

The Structure and Content of Family Practice: Current Status and Future Trends

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General and family physicians provide approximately one third of the ambulatory medical care in the United States.¹ They are the quintessential primary care physicians, providing a broad range of medical services to patients of all ages in many diverse locations. More than any other discipline within medicine, they form the base of the clinical pyramid.

Family practice, the term used here to denote the work performed by general practitioners and family physicians, is a discipline in flux. Family physicians accounted for 83 percent of all private practitioners in 1931. By 1978 they comprised only 16 percent of physicians involved in patient care activities.² In the 1970s, however, the discipline underwent a transformation with the creation of the American Board of Family Practice and the establishment of 367 residency programs. In the late 1970s, for the first time in several decades, the number of active family physicians began to increase.

The delivery of primary care has been the focus of intense concern for the last decade. As the numbers of family physicians dwindled and physicians became increasingly specialized, many Americans had difficulty gaining access to physicians who were willing and able to provide continuous and comprehensive health care. The creation of the specialty of family practice was one response to this problem and was closely followed by an increasing emphasis on the delivery of primary care within the specialties of internal medicine and pediatrics. In the pluralistic tradition of

American medicine, the need for primary medical care is being met by a number of different mechanisms, and it is not clear which will prove to be most effective, appropriate, or acceptable.³ Despite the large investments in the delivery of primary medical care services, little is known about the content and characteristics of ambulatory medical practice. There is only fragmentary information on what physicians do in their offices, the types of patients they see, the spectrum of resources they use, or the differences that exist among the physicians themselves.⁴ This study seeks to illuminate this area.

Initiated by the University of Southern California (USC) in the 1970s, the Medical Activities and Manpower Project was the most intensive examination of medical practice ever performed in the United States.⁵ Supported by the Robert Wood Johnson Foundation and the Health Resources Administration, the USC researchers gathered detailed data on the structure and content of medical practice by having physicians record extensive data on all the patients they saw during a three-day period. This survey, supplemented by a detailed questionnaire filled out by the physician and exhaustive demographic information from the National Center for Health Statistics, makes up the data base upon which this report is based.

In 1980 the Robert Wood Johnson Foundation made a grant to the Research Section of the Department of Family Medicine at the University of Washington School of Medicine to support a detailed analysis of the family practice component of the USC survey. The study team included members of the department as well as researchers from the Battelle Human Affairs Research Centers and the Department of Family and Community Medicine, University of Missouri-Columbia. The report focuses on general practitioners and family physicians, who represent about 10 percent of all

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the physicians surveyed in the sample selected by USC.

This study had four main goals. The first was to describe the characteristics of general and family physicians in the United States as well as the patients for whom they care and the practices in which they work. Based on a stratified random sample of all active general practitioners and family physicians in the country, the USC survey provided extensive descriptive data on each physician surveyed and his or her practice. These data are used to draw a picture of the physicians practicing in this field and to give some insight into their training and background, the organization of their practices, where they live, and how they work.

Also described are the demographic characteristics of the patients who visit family physicians in order to understand which portion of the American population looks to this type of physician for medical care. As part of this process, the number of patients seen by family physicians and the amount of time they spend in patient care activities were examined. Using these data, differences in productivity among various subgroups of family physicians were calculated, and an attempt was made to delineate some of the reasons for the existence of these rather marked differences.

The second objective was to investigate in detail the clinical content of family practice and to compare the findings with those presented in other studies describing the diagnostic conditions family physicians address. In order to perform these analyses, a new technique, based on the creation of clinical clusters, was devised for the examination of large masses of diagnostic information. Using this technique, it was possible to group diagnoses into clusters that bring together discrete conditions which share pathophysiological causes and prompt similar intellectual response and resource use on the part of the physician. The clinical composition of the practices of the physicians in this study was compared with similarly clustered diagnostic data from the National Ambulatory Medical Care Survey⁶ and the Virginia Study.⁷

The examination of clinical content was rounded out by examining several specific questions of particular interest to the discipline of family medicine in particular and to primary health care in general. The factors that influence the amount of time spent and the range of conditions cared for by the family physician in the hospital

setting were reviewed. Also examined was the subset of physicians who do not admit patients to the hospital or who exclude obstetrical care from their clinical repertoire.

The third goal of this project was to examine the way physicians used diagnostic and therapeutic resources in their treatment of patient problems. Major questions about cost and quality of care remain unanswered in studies of primary care. Medical care costs have escalated rapidly in the last 20 years, and the trend shows no sign of abating. Although primary care is not the most expensive component of medical care, the resources that physicians use in the care of the frequently occurring illnesses and their decisions about such options as hospitalization have a major impact on overall costs. Diagnostic and therapeutic resources are also related to the quality of medical care and to patient outcome. Both of these areas, although critical to an understanding of the dynamics of primary care and essential to decisions about the optimal design of the health care delivery system, remain scantily explored and poorly understood.

In addition to describing the actual procedures family physicians performed, the previously developed technique of tracer analysis was expanded to see how selected diagnostic entities were approached by the physicians in this sample. Several highly representative and prevalent conditions were identified, and the diagnostic and therapeutic resources that physicians used in caring for patients with these conditions were then examined. Differences in case mix were partially controlled for, and it was possible to observe and to attempt an explanation of the variation between subgroups of physicians in the way they approached common medical problems.

The concluding phase of this effort was to speculate on some of the clinical, educational, research, and policy implications of these data. Since family practice is a pivotal primary care discipline that is undergoing significant change, it is important to be able to predict how this change will affect and be affected by trends in American medicine. By the same token, those responsible for the education of medical students and residents and those interested in improving the provision of medical care in the community can use this information to make considered changes in curriculum and policy.

Materials and Methods

This study was performed by meshing together several complex national sets of data containing pertinent information about the medical practices of American physicians. The report is based on a secondary analysis of these data sets; no new information was collected for this effort, although some new techniques were created for analyzing health services information in order to handle the voluminous amount of data. The methods described here were selected to get below the surface of routine information about the structure and content of practice—to delve into the possible causes for differences in practice patterns and styles among physicians.

Materials

The major source of information about general and family physicians came from the Medical Activities and Manpower Project of the University of Southern California, a survey designed and managed by Robert Mendenhall.⁵ The USC data consisted primarily of information about individual physicians and their patients. These data were supplemented with selected components of the Area Resource File, a federally maintained data set that describes the demographic characteristics of counties within the United States and the health resources available in each of those counties.⁸ The National Medical Ambulatory Care Survey, an ongoing survey of office-based physicians sponsored by the National Center for Health Statistics, was also used as a source of comparable information about physicians and their practices.⁶

The USC Data Set

The Medical Activities and Manpower Project (MAMP) began in 1976. Sponsored by the Robert Wood Johnson Foundation and the Health Resources Administration, the project quickly ex-

panded from a modest examination of one medical specialty to an extensive national survey of physicians from the 24 major specialty groups. The USC researchers utilized the American Medical Association's Physician Masterfile, a virtually complete list of licensed Doctors of Medicine in the United States, as their sampling frame.⁹ Individuals in the masterfile were considered general or family physicians if, on the 1975 AMA Professional Activities Questionnaire, they indicated they spent a plurality of their professional working hours in these fields. A stratified random sample was selected from the AMA file. Family physicians were sampled at a considerably higher rate than general practitioners relative to their numbers in the medical labor force at the time of selection in order to ensure an adequate number of family physicians in the study.

Each physician selected was asked to complete a three-part booklet designed to record a variety of data about his or her practice. The first element of the booklet, a "week's practice summary," instructed respondents to record the number of hours spent in various professional activities during each day of a specified, seven-day reporting period. The core of the instrument was a detailed log-diary that the physician filled out during a three-day practice period. The physician was asked to record detailed information about every patient seen during the three-day survey period, including diagnostic and demographic information about the patient, the diagnostic tests ordered, and the therapeutic interventions selected. The last part of the booklet consisted of a questionnaire about the physician's personal characteristics, professional background, and practice. This series of questions included inquiries about residency training, board certification, hospital affiliations, type of practice, practice location, and office staff and office facilities, including equipment for diagnostic tests.¹⁰

The survey was carried out in the summer and fall of 1977. General practitioners were surveyed in July and September and family physicians in October of that year. It is important to note that a "general practitioner" was someone who chose that term when responding to the AMA Profes-

sional Activities Questionnaire in 1975. It was found that physicians who called themselves general practitioners could not reliably be distinguished from physicians who called themselves family physicians. For that reason, the two groups were combined for the purpose of analysis.

The research instruments were distributed by mail, accompanied by letters in support of the survey from local and national leaders of the medical community. In its survey of general practitioners, USC received responses from 469 physicians, a response rate of 36 percent. A total of 683 family physicians responded to the survey, a response rate of 44 percent. Researchers from USC have published details of their methodology,¹¹ and segments of the data have been analyzed by other researchers.¹²

Researchers at USC and their colleagues elsewhere made systematic efforts to assess the representativeness of the USC samples and the reliance that could be placed on responses to specific survey items. To determine representativeness, USC researchers compared those who responded to their surveys with physicians in the AMA masterfile who did not respond with respect to key variables. To determine the reliability of specific items, USC collaborated with Battelle Human Affairs Research Centers in Seattle, Washington, to reinterview physician respondents. The responses to questions in the reinterview were compared with the earlier responses to the survey as a check on the reliability of the data.¹³

USC compared respondents with nonrespondents along the following dimensions: age, board certification, practice arrangement, specialty society membership, geographical region, and the population of the county of practice. No statistically significant differences appeared in the comparison between family physicians who responded to the survey and those who did not. Significant differences did appear, though, between respondents and nonrespondents in general practice. Among responding general practitioners, solo physicians, those without board certification, those not belonging to specialty societies, residents of the Northeast, and residents of urban areas were significantly underrepresented.

Researchers at Battelle performed a separate analysis of the reliability of individual survey items, reinterviewing approximately 600 general practitioners, family physicians, and pediatricians

who had responded to the initial USC surveys. They demonstrated that some of the variables were reliably measured by the USC instruments but that others were less reliable and should be used with caution. According to the Battelle report, primary practice arrangement, primary specialty, outpatients seen per week, and hours worked per week appeared to have been measured reliably. Patient encounter data sometimes appeared quite reliable, particularly for questions regarding whether or not the patient had been seen before and identification of the primary diagnosis. Items concerning where patients were seen, office staff, and diagnostic and therapeutic procedures appeared to be the least reliable.¹³ The analyses in this report focused on those elements of the survey that appeared most reliable and combined ambiguous categories in order to eliminate possible confusion caused by unreliable variables.

The Area Resource File

The Area Resource File (ARF)⁸ furnished data on the "environment" of practice for all physicians in the USC surveys. Assembled by the Bureau of Health Professionals and maintained by the US Department of Commerce, the ARF is an extensive array of data on every county in the United States. These data include demographic information, per capita income, the relative supply of health professionals, infant mortality rates, and the like. All data in the ARF derive from past and ongoing studies, such as the US Census, the Health Interview Survey, and local departments of public health. For this analysis, the USC data were merged with selected information from ARF, matching each physician with the county in which he or she worked.

The National Ambulatory Medical Care Survey

The National Ambulatory Medical Care Survey (NAMCS),⁶ one of the best known data sets on physician activities in the United States, is conducted on an ongoing basis by the National Center for Health Statistics. NAMCS randomly surveys approximately 1,000 nonfederal, office-based physicians each year. Roughly equal numbers of

physicians are approached each week and asked to record data on patient encounters during that week as well as to provide data about themselves and their practices. In 1977, NAMCS obtained a 78 percent response to its survey.

The NAMCS survey instrument consists of practice information collected by interview and a log diary. In general, the NAMCS instrument asks questions similar to those asked by USC, but in less detail. Although the substantive conclusions of this report rest on data obtained from USC, NAMCS represents an alternative data source whose sampling frame is nearly identical to that of USC and which asks respondents similar questions. Because of the similarities in these two surveys, it was possible to use them to validate one another and to determine the extent to which the low response rate in the USC survey may have skewed the results.

Methods

Analysis of the USC data focused on "office-based" general and family physicians, the group of physicians that makes up the core of family practice in the United States. Physicians based in hospitals or other institutions and physicians who at the time of the survey said they were not general or family physicians were excluded from most of the analyses. The original sample contained 1,088 general and family physicians; of these, 735 provided direct patient care, were office based, and saw patients during the three-day survey period. These physicians resemble the group surveyed by NAMCS and represent those physicians most people think of when they talk about office-based family physicians. With the exception of Tables 1, 2, and 3, the analyses in this report include only these office-based family physicians.

For these analyses, the responses of the individual physicians were "weighted" to compensate for the different rates at which USC sampled different groups of physicians and for differential response rates. For example, because solo general practitioners were sampled initially at a low rate and because relatively few of them responded, more weight was given in the analysis to those who did respond to the survey. Through the use of

such weighting, the study results represent estimates of the overall population of general and family physicians in the United States.

Tests of Statistical Significance

Formal statistical tests of significance were used sparingly in the analysis for a number of conceptual and methodological reasons. First, this was a primarily descriptive study that served to generate hypotheses rather than to test them. Second, the calculation of variance estimates of the weighted means presented a formidable challenge due to the complex method of weighting, which was designed to compensate for both the unequal sampling rates within the strata and the response rate differentials occurring across geographic regions. Third, the sampling strata (ie, solo, partnership, group, institutional, and other) reflected the employment arrangement of physicians as reported by the 1975 AMA masterfile, and since a sizable number of physicians are likely to have changed their practice arrangements between 1975 and 1977, when the USC survey was undertaken, some physicians were not in the correct stratum. Fourth, the stratification categories of partnership and group used in the USC survey were considered ambiguous, and the new categories of single-specialty group and multispecialty group were developed for use in this study as described above. Finally, in the analyses of encounter data, sample sizes were typically so large (over 1,000 in every subgroup) that the use of statistical tests would have shown even miniscule differences to be significant.

