A Method of Estimating Physician Requirements

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This article describes and applies a method of estimating physician requirements for the United States based on physician utilization rates of members of two comprehensive prepaid plans of medical care providing first-dollar coverage for practically all physician services. The plan members' physician utilization rates by age and sex and by field of specialty of the physician were extrapolated to the entire population of the United States. On the basis of data for 1966, it was found that 34 percent more physicians than were available would have been required to give the entire population the amount and type of care received by the plan members. The "shortage" of primary care physicians (general practice, internal medicine, and pediatrics combined) was found to be considerably greater than of physicians in the surgical specialties taken together (41 percent as compared to 21 percent). The paper discusses in detail the various assumptions underlying this method and stresses the need for careful evaluation of all methods of estimating physician requirements.

Introduction

How many physicians do we need in the United States to provide adequate medical care to the entire population? There is obviously no single, scientific answer since the number required depends entirely on how we define "adequate care." The best that can be done, therefore, is to use different methods for estimating current and future needs for physicians. In the end, the decision of planners depends on how much of our limited resources should be spent on physician services as against other pressing needs, such as education, housing, and nutrition.

Professor Herbert E. Klarman (1969) has classified the various methods used for estimating current and future physician requirements into three broad groups. The simplest and most frequently used method is to select a physician-to-population ratio of an area where the supply of physician services is deemed to be adequate. Examples of this approach or variations of it are the report of the President's Committee on Health Needs of the Nation (1953) and the Bane Committee Report (1959). The main limitation of this method

is that the selection of any given physician-to-population ratio is completely arbitrary. In addition, it assumes that the staffing pattern implied by the ratio will provide adequate care.

A second method is the professional-standards approach. This involves, to quote Klarman (1969:362), "(a) determining the frequency or occurrence of illnesses in the nation's population . . .; (b) gathering a consensus among experts regarding the number of services required to treat and diagnose a given illness; (c) estimating the number of services rendered per hour by a provider; and (d) securing agreement on the average number of hours that a provider spends per year in caring for patients." The classic Lee-Jones study (1933) is the best-known example of this method. A more recent study using this approach is that by Schonfield, Heston, and Falk (1972) of the number of physicians required for good primary care. It is of interest to note that this method tends to result in very high estimates of physician requirements. For example, Schonfield, Heston, and Falk estimated that on the basis of data for the late 1960s, 133 primary physicians (internists and pediatricians) per 100,000 population would be required for good primary care, compared to less than half this number available at that time. Their high estimate may to some extent be due to the fact that the clinical judgments regarding the kind of care required were made by 24 pediatricians and 44 internists who were members of the clinical faculty at Yale-New Haven Medical Center. The possibility that their university affiliation and the relative abundance of physicians in their geographical area may have resulted in high estimates should certainly be borne in mind.

Finally, there are a number of economic methods for estimating and projecting physician requirements. Very briefly, they take account of variables such as price, income, health insurance, and various demographic and socioeconomic characteristics of the population which affect physician utilization. On the basis of projected changes in these variables, physician requirements are then calculated. Thus, the validity of the projected physician requirement is dependent on the success with which the magnitude and direction of changes in these variables has been quantified. A good example of this approach is Rashi Fein's *The Doctor Shortage* (1967).

There is yet another method which, though mentioned briefly by Klarman (who groups it with the professional-standards method), has been used very rarely. This is to estimate the number of physicians who would be required on a national basis to provide the

amount and type of services provided to members of a comprehensive health insurance plan. Professor Carl S. Stevens (1971) used this method, basing his physician estimates on utilization rates of members of the Kaiser-Portland comprehensive prepaid plan of medical care and on output rates by Kaiser-Portland physicians in 1967. His method is somewhat cumbersome, since he did not have utilization data for physician hospital visits. Nevertheless, it is a pioneering study in this field. He concluded that, in 1967, the U.S. physician supply was more than adequate to provide Kaiser-type care to the nation as a whole.

