent stoicism or disinterest on the military's part which has limited research in this area is particularly distressing behavior in an era of increasing "physician shortages" in the military sector.

B. NPSS UTILIZATION IN THE MILITARY

The literature leads to the conclusion that the NPP is being utilized for the same type of tasks for similar types of patients in the civilian and military sectors. Type of task delegation is defined as acute care for the PA and a

mis of acute, chronic, and preventive (routine check-up) care for the NP.

It is also clear that the military sector enforces less direct supervision on the NPP than practiced in the civilian sector. Whether this is due to the lack of legal requirement for supervision, the lack of a threat of physician liability for the NPP's actions, or the general trend to delegate more responsibility to allied health providers is subject to conjecture.

Productivity of the NPP has not been addressed adequately in the civilian or military sector. In fact, military NPP productivity has drawn on civilian literature when mentioned at all. The conclusion reached in this section is that little has been done to address the productivity of the NPP, particularly when quality of care is emphasized equally with patients per some unit of time. Normally, the literature skirts the issue of quality with assumptions of equality between NPP and physician care. However, it may also be true that at some point on the productive scale, the NPP ceases to deliver the same quality -- becoming, perhaps, counter-productive. This speculative conclusion is based on the education, training, skill and diagnostic differences between NPP and physician. At some point on the productive scale the superior trained physician should be able to deliver higher quality care than the NPP. Some attempt should be made to draw the quality aspects of care into the quantity emphasized productivity measurements.

Finally, it can be concluded that the civilian NPP shares the same types of satisfiers/dissatisfiers with his military counterpart. Both sectors are worried about the future of the profession. The civilian and military PA are both concerned over their absolute dependence on the whims of the physician to assure their future. Thus, both are struggling for recognition as a profession in their own right. Both groups of NPs are concerned over the possibility of having to leave the NP profession in order to advance in nursing. This is true more so for the military NP than for her civilian counterpart, but both groups see the NP profession as somewhat career limiting.

C. STAFFING CONCLUSIONS

The overall conclusion that can be reached from the discussion of the three military and three civilian methodologies, is that only a very general, conceptual framework exists on how to approach the subject of the number of NPPs to utilize. There is, as yet, no agreement on a specific methodology. The framework involves observation of work, cost considerations, and selection of the least-cost mix of providers. This selection process must then consider the constraint of physician preferences.

Of the three specific military approaches discussed, although not all are intended to be staffing determinants, each in some way contributes to the process. The Rand Model appears to be the first rigorous attempt to apply civilian staffing methodology to the military sector. Its weaknesses are that

it is facility specific, fails to account for physician preference, and does not account for team productivity, only patient flow. Yet it is the most realistic approach to the NPP staffing in the military sector to date. SHORSTAMPS focuses on aggregate level staffing for a large population base geographically separate. Its weaknesses lie in the disaggregation of the staffing mix down to the facility level while not accounting for facility differences. Further, it focuses on manhours per month as an output (rather than an input) measure as a justification for "what is." The model does not strive for optimality and fails to consider true demand. The strengths of SHORSTAMPS lie in its time-motion study approach to gathering raw data on workload. Finally, NOTAP is an aggregation of individual responses to determine what really makes up a job. Its weaknesses relate to the form in which the data is collected not being specific enough for time-motion measurement of work and its emphasis on frequency with no measurement of quality. The merits of NOTAP are in its ability to show what is actually being done in terms of tasks performed in each job subset.

The civilian models discussed also manifest a diversity of techniques and approaches to the subject of staffing. The New Jersey Model offers an aggregate approach to staffing for a large populace, geographically separated. Weaknesses of the model lay in the sampling methodology which tends to draw more responses from those physicians supporting the NPP movement than from those not as enthusiastic. Further, it suffers

from the requirement of computer solutions with somewhat sophisticated programming capability. The models' advantages stem from its ability to show optimality -- not just "what is," and its ability to project demand given certain parameters that are fairly easy to determine. Kaiser's approach differs from the New Jersey Model in that it is facility-specific and uses judgment and cost-effectiveness as the determining criteria for task delegation to the NPP. Its weakness is the lack of an explicit upper bound specified for NPP utilization. However, its advantage is the overall pragmatic approach it takes to the issue of NPP utilization and substitution for physicians. Further, it offers the implicit upper bound on NPP utilization as being a function of physician preference. The final civilian methodology discussed tends to support Kaiser's findings that the NPP "upper bound" on utilization is the physician. Glenn shows that the willingness of the physician to evolve in his role from care provider to care supervisor is the key determinant of NPP productivity and substitutability for physicians.