The only formal statistical tests used were *t* tests, both for comparing unpaired means and for testing the significance of unstandardized regression coefficients. For a further exploration of the statistical issues dealt with in an analysis of the data and for a more detailed description of the complex methodological problems associated with the stratified sample and differential response rates encountered in this study, the reader can consult the final report generated as part of the project.¹⁴ In general, the strategy was to be conservative in interpretation of the data and to base an analysis on those elements of the survey that have been demonstrated to be most trustworthy and most meaningful.

A Profile of Family Physicians in the United States

This section presents a profile of family physicians in the United States. Key attributes of these physicians and of their practices are identified and examined: the age, gender, and training of physicians and the location, organization, and structure of their practices. Because 1977 was a time of transition for the discipline of family practice, comparing older physicians with their younger colleagues and weighing the effect of residency training on what family physicians do and where they do it may give some idea of what the profession will look like in the future.

Characteristics of General and Family Physicians

The typical family physician is a middle-aged man with little or no formal postgraduate residency training after internship who works as a solo practitioner in an office located in an urban area. Although this "typical" physician is a statistical construction only, it is helpful to invoke his existence to understand the current status of the profession and the major changes that are occurring within it.

Table 1 shows the age composition of the 1,088 general and family physicians who responded to the survey. In the late 1970s, family practice was composed largely of older physicians, with 46 percent of the practicing physicians over the age of 55 years. Of the respondents, 95.6 percent were men.

Formal postgraduate education was a relatively rare phenomenon in family medicine in 1977 (Table 2). Forty-two percent of the respondents had completed at least one year of postgraduate training, but only 13 percent had finished a residency, most of them in family practice or general practice. This is reflected by the fact that only 30 percent of the study sample were board certified, virtually all in family practice.

About three quarters of the ambulatory care physicians who responded worked primarily in an office, with the remainder working in a variety of other settings ranging from academic departments to hospitals. The majority of these physicians were

Age (yr)	Weighted Percent	Actual Number
Under 35	7.5	158
35-44	12.7	245
45-54	33.7	386
55-64	30.9	224
Over 64	15.3	75
Total	100.0	1,088

Residency Graduate	Weighted Percent	Actual Number
No	86.6	859
General/family practice	11.5	211
Other specialty	1.9	18
Total	100.0	1,088

Arrangement	Weighted Percent	Actual Number
Solo	64.7	248
Single-specialty group	17.3	309
Multispecialty group	8.8	179
Academic department	1.0	25
Hospital	0.9	12
Clinic	2.0	27
Government (nonhospital)	0.5	6
Other	2.4	31
Multiple arrangements	2.5	25
Total	100.0	862*

*Data missing for four respondents

solo practitioners, with the balance working in single- or multispecialty group practices (Table 3). Very few physicians worked in group practices with more than three other physicians.

Two thirds (67.8 percent) of the office-based

Table 4. Characteristics of Office-Based Urban and Rural General and Family Physicians (weighted data)		
	Urban (within SMSA) (n = 456)	Rural (outside SMSA) (n = 279)
Mean age	38.7	37.8
Percent in group practice	24.9	36.3
Percent board certified (ABFP)	25.4	31.2
Percent completing general practice or family practice residency	11.2	4.2
SMSA—Standard metropolitan statistical area; ABFP—American Board of Family Practice		

physician practices were located in standard metropolitan statistical areas (SMSAs), compared with 85 to 90 percent of office-based physicians in other specialties.¹⁵ Rural family physicians differ in several important respects from their urban counterparts: they are more likely to be board certified, less likely to have been residency trained, and are more often found in group practices (Table 4).

How Family Physicians Differ According to Age

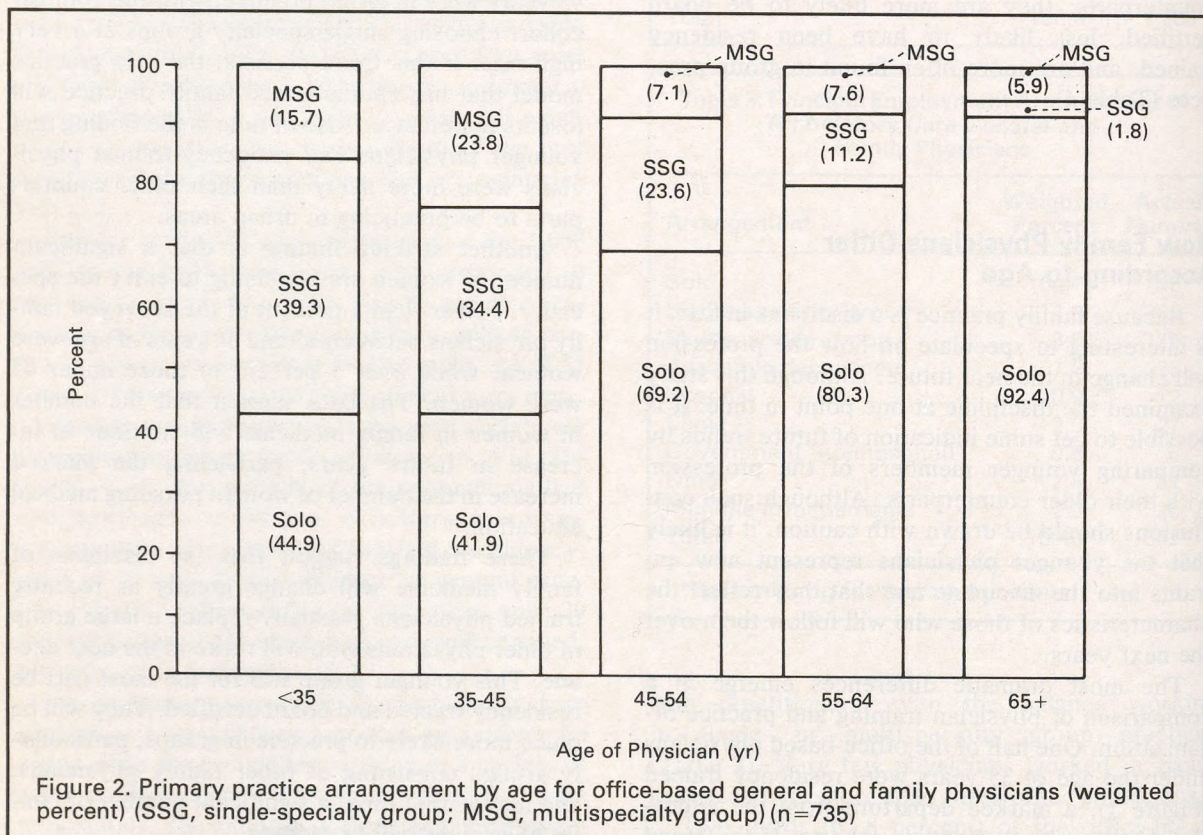
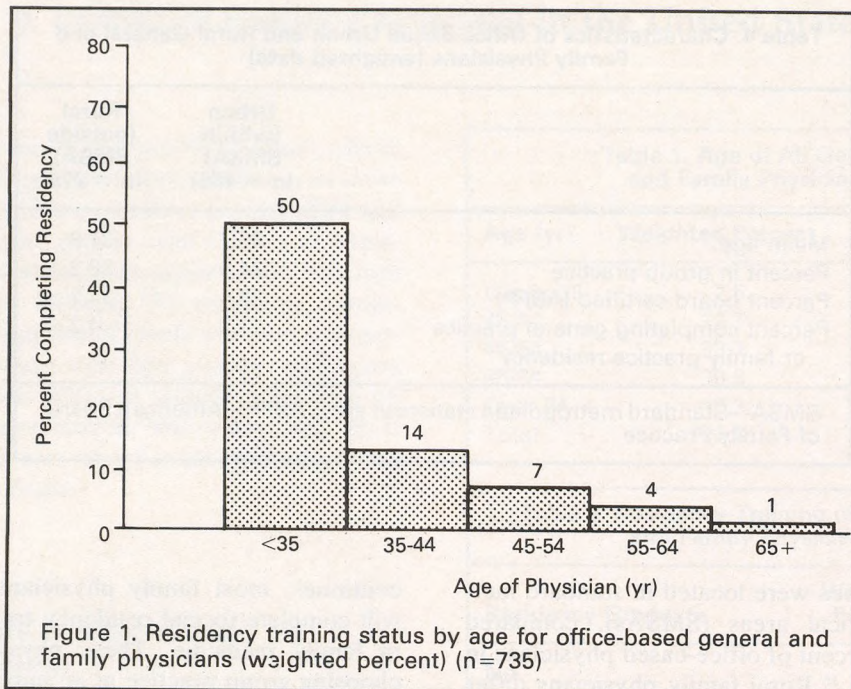
Because family practice is a discipline in flux, it is interesting to speculate on how the profession will change in the near future. Although this study examined the discipline at one point in time, it is possible to get some indication of future trends by comparing younger members of the profession with their older counterparts. Although such conclusions should be drawn with caution, it is likely that the younger physicians represent new entrants into the discipline and that they reflect the characteristics of those who will follow them over the next years.

The most dramatic differences emerge in a comparison of physician training and practice organization. One half of the office-based physicians under the age of 35 years were residency trained (Figure 1), a marked departure from the educational preparation of earlier cohorts. If this trend

continues, most family physicians in the future will complete formal residency training programs in family medicine. These physicians are also choosing group practice at an unprecedented rate (Figure 2); over 55 percent of those younger than 45 years were in group practice, with the younger cohort choosing single-specialty groups at a very high rate. If this trend persists, the solo practice model that has characterized family practice will lose its dominance. Also of note is the finding that younger physicians and residency-trained physicians were more likely than their older counterparts to be practicing in urban areas.

Another striking finding is that a significant number of women are beginning to enter the specialty. Fewer than 1 percent of the surveyed family physicians between 45 and 64 years of age were women, while over 5 percent of those under 45 were women. The data suggest that the number of women in family medicine will continue to increase in future years, paralleling the marked increase in the number of women pursuing medical education.

These findings suggest that the discipline of family medicine will change greatly as recently trained physicians gradually replace a large group of older physicians who will retire in the next decade. This younger group will for the most part be residency trained and board certified. They will be much more likely to practice in groups, particularly groups consisting of other family physicians, and for the first time, a significant number of family physicians will be women.



Family Physicians and Their Patients

Patient Age and Gender

Table 5 shows the age and gender characteristics of patients seen by office-based physicians outside the hospital. Family physicians responding to the survey encountered considerably more female than male outpatients. Female patients in their childbearing years (17 to 44 years) constituted the largest category, encompassing nearly 24 percent of all encounters recorded.

In general, these age and gender distributions are confirmed by other studies of family physicians and studies of other physician specialties. Analysis of NAMCS data on general and family physicians, for example, indicates that female patients account for 59.5 percent of the encounters compared with 58.4 percent reported by USC. According to NAMCS, persons under 17 years of age account for 18.1 percent of the encounters, persons 17 through 44 years account for 39.1 percent, persons 45 through 64 years account for 25.5 percent, and persons 65 years and over account for 17.3 percent. All percentages are quite close to those in Table 5. The close correspondence between USC and NAMCS data suggests that both surveys are measuring basic characteristics of family physicians' practices, a finding which increases confidence in other conclusions drawn from this study.

Physician and Patient Characteristics

Table 6 demonstrates the relationship between the age of a physician and the ages of the patients he or she is likely to encounter. There is a nearly linear association between physician age and mean patient age. Family physicians under the age of 35 years, for example, saw patients whose age averaged 30.6 years; physicians over the age of 65 years saw patients with an average age of 42.1 years, an observation similar to one reported by other researchers.¹⁶

Patient and physician gender bears the same kind of relationship as patient and physician age. Whereas nearly 75 percent of the patient encounters reported by female physicians were with fe-

male patients, only 58.1 percent of the encounters reported by male physicians were with female patients. One must be cautious in interpreting these data, since they include information from only 22 female physicians and 800 patient encounters. Despite the small sample, however, other studies confirm the relationship between physician and patient gender. NAMCS, for example, reports that 74.7 percent of the patients encountered by female physicians in general practice, family practice, and general internal medicine in the 1977 survey were female, and only 59.4 percent of the patients encountered by male physicians in these specialties were female.¹⁷ While NAMCS did not publish separate statistics for general and family physicians and for internists, it seems safe to assume that this tendency of female physicians to attract female patients is quite pervasive.

Specialization and Age of Patients

The notion that some family physicians may choose to treat certain segments of the population preferentially, and thus become de facto pediatricians, obstetrician-gynecologists, or geriatricians, was explicitly examined. In general, despite a strong tendency for older physicians to see an older patient population, "age specialization" is a rare phenomenon among family physicians. Although patient age increases with physician age, analysis of the data for individual physicians demonstrates that very few respondents function as pediatricians or geriatricians, treating predominantly young or old patients. During the three-day survey period, only 1.2 percent of the physicians surveyed saw patients whose mean age was greater than 55 years; none of the respondents in this study had patient populations with a mean age below 15 years old.