Our method, like that of Stevens, is based on physician-utilization rates of persons covered by a comprehensive prepaid plan of medical care.[1] It requires fewer assumptions than that of Stevens, since we have data not only on physician office visits but also on physician hospital services. In addition, we also have data on visits by field of specialty of the physician. In the following pages, our method will be described and our findings presented and evaluated. We hope that this article will also illustrate the extreme complexity of making estimates of physician requirements and the need for constantly keeping in mind the limitations of and assumptions underlying any given estimate. This is true of all methods of estimating the number of physicians required to provide adequate care to all. As regards our method of estimating physician requirements based on the utilization rates of a specific group, what has to be borne in mind is the great diversity of utilization patterns of different groups. An illustration of this diversity is shown in Table 3. If the method is to be used more widely, we need additional studies of the reasons which lie behind these differences in physician-utilization patterns. Studies of such differences would have to take account of the demographic, economic, and social characteristics of the different groups; of the characteristics of the providers, such as amount of time spent on patient care; and of the characteristics of the particular medical care plans such as services covered, administrative problems, and barriers to access to care. Such studies would provide planning officials with some additional insights into factors to be considered when choosing among estimates of physician requirements based on utilization patterns of specific populations.

[1]The methodology was originally proposed by Professor Melvin W. Reder in an unpublished paper in 1968.

Methodology

Our estimate of physician requirements is based on physician-utilization rates of two groups of persons covered by comprehensive prepaid plans of medical care which provided unlimited first-dollar coverage for almost all physician services in and out of the hospital. The first group, all under 65 years of age, consists of Stanford University staff and their dependents in 1966, the second of residents of two retirement centers for persons aged 65 and over in 1965 (Scitovsky and Snyder, 1972; 1975). Both groups received physician services and outpatient ancillary services under their plans from physicians at the Palo Alto Medical Clinic (PAMC), a large multispecialty group practice in Palo Alto, California, which operates about 85 percent on a fee-for-service basis. Details of the age-sex distribution of our study population (4,335 members) and of the U.S. population in 1966 are given in Appendix Table A. As the table indicates, our study population contained a larger proportion of women and a smaller proportion of persons in the 19–24 year age group than did the national population. In addition, males 65 years and over are underrepresented in our population, and our 65 years and over population is older than that of the United States in 1966. However, since our method of estimating physician requirements neutralizes these differences, they do not affect our calculations.

Very briefly, our method assumes that if a given age-sex group of our study population used x percent of the total annual number of physician visits in a particular field of specialty at the PAMC in 1966, this group required x percent of the total number of physicians in that field of specialty at the PAMC in that year. We then extrapolated these physician requirements for each age-sex cell and each field of specialty to the United States as a whole, using the national age-sex distribution. Summing up these estimated requirements of all age-sex cells for each field of specialty gave us an estimate of the total number of physicians, by field of specialty, required to give PAMC-type care to the total population of the United States. The various assumptions underlying this method will be discussed later on in the paper.

The method can be described in more detail by the following formulas. Let:

k = field of specialty of physician (15 cells)

i = sex of patient (2 cells)

j = age of patient (10 cells)

n_{ijk} = total annual number of physician visits by study plan members in age-sex cell ij to PAMC physicians in specialty k

N_k = total annual number of physician visits by all PAMC patients to PAMC physicians in specialty k

d_k = number of PAMC physicians in specialty k (annual full-time equivalent)

d_{ijk} = number of PAMC physicians required in specialty k to give study plan members in cell ij the services they received (i.e., n_{ijk})

D_{ijk} = number of physicians required in specialty k to give the entire U.S. population in cell ij the services received by study plan members in this cell from physicians in specialty k

D_k = number of physicians in specialty k required to give the entire U.S. population the services received by study plan members from physicians in specialty k

p_{ij} = number of study plan members in cell ij

P_{ij} = U.S. population in cell ij

Then:

$$d_{ijk} = \frac{n_{ijk}}{N_k} \times d_k \qquad [1]$$

$$D_{ijk} = d_{ijk} \times \frac{P_{ij}}{p_{ij}} \qquad [2]$$

$$D_k = \sum_{i=1}^{2} \sum_{j=1}^{10} D_{ijk} \qquad [3]$$

$$D_T = \sum_{k=1}^{15} D_k \qquad [4]$$

TABLE 1

Number of Physicians in Patient Care (in thousands) in the U.S., by Field of Specialty, 1966, and Number of Physicians, by Field of Specialty, Required to Provide PAMC-Type Care to the U.S. Population, 1966