Thus, perhaps the most important factor to be considered when determining a mix of providers is the physician's willingness to <u>allow</u> the mix. With the physician as the primary determinant of NPP success, the issue is crucial.

D. THE MILITARY'S PERSPECTIVE ON THE NPP ISSUE

It appears clear that the military enjoys opportunities for NPP utilization not found in the civilian sector. The

most important of these are the lack of legal constraint and the ability to channel resources by incentives into innovative techniques. First, the military is not hindered by state sanctions on what the NPP can or cannot do or by the amount of supervision required (either by technique that must be employed or by limiting the number of NPPs the physician may supervise). Kaiser estimated that the legal sanctions alone sacrificed 59% of the potential (cost) savings that could be realized with a cost-effective mix of PAs and physicians (because of the legal requirement of a 1:1 PA/MD ratio). It appears clear that without such legal constraints the military is in a much better position to reap the cost savings projected through efficient NPP substitution for physicians. Second, presently the military exacts no "penalty" on the individual health care facilities for the military resources it utilizes. A change in the budgeting structure to make individual commands responsible for the salaries its personnel draw might make the NPP a much more attractive option in provider mix. As Colfack (Ref. 1) has pointed out, the primary incentive to utilize NPPs is the profit potential while caring for more patients. The military has the prerogative to make each facility responsible for the military personnel resources it utilizes in rendering care. Whether this is accomplished through capitation budgeting or some other incentive plan is inconsequential. The fact that it <u>can</u> be done is of importance. If the military facility has the proper incentives to utilize cheaper forms of care, the mix of providers might be

much more cost-effective with increased utilization of NPPs.

Thus, the military is in a much more advantageous position to utilize NPPs. If incentives are given to the physician provider, a much more cost-effective mix of providers may result.

APPENDIX A

Reprinted from Reference 26, Appendix G

TASK ANALYSIS MASTER LIST[1]

Level IV Tasks - Major Task Categories[2]

01 = Direct Patient Care Tasks (Technical); e.g., medical history and physical examinations, screening tests, special procedures, and laboratory tests.

02 = Direct Patient Care Tasks (Non-Technical/Interpersonal); e.g., patient teaching, anticipatory guidance, and telephone advice on minor medical/health problems.

03 = Supportive Tasks; e.g., includes clerical tasks, administrative tasks, educational responsibilities, research activities, and maintenance activities.

99 = No response.

Level III Tasks

01 = Direct patient care (TECHNICAL) tasks; e.g., medical history and physical examinations, screening tests, spinal taps, and laboratory tests. (01)

02 = Direct patient care (Non-Technical or Interpersonal); e.g., anticipatory guidance, telephone advice on minor medical problems, and patient education. (02).

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[1]This master list of tasks was used for the task analysis section of (Ford's) Chapter 4. There are four levels of tasks. Level I Tasks are very specific health care activities. These Level I Tasks were progressively reclassified into broader categories with the largest task category being designated as Level IV Tasks.

[2]Number to left of a task is the 'task identification' number; number to the right of a task relates a lower level task to the next higher level of task classification. For example, "79 = Discharge Summaries (21)" is a Level I Task; the (21) relates this Level I Task to "21 = Documentation of Care (03)" which is a Level II Task; in turn, the (03) relates this Level II Task to "03 = Clerical/Reporting Tasks (03)" which is a Level III Task; finally, the (03) in parentheses relates this Level III Task to "03 = Supportive Tasks" which is a Level IV Task. Level IV Tasks are the largest task categories into which specific Level I Tasks have been aggregated.