In order to further examine these relationships, various subgroups of general and family physicians and the age and sex composition of the patients they saw during the survey period were examined. Figures 3 and 4 depict the two contrasting groups for whom the differences were largest. Residency-trained family physicians devoted a

Table 5. Age and Gender Distribution of Outpatients Encountered by Office-Based General and Family Physicians (weighted percent)

Age of Patient (yr)	Gender of Patient		Total
	Female	Male	
Under 17	8.9	10.2	19.1
17-44	23.9	16.0	39.9
45-64	14.5	9.6	24.1
Over 64	11.1	5.8	16.9
Overall	58.4	41.6	100.0

Note: Based on 38,466 outpatients encountered by 650 physicians; age or gender were unknown for 746 encounters

Table 6. Age Distribution of Outpatients Encountered by 650 Office-Based General and Family Physicians by Physician Age (weighted percent)

Physician Age (yr)	Patient Age (yr)				Total	Weighted Mean
	Under 17	17-44	45-64	Over 65		
Under 35 (n = 98)	27.3	47.9	15.7	9.2	100.0	30.6
35-44 (n = 159)	22.2	44.4	19.0	14.4	100.0	35.1
45-54 (n = 231)	21.5	42.1	22.8	13.6	100.0	36.0
55-64 (n = 124)	13.2	37.1	28.7	21.0	100.0	43.2
Over 65 (n = 38)	18.7	32.2	25.9	23.3	100.0	42.1
Overall	19.1	39.9	24.1	16.9	100.0	38.5

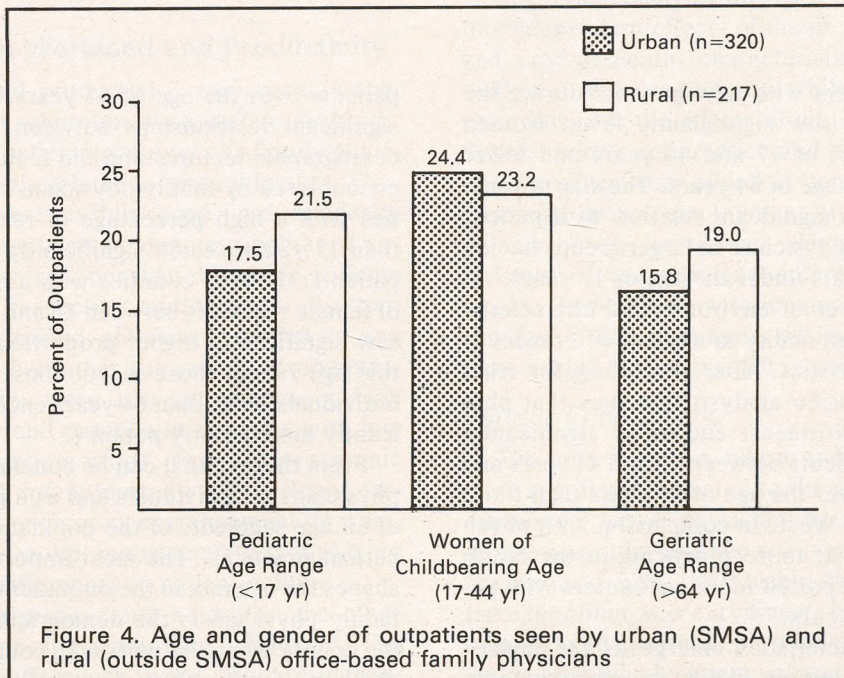
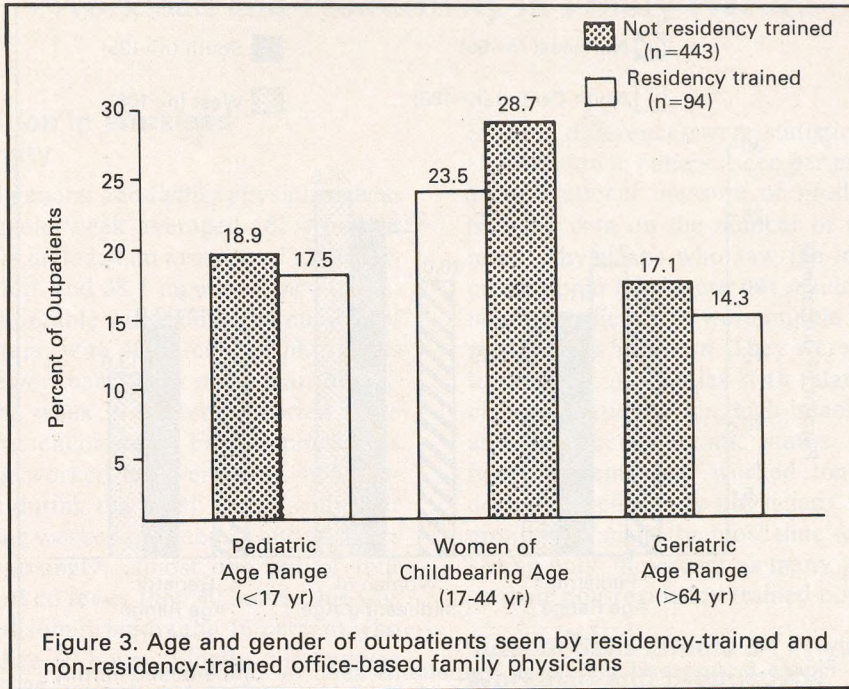
Note: Based on 38,652 outpatient encounters; patient age was unknown for 560 encounters

greater proportion of their practices to women of child-bearing age and saw correspondingly fewer pediatric or geriatric patients. Rural physicians showed the reverse pattern; they saw more pediatric and geriatric patients and fewer women of child-bearing age than did their urban counterparts.

Figure 5 shows that regional differences exist in the patient composition of family practice. Western physicians saw the fewest pediatric and geriatric outpatients and the most women of child-bearing age. Northeastern family physicians saw the fewest women in the obstetrical age range, while phy-

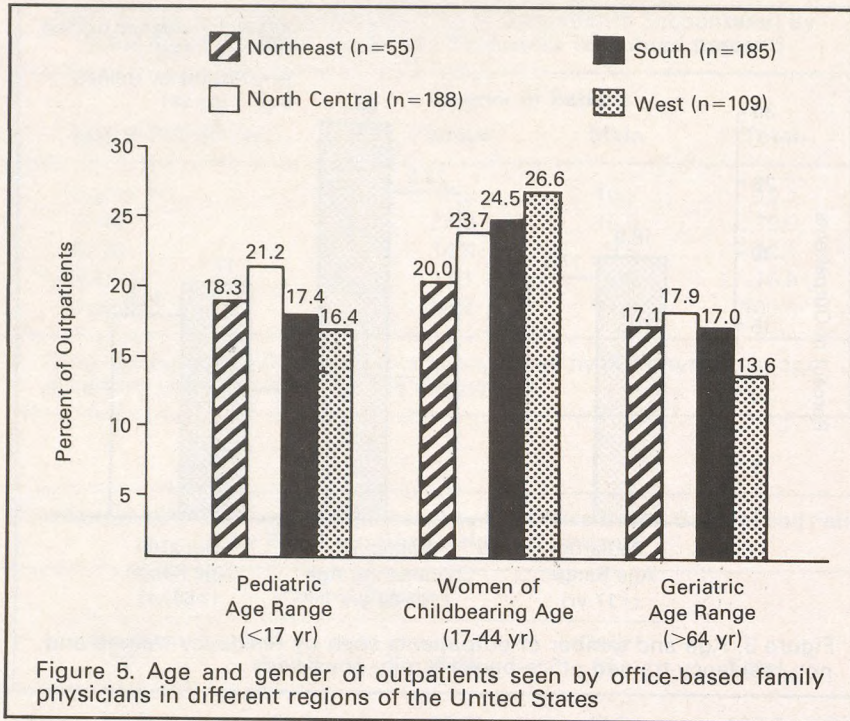
sicians in the North Central region devoted relatively more of their energy to the pediatric and geriatric patients in their ambulatory practices. Although interesting, the absolute differences are not large. As will be seen later, regional differences are more pronounced for inpatient than for outpatient practice.

In order to look more closely at the way these various characteristics relate to one another, multiple regression techniques were used to assess the independent explanatory power of a range of potentially important independent variables. A num-



ber of independent variables influence age and gender composition of the practices of family physicians when all other variables are held constant. When compared with younger physicians, older

physicians saw significantly fewer patients under the age of 17 years. Percentage of new patients also appears to be related to patient age and gender; family physicians with relatively large num-



bers of encounters with new patients during the reporting period saw significantly fewer women between the ages of 17 and 44 years and fewer persons over the age of 64 years. The size of practice group had a significant relation with patient age, with family physicians in larger groups having seen fewer patients under the age of 17 years.

A large number of environmental characteristics also add to an ability to explain differences in patient characteristics. After controlling for other variables, regression analysis indicates that physicians in the Northeast encounter significantly fewer female patients between 17 and 44 years and more patients over the age of 64 years than those practicing in the West. In comparison with physicians in the West, those practicing in the North Central region reported more encounters with patients under 17 years.

County characteristics emerge as the consistently most important factor in explaining observed variations in the age and sex composition of family practice. Family physicians in counties whose populations enjoy a relatively high socioeconomic status encountered more women between the ages of 17 and 44 years and fewer

patients over the age of 64 years. There are also significant relationships between several county demographic features and the features of patients encountered by family physicians. Those in counties with a high percentage of residents younger than 15 years treated significantly more pediatric patients; those in counties with a high percentage of female residents between 15 and 44 years of age saw significantly higher proportions of women in this age range; those in counties with numerous individuals older than 64 years encountered significantly more elderly patients.

From these data it can be concluded that family physicians as individuals and as a group take care of all age segments of the population in their outpatient practices. The most important factor that shapes the age mix in the outpatient practice of the family physician is the demographic structure of the county where he works. In counties with more children, family physicians see relatively more pediatric patients. This effect is even more pronounced for counties with more women of childbearing age or a larger elderly population. Family practice adapts to and is a reflection of the population it serves.

Workload and Productivity in Family Practice

Overall Variation in Workload and Productivity

Office-based general and family physicians who worked a complete week averaged 167.4 patient encounters. This included an average of 129.0 outpatient encounters and 38.4 inpatient encounters. There was considerable variation in the number of patient encounters, with 40 percent of physicians encountering fewer than 100 or more than 200 patients during the week; 9 percent reported more than 250 patient encounters. Family physicians reported having worked an average of 49.5 professional hours during the study week, with over 75 percent having worked between 35 and 60 hours per week. Surprisingly, almost one out of four respondents worked fewer than 40 hours; this was counterbalanced somewhat by the 16 percent who worked more than 60 hours. Finally, the average physician saw 3.38 patients per professional hour of work.

Differences in Workload and Productivity

Workload and productivity vary considerably among different subgroups of physicians (Table 7). The number of patient encounters by family physicians was strongly related to several factors. Physicians who were middle aged, not residency trained, and practiced in nonmetropolitan areas and in the South saw considerably more patients than did their respective counterparts. Western and residency-trained physicians tended to see fewer patients than other subgroups. Strong positive relationships were also noted between high patient volume and practice in counties with low physician-population ratios, low socioeconomic status, and high infant mortality rates. Board certification status and practice arrangement (ie, solo, single-specialty group, multispecialty group) were not related to differences in patient volume.

The data on professional hours, on the other hand, show more similarities than differences. The only sizable differences were that residency-trained physicians worked 3.3 hours longer than those without residency training, whereas urban and Western physicians and those who practiced in counties with high physician-population ratios worked fewer hours than their counterparts. None

of these differences were statistically significant.

Variation in patients seen per professional hour, a conventional measure of productivity, resembles the data on the number of patients encountered. Physicians who saw the most patients per professional hour were not residency trained, not board certified, and were middle aged, nonmetropolitan, and Southern. They were also more likely to practice in counties with relatively low physician-population ratios, high infant mortality rates, and low socioeconomic status. Since they saw fewer patients and worked longer hours, residency-trained family physicians stood out as the group who spent the most time with each patient, seeing only 78 percent as many patients per hour as their non-residency-trained counterparts.

Independent Effects on Physician Workload and Productivity

Regression analysis was used in order to assess the independent effects of the physician, practice, and environmental characteristics on physician workload and productivity while simultaneously controlling for the effects of all the other factors. Several additional practice and patient characteristic variables were added as controls (eg, size of physician group, employment of registered nurse or new health practitioner, demographic characteristics of patients encountered during study week). Respondents with incomplete data or who saw fewer than 30 patients during the study week were excluded, leaving 420 in the analysis.