Fields of Specialty	*Number of Physicians, U.S.*[a]	*Number of Physicians Required*	*Physician Shortage (Excess)*
Total, specialties listed	217	290	73
General practice	70	21	(49)
Medical specialties	59	161	102
Allergy	1	9	8
Dermatology	3	10	7
Internal medicine	40	101	61
Pediatrics	15	41	26
Surgical specialties	77	93	16
General surgery	30	15	(15)
Neurological surgery	2	2	0
Obstetrics and gynecology	17	16	(1)
Ophthalmology	9	20	11
Orthopedic surgery	8	15	7
Otolaryngology	5	11	6
Plastic surgery	1	6	5
Urology	5	8	3
Other specialties	11	15	4
Radiology	10	11	1
Neurology	2	4	2
General practice and medical specialties	129	182	53
Primary care: GPs, internists, and pediatricians	125	163	38

NOTE: Items may not add up to totals because of rounding.

[a]Numbers refer to federal and non-federal physicians in patient care. Data are from American Medical Association (1967). For details and specialties omitted in the above list, refer to Appendix Table B.

Thus D_T is the number of physicians required in all of the specialties to give the entire U.S. population the amount and type of care received by our study population.

Findings

Table 1 shows the estimated number of physicians which would have been required in 1966 to give the entire U.S. population the amount and type of care received by our study population, by the fields of specialty for which we have data.[2] It also shows the total number of

[2]The major fields of specialty for which we did not have utilization data are psychiatry, anesthesia, and pathology. For details on their total number in the U.S. in 1966, refer to Appendix Table B.

federal and non-federal physicians in patient care available in the United States in 1966 for the same fields of specialty, and the "shortage" or "excess" indicated by our estimates. As can be seen from the table, almost 290,000 physicians would have been required, as against the 217,000 actually available for patient care. This is 34 percent more physicians than were available at the time. The table also shows that the "shortage" was least in the surgical specialties, where it amounted to 21 percent. In the case of general surgery, we even found an "excess," our estimates showing the need for half as many general surgeons as were available. In other words, the "shortage" we found for the surgical specialties is entirely in the subspecialties. This is undoubtedly due to the high degree of specialization at the PAMC, where subspecialist surgeons perform some of the procedures carried out by general surgeons in other practice settings.

We found the largest "shortage"—173 percent—in the medical specialties. However, again because of the high degree of specialization at the PAMC, which has few general practitioners on its staff, we found an "excess" of the latter (over three times as many as were available). If we include general practitioners with the medical specialties, the "shortage" in that field becomes 41 percent. The "shortage" of primary physicians (general practitioners, internists, and pediatricians) came to 30 percent. As in the case of the surgical subspecialties, the highly specialized staffing pattern of the PAMC is also the main reason for some of the rather substantial "shortages" we found in some of the medical specialties.[3] For example, at the PAMC a patient with a skin disorder will always be treated by a dermatologist rather than a general practitioner or an internist as might be the case in another practice setting. Similarly, pediatricians do not perform even minor surgical procedures such as setting a broken limb but send the patient to an orthopedic surgeon. Table 2 shows the distribution of physicians by field of specialty in the United States as compared to that of the PAMC.

Except for the magnitude of our estimates, our findings that the "shortage" of physicians is greater in the medical than in the surgical specialties is not surprising. Actually, some recent studies (Fuchs et

[3]Another possible reason for some of the rather large "shortages" we found in a few of the medical and surgical subspecialties may be the small number of observations we had for some age-sex cells for these subspecialties. A few heavy users may have a considerable impact on our estimates for these subspecialties.

TABLE 2
Percentage Distribution of Physicians in Patient Care by Field of Specialty, U.S. and PAMC, 1966

Fields of Specialty	*U.S.*[a]	*PAMC*[b]
Total, specialties listed	100.0 (N = 216,773)	100.0 (N = 74.80)
General practice	32.1	8.5
Medical specialties	27.3	48.2
Allergy	0.4	2.7
Dermatology	1.6	2.7
Internal medicine	18.3	33.5
Pediatrics	6.9	9.4
Surgical specialties	35.3	37.3
General surgery	13.8	8.0
Neurological surgery	0.9	1.3
Obstetrics and gynecology	7.8	7.4
Ophthalmology	3.9	5.3
Orthopedic surgery	3.6	6.9
Otolaryngology	2.4	3.7
Plastic surgery	0.5	2.0
Urology	2.3	2.7
Other specialties	5.3	6.0
Radiology	4.4	3.6
Neurology	0.8	2.4

NOTE: Items may not add up to totals because of rounding.