03 = Clerical; e.g., discharge summaries, progress notes, charting, and writing orders. (03).

04 = Administrative tasks; e.g., develop policies and procedures for clinic, staff orientation, and staff discipline. (03)

05 = Maintenance activities; e.g., clean equipment, check inventory, and order supplies. (03)

06 = Education; e.g., includes educational responsibilities for staff, students, etc. but excludes patient teaching. (03)

07 = Research; e.g., clinical research, keep statistics, and laboratory research. (03)

99 = No response.

Level II Tasks

01 = History (medical/social/statistical). (01)

02 = Physical examination, general. (01)

03 = Obstetrical/gynecological procedures. (01)

04 = Surgical procedures. (01)

05 = Therapeutic procedures; e.g., catheterization and casting. (01)

06 = Diagnostic screening tests; e.g., visual screening and growth and development testing. (01)

07 = Laboratory tests; e.g., CBC, hematocrit. (01)

08 = Special procedures; e.g., sigmoidoscopy, lumbar puncture, and x-ray. (01)

09 = Initial (preliminary) diagnosis of problem and development of a treatment regime. (01)

10 = Hospital rounds. (01)

11 = Giving medication. (01)

12 = "On-Call" for physician; e.g., take on-call for physician; act in place of physician (home visits, nursing home). (01)

13 = Autopsies. (01)

14 = Operat technical equipment directly attached to patient; e.g., monitor by-pass pump. (01)

15 = Development and/or carrying out of regime for chronically ill patients; includes follow-up care for chronic illness. (01)

16 = Psychological/psychiatric evaluation and emotional support activities. (02)

17 = Health maintenance activities; e.g., anticipatory guidance, counseling on diet, child care, patient teaching, and patient advocate role. (02)

18 = Other non-technical patient services; e.g., taking patient to room. (02)

19 = Referral activities. (02)

20 = Extra category for coders; not used. (02)

21 = Documentation of care; e.g., progress notes. (03)

22 = Writing orders. (03)

23 = Writing prescriptions. (03)

24 = Completing "forms"; e.g., insurance forms, and letter writing. (03)

25 = Extra category for coders; not used. (03)

26 = Staff supervision. (04)

27 = Colleague collaboration and conferences. (04)

28 = Coordination activities - out of office care. (04)

29 = Coordination activities - in office services. (04)

30 = Extra category for coders; not used. (04)

31 = Inventory/supply activities. (05)

32 = Equipment maintenance. (05)

33 = Extra category for coders; not used. (05)

34 = Resource person for other staff members. (06)

35 = Academic teaching activities. (06)

36 = Personal continuing education activities; including seminars and reading journals. (06)

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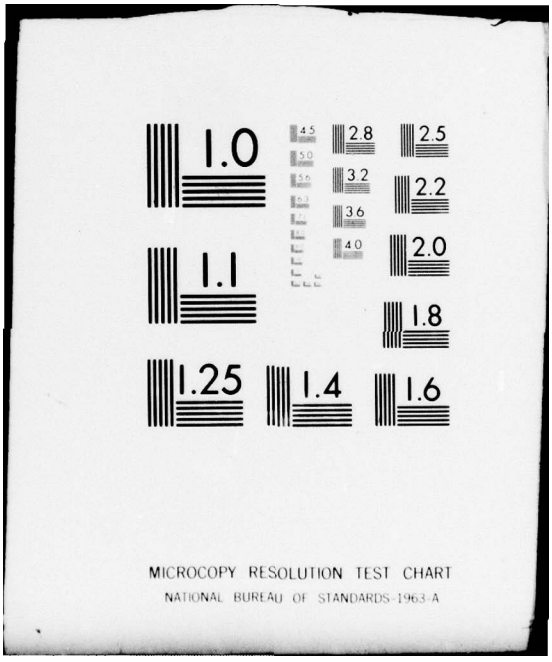
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37 = In-service education activities. (06)

38 = Extra category for coders; not used. (06)