Patient Encounters

The only variables whose independent effects were significantly related to the number of patient encounters were physician age, the physician-population ratio, and the socioeconomic status of the county. The relationship between age and patient volume was curvilinear; patient volume increased with age until approximately the age of 47 years, after which patient volume decreased again. When all other variables were taken into consideration, residency-trained physicians saw 15.4 fewer patients and Western physicians about 17 fewer patients per week than their respective counterparts. Neither of these differences was

Table 7. Patient Encounters, Professional Hours Worked, and Patients Seen per Professional Hour by Physician, Practice, and Environmental Characteristics

	Total Patient Encounters Weekly (weighted mean) (n = 577)	Total Professional Hours Worked Weekly (weighted mean) (n = 546)	Patients Seen per Professional Hour (n = 514)
<i>Physician Characteristics</i>			
Residency graduate			
Yes	141.0	52.5	2.70
No	169.8	49.2	3.44
Board certified			
Yes	164.6	50.8	3.16
No	168.5	49.0	3.46
Age			
Under 45 yr	156.8	49.3	3.32
45-54 yr	187.7	50.7	3.62
Over 54 yr	154.9	48.6	3.20
<i>Practice Characteristics</i>			
Arrangement			
Solo	166.8	49.5	3.34
Single-specialty group	171.0	49.0	3.57
Multispecialty group	164.9	50.7	3.29
Urbanization level			
SMSA	155.6	48.5	3.22
Adjacent to SMSA	202.2	51.5	3.81
Not adjacent to SMSA	181.8	51.3	3.58
Region			
Northeast	156.3	49.7	3.18
North Central	160.7	49.7	3.22
South	191.8	50.5	3.81
West	130.9	45.9	2.85
<i>Environmental Characteristics (county)</i>			
Physician-population ratio			
Low	185.6	50.7	3.62
Medium	165.9	50.0	3.48
High	136.7	46.5	2.82
Infant mortality rate			
Low	151.2	49.8	3.11
Medium	157.7	48.9	3.18
High	198.4	50.1	3.91
Socioeconomic status			
Low	222.5	51.4	4.64
Medium	163.4	49.5	3.23
High	150.5	48.8	3.13
Overall	167.4	49.5	3.38

Note: Brackets denote statistically significant differences at 0.05 level using two-tailed unpaired *t* test with 10 degrees of freedom using standard errors corrected for design defects

statistically significant. Physicians working in counties with a higher socioeconomic status and a greater relative supply of physicians tended to have fewer patient encounters per week.

Professional Hours

The number of professional hours worked in a week by family physicians varied only slightly from one type of physician to another (Table 7). After the effects of all other variables were controlled for, the only variables that emerged with significant independent relationships with professional hours were employment of a new health practitioner and proportion of encounters that occurred in the hospital. Physicians who employed a new health practitioner worked longer, as did physicians whose practices were more hospital oriented.

Patients Per Hour

Youth and residency training were significantly related to seeing fewer patients per hour after controlling for all the other variables. The independent effect of residency training was particularly strong. A typical residency-trained physician saw patients at a lower rate than a family physician who has not completed a residency. As was the case with the number of patient encounters, physician age was related to patients seen per hour in a

curvilinear fashion, with a peak at 47 years of age. The physician-population ratio, infant mortality rate, and socioeconomic status of the county of practice also exerted significant independent effects on the rate at which family physicians saw their patients. Practicing in counties with low physician-population ratios, high infant mortality rates, and low socioeconomic status was associated with seeing more patients per hour. Practice in the West was not significant in relation to patients seen per hour after controlling for the other variables.

One striking finding of this analysis is that family physicians seem to vary their total workload (the number of patients they see in a week) by changing the rate at which they see patients rather than the number of hours they work. There is remarkable uniformity across groups in the total number of hours worked—about 50 hours per week. The two major factors that determine productivity appear to be external demand and physician training. In areas where the need for physician services might be expected to be greatest (counties with low physician-population ratios, low socioeconomic status, and high infant mortality rates), patients are seen at the fastest rates. Training experience has a similarly important influence, with residency-trained physicians working at a consistently slower pace, even after correcting for physician age and the degree of patient demand.

Clinical Content of Ambulatory Care in Family Practice

This section provides an in-depth view of the clinical content of family practice in the ambulatory setting. While other studies have provided glimpses at what family physicians do in this setting, none has analyzed the influence of physician or practice characteristics on diagnostic mix in any detail. The USC data were used to examine the factors influencing the diagnostic content of medical practice and the time physicians spend with each patient, and the results were then compared with those reported in the Virginia Study and by the National Ambulatory Medical Care Survey.

Diagnosis Clusters: A Method for Handling Diagnostic Data

Ambulatory care encompasses a remarkably large number of individual conditions that patients

bring to physicians. A new way of grouping diagnostic codes has been devised to facilitate the analysis of ambulatory medical care. This is done by creating clusters of diagnoses that represent similar pathophysiologic conditions, thus reducing the large number of discrete diagnostic rubrics used in clinical practice to manageable proportions. The clustering method permits a comprehensive but concise description of the content of problems seen in the ambulatory setting. Because this technique reduces the confounding effect of the idiosyncratic coding patterns of individual health care providers or organizations, it improves the ability to compare the case mix of different practice populations while retaining compatibility with all major coding schemes in current use.

The clusters were created using NAMCS data

from 1977¹⁸ and 1978.¹⁹ The NAMCS data file contains the principal diagnosis recorded for a sample of all the patients seen in the outpatient setting over a three-day period. These 96,332 diagnoses, which were coded to the fourth digit using ICDA-8, formed the raw data from which the diagnostic clusters presented here were constructed. The objective of the clustering process was to identify groups of diagnostic rubrics that were clinically homogeneous; that is, each of the individual diagnostic rubrics within a cluster should ideally generate a similar clinical response from the physician in terms of the cognitive processes involved, the type of diagnostic tests ordered, the class of therapies employed, and the general services rendered.

The clusters were submitted for review and critique to 15 physicians representing the following disciplines: dermatology, epidemiology, family practice, gastroenterology, general internal medicine, obstetrics-gynecology, ophthalmology, orthopedics, otolaryngology, psychiatry, primary pediatrics, and urology. These specialties were selected because they covered the broad spectrum of problems encountered in office-based practice. The reviewers were requested to critique the clinical logic and consistency of the clusters. In most cases the reviewers agreed with the logic and clinical relevance of the clusters. In a few cases the reviewers recommended combining clusters that were originally separate. Fifteen such recommendations were incorporated into the clusters. The clusters were ranked according to their relative frequency in the NAMCS data set and, only clusters with a frequency of greater than 0.1 percent were retained.

It was possible to capture 80 percent of all principal ambulatory diagnoses made by US office-based physicians in the course of a year with the use of 60 clinical clusters. Fifty percent of all visits can be identified with the use of only 15 clusters. A more extensive discussion of the method and a complete list of all the clusters and their component diagnostic codes based on ICDA-8 can be found in another publication.²⁰

Factors Influencing the Diagnostic Content of Ambulatory Medical Practice

One might expect family physicians with different training or with practices in different environ-

ments to encounter different mixes of patients. Indeed, the data in Tables 8 and 9 demonstrate that the diagnostic content of family practice is influenced by physician and practice characteristics. Examination of the 25 most frequent diagnosis clusters representing about 70 percent of all encounters yields some striking variations among subgroups of physicians.

A factor that almost certainly explains some of the variation is the age differences of the physicians and their patients. Age has a major effect on the diagnostic conditions of patients. Older physicians, who tend to see older patients, encountered proportionately more chronic illness and less obstetrics than did younger physicians (Table 8). Physicians in the West have been shown to treat younger patients, partially explaining the relatively low frequency of chronic illness in this region.

The diagnostic mix of family practice varies dramatically from one region to another (Table 9). When compared with family physicians in other parts of the country, Northeastern physicians encountered more chronic illness and dermatologic conditions, but almost no obstetrics. North Central physicians saw many obstetric patients but recorded relatively few diagnoses associated with psychosocial problems. Southern physicians encountered greater amounts of infectious disease but less obstetrics and musculoskeletal illness. Physicians in the West saw relatively little chronic illness (eg, hypertension, ischemic heart disease, diabetes, degenerative joint disease) or dermatological conditions but relatively large amounts of trauma (particularly sprains or strains and fractures or dislocations).

There are a number of possible explanations for these regional differences. First, one might speculate that the actual incidence of certain illnesses is higher in some regions than in others. If true, this may explain the higher frequency of encounters for infectious disease noted in the South and the high and low visit rates for dermatological conditions in the Northeast and West, respectively.

One might also speculate that the mix of services provided by family physicians in each region is influenced by the scope of family practice training in that region and by the relative supply of other specialists. A relative abundance of obstetricians in the Northeast may be related to the observation that fewer family physicians in that region incorporate obstetrics into their practices.

Table 8. Frequency of Most Common Diagnosis Clusters for Outpatient Family Practice by Physician Age, Board Certification, and Residency Training (weighted percent)

Cluster	All Family Physicians	Physician Age (yr)			Board Certified		Residency Completed	
		<45	45-54	55+	Yes	No	Yes	No
1 General medical examination	14.5	12.7	16.1	13.7	13.1	15.1	11.9	14.8
2 Acute upper respiratory tract infection	7.9	9.5	8.6	6.7	8.5	7.7	7.1	8.0
3 Hypertension	7.0	5.5	6.2	7.4	5.9	7.4	8.6	6.8
4 Soft tissue injuries	3.9	3.7	3.2	4.7	3.4	4.2	2.8	4.1
5 Acute sprains, strains	3.1	3.1	3.3	2.9	3.2	3.1	2.5	3.2
6 Prenatal and postnatal care	3.0	4.2	3.9	1.6	3.7	2.6	3.1	2.9
7 Depression/anxiety	2.9	2.6	2.3	3.7	3.0	2.9	4.6	2.8
8 Ischemic heart disease	2.6	1.7	2.3	3.3	2.4	2.7	1.9	2.7
9 Diabetes	2.4	2.4	1.9	3.0	2.4	2.4	2.2	2.4
10 Dermatitis/eczema	2.1	1.6	2.1	2.3	1.4	2.4	1.6	2.2
11 Degenerative joint disease	2.0	1.6	1.1	3.1	1.2	2.1	2.2	2.0
12 Urinary tract infection	2.0	1.5	2.1	2.2	1.6	2.2	1.7	2.1
13 Obesity	1.7	1.0	1.8	1.9	1.2	1.9	2.1	1.7
14 Acute lower respiratory tract infection	1.7	2.3	1.2	2.0	2.0	1.6	1.6	1.7
15 Nonfungal skin infection	1.6	1.9	1.3	1.8	1.6	1.6	1.2	1.7
16 Infectious diarrhea/gastroenteritis	1.5	1.4	1.3	1.7	1.5	1.5	1.3	1.6
17 Vaginitis, vulvitis, cervicitis	1.3	1.2	1.2	1.4	1.5	1.2	2.4	1.2
18 Fractures/dislocations	1.2	1.3	1.5	1.0	1.5	1.2	1.2	1.3
19 Otitis media	1.2	1.8	1.3	0.9	1.2	1.2	1.4	1.2
20 Emphysema, chronic bronchitis, chronic obstructive pulmonary disease	1.2	1.7	1.3	0.8	1.6	1.0	1.5	1.1
21 Medical/surgical aftercare	1.1	1.4	1.1	2.0	1.5	1.0	1.5	1.1
22 Peptic ulcer diseases	1.0	1.2	0.8	1.1	1.2	1.0	0.5	1.1
23 Headache	0.9	0.9	0.6	1.1	0.8	0.8	0.7	0.9
24 Bursitis, synovitis, tenosynovitis	0.8	0.8	0.8	0.8	0.8	0.8	0.9	0.8
25 Low back pain	0.8	0.7	0.8	0.9	0.8	0.8	0.8	0.8

Based on 38,511 patient encounters recorded in USC data by office-based physicians

Of interest is the relatively small variation in diagnostic mix by board certification status, practice arrangement, or residency training, although residency-trained physicians were more likely to diagnose anxiety and depression. Finally, the main difference between urban and rural physicians is that the former saw obstetrical patients only one half as frequently as the latter, probably because of the relative abundance of urban obstetricians.

It appears that a combination of factors, including availability of specialists, scope of training, disease incidence, and patient demographics, uniquely influence the diagnostic composition of practices in each region. Family practice is not a homogeneous discipline. Although family physicians of all types and in all areas see a broad spectrum of the population with respect to age, the actual diagnostic conditions for which they pro-

Table 9. MAMP Cluster Frequency for Outpatient Family Practice by Region, Practice Arrangement, and Urbanization Level (weighted percent)

Cluster	Region				Practice Arrangement			Urbanization Level		
	West	South	North Central	North East	Solo	SSG	MSG	Adjacent		Not Adjacent
								SMSA to	SMSA to	
1 General medical examination	12.2	12.2	17.0	17.0	15.4	12.6	12.0	16.3	11.6	10.8
2 Acute upper respiratory tract infection	7.5	9.3	6.5	8.6	7.6	8.7	8.8	7.2	10.2	8.1
3 Hypertension	4.8	6.6	7.6	8.9	7.4	6.1	5.9	7.8	5.7	4.7
4 Soft tissue injuries	4.2	4.1	4.0	2.7	3.7	4.5	4.8	3.6	4.4	4.8
5 Acute sprains, strains	4.3	2.8	2.8	3.5	2.9	3.7	3.5	3.3	2.6	3.0
6 Prenatal and postnatal care	3.3	2.4	4.3	0.4	2.4	4.5	3.9	2.3	3.1	5.2
7 Depression/anxiety	2.7	3.5	2.0	4.1	3.0	2.6	2.7	3.3	2.1	2.4
8 Ischemic heart disease	1.5	3.0	2.6	2.7	2.7	2.6	2.1	2.3	2.8	3.6
9 Diabetes	1.9	2.2	2.7	2.9	2.4	2.4	2.6	2.5	2.2	2.4
10 Dermatitis/eczema	1.4	2.1	2.1	3.2	2.4	1.4	1.6	2.3	1.9	1.8
11 Degenerative joint disease	1.8	2.1	2.1	2.0	2.2	1.6	1.6	1.9	2.2	2.2
12 Urinary tract infection	1.5	2.5	2.0	1.3	1.7	3.5	1.7	2.2	1.6	1.7
13 Obesity	1.4	1.5	2.3	1.0	2.0	1.1	0.9	2.3	0.7	0.7
14 Acute lower respiratory tract infection	2.1	1.6	1.8	1.3	1.6	2.0	2.1	1.8	0.8	1.8
15 Nonfungal skin infection	0.9	2.2	1.1	2.1	1.5	1.8	1.8	1.6	1.3	2.2
16 Infectious diarrhea/gastroenteritis	1.5	1.8	1.2	1.4	1.6	1.3	1.4	1.5	1.2	1.8
17 Vaginitis, vulvitis, cervicitis	1.8	1.3	1.0	1.5	1.3	1.2	1.3	1.4	0.9	1.3
18 Fractures/dislocations	1.7	0.8	1.6	0.9	1.1	1.5	1.4	1.1	1.5	1.4
19 Otitis media	1.1	0.9	1.5	1.3	1.1	1.4	1.4	1.7	3.5	0.8
20 Emphysema, chronic bronchitis, chronic obstructive pulmonary disease	1.3	1.1	1.3	1.0	1.0	1.6	1.3	1.0	1.5	1.2
21 Medical/surgical aftercare	1.4	1.1	1.1	1.1	1.1	1.2	1.5	0.9	1.5	1.4
22 Peptic ulcer diseases	1.1	1.3	0.7	1.0	0.9	1.2	1.3	1.1	0.6	1.1
23 Headache	1.1	1.2	0.3	0.9	0.9	0.7	0.7	0.9	0.8	0.8
24 Bursitis, synovitis, tenosynovitis	0.9	0.5	1.1	0.8	0.8	1.1	0.9	1.0	0.6	0.6
25 Low back pain	1.7	0.7	0.5	0.9	0.9	0.8	0.7	0.9	0.7	0.7

SSG—single specialty group, MSG—multispecialty group
 Based on 38,571 patient encounters recorded in USC data by office-based physicians

vide care is affected by factors external to the practice.