[a]Numbers refer to federal and non-federal physicians in patient care. Data are from American Medical Association (1967). For details and specialties omitted in the above list, refer to Appendix Table B.

[b]Personal communication. Number refers to full-time equivalents.

al., 1972) seem to indicate that, if anything, we may have a surplus of surgeons.

The main reason for the very substantial "shortage" of physicians we found is that our estimates are based on physician-utilization rates of middle- to upper-middle-class persons who had first-dollar coverage for almost all physician services. Additional factors which may also have contributed to the magnitude of our figures will be discussed below. Thus our estimates should be regarded very much in the upper range of physician requirements. We also want to stress that we do not think that such a large number of physicians, and especially of specialists, would have been desirable in 1966. We shall return to this point later.

Discussion

Except for two factors, the assumptions underlying our methodology as well as the data used tend to result in high estimates of physician requirements. The first factor which may have led to some underestimate is that members of our study population probably used at least some out-of-plan physician services. We have no data on such out-of-plan use. We doubt, however, that it amounted to much in view of the very broad coverage of the plan and the fact that all physician services were received at no cost to the patient. Thus any underestimate on this score must be negligible.

The second factor which might have led to an understatement of physician requirements is our assumption that there were no constraints to physician use on the provider side. According to PAMC officials, while the PAMC staff was almost fully utilized during the period studied, there were no unduly long waiting periods for obtaining appointments. Likewise patients did not have long waits in the physicians' waiting rooms. Thus our assumption that there were no constraints on the supply side seems to have been reasonable and not to have led to any underestimate of physician requirements.

To turn to the assumptions in our calculation that make (or may make) for high estimates of physician requirements, one of the most important is the basic assumption underlying our estimates that our study population used the same "mix" of physician services as all PAMC patients. We have no detailed utilization data for fee-for-service PAMC patients, who form the vast majority of all patients. However, comparing the total dollar value of physician services received by our study population (calculated from their PAMC bills) with gross PAMC receipts for all physician services in 1966, our study population's share of total PAMC receipts was smaller than its share of total PAMC physician services. Thus it seems that our study population used somewhat less expensive and presumably (though not necessarily) less time-consuming physician services than all PAMC patients. This factor alone may have led to an overestimate of physician requirements of up to 20 percent.

Another assumption we had to make is that the "mix" of complaints and illnesses for which our study population sought physician care was the same as that for the population as a whole. While we have some data on diagnoses for our study population, there are no comparable national data. It is impossible to say whether this as-

sumption caused an under- or an overstatement of physician requirements on a national basis.

Furthermore, we assumed that, given free physician services and ready access to them, the U.S. population as a whole would have used the same type and amount of services as our study population. This assumption is unrealistic on two counts. For one thing, it is highly probable that the plans, because of their liberal benefits, attracted a disproportionate share of high users. For another, most of our study population consisted of white, middle-class persons, a high proportion of whom also were highly educated and presumably sophisticated users of medical care.

In Table 3 we have brought together data on the per capita number of all physician visits and of office visits by age group for our study population and some other groups for whom data were available. Only H.I.P. had data for all physician visits. As can be seen, the per capita number of all physician visits of our study population as a whole was 7.0 per year as against 4.6 for H.I.P. members, or 52 percent higher. Taking office visits only, our study population as a whole had 5.9 visits per year as against 3.9 for H.I.P. members, 3.1 for the U.S. population as a whole (3.5 visits if hospital clinic and emergency room visits are included), and 2.8 for Kaiser-Portland members (3.0 if emergency visits are included). This means our group as a whole used on the average about 50 percent more physician office services than H.I.P. members, 90 percent (or about 70 percent, if hospital outpatient visits are included) more than the U.S. population as a whole, and over twice as many as Kaiser-Portland members.