39 = Extra category for coders; not used. (06)

40 = Clinical research. (07)

41 = Academic research. (07)

Level I Tasks - Most Detailed Task Specification

01 = Physical examination (COMPLETE); e.g., specified used inspection, palpation, auscultation, percussion and/or did not specify that physical exam was a partial one. (02)

02 = Physical examination (PARTIAL); specified that exam was partial, interval, episodic. (02)

03 = Complete obstetrical/gynecological exam; specified breast check, pelvic exam. (02)

04 = Partial obstetrical/bynecological exam; e.g., prenatal check or postnatal follow-up, and pap smear. (02)

05 = Pre- or post-operative physical exam. (02)

06 = Vital signs; e.g., temperature, pulse, respiration, height, weight, blood pressure. (02)

07 = Order laboratory tests. (22)

08 = Obtain laboratory specimens; e.g., draw blood, collect urine, and obtain naso-gastric washings. (07)

09 = Perform general laboratory tests; e.g., throat culture, CBC, blood studies, hematocrit (Hct), and urinalysis. (07)

10 = Perform specialized laboratory tests such as pulmonary function studies and pathological tissue examination. (07)

11 = Interpret general laboratory tests. (07)

12 = Interpret specialized laboratory tests. (07)

13 = Order radiological (x-ray) exams. (22)

14 = Perform radiological exams. (08)

15 = Interpret radiological exams. (08)

16 = Order diagnostic screening tests such as visual exam, hearing exam, EKG, EEG, tonometry and otoscopic exam. (22)

17 = Perform diagnostic screening tests. (06)

18 = Interpret diagnostic screening tests. (06)

19 = Administer oral medication. (11)

20 = Administer injections and immunizations. (11)

21 = Administer general IVs (intraveneous feedings, medications, etc.). (11)

22 = Administer blood. (11)

23 = Order any drugs needed for patient. (23)

24 = Order any drug EXCEPT NARCOTICS. (23)

25 = Develop care plan for patient. (09)

26 = Treat minor illnesses. (09)

27 = Perform minor treatment procedures such as ear lavage, eye lavage. (05)

28 = Perform intermediate treatment procedures such as casting, setting up traction, catheterization, and use of air splints. (05)

29 = Cleanse, debride, and dress minor wounds. (05)

30 = Treat minor burns. (05)

31 = Suture minor wounds. (04)

32 = Emergency care, general. (09)

33 = Perform external cardiac massage. (09)

34 = Perform emergency tracheotomy. (04)

35 = Perform venous cut-down. (04)

36 = Prep (shave) patient for surgery. (04)

37 = Assist with anesthesia. (04)
*(If Obstetrical anesthesia, then (03)).

38 = Perform local anesthesia. (04)
* (If Obstetrical anesthesia, then (03)).

39 = Perform spinal (epidural) anesthesia. (04)
* (If obstetrical anesthesia, then (03)).

40 = Perform general anesthesia. (04)
* (If obstetrical anesthesia, then (03)).

41 = Perform intubation (endo-tracheal tube). (04)

42 = First assist in surgery. (04)

43 = Closure of surgical incisions. (04)

44 = Cadaver surgery (for organ transplants or for autopsies). (04)

45 = Run cardio-pulmonary by-pass machine. (14)

46 = Run kidney dialysis machine. (14)

47 = Administer and interpret EKG tracings. (06)

48 = Perform rectal exam or proctoscopy. (08)

49 = Perform sigmoidoscopy. (08)

50 = Perform needle thoracentesis/paracentesis. (08)

51 = Perform spinal taps, lumbar punctures, or bone marrow aspirations. (08)

52 = Deliver normal pregnancy. (03)

53 = Provide total maternity care, pre- and postpartum. (03)

54 = Use forceps for delivery. (03)

55 = Perform and repair episiotomy. (03)

56 = Hospital or home postpartum care. (03)

57 = Instruct in use of contraceptive techniques. (17)

58 = Insert IUD (intra-uterine device). (03)

59 = Teach prenatal classes in Lamaze. (17)

60 = Patient teaching regarding patient disease, treatment, and preventive care.