Mean Time per Encounter

The USC survey requested physicians to record the amount of time (in minutes) spent face to face

with each patient seen. This recording permitted calculation of the average time spent per patient encounter for different groups of physicians and practices (Table 10). The amount of time physicians spend with individual patients is thought to be related to patient satisfaction and may affect

Table 10. Mean Encounter Time Per Patient by Selected Physician, Practice, and Patient Characteristics

	Minutes (weighted mean)
Physician Characteristics	
Board certified	
Yes	11.1
No	10.7
Residency graduate	
Yes	13.0
No	10.6
Age	
Under 45 yr	11.1
45-54 yr	10.2
Over 54 yr	11.4
Practice Characteristics	
Arrangement	
Solo	10.8
Single-specialty group	10.7
Multispecialty group	11.5
Urbanization level	
In SMSA	11.3
Adjacent to SMSA	10.0
Not adjacent to SMSA	10.0
Region	
Northeast	11.8
North Central	9.9
South	10.1
West	14.4
Patient Characteristics	
Sex	
Female	11.1
Male	10.5
Age	
Under 17 yr	8.8
17-64 yr	11.3
Over 64 yr	11.5
Overall	10.8
Based on 35,410 patient encounters in USC data recorded by office-based physicians	

quality of care. It has profound effects on overall physician productivity.

Residency graduates spent significantly more time per encounter than nongraduates. The average residency-trained physician spent 23 percent more time (2.4 minutes) with each patient than did his non-residency-trained counterpart, while physicians in SMSAs as a group spent 13 percent more

time per patient than did physicians in nonmetropolitan counties. A striking regional difference is apparent. Western family physicians spent 22 percent more time per encounter than those in the Northeast, 43 percent more than those in the South, and 45 percent more time than their counterparts in the North Central region. The pediatric age group (younger than 17 years) received only about three quarters of the average encounter time allocated to adult patients. Board certification, physician age, practice arrangement, and patient gender were not strongly related to mean time per encounter.

Not surprisingly, physicians who saw fewer patients per hour spent more time per patient encounter. This was true for residency graduates, who saw 0.74 (22 percent) fewer patients per hour than nongraduates, and for urban physicians, who saw more than 10 percent fewer patients per hour than rural physicians. That there are proportionately more residency graduates in the West, 14.7 percent vs 6 to 9 percent in the other regions, may account for some of the regional differences noted above.

The introduction of formal residency training in family medicine represents the most significant change in the discipline in the last decade. Examination of the mean time per encounter for the 25 most common diagnosis clusters in Table 11 reveals differences in practice style between graduates and nongraduates of residency programs.

Residency graduates spent more time per patient for 18 of the 25 most frequently encountered outpatient diagnoses. This discrepancy was greater than 25 percent for acute upper respiratory tract infections, dermatitis or eczema, acute lower respiratory tract infections, otitis media, and emphysema or chronic bronchitis; time allocated to each patient was more than 50 percent greater for prenatal and postnatal care, degenerative joint disease, and urinary tract infections. The only diagnosis for which residency graduates spent at least 25 percent less time per patient than their non-residency-trained counterparts was obesity, although they also spent notably less time with patients given the diagnosis of diabetes or ischemic heart disease.

These differences are not trivial. Although the absolute amount of time per patient may be a matter of only several minutes, the cumulative effect demonstrates major differences in the way in

Table 11. Mean Time Per Encounter for the 25 Most Frequent Diagnosis Clusters: Residency Graduates vs Nongraduates

Cluster	Mean Time (min) (weighted mean)		Difference (graduate – nongraduate)
	Graduate	Nongraduate	
1 General medical examination	14.5	11.9	2.6
2 Acute upper respiratory tract infection	10.2	8.0	2.2
3 Hypertension	10.4	9.7	0.7
4 Soft tissue injury	11.2	10.5	0.7
5 Acute sprains, strains	13.4	11.3	2.1
6 Prenatal and postnatal care	13.6	8.5	5.1
7 Depression/anxiety	14.4	13.5	0.9
8 Ischemic heart disease	10.8	12.0	-1.2
9 Diabetes	9.8	11.8	-2.0
10 Dermatitis/eczema	10.2	7.4	2.8
11 Degenerative joint disease	17.7	11.5	6.2
12 Urinary tract infection	14.5	9.2	5.3
13 Obesity	7.3	10.7	-3.4
14 Acute lower respiratory tract infection	13.2	9.0	4.2
15 Nonfungal skin infection	8.8	9.1	-0.3
16 Infectious diarrhea/gastroenteritis	11.7	11.4	0.3
17 Vaginitis, vulvitis, cervicitis	12.0	13.0	-1.0
18 Fractures/dislocations	12.2	12.8	-0.6
19 Otitis media	9.8	7.8	2.0
20 Emphysema, chronic bronchitis, chronic obstructive pulmonary disease	12.8	9.9	2.9
21 Medical/surgical aftercare	10.4	9.1	1.3
22 Peptic ulcer diseases	12.8	10.5	2.3
23 Headache	10.8	11.1	-0.3
24 Bursitis, synovitis, tenosynovitis	10.9	9.5	1.4
25 Low back pain	15.4	13.1	2.3

Based on 271 to 4137 patient encounters in USC data recorded by office-based physicians

which residency-trained physicians use the physician's most valuable resource, his own time. It is interesting to speculate on the reason for these differences. There is no obvious common denominator to the conditions for which residency-trained physicians choose to spend more time; they span the spectrum from self-limited infectious disease to complex chronic conditions to pregnancy. The patients seen by residency-trained physicians were for the most part slightly younger, and it is unlikely that these physicians were seeing patients whose diagnoses were consistently more complex than those seen by nongraduates. Residency-trained physicians had less practice experience, and they may have been less certain of themselves

in a new practice situation. In addition, they may have had fewer patients and thus more leisure time.

One important possibility is that the residency-trained physician adopts a different clinical approach to medical practice. A subsequent section of this report describes systematic differences in the way in which residency graduates used diagnostic tests and various therapeutic interventions. The differences in time spent with patients noted here are of the same order of magnitude as differences reported by others who have compared general practitioners with internists.²¹ Perhaps the residency-trained family physician will more closely resemble his residency-trained counterpart in other specialties than his

non-residency-trained predecessor in general practice.

Comparison of the USC, NAMCS, and Virginia Data Sets

Much previous information about the clinical content of family medicine has come from the National Ambulatory Medical Care Survey⁶ and the Virginia Study.⁷ NAMCS depends on a nationwide random sample of physicians and records data during one week of practice. The Virginia Study reported on all the diagnostic data recorded by 36 family physicians and 82 family practice residents in the state of Virginia from mid-1973 to mid-1975. The diagnostic clustering technique allows a comparison of these two profiles of family practice with that which emerges from the USC survey to determine the extent to which each of these important studies appears to capture the essence of the discipline. For a more detailed discussion of the methodological differences in these three studies, the interested reader should consult the final report of this project.¹⁴

Comparison of USC/MAMP and NAMCS

Table 12 illustrates the top 30 clusters for NAMCS 1977-78 (recorded from July through October in both years) and for the USC data set. These clusters accounted for about 72 percent of all diagnoses in each of the data sets. The data sets are remarkably similar both in terms of the frequency of these clusters and in terms of their rank order.

Most of the significant differences appear to be related to methodological peculiarities of the specific studies. For example, a higher incidence of upper respiratory tract illnesses (cluster 2) was noted in the 1977-78 NAMCS data, along with a higher frequency of acute lower respiratory tract diseases (cluster 6). This higher incidence of respiratory tract illness in the 1977-78 NAMCS data could be attributed either to a high incidence of respiratory tract illness in 1978 relative to 1977 or to the USC data being more concentrated during the summer months than were the NAMCS data. Hence, any upswing in respiratory tract illness occurring in October would more likely appear in the NAMCS data.

Similarly, the apparent excess of general medical examinations noted in the USC survey may be due to its relatively heavier weighting in the sum-

mer months, a time when school physical examinations are performed. In general, the preponderance of similarities between the two data sets is remarkable. In fact, the USC data resemble the NAMCS data just as closely as data obtained by NAMCS in one year resemble data collected in a subsequent year. This is interpreted as a powerful validation of the USC data.

Comparison of the Virginia and NAMCS Data

The Virginia cluster data are compared with those from the 1975-76 NAMCS data in Table 13. Although the 15 most frequent diagnoses tend to be virtually the same in the Virginia and NAMCS data sets, the relative frequencies and the rank orders often differ significantly between the two data sets. These differences may reflect the fact that the Virginia Study gives a picture of the discipline as it existed in one specific region of the country, rather than representing a national sample of physicians. In addition, generalizability of the Virginia Study may be limited because the majority of the study participants were residents working in educational settings, an environment that is quite different from that in which most office-based family physicians see patients.

A consideration of some of the individual clusters helps to illustrate these observations. The relatively low frequency of upper respiratory tract infections, infectious diarrhea or gastroenteritis, prenatal and postnatal care, and menopausal symptoms in the Virginia experience may reflect a regional tendency for individuals with these conditions (ie, primarily children and women) to seek care from pediatricians and obstetricians. Similarly, it is possible that the Virginia physicians, most of whom were residents, have relatively few older patients, thereby explaining the lower frequencies of degenerative joint disease, bursitis, synovitis or tenosynovitis, and fibrositis, myalgia, or arthralgia noted in the Virginia Study.

In three instances, specifically general medical examination, depression or anxiety, and nonfungal skin infections, the Virginia frequencies were notably higher than those for NAMCS. The higher rate of general medical examinations could reflect an emphasis on preventive care on the part of the statewide residency network. In addition, the inclusion of both primary and secondary diagnoses

Table 12. Comparison of USC with NAMCS Diagnosis Cluster Data: Ambulatory Encounters with Office-Based General and Family Physicians

Cluster**	Percentage*		Rank	
	NAMCS (1977-78)	USC (1977)	NAMCS (1977-78)	USC (1977)
1 General medical examination	9.8	14.5	1	1
2 Acute upper respiratory tract infections	9.3	7.9	2	2
3 Hypertension	6.8	7.0	3	3
4 Soft tissue injuries	4.2	3.9	4	4
5 Acute sprains, strains	3.6	3.1	5	5
6 Acute lower respiratory tract infections	3.1	1.7	6	14
7 Prenatal and postnatal care	2.9	3.0	7	6
8 Ischemic heart disease	2.5	2.6	8	8
9 Diabetes mellitus	2.4	2.4	9	9
10 Depression/anxiety	2.3	2.9	10	7
11 Dermatitis/eczema	2.2	2.1	11	10
12 Obesity	2.2	1.7	12	13
13 Degenerative joint disease	2.1	2.0	13	11
14 Medical/surgical aftercare	1.7	1.1	14	21
15 Infectious diarrhea/gastroenteritis	1.7	1.5	15	16
16 Urinary tract infection	1.7	2.0	16	12
17 Otitis media	1.4	1.2	17	19
18 Chronic rhinitis	1.3	0.7	18	28
19 Fractures/dislocations	1.2	1.2	19	18
20 Nonfungal skin infection	1.2	1.6	20	15
21 Peptic ulcer diseases	1.2	1.0	21	22
22 Bursitis, synovitis, tenosynovitis	1.1	0.8	22	24
23 Vaginitis, vulvitis, cervicitis	1.1	1.3	23	17
24 Sinusitis	1.1	0.8	24	26
25 Low back pain	1.0	0.8	25	25
26 Fibrositis, myalgia, arthralgia	1.0	0.7	26	29
27 Headaches	0.7	0.9	27	23
28 Menstrual disorders	0.7	0.6	28	34
29 Asthma	0.7	0.5	29	37
30 Iron deficiency anemia	0.7	0.5	30	36
Cumulative Percent	72.9	71.9		