The differences between the physician-utilization rates of our study population and the rates of the other groups for whom data are available are especially striking for the 65 years and over age group. As Table 3 shows, this group used almost twice the per capita number of all physician visits per year as did H.I.P. members in the same age group (16.4 visits per person per year for members of our group as against 8.4 visits for H.I.P. members). Yet, as a comparison of office visits by the different groups shows, H.I.P. members were higher users than any of the other groups except our study population. Comparing the data on office visit utilization rates of our 65 years and over group with those for the other groups, we find that our 65–74 age group used more than three times the per capita number of office visits than the U.S. population as a whole,

TABLE 3
Per Capita Number of Physician Visits by Age Group:
PAMC Studies, H.I.P., U.S., and Kaiser-Portland

	ALL VISITS		OFFICE VISITS					
					United States, July 1966 to June 1967[c]		Kaiser-Portland 1967[d]	
Age Groups	*PAMC Studies 1966*[a]	*H.I.P. 1966*[b]	*PAMC studies 1966*[a]	*H.I.P. 1966*[b]	*Office only*	*Office and hospital clinic or emergency room*	*Office only*	*Office and emergency*
All ages	7.0	4.6	5.9	3.9	3.1	3.5	2.8	3.0
Under 5	6.1	5.9	5.9	4.8	3.4	4.0	3.3	3.8
5–14	4.6	3.3	4.5	3.0	1.8	2.1	2.2	2.5
15–24	4.8	3.4	4.7	3.0	2.9	3.3	1.9	2.1
25–44	5.7	4.3	5.3	3.7	3.3	3.7	2.7	2.9
45–64	7.2	5.3	6.4	4.4	3.6	4.0	3.2	3.3
65+	16.4	8.4	10.0	6.4	4.4	4.8	4.1	4.3
65–74	15.8	NA	NA	NA	4.6	5.0	3.8	4.0
75 and over	16.8	NA	NA	NA	4.2	4.5	4.9	5.1

[a]For the under 65 years age group: Scitovsky and Snyder (1972). For the 65 years and over age group: Scitovsky and Snyder (1975). The data for the 65 year and over age group are for 1965.

[b]Health Insurance Plan of Greater New York (1966).

[c]National Center for Health Statistics (1967: calculated from tables 14, 15 and 21).

[d]Stevens (1971).

TABLE 4
Number of Physicians (in thousands), by Field of Specialty, Required to Provide PAMC-Type Care to the U.S. Population under Age 65 and to the U.S. Population Aged 65 and over, 1966

Fields of specialty	Number of physicians required	
	For population under age 65	*For population aged 65 and over*
Total, specialties listed	220	70
General practice	21	0
Medical specialties	114	46
Allergy	8	1
Dermatology	7	2
Internal medicine	58	43
Pediatrics	41	0
Surgical specialties	73	20
General surgery	11	4
Neurological surgery	2	0
Obstetrics and gynecology	16	0
Ophthalmology	13	7
Orthopedic surgery	12	3
Otolaryngology	9	2
Plastic surgery	5	1
Urology	5	3
Other specialties	12	3
Radiology	9	2
Neurology	3	1

NOTE: Items may not add up to totals because of rounding.

and over four times the per capita number of office visits than Kaiser-Portland members in this age group. Similarly, our 75 years and over age group used four times the average annual number of office visits than the U.S. population in this age group, and more than three times that of Kaiser-Portland members.[4]

This quite exceptionally high use of physician services by the older people in our study population obviously had a significant impact on our estimates of physician requirements. We therefore made separate estimates for the under 65 years and the 65 years and over groups. These are shown in Table 4. Of the estimated 290,000 physi-

[4]The detailed H.I.P. data for the 65 years and over age group are not comparable to the other data because they are broken down into two different age groups (65–70 and 70 and over).

cians in all listed fields of specialty required according to our estimates, 70,000 would have been required to meet the demands of the 65 years and over age group. Thus this group, which accounted for 9.6 percent of the total population in 1966, would have required 24 percent of all physician manpower. The estimated requirements of this group are especially high in the fields of internal medicine, ophthalmology, and urology, where they amounted to 43 percent, 35 percent, and 38 percent, respectively, of our estimated physician requirements.