61 = Guidance and counseling activities such as marriage counseling, parent-child problems. (16)

62 = Nutritional counseling for infants, children, and obesity problems. (17)

63 = Provide emotional support for patient and family. (16)

64 = Group counseling or therapy. (16)

65 = Telephone/minor medical advice. (09)

66 = Telephone/growth and development advice. (17)

67 = Home visits, minor illnesses. (12)

68 = Home visits, chronic illnesses. (12)

69 = Arrange for care in nursing home or extended care facility. (28)

70 = Provide care in nursing home or extended care facility. (12)

71 = Academic administrative duties. (26)

72 = Nursing service administrative duties. (26)

73 = Office manager/hospital unit manager. (26)

74 = Patient-centered research. (40) or (41)

75 = Technical laboratory-oriented research. (40) or (41)

76 = Arrange for hospital admissions. (28)

77 = General charting. (21)

78 = Progress notes. (21)

79 = Discharge summaries. (21)

80 = Referrals to other physicians. (19)

81 = Referral to other community agencies. (19)

82 = Take telephone appointments for patients to see physician, schedule treatments. (29)

83 = "Escort patient" to examining room, prepare patient for examination. (18)

84 = Set-up equipment, rooms, etc., after patient use. (32)

85 = Clean-up equipment, and room. (32)

86 = Order supplies. (31)

87 = Treat chronic illnesses. (15)

88 = Other minor surgical procedures; e.g., circumcision. (04)

89 = General follow-up care. (15)

98 = No further specification.

99 = No response.

APPENDIX B

Table 2
Percentage of distribution of presenting morbidities by provider

Presenting morbidities	Physician assistant	Internist					
		I	II	III	IV	V	VI
Burns and traumatic injuries to body	27.3	2.2	4.9	2.6	2.8	1.8	2.1
Diseases of the skin	26.8	4.1	2.4	4.1	4.2	2.4	1.7
Diseases of bones, joints and muscles	10.2	5.1	9.1	4.1	5.6	5.1	9.3
Diseases of the respiratory system	10.2	11.7	7.9	13.4	12.6	6.9	9.7
Symptoms of undiagnosed disease	6.0	9.5	10.6	11.9	14.0	13.4	9.3
Preventive medical services	4.2	18.3	22.7	22.2	17.8	23.3	24.5
Diseases of genitourinary system	3.2	3.2	1.2	1.5	1.4	3.9	3.0
Diseases of the ear	2.3	0.9	1.2	2.1	0.4	0.6	2.9
Rheumatic fever and heart disease	2.3	9.5	8.8	3.6	1.1	6.3	1.7
Other micro-organism infections	1.8	1.3	0.3	0.5	0.7	1.5	2.5
Diseases of the eye	0.9	0.3	0.6		2.1	0.9	0.4
Allergic conditions	0.9	2.2	3.3	2.1	0.7	1.8	4.2
Common viral infections	0.5	1.9		2.1	0.4	0.9	3.8
Malignant neoplasms	0.5	6.6	4.6	0.5		5.1	1.7
Emotional disorders, including diseases with emotional component without significant organic manifestation	0.5	4.4	6.1	10.8	11.9	6.3	5.1
Diseases of digestive system	0.5	8.2	3.9	3.6	4.2	3.0	5.1
Venereal diseases		0.6				3.9	
Endocrine disorders		2.5	0.6	5.2	1.8	1.8	1.3
Obesity		2.2	1.2		1.4	2.4	0.8
Anemias and other diseases of blood-forming organs		1.6	0.9	1.0	2.5		
Organic diseases of central nervous system			7.6	1.0	1.4	1.2	2.1
Diseases of arteries and veins		0.3	0.3	3.1	3.8		3.0
Diseases of female genitals		0.9	1.2		2.5	3.3	2.5
Adverse effects of chemicals, drugs, and physical agents		1.9		2.6	2.8	0.9	0.8
Other	1.9	0.6	0.6	2.0	3.9	3.3	2.5
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Reference 30, p. 210.