*NAMCS data based on 9,164 encounters recorded July through October, 1977 and 1978; USC data based on 38,571 encounters recorded July, September, and October 1977
 **Ranked by NAMCS 1977-78 (July through October) diagnosis frequency

in the Virginia Study could inflate the frequency of the general medical examination cluster, since physicians might have a tendency to record any diseases that are discovered in the course of a general medical examination as the primary diagnosis. Since both NAMCS and USC included only principal diagnoses, general medical examinations would be counted only if they were listed as the

principal diagnosis. The higher incidence of depression or anxiety could also be related to the preponderance of residents in the Virginia Study and to its inclusion of secondary diagnoses. In the USC survey, depression or anxiety represented 4.6 percent of all encounters seen by residency-trained physicians compared with only 2.8 percent of all encounters for those who had not completed

Table 13. Comparison of Virginia Study with NAMCS Diagnosis Cluster Data: Ambulatory Encounters with Office-Based General and Family Physicians

Cluster**	Percentage*		Rank	
	Virginia 1973-75	NAMCS 1975-76	Virginia 1973-75	NAMCS 1975-76
1 Acute upper respiratory tract infection	8.4	11.2	2	1
2 General medical examination	11.7	7.8	1	2
3 Hypertension	5.8	6.0	3	3
4 Soft tissue injuries	4.0	3.3	4	6
5 Acute sprains, strains	2.6	3.3	7	5
6 Acute lower respiratory tract infection	3.3	3.0	5	7
7 Prenatal and postnatal care	1.5	2.8	13	8
8 Ischemic heart disease	2.2	3.3	9	4
9 Depression/anxiety	3.8	2.6	6	9
10 Diabetes mellitus	2.4	2.5	8	11
11 Degenerative joint disease	1.4	2.5	15	10
12 Obesity	2.0	2.4	10	12
13 Dermatitis/eczema	1.5	2.1	14	13
14 Urinary tract infection	1.2	1.9	17	14
15 Otitis media	1.9	1.4	11	17
16 Infectious diarrhea/gastroenteritis	0.6	1.5	29	15
17 Sinusitis	1.0	1.5	19	16
18 Peptic ulcer diseases	0.9	1.2	22	18
19 Fractures/dislocations	0.9	1.1	21	21
20 Bursitis, synovitis, tenosynovitis	0.6	1.2	31	19
21 Nonfungal skin infection	1.7	1.1	12	20
22 Chronic rhinitis	0.6	0.9	30	27
23 Fibrositis, myalgia, arthralgia	0.5	1.0	33	23
24 Vaginitis, vulvitis, cervicitis	1.2	1.0	16	22
25 Low back pain	0.8	0.9	23	28
26 Headaches	0.8	1.0	24	25
27 Acne, diseases of the sweat and sebaceous glands	0.4	0.5	38	37
28 Iron deficiency anemias	0.8	1.0	25	24
29 Menopausal symptoms	0.2	1.0	>60	26
30 Sexually transmitted diseases	0.5	0.6	34	32
Cumulative percent	65.2	71.6		

*NAMCS data based on 32,021 encounters recorded during 1975 and 1976; Virginia data based on 526,196 diagnoses recorded mid-1973 through mid-1975

**Rank by 1977-78 NAMCS (full years) diagnosis frequency

a family practice residency (Table 8).

In sum, the Virginia Study data present a profile of family medicine in one area of the county. Major differences emerge in the specific frequency of individual diagnoses in the Virginia Study when compared with a national sample. As contrasted with the NAMCS-USC comparison, in which only 2 of the most common 30 rubrics differed from one

another by more than 50 percent, 15 of 30 rubrics differed by that amount in the NAMCS-Virginia comparison. There is considerable variation in diagnosis frequency by region, patient age, and physician age and training. It is this variation that limits the generalizability of any regional or residency-based data on the content of family practice.

The Inpatient Role of the Family Physician

Family Physicians in the Hospital Setting

The vast majority of general and family physicians reported that they admit patients to the hospital as part of their ongoing practice. Only 3.6 percent of the physicians in the study sample indicated that they do not admit patients to the hospital. This very small group was more likely to be found in counties that had no hospitals, but with the exception of this finding, there were no major differences between them and the physicians who did admit. Furthermore, 99.5 percent of all family physicians who had completed residency training admitted patients to the hospital, suggesting that residency-trained family physicians will continue to have an active hospital role in the future.

The average physician had 23.1 percent of all patient encounters in a hospital setting. Because patients were seen for longer periods in the hospital setting than in the office, about 26.1 percent of the physician's workday was spent seeing hospitalized patients. There was considerable variation in the relative hospital workload for the physicians in this sample. About 25 percent of the respondents recorded fewer than 10 percent of their total patient encounters in the hospital during the seven-day study period, whereas 15 percent had over 35 percent of their patient encounters in the inpatient setting. Table 14 presents the differing proportion of hospital encounters for the major physician subgroups that make up the study sample. Several interesting differences emerge. Compared with noncertified colleagues, board-certified physicians devoted a larger proportion of their practices to inpatient work. Physicians in the West spent a considerably smaller portion of their practice day in the hospital setting. Physicians in counties with a greater relative supply of hospital beds devoted more of their efforts to hospital work, as did physicians in areas with low hospital occupancy rates.

Multiple regression analysis helps to understand the interplay among these and other factors in accounting for differences in the hospital workload of the family physician. Neither the training and certification of the physician nor the organization of practice makes a significant contribution after controlling for the other factors. Only patient

and environmental characteristics make a unique contribution to explaining the variance in hospital workload among physicians. In particular, physicians with a greater proportion of older patients had relatively greater hospital workloads, probably reflecting the higher hospitalization rates for this segment of the population in general. Physicians with more new patients in their practices spent less time working in the hospital, which may be a reflection of the newer practices having younger patients and smaller hospital loads. Western physicians devoted a smaller proportion of their practice to inpatient work, and North Central physicians spent more time working in the hospital, even after controlling for other variables.

The findings with regard to bed supply and hospital occupancy rate are consistent with the recurrent observation that the presence of medical resources tends to foster their use.²² Regression analysis demonstrates that areas with a greater relative supply of hospital beds and where hospital beds are more likely to be empty, family physicians see a greater portion of their patients in the hospital setting. This appears logical from the standpoint of the physician. If hospital beds are plentiful and unfilled, there are likely to be few barriers to hospitalization. In fact, there may be subtle encouragements to hospitalize patients to improve the economic condition of the hospitals themselves. Conversely, in areas where hospital beds are relatively scarce, physicians may be more likely to substitute ambulatory care, particularly in that fraction of cases for which hospitalization is discretionary.

It is worth noting that the physician-population ratio and the relative urbanization of the area played no unique role. It has been predicted that in areas with more specialists (for example, urban areas and places with abundant physician supplies) family physicians would be more likely to have narrow hospital privileges and less likely to use the hospital.²³ The present evidence does not provide any support for that conjecture.

Content of the Hospital Practice of the Family Physician

The inpatient population is considerably older than the population family physicians treat in the

Table 14. Percent of All Patient Encounters Occurring in Hospital by Physician, Practice, and Environmental Characteristics

	Percent of All Encounters Occurring in Hospital (weighted mean)
<i>Physician Characteristics</i>	
Residency graduate	
Yes	18.9
No	22.1
Board certified	
Yes	25.8
No	20.3
Age	
Under 45 yr	21.0
45-54 yr	23.6
Over 54 yr	20.8
<i>Practice Characteristics</i>	
Arrangement	
Solo	21.6
Single-specialty group	22.8
Multispecialty group	22.3
Urbanization level	
SMSA	20.5
Adjacent to SMSA	26.6
Not adjacent to SMSA	22.6
Region	
Northeast	20.2
North Central	24.8
South	22.5
West	14.0
<i>Environmental Characteristics (county)</i>	
Physician-population ratio	
Low	22.5
Medium	20.6
High	22.0
Infant mortality rate	
Low	19.9
Medium	23.2
High	21.6
Socioeconomic status	
Low	20.9
Medium	22.7
High	20.9
Bed-population ratio	
Low	16.5
Medium	21.9
High	25.1
Hospital occupancy rate	
Low	27.2
Medium	22.0
High	17.8
Overall Mean	21.9
All percentages based on at least 70 encounters (range, 70-465)	

Table 15. Fifty Most Common Hospital Diagnoses by Office-Based General and Family Physicians (n = 7,830)

Diagnosis (ranked by frequency in USC data)	ICDA-8 Code	Weighted Percent	Cumulative Percent
1 Acute myocardial infarction without hypertensive disease	410.9	3.5	3.5
2 Acute, ill-defined cerebrovascular disease without hypertension	436.9	2.7	6.2
3 Pneumonia, unspecified	486.0	2.7	8.9
4 Congestive heart failure	427.0	2.7	11.6
5 Diabetes mellitus without acidosis or coma	250.9	2.6	14.2
6 Chronic ischemic heart disease without hypertensive disease	412.9	2.5	16.7
7 Emphysema	492.0	2.4	19.1
8 Medical/surgical aftercare—other	Y10.5	1.9	21.0
9 Back sprain, strain—unspecified	847.9	1.7	22.7
10 Postpartum observation	Y7.0	1.6	24.3
11 Single born without immaturity	Y20.0	1.5	25.8
12 Diaphragmatic hernia without obstruction	551.3	1.4	27.2
13 Back sprain, strain—other	847.8	1.3	28.5
14 Cholecystitis, cholangitis without calculus	575.0	1.2	29.7
15 Gastroenteritis, colitis	9.2	1.2	30.9
16 Other diseases of intestines, peritoneum—other	569.9	1.2	32.1
17 Acute appendicitis with peritonitis	540.0	1.1	33.2
18 Essential benign hypertension	401.0	1.1	34.3
19 Inguinal hernia without obstruction	550.0	1.0	35.3
20 Delivery without complication	650.0	1.0	36.3
21 Diverticula of colon	562.1	0.9	37.2
22 Fracture of neck or femur—other and unspecified—closed	820.4	0.8	38.0
23 Uterine fibroma	218.0	0.8	38.8
24 Prenatal care without associated nonobstetric condition	Y6.0	0.8	39.6
25 Uterine prolapse	623.4	0.8	40.4
26 Appendicitis, unqualified	541.0	0.8	41.2
27 Fracture of vertebral column without spinal cord lesion—unspecified	805.6	0.8	42.0
28 Calculus of kidney and ureter	592.0	0.7	42.7
29 Malignant neoplasm of large intestine—unspecified	153.8	0.7	43.4
30 Ulcer of duodenum—other and unspecified	532.9	0.7	44.1

ambulatory setting; 39 percent of all hospital encounters were with patients in the geriatric age range, while only 17 percent of outpatient encounters were with patients in this age group. Conversely, the pediatric age group made up only 7.7 percent of all the inpatient encounters as opposed to 19.1 percent in the outpatient setting, indicating that pediatric inpatient care was not a major part of the hospital workload of the family physician.

The sex distribution of hospitalized patients shows a predominance of female patients; most of the difference is attributable to women in the child-bearing years. This predominance is most likely due to obstetrical care, which is one of the

major diagnostic categories for which family physicians provide inpatient care. Elderly women are the largest single demographic group for whom family physicians provide care, probably reflecting the geriatric population's being disproportionately female.

Table 15 presents the most common hospital diagnoses recorded by the physicians in the study sample ranked according to their relative frequency. When compared with the list of the most frequent outpatient diagnoses, only two diagnoses share a ranking in the top ten: diabetes mellitus and chronic ischemic heart disease.

Individual diagnostic rubrics are of limited util-

**Table 15. Fifty Most Common Hospital Diagnoses (n = 7,830)
(Continued)**

Diagnosis (ranked by frequency in USC data)	ICDA-8 Code	Weighted Percent	Cumulative Percent
31 Abdominal pain	785.5	0.7	44.8
32 Other disease of respiratory system—other	519.9	0.7	45.5
33 Gastritis and duodenitis	535.0	0.7	46.2
34 Gangrene NEC	445.9	0.7	46.9
35 Intestinal obstruction without hernia— other and unspecified	560.9	0.7	47.6
36 Pain referable to urinary system	786.0	0.7	48.3
37 Asthma	493.0	0.6	48.9
38 Displacement of intervertebral disc—unspecified	725.9	0.6	49.5
39 Fracture of ankle—closed	824.0	0.6	50.1
40 Metabolic diseases—other and unspecified	279.0	0.6	50.7
41 Malignant neoplasm—other	199.1	0.6	51.3
42 Vaginal bleeding	629.5	0.6	51.9
43 Diseases of jaw—inflammatory conditions	526.4	0.6	52.5
44 Cholelithiasis—other and unspecified	574.9	0.6	53.1
45 Anemia, unspecified	285.9	0.6	53.7
46 Pelvic inflammatory disease	616.0	0.6	54.3
47 Malignant neoplasm of bronchus and lung	162.1	0.5	54.8
48 Malignant neoplasm of breast	174.0	0.5	55.3
49 Malignant neoplasm of kidney excluding pelvis	189.0	0.5	55.8
50 Diabetes mellitus with acidosis or coma	250.0	0.5	56.3

NEC—not elsewhere classified

ity in understanding the complexity of practice and do not readily permit comparisons between data sets. Therefore, a set of inpatient diagnostic clusters were created using the USC data in a manner analogous to that used to cluster ambulatory data; the results are presented in Table 16.

More than 50 percent of all hospital encounters can be classified using 14 clinical clusters; this contrasts with the 45 individual diagnoses required to capture the same proportion of outpatient clinical content. When the cluster technique is used, two major clusters emerge as major components of the hospital work of family physicians that were not evident in the list of most common diagnoses: pregnancy and malignant neoplasms. These conditions are the second and third most prevalent clusters, but do not appear in any form among the nine most common single diagnoses.