To the best of our knowledge, there are no estimates of the percentage of physician manpower in the United States devoted to the care of the elderly, based on physician-utilization data. The best we can do, therefore, is to use expenditure data. We realize that the percentage of physician services used and the percentage of physician expenditures may not be the same for any given age group, and that the relation between the two percentages may vary as between different age groups because the "mix" of physician services may be different for different age groups. Nevertheless, in our past studies we found that, by and large, per capita number of physician expenditures by age group moved very much in the same direction. Thus national data on physician expenditures by different age groups may serve for the purposes of a rough comparison between the amount of physician manpower we estimated as required for the elderly and the amount the elderly actually used.

According to Social Security Administration data (Cooper and Worthington, 1972), in fiscal year 1966, expenditures by persons aged 65 years and over accounted for just under 19 percent of total personal health care expenditures for physician services.[5] If we assume that this percentage corresponds to their share of physician manpower used, this would imply that they required the services of 41,000 of the 217,000 physicians in patient care in the fields of specialty covered by our study. Our estimate of physician requirements for this group thus is over 70 percent higher than the physician manpower actually used by persons aged 65 years and over. Even in

[5] The total population figure used in the Social Security Administration study differs slightly from ours in that it includes armed forces and civilian employees overseas while our figure refers to the resident population. Thus the Social Security figure for persons aged 65 and over is 9.4 percent of the total population compared to our figure of 9.6 percent.

the post-Medicare year of 1974, when the 65 years and older group accounted for 10.2 percent of the U.S. population, their share of expenditures for physician services accounted for only 21 percent of total expenditures for physician services (Mueller and Gibson, 1975). Again assuming that this percentage corresponds to their share of physician manpower used, they would have used the services of just under 50,000 physicians, a figure still considerably below our estimate for 1966.

Before concluding this section, it may be of interest to note that we have some evidence that our under 65 years age group (Stanford University staff and dependents) may have overutilized physician services in 1966. In our study of the effect of coinsurance on use of physician services referred to above (Scitovsky and Snyder, 1972), we found that when a 25 percent across the board coinsurance provision applying to all physician services and outpatient ancillary services was introduced in the spring of 1967, per capita use of physician services declined by 24 percent. Even if the introduction of coinsurance led to increased out-of-plan utilization (on which we have no data), it is most unlikely that it came anywhere near to offsetting the decline in in-plan use. Thus our estimates of physician requirements for this group are also likely to be on the high side.

A further reason why our physician-requirement estimates are high is that PAMC physicians probably see fewer patients per year than the average U.S. physician in patient care. For one thing, because of liberal provisions for vacations (four weeks per year), for attending conferences or refresher courses (two weeks per year) and a sabbatical of four months every seventh year, a full-time PAMC physician works about 44 weeks per year on the average. This is probably less than the number of weeks worked by most U.S. physicians. In addition, many PAMC physicians also do some part-time teaching at the Stanford University School of Medicine.

Finally, there is also some evidence that PAMC general practitioners and physicians in most of the medical specialties see fewer patients per week than does the average American physician in these specialties. Table 5 compares the average number of physician office contacts per week by field of specialty for PAMC physicians with the median number of such contacts reported by *Medical Economics* during 1967, and with the average number of such contacts for four

TABLE 5
Number of Physician Contacts per Week, by Field of Specialty, PAMC and U.S., 1966

	Mean PAMC, 1966[a]	*Median U.S.,* Medical Economics, *1966*[b]	*Mean U.S., AMA Survey, 1966*[c]
Office visits			
General practice	87	136	131
Allergy	48	122[d]	NA
Dermatology	167	154[d]	NA
Internal medicine	57	70	77
Pediatrics	112	121	122
General surgery	76	56	NA
Obstetrics and gynecology	80	87	88
Ophthalmology	120	109	NA
Orthopedics	91	82	NA
Otolaryngology	112	109	NA
Plastic surgery	54	53	NA
Urology	113	62	NA
Total contacts			
General practice	94	167	NA
Allergy	48	125[d]	NA
Dermatology	167	156[d]	NA
Internal medicine	84	104	NA
Pediatrics	117	144	NA