APPENDIX C
Reprinted from Ref. 32, pp. 106-109

Table 3
Productivity Results for the NPP - Adult Medicine

Category of Complaint	Patient Contact Units Required Per Visit	Weekly Total Patient Contact Units for Physicians Only Delivery Mode	1st	2nd	3rd	4th
Chronic illness	2	394	160 (20) 140	55 (5) 46	73 (10) 49	
	3	144		25 19	87 56	
Acute illness	1	38				26 (7) 18
	2	38				24 14
	3	58				25 14
Subacute illness	1	33				22 (5) 14
Miscellaneous	2	29				13 8
	3	43				14 8

Table 3
Productivity Results for the NPP
Adult Medicine
(continued)

Miscellaneous	1	19				7	3, 5
	2	29				7	5
	3	43				9	5
Checkup	2	67		80	10, 67		
Trauma	1	5				6	2, 4
	2	10				8	5
Psychological	2	10					
Total		960					
Net savings in physician time units			120	117	94	83	

*120 patient contact units take half-time for one internist.

Table 4
Productivity Results for the NPP
Pediatric Service

Category of Complaint	Patient Contact Units Required Per Visit	Weekly Total Patient Contact Units for Physicians Only Delivery Mode	Physician Assistants				
			1st	2nd	3rd	4th	
Chronic illness	2	59				45	6 29
Acute illness	1	95		36 29	20 15	8	3 5
	2	213		55 43	53 36	11	7
	3	89		13 9	32 20	8	5
Subacute illness	1	35				21	5 12

Table 4
Productivity Results for the NPP
Pediatric Service
(continued)

Category of Complaint	Patient Contact Units Required Per Visit	Weekly Total Patient Contact Units for Physicians Only Delivery Mode	Physician Assistants 1st	2nd	3rd	4th
	2	59				37 20
Miscellaneous	1	53				30 4 19
Checkup	1	154	130 20 115	45 5 39		
Trauma	2	35	30 26	11 9		
	1	35			40 6 27	
	2	12			15 9	
Total[b]		839				
Net saving in physician time units			121	111	91	79

[a]120 patient contact units take half-time for one pediatrician.

[b]Total of 839 differs from 120 x 7 = 840 due to rounding.

APPENDIX D

Reprint of Ref. R-100, Appendix C, pp. C-3 to C-9

Table C-1

General Medical Clinics
Patient Contact Time by Practitioner Team
Robins AFB - 12-25 June 1974
Any Hard Diagnosis - First Visit

	TIME IN MINUTES				#	SALARY COST INDEX	
TEAM	MD	PA	NU	CP	OF CASES	WITHOUT MD REFERRAL	WITH MD REFERRAL
MD	8.6				12	4.8	4.8
MD + PA	7.5	7.3			1[a]	5.1	5.1
MD + NU	10.8		4.3		12	6.7	6.7
MD + CP	5.6			4.2	9	3.5	3.5
PA		6.8			9	.9	5.7
PA + NU		10.2	3.3		6	1.9	6.7
PA + CP		6.2		1.5	1[a]	1.0	5.7
NU + CP			1.5	3.9	5	.7	5.4
CP				8.5	7	.9	5.7

[a]Not used for analysis; times shown are from "Any Intermediate-Intermediate-Intermediate" Group.

Table C-2

General Medical Clinics
Patient Contact Time by Practitioner Team
Robins AFB - 12-25 June 1974
Any Intermediate-Intermediate-Intermediate Diagnos - First Visit

TEAM	TIME IN MINUTES MD	PA	NU	CP	# OF CASES	SALARY COST INDEX WITHOUT MD REFERRAL	SALARY COST INDEX WITH MD REFERRAL
MD	10.5				30	5.8	5.8
MD + PA	7.5	7.3			5	5.1	5.1
MD + NU	10.3		2.4		8	6.1	6.1
MD + CP	5.6			4.4	31	3.6	3.6
PA		7.6			24	1.0	6.8
PA + NU		7.0	2.0		11	1.3	7.1
PA + CP		6.2		1.5	7	1.0	6.8
NU + CP			2.0	4.4	10	.8	6.6
CP				7.6	25	.8	6.6