Comparing the inpatient clusters with outpatient clusters again illustrates the marked clinical divergence between the content of hospital and

ambulatory practice for the family physician. Using clusters, only three entities share ranking in the ten most prevalent list: pregnancy, ischemic heart disease, and diabetes mellitus. It makes sense that, in general, conditions that are common in an office practice are probably less severe than those necessitating hospitalization. However, these disparate lists do suggest that family physicians must deal with a broad range of disorders as part of their practices and that there are major differences between problems confronted in the hospital and those seen in the office.

The future hospital role of the family physician is the subject of considerable controversy. Using the clustering methodology, the clinical content of the hospital practices of residency-trained physicians were compared with those physicians who had not completed a residency. Table 17 presents the clusters for which there were substantial differences between the two subgroups.

Provocative differences emerge from this com-

Table 16. Top 30 Clusters of Hospital Diagnoses by Office-Based General and Family Physicians (n = 7,830)

Cluster*	Weighted Percent				Rank	
	Weighted Percent	Cumulative Percent	Residency Graduates (n = 1,240)	Nongraduates (n = 6,590)	Residency Graduates	Nongraduates
1 Ischemic heart disease (including myocardial infarction)	7.9	7.9	5.6	8.0	3	1
2 Pregnancy—normal and complicated	6.2	14.1	12.8	5.8	1	3
3 Malignant neoplasm	6.2	20.3	6.5	6.2	2	2
4 Back pain, radiculopathy	4.3	24.6	2.2	4.5	10	4
5 Cerebrovascular disease	4.0	28.6	5.0	3.9	4	5
6 Pneumonia	3.1	31.7	3.7	3.1	6	6
7 Diabetes mellitus	3.1	34.8	3.8	3.0	5	7
8 Congestive heart failure	2.7	37.5	2.3	2.8	8	8
9 Chronic obstructive pulmonary disease	2.7	40.2	1.6	2.8	13	9
10 Appendicitis/appendectomy	2.3	42.5	0.8	2.4	26	10
11 Fractures and dislocations (except femur)	2.3	44.8	0.8	2.4	27	11
12 Surgical aftercare	2.0	46.8	2.5	2.0	7	12
13 Cholecystitis	1.9	48.7	0.7	1.9	30	13
14 Peptic ulcer disease	1.8	50.5	1.9	1.8	11	14
15 Benign diseases of uterus	1.7	52.2	0.5	1.7	34	15
16 Fracture of femur	1.6	53.8	0.3	1.7	39	16
17 Diarrheal disease	1.6	55.4	1.7	1.6	12	17
18 Hernias of abdominal wall without obstruction	1.4	56.8	0.9	1.5	24	19
19 Kidney stone	1.4	58.2	0.2	1.5	40	18
20 Diseases of urinary tract	1.4	59.6	1.0	1.4	22	20
21 Diseases of intestine and peritoneum (NEC)	1.3	60.9	1.0	1.4	21	21
22 Upper respiratory tract infection and influenza	1.2	62.1	1.2	1.2	18	22
23 Essential benign hypertension	1.1	63.2	0.2	1.2	43	23
24 Abnormal menstrual bleeding	1.0	64.2	0.1	1.0	46	24
25 Pyogenic infections of skin and subcutaneous tissue	0.9	65.1	1.3	0.9	17	25
26 Diverticulitis of colon	0.9	66.0	0.4	0.9	35	26
27 Pelvic inflammatory disease	0.8	66.8	0.1	0.9	45	27
28 Gastrointestinal obstruction	0.8	67.6	0.7	0.8	31	28
29 Arthritis	0.8	68.4	0.6	0.8	32	29
30 Anemia	0.7	69.1	1.3	0.7	15	31

NEC—not elsewhere classified

*Ranked by frequency of clusters in USC diagnosis data

Table 17. Summary of Major Differences Between Graduates and Nongraduates of Family Practice Residency Programs in Hospital Diagnosis Cluster Frequency

Cluster	Weighted Percent of All Diagnoses	
	Graduates (n = 1,240)	Nongraduates (n = 6,590)
<i>Diagnoses Seen with Greater Relative Frequency by Residency Graduates</i>		
Pregnancy—normal and complicated	12.8	5.8
Asthma	2.3	0.6
Anemia	1.3	0.7
Head injury	1.3	0.5
Alcoholism	1.3	0.5
Cardiac arrhythmias	1.2	0.3
Anxiety/depression	1.0	0.6
<i>Diagnoses Seen with Greater Relative Frequency by Nongraduates</i>		
Back pain	2.2	4.5
Chronic obstructive pulmonary disease	1.6	2.8
Appendicitis/appendectomy	0.8	2.4
Fractures/dislocations (excluding femur)	0.8	2.4
Cholecystitis	0.7	1.9
Benign uterine disease	0.5	1.7
Fractures—femur	0.3	1.7
Hernias of abdominal wall without obstruction	0.9	1.5
Kidney stone	0.2	1.5
Essential benign hypertension	0.2	1.2

parison. There are essentially three types of diagnostic clusters that are more important in the hospital practices of residency graduates: pregnancy; psychosocial entities, such as alcoholism and anxiety or depression; and relatively complex medical diagnoses such as asthma, anemia, and cardiac arrhythmias. Clusters seen more frequently by nongraduates similarly fall into several discrete clinical areas: surgical diagnoses and procedures, such as appendectomy, cholecystitis, and hernias; orthopedic diagnoses, including fractures of all types and back pain; and two common medical conditions, chronic obstructive pulmonary disease and hypertension. From these differences, one can speculate that residency-trained physicians are more comfortable than their general practice predecessors with behavioral and psychiatric diagnoses and may be more likely to care for patients with complex medical diagnoses. In addition, they devote more than twice as much of their hospital practice to obstetrics. On the other hand, they appear to be much less involved in the care of hospi-

tal patients with surgical or orthopedic problems.

Caution must be employed in using these data to predict the future hospital role of the family physician. As already shown, residency-trained physicians are considerably younger than their non-residency-trained counterparts, are more likely to be in group practice, and take care of a different spectrum of patients. It is possible that their hospital practice will come to resemble the current norm as they age and their practices mature. It is also quite possible, however, that because of differences in their training and in their definition of themselves as clinicians, they will continue their current pattern. In that case, one can expect a substantial reshuffling of the way in which hospitalized patients are cared for as residency-trained family physicians replace an older cohort of physicians.

Table 18 shows that there are marked differences among subgroups of family physicians as to whether they include obstetrical care in their usual practice. In this case, all obstetrically related

Table 18. Proportion of Office-Based General and Family Physicians Providing Obstetrical Services by Physician, Practice, and Environmental Characteristics (n = 607)

	Provided Obstetrical Service (weighted percent)
<i>Physician Characteristics</i>	
Residency graduate	
Yes	43.4
No	45.9
Board certified	
Yes	53.2
No	42.5
Age	
Under 45 yr	58.5
45 to 54 yr	64.6
Over 54 yr	24.2
<i>Practice Characteristics</i>	
Arrangement	
Solo	41.3
Single-specialty group	59.5
Multispecialty group	50.2
Urbanization level	
SMSA	34.7
Adjacent to SMSA	60.0
Not adjacent to SMSA	78.0
Region	
Northeast	6.2
North Central	60.7
South	43.1
West	51.5
<i>Environmental Characteristics (county)*</i>	
Physician-population ratio	
Low	54.6
Medium	40.4
High	34.0
Infant mortality rate	
Low	45.7
Medium	44.8
High	46.9
Socioeconomic Status	
Low	40.5
Medium	44.2
High	49.6
<i>Overall</i>	45.7
*Physicians with fewer than 20 encounters were excluded	

diagnoses, both in the ambulatory and inpatient setting, were examined; physicians who provided any of these services during the three-day study period were considered to incorporate obstetrics into their practices. Overall, slightly less than one

half the family physicians (45.7 percent) did care for obstetric patients during the study interval. Given the method used, the true figure is probably closer to 50 percent.

Some of the differences among the subgroups

are striking. The most remarkable finding, noted earlier, is the degree to which Northeastern family physicians systematically excluded obstetrics from their practice. Only 6 percent, a negligible portion of family physicians in that region of the country, took care of any obstetric problems during the study interval. Several other physician subgroups were also less likely to provide obstetric services: physicians in solo practice, urban physicians, physicians over the age of 54 years, and physicians in counties with socioeconomic status.

Multivariate analysis sheds further light on the interplay among these factors. The impact of regional practice patterns was quite important; all other things being equal, family physicians in both the Northeast and the South were significantly less likely to practice obstetrics. The socioeconomic status of the patient population also played a

role, with family physicians being more likely to perform obstetrics if they have more Medicaid patients. However, in counties with a greater relative supply of physicians, family physicians were less likely to include obstetrics in their repertoires.

These observations are consistent with the conclusion that the decision whether or not to do obstetrics is highly influenced by the environment in which the physicians work. Family practice is not a uniform discipline; the family physician who practices obstetrics in the Northeast is a rarity, whereas caring for pregnant women is the norm in the North Central United States. Even with regional variation taken into account, in areas with more physicians and, presumably, more obstetricians, family physicians are less likely to provide obstetrical care. In poorer or more sparsely populated areas, however, family physicians are more likely to provide obstetric services.

Use of Diagnostic Tests and Therapeutic Procedures in Family Practice

Tests and Procedures in the Office and the Hospital

For all ambulatory encounters, a diagnostic test was ordered in 40 percent and a therapeutic procedure (including counseling and drug prescription) was performed in 75 percent. Table 19 displays the most frequently performed outpatient diagnostic test and therapeutic procedures in rank order. Systemic drugs were prescribed in 46.4 percent of outpatient encounters.

Tests were used more frequently in the hospital setting, being ordered during 47 percent of the inpatient encounters. Therapeutic procedures (including counseling in drug prescription) however, were ordered during only 61 percent of the inpatient encounters, significantly less often than in the office. The most frequently performed or ordered hospital tests and procedures are shown in rank order in Table 20, illustrating the much greater use of diagnostic methods in the hospital. Systemic drugs were prescribed in 31.0 percent of inpatient encounters.

There were major differences in the rates at which individual physicians and groups of physi-

cians, defined by such characteristics as location and training, used diagnostic and therapeutic resources. Younger, board-certified, residency-trained physicians and those in group practices generally used more diagnostic resources and a different mix of therapeutic resources in the outpatient setting than did their older, non-residency-trained colleagues in solo practice. The first group was more likely to order a culture or an x-ray examination, less likely to give an injection, more prone to use patient education, and somewhat more likely to apply a cast or splint.

In particular, younger and residency-trained physicians ordered many more cultures and chest x-ray examinations, gave significantly fewer injections, and used patient education much more frequently than older and non-residency-trained physicians. It is clear that individual physicians differed greatly in the total amount and mix of diagnostic and therapeutic resources they used in managing their patients, differences that have major implications for the cost, quality, and satisfaction with medical care.

Regional differences are also dramatic with respect to specific procedures or tests, although it is

Table 19. Most Frequently Performed Outpatient Tests and Procedures	
Tests/Procedures	Percent of Encounters
<i>Diagnostic Tests*</i>	
1 Routine laboratory: complete blood cell count, urinalysis	20.9
2 Blood chemistry	4.8
3 X-ray—other	4.6
4 Pap smear	4.4
5 Chest x-ray examination	3.1
6 "Panel"—automated (eg, SMA-12)	2.5
7 Breast examination	2.4
8 Electrocardiogram	2.3
9 Culture	2.2
<i>Therapeutic Procedures**</i>	
1 Injections—other	11.0
2 Immunizations	3.8
3 Dressing: apply/remove	2.2
4 Suture removal	1.1
5 Cast/splint: apply/remove	1.0
6 Minor tissue removal	0.9
7 Incision/drainage	0.6
8 Suturing only	0.6
9 Cauterization/cryotherapy	0.6
*Includes all procedures with frequency of at least 2.0 percent except for "other" categories	
**Includes all procedures with frequencies of at least 0.5 percent, except counseling, prescriptions, physical rehabilitation, and "other" categories	
Based on 39,247 encounters recorded by office-based physicians in USC data	

Table 20. Most Frequently Performed Hospital Tests and Procedures	
Tests/Procedures	Percent of Encounters
<i>Diagnostic Tests*</i>	
1 Routine laboratory: complete blood cell count, urinalysis	25.1
2 Blood chemistry	17.9
3 Chest x-ray	16.4
4 Electrocardiogram	14.5
5 "Panel"—automated (eg, SMA-12)	13.5
6 X-ray—other	10.2
7 Serology/venereal disease	8.7
8 Radiology—gastrointestinal	5.4
9 Enzymes	3.3
10 Culture	3.0
<i>Therapeutic Procedures**</i>	
1 Injections—other	11.4
2 Anesthetization	3.1
3 Dressing: apply/remove	2.3
4 Organ removal/repair	1.4
5 Surgery—other	1.4
6 Cast/splint: apply/remove	1.1
7 Reduction—closed	1.0
8 Chemotherapy	1.0
9 Transfusion	1.0
*Includes all diagnostic procedures with frequencies of at least 2.0 percent except for "other" categories	
**Includes all therapeutic procedures with frequencies of at least 1.0 percent except for counseling, prescriptions, physical rehabilitation, and "other" categories	
Based on 7,830 encounters recorded by office-based physicians in USC data	

difficult to identify coherent patterns. Northeastern physicians showed lower rates of diagnostic and therapeutic procedures (with the exception of cultures), patient education, and therapeutic listening. Western physicians did more of everything except give injections. Southern physicians stood out for giving the most injections, but they ordered very few cultures and rarely provided patient education or therapeutic listening. The effects of rural vs urban location on resource use did not reveal any clear pattern.