[a]Personal communication. A year was assumed to contain 44 work weeks.
[b]*Medical Economics* (1967: various issues).
[c]Theodore and Sutter (November 6, 1967).
[d]These are figures for 1968 since data for 1966 were not available.

specialties reported by a 1966 American Medical Association survey. It also compares the average number of all physician contacts per week for five medical specialties for PAMC physicians with the median number of such contacts reported by *Medical Economics*. As the table shows, average weekly office contacts by PAMC physicians in the surgical specialties were either much the same as those reported by the other sources or, in some instances (especially in urology), higher than the others. In general practice and all but one of the medical specialties, however, PAMC weekly physician office contacts were considerably lower. For example, a PAMC internist saw an average of 57 patients per week in his office compared to a median number of 70 patients reported by *Medical Economics* for the average U.S. internist. The comparable figures for pediatricians

TABLE 6
Number of Physicians (in thousands) by Field of Specialty, Required to Provide PAMC-Type Care to the U.S. Population, 1966, Assuming PAMC Physicians Saw Patients 10 Half Days a Week

Fields of Specialty	*Number of Physicians Required*	*Physician Shortage (excess)*
Total, specialties listed	250	22
General practice	19	(51)
Medical specialties	140	74
Allergy	8	7
Dermatology	9	5
Internal medicine	86	42
Pediatrics	37	20
Surgical specialties	79	0
General Surgery	13	(18)
Neurological surgery	3	1
Obstetrics and gynecology	13	(4)
Ophthalmology	17	8
Orthopedic surgery	13	5
Otolaryngology	9	4
Plastic surgery	5	4
Urology	7	2
Other specialties	13	0
Radiology	9	(1)
Neurology	3	1

NOTE: Items may not add up to totals because of rounding.

are 112 office contacts for PAMC physicians as against 121 reported by *Medical Economics*.[6] The picture is the same for the medical specialties where *Medical Economics* figures are available for all physician contacts. For example, the average PAMC internist saw 84 patients per week as against 104 patients reported by *Medical Economics* as the national median. Similarly, the average PAMC pediatrician saw 117 patients per week compared to 144 shown by the *Medical Economics* data.

This lower physician-contact rate of PAMC general practitioners and physicians in the medical specialties may be due to their working a shorter work week, their spending more time per patient visit, or a combination of the two. There are no data, either for PAMC physicians or for physicians in other practice settings, on

[6]The only explanation we have for the large difference in weekly contacts by allergists is that the Medical Economics figure may include visits for injections only which our figure excludes.

time spent per patient visit. We also know of no national data on number of hours per week worked by the average physician. At the PAMC, physicians are expected to work 10 out of 11 half days. However, according to PAMC officials, quite a few departments work less. A PAMC staff member indicated to us those departments which normally worked less than the 10/11 work week. We then calculated the number of physicians, by field of specialty, that would be required if all PAMC physicians worked the 10/11 work week. We found that this would reduce our estimated physician requirements for the U.S. by 40,000 physicians. Table 6 gives the results of our revised estimate by field of specialty.

Conclusion

We do not want to imply that the quantity and type of physician care received by our study population would necessarily be desirable for the nation as a whole. This is especially true of the high proportion of care received from specialists and subspecialists. Like many persons concerned with the delivery of medical care, we view with considerable reservations the increasing trend toward more and more physician specialization in the United States and tend to agree with those who advocate greater emphasis on primary care. We also believe, like many others, that our current problem is not so much a shortage of physicians as a serious maldistribution problem. We tend to agree with Professor Eli Ginzberg (1970) that expanding the supply of physicians is very unlikely to solve this latter problem. Hence our estimate of physician requirements should in no way be interpreted as our advocating that we actually would have been better off with that many physicians in 1966.

We also want to stress again that our estimate of 290,000 physicians (in the specialties for which we had data) who would have been required in 1966 to give PAMC-type care to the nation as a whole (or 148 per 100,000 population as against the 111 per 100,000 population actually available) is subject to many qualifications. For example, as pointed out earlier, elimination of our basic assumption that our study population received the same "mix" of physician services as all PAMC patients might reduce our estimated physician requirement by up to 20 percent. Assuming that the overestimate on

this count was about 15 percent, this alone would reduce the estimated "shortage" of physicians from 73,000 to 30,000. The dropping of some other assumptions, e.g., that the U.S. population as a whole would actually use the same amount and type of services as our study population, given free access to services, would reduce the estimated "shortage" still further.