Table C-3

General Medical Clinics
Patient Contact Time by Practitioner Team
Robins AFB - 12-25 June 1974
Any Easy-Intermediate-Intermediate Diagnosis - First Visit

TEAM	TIME IN MINUTES MD	PA	NU	CP	# OF CASES	SALARY COST INDEX WITHOUT MD REFERRAL	WITH MD REFERRAL
MC	4.4				8	2.4	2.4
MD + PA	7.5	7.3			1[a]	5.1	5.1
MD + NU	15.8		3.0		3	9.3	9.3
MD + CP	9.9			2.9	7	5.8	5.8
PA		8.7			9	1.1	3.6
PA + NU		10.1	2.8		5	1.8	4.2
PA + CP		5.3		4.7	4	1.2	3.6
NU + CP			2.1	5.4	2[b]	.9	3.4
CP				7.0	21	.7	3.2

[a]Note used for analysis; times shown are from "Any Intermediate-Intermediate-Intermediate Group.

[b]Not used for anlaysis; times shown are from "Any Easy-Easy-Easy" Group.

Table C-4

General Medical Clinics
Patient Contact Time by Practitioner Team
Robins AFB - 12-25 June 1974
Any Easy-Easy-Easy Diagnosis - First Visit

TEAM	TIME IN MINUTES MD	PA	NU	CP	# OF CASES	SALARY COST INDEX WITHOUT MD REFERRAL	WITH MD REFERRAL
MD	6.6				40	3.7	3.7
MD + PA	3.9	6.3			5	3.0	3.0
MD + NU	5.1		3.3		12	3.4	3.4
MD + CP	8.6			6.4	43	5.4	5.4
PA		7.9			24	1.0	4.7
PA + NU		7.6	2.1		15	1.4	5.0
PA + CP		10.5		6.0	13	2.0	5.7
NU + CP			2.1	5.4	15	.9	4.6
CP				9.0	131	.9	4.6

Table C-5

General Medical Clinics
Patient Contact Time by Practitioner Team
Robins AFB - 12-25 June 1974
Return Visits - MD Usually Required

TEAM	TIME IN MINUTES MD	PA	NU	CP	# OF CASES	SALARY COST INDEX WITHOUT MD REFERRAL	WITH MD REFERRAL
MD	10.0				62	5.6	5.6
MD + PA	8.1	5.8			8	5.3	5.3
MD + NU	13.0		2.6		50	7.7	7.7
MD + CP	7.5			4.3	16	4.6	4.6
PA		12.1			11	1.6	7.1
PA + NU		10.1	2.2		9	1.7	7.2
PA + CP					-	-	-
NU					-	-	-
CP				9.4	4	1.0	6.5

Table C-6

General Medical Clinics
Patient Contact Time by Practitioner Team
Robins AFB - 12-25 June 1974
Return Visits - MD Usually Not Required

TEAM	TIME IN MINUTES MD	PA	NU	CP	# OF CASES	SALARY COST INDEX WITHOUT MD REFERRAL
MD	9.5				45	5.3
MD + PA	12.0	10.0			8	8.0
MD + NU	9.8		2.3		37	5.8
MD + CP	5.6			4.3	40	3.6
PA		9.9			35	1.3
PA + NU		13.4	2.9		17	2.2
PA + CP		5.5		3.5	8	1.1
NU			3.3		7	.6
CP				6.8	59	.7

Table C-7

General Medical Clinics
Patient Contact Time by Practitioner Team
Robins AFB - 12-25 June 1974
Physical Exams

	TIME IN MINUTES		# OF CASES	SALARY COST INDEX
TEAM	MD	CP		
MD + CP				
Well Adult Exam	13.7	1.4	5	7.8
Flight Physical	5.9	28.9	16	5.8
Other	8.7	6.9	8	5.6
CP				
Other		5.6	7	.6

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