The differences among different groups is bewildering, and it is difficult to draw solid conclusions from these data. Is a practice pattern in which many cultures are done and few injections

given an example of good medical quality? Is it a reflection of regional norms of behavior? Or is it a response to patient pressures? In an attempt to gain some insight into these issues, several common diagnostic conditions, called clinical tracers, were selected to help control for the effect of case mix on resource use. By using these clinical tracers, it was possible to see how different physicians responded to patients with similar complaints and pathophysiological conditions. Five tracer conditions were analyzed: tonsillitis or pharyngitis, upper respiratory tract infection, essential hypertension, diabetes mellitus, and neurosis or depression.

Table 21. Physician Use of Diagnostic and Therapeutic Resources for Selected Tracer Conditions in Office Practice (weighted estimates)

	Percentage of Patients Receiving						Visit Duration (min)	Number of Cases
	Blood Test	Culture	Any Diagnostic Procedure	Drug Injection	Drug Therapy	Counseling		
Tonsillitis and pharyngitis (first visit)	6.2	18.1	25.3	21.3	84.1	11.2	7.6	1,020
Upper respiratory tract infection (first visit)	9.4	5.5	17.9	15.6	87.5	8.4	8.1	1,284
Hypertension								
First visit	21.5	NA	29.0	NA	67.6	23.3	11.7	580
Follow-up visit	19.9	NA	34.2	NA	73.3	28.5	9.2	1,443
Diabetes								
First visit	85.1	NA	87.0	NA	65.3	28.7	12.5	201
Follow-up visit	82.5	NA	85.3	NA	65.4	35.2	10.8	532
Neurosis/depression								
First visit	16.0	NA	21.7	2.1	55.4	33.4	13.9	238
Follow-up visit	15.1	NA	15.2	7.1	79.1	27.0	12.0	263

Use of Diagnostic and Therapeutic Resources for Tracer Conditions

Table 21 displays how physicians in this sample used various resources in the care of patients with selected tracer diagnoses. Individual tests and procedures have been combined into fairly broad, homogeneous groups such as blood tests, cultures, or counseling. With respect to the three chronic conditions studied, the data for patients visiting the physician for the first time for a given problem and those for patients making follow-up visits, were analyzed separately, since it is likely that clinical management differed in the two situations.

Some interesting patterns are apparent. In almost every case, some therapeutic intervention was selected, with drug therapy being used the majority of the time for all types of illness. The likelihood of a diagnostic procedure varied greatly, ranging from 15 percent in follow-up visits for depression and neurosis to 87 percent in first visits for diabetes. Visit duration also varied significantly, with physicians spending almost twice as much time with a patient coming in for the first time with a diagnosis of depression or neurosis than with patients coming for a first visit for tonsillitis or pharyngitis.

Physicians in the study sample differed greatly

from one another in the way they managed patients with ostensibly identical diagnoses. To explain the reasons for these differences, the rates at which different subgroups of physicians used specific procedures were compared, and the data were then analyzed using multiple regression techniques. Because the results are extremely complex, the major conclusions will be discussed individually.

Differences in Resource Use by Residency-Trained Physicians

Family physicians who completed a residency tended to use a different mix of resources in their approach to patients with selected diagnoses. Although the behavior was not identical for every condition, certain patterns emerge in most of the conditions studied. Residency-trained physicians ordered cultures about three times more frequently than their non-residency-trained counterparts; for example, residency-trained physicians obtained cultures 49.5 percent of the time for tonsillitis or pharyngitis compared with a rate of 15.8 percent for physicians without residency training. Residency-trained physicians were also likely to report more patient counseling but to use fewer drugs and to give fewer injections in treating acute conditions. Residency-trained physicians tended

Table 22. Relation Between Environmental Characteristics and Resource Use for Patients with Selected Diagnoses (weighted estimates)

	Tonsillitis and Pharyngitis (First Visits): Percent of Patients Receiving			Hypertension (Follow-up Visits): Percent of Patients Receiving		
	Culture	Drug Injection	Drug Therapy	Any		Visit Duration (min)
				Diagnostic Procedure	Drug Therapy	
<i>Region</i>						
Northeast	45.8	10.7	71.4	28.5	84.2	12.2
North Central	15.4	19.8	80.1	49.1	65.6	7.5
South	8.4	26.4	90.9	22.7	81.7	8.2
West	36.1	15.2	79.0	29.2	55.4	14.1
<i>Infant Mortality Rate</i>						
Low	33.9	16.4	81.3	50.5	71.3	10.2
Medium	20.9	16.4	82.6	29.0	69.2	9.0
High	4.0	30.9	87.8	20.9	80.3	8.2
<i>Socioeconomic Status</i>						
Low	5.6	30.7	95.4	38.6	83.1	8.2
Medium	13.5	20.1	83.6	19.9	75.7	9.9
High	34.6	17.7	77.7	50.1	67.3	8.6
<i>Physician/Population Ratio</i>						
Low	9.1	21.7	86.3	24.6	68.1	9.7
Medium	17.9	23.1	91.1	39.9	77.6	8.0
High	45.0	18.4	70.4	38.3	70.9	12.4
Overall Mean	18.1	21.3	84.1	34.2	73.3	9.2
Number of Cases	1,020	1,020	1,020	1,443	1,443	1,443

to spend significantly more time with patients visiting for the first time with acute and chronic conditions.

Using multiple regression techniques helps somewhat to control for the potentially confounding effects of physician age, the organization of the physicians' practices, and other factors that may be associated with completion of a residency. The trends noted above persist after taking other factors into account, although differences are not as great.

County Demographics and Resource Use

Perhaps the most striking finding of this analysis is the degree to which such factors as socioeconomic class or geographic region are associated with major differences in physician resource use. Table 22 illustrates how great the differences are from one part of the country to another or even from one county to another.

As noted earlier, family physicians in one re-

gion of the country often did things differently from their colleagues living in other regions. For patients with tonsillitis or pharyngitis, Northeastern physicians ordered cultures for one half of the cases and gave 11 percent of their patients injections; by contrast, Southern physicians used cultures in fewer than 10 percent of the cases, gave injections 26 percent of the time, and spent 4 fewer minutes with each patient. Large differences are also apparent between regions for follow-up visits for hypertension, indicating that regional patterns of care differed significantly.

Infant mortality rates and socioeconomic status of the county where the physician worked were associated with even larger differences in the use of resources. Infant mortality rate is often considered to be a reflection of overall health status, and socioeconomic status is a reflection of educational and income levels for the counties in question. Poorer counties tend to be those with higher infant mortality rates. Physicians working in counties

with wealthier and healthier populations used more diagnostic resources for acute and chronic conditions, tended to spend more time with their patients, and gave fewer injections. This same pattern was true for places with relatively plentiful supplies of physicians. It seems reasonable to conclude that the way a physician approaches a patient is shaped to a certain extent by the professional norms and medical resources of the place in which he works and the socioeconomic and health status of the population from which he draws his clientele.

It is important to note that these environmental factors also are often correlated with other characteristics of medical practice, for example, type of training, board certification, and the like. Environmental characteristics are more strongly related to resource use than such factors as physician training. For example, one can more accurately predict what diagnostic tests a physician will use by knowing where he practices than by knowing how old he is or what kind of training he received. It appears that the setting in which a physician works is a very powerful influence in determining his approach to common clinical problems.

Resource Use and Proximity of Testing Facilities

Most family physicians had the capability to perform selected diagnostic tests in their offices. Ninety-two percent did urinalyses, 66 percent performed electrocardiograms, 57 percent did some blood tests, 47 percent could do chest x-ray examinations, and 40 percent could obtain cultures. In the analysis of the tracer conditions, all other things being equal, physicians were more likely to order a specific test if they could do that test in their offices. For example, physicians seeing patients with a diagnosis of tonsillitis or pharyngitis were 16 percent more likely to get a culture if they had culture facilities in their office, even after controlling for the possibly confounding effect of patient, physician, practice, and environmental factors. This effect persists across all tracer conditions, including neurosis or depression. Residency-trained physicians and physicians working in single-specialty groups were most likely to have the in-office capability to do diagnostic tests.

These results can be interpreted in several

ways. It is likely that physicians who tend to use specific diagnostic tests will acquire the capability to do them in their office for their own convenience and that of their patients and because of economic incentives to the practice. Once the capability is present, it is also likely that physicians will have a greater propensity to use the equipment. It seems safe to predict that as more family physicians complete residency training and enter single-specialty group practices, the most rapidly growing category of young family physicians, more diagnostic tests of this type will be done.

Miscellaneous Results

A number of other interesting observations emerged from the analysis of these data. Practice arrangement generally had a weak influence on resource use when compared with the other factors discussed above. Solo practitioners, however, did have a tendency to use relatively less of everything except time. It is interesting to note that physicians who had a higher percentage of their practice visits in inpatient settings tended to use resources proportionately more in the care of outpatients (neurosis or depression being the exception) after all other factors were held constant.

As expected, physicians used more resources when caring for patients with serious and urgent conditions and in the care of new patients. Patients who were referred to other physicians usually received more diagnostic procedures and longer visits but less therapeutic intervention. Patient age and gender did not have much independent effect on resource allocation, though this is partially because severity was simultaneously controlled for.

These results show that physicians vary greatly in the way they approach clinical problems, and one of the ways in which these differences manifest themselves is in the use of diagnostic tests and therapeutic procedures. The study analysis suggests that physicians are influenced by the setting in which they work and that regional idiosyncracies and patient demographics exert a major effect on the way physicians deploy resources on behalf of their patients. In addition, the way in which the physician was trained and the capability of the physician to perform certain tests in the office also play a role in his or her approach to problems.

General Conclusions and Implications

Family medicine, an endangered species in the two decades following World War II, began a resurgence in the 1970s.²⁴ During the 1960s there developed a broad national consensus that the American public was experiencing increasing difficulty in gaining access to medical care.^{25,26} Major causes of this problem included physician specialization, geographic maldistribution of physicians, and the apparent decline of the personal physician. The creation of the specialty of family medicine and the establishment of formal postgraduate training programs were part of a series of changes adopted to improve the availability and accessibility of primary health care.

Although family physicians account for one third of all ambulatory visits to US physicians, there is little reliable national information about the clinical role of this important primary care discipline. This study was designed to supplement an understanding of family practice, to explore the types of illnesses for which family physicians provide medical care, to investigate the spectrum of medical resources they use in providing that care, and to learn more about the physicians themselves in relation to their patients and the medical community. These findings are particularly important because they provide a picture of the profession as it exists before the influence of a generation of residency-trained family physicians is widely felt.

These data will make it possible to evaluate the degree to which family practice as a discipline has been changed by the major formal modifications in training and expectations. At the same time, these findings allow speculation about the future by looking at the way the residency-trained family physicians in this sample differ from their predecessors.

A Profile of Family Physicians in the United States

A clear picture of family physicians emerges from this study. In general, they are relatively old, with 61 percent being above the age of 50 years.

Only a small proportion had completed residencies in general or in family practice, though over one fourth had had some residency training beyond internship; this is changing rapidly. One half of the respondents under 35 years were residency trained. In the near future, as younger physicians enter the profession, the majority of family physicians can be expected to have completed formal residency training.

Almost all of the physicians surveyed were men. The increased number of women entering medical schools had not made a significant impact upon the discipline of family practice by 1977. By 1979, when Black et al studied 3,021 graduates of family practice residencies, women accounted for 7.1 percent of graduates compared with 4.4 percent of those in the present study.²⁷ Women now are believed by many to be entering residencies in family practice at an increased rate and, thus, are expected to make up an increasingly large proportion of family physicians within the next several years. Since data in this study show that women physicians tend to see predominantly female patients (75 percent of all ambulatory encounters in the study), this trend has a considerable and growing implication on manpower needs and educational policy in family practice.

One of the conventional wisdoms about family practice is that it is a specialty which is oriented to the rural environment. It is clear from these data that although family physicians tend to settle in rural areas to a greater extent than other types of physicians, the majority of family physicians, as does most of the population, live in urban areas. Even so, it is somewhat surprising to find that 85 percent of the 135 office-based, residency-trained family physicians who responded were practicing in urban areas, a proportion greater than that for the profession as a whole. Since only the very first residency graduates were included in this study, this finding should be interpreted with caution. In fact, a recent study of the practice location of over 3,300 family physicians who completed residency training between 1970 and 1978 found that only 60 percent were practicing in metropolitan areas.²⁸ The discrepancy between the two studies could be due to the unique characteristics of the earliest

graduates, many of whom may have been recruited to teach in the new and often urban family practice residency programs that proliferated during the early 1970s.

The office setting remains the base for most family physicians, although hospital practice is the rule rather than the exception. Although most family physicians were in solo practice in 1977, the strong tendency of younger and residency-trained physicians to enter into group practice, particularly single-specialty group practice, suggests that solo practice is waning. It is clear that the picture of the family physician as a rural solo physician without formal postgraduate training is becoming obsolete. By the end of the 1980s, if the trends described here persist, the typical family physician will be residency trained. The majority will be working as members of urban group practices, with a substantial minority in rural areas.

Patient Characteristics

The patients who visit family physicians make up a broad spectrum of the population. Although older physicians saw older patients and the practice of family physicians tended to reflect the demographic composition of the counties where they work, family physicians do not become de facto pediatricians or geriatricians. The youngest family physicians saw older patients, and the oldest family physicians continued to have significant pediatric practices. The most powerful influence on the profile of patients seen by a family physician was the demographic