Finally, we want to emphasize again the complexity and the limitations of making estimates of physician requirements. This does not mean that no such estimates should be made. Instead, it indicates the desirability of making a variety of estimates using different data and different methodologies. The results should then be compared bearing in mind the limitations of each method and the extent to which they may lead to over- or underestimates of physician requirements. In particular, with continuing interest by the government in promoting HMOs, calculations of physician requirements based on existing norms of medical care delivery under prepaid plans seem highly appropriate. We hope that our efforts to quantify one of these norms will stimulate others to make similar estimates.

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APPENDIX TABLE A

Percentage Distribution of the U.S. Population and the PAMC Study Population, by Sex and Age, 1966

	U.S. Population[a]	*PAMC*[b]
Total, both sexes, all ages	100.0 (N = 195,578,000)	100.0 (N = 4,335)
Total, all males	48.9	45.9
< 2	1.9	1.4
2–4	3.1	2.8
5–14	10.4	10.0
15–18	3.7	3.8
19–24	4.3	1.4
25–34	5.6	5.6
35–44	6.0	7.5
45–54	5.5	6.7
55–64	4.2	4.2
65+	4.1	2.6
Total, all females	51.1	54.1
< 2	1.8	1.2
2–4	3.0	2.6
5–14	10.1	10.4
15–18	3.6	2.7
19–24	4.5	2.1
25–34	5.9	6.7
35–44	6.3	7.3
45–54	5.8	7.7
55–64	4.7	4.1
65+	5.5	9.3

NOTE: Items may not add up to totals because of rounding.

[a]Figures refer to resident population. *Source:* U.S. Bureau of the Census (1974).

[b]Figures for the PAMC study population 65 years and over refer to 1965.

APPENDIX TABLE B

Number of Physicians by Field of Specialty and by Major Professional Activity, U.S. and Possessions, 1966

	Number of Physicians[a]	Number in Patient Care		*Other Professional Activity*[d]
		Private Practice[b]	*Hospital Based*[c]	
Total, specialties listed[e]	227,543	164,903	51,870	10,770
General practice	70,223	64,063	5,548	612
Medical specialties	65,591	38,921	20,245	6,425
Allergy	944	849	64	31
Dermatology	3,674	2,737	729	208
Internal medicine	44,293	25,147	14,607	4,539
Pediatrics	16,680	10,188	4,845	1,647
Surgical specialties	79,245	55,170	21,365	2,710
General surgery	31,030	19,628	10,258	1,144
Neurological surgery	2,189	1,332	687	170
Obstetrics and gynecology	17,444	12,890	3,950	604
Ophthalmology	8,735	6,819	1,669	247
Orthopedic surgery	7,982	5,564	2,204	214
Otolaryngology	5,429	4,192	1,095	142
Plastic surgery	1,207	903	271	33
Urology	5,229	3,842	1,231	156
Other specialties	12,484	6,749	4,712	1,023
Radiology	10,189	5,906	3,729	554
Neurology	2,295	843	983	469
Total physicians	300,375	187,100	79,666	19,091
			285,857	
Inactive			13,212	
Address unknown			1,306	

[a]Numbers refer to federal and non-federal physicians. Data are from American Medical Association (1967).
[b]Private practice includes solo, partnership, group, or other practices.
[c]Hospital based includes interns (10,247), residents and fellows (34,690), and full-time physician staff (34,729).
[d]Other professional activity includes medical school faculty (10,503), administration (4,143), and research (4,445).
[e]Excludes all other specialties except Radiology and Naurology and those inactive, address unknown, and temporary foreign.

The following specialties were excluded:

Aviation medicine	812
Anesthesia	9,110
Child psychiatry	958
Forensic pathology	49
Occupational medicine	1,727
Psychiatry	18,875
Pathology	8,914
Physical medicine and rehabilitation	1,140
General preventive medicine	1,005
Public health	1,679
Not recognized	3,917
Unspecified	10,128
Inactive	13,212
Address unknown	1,306
Total	72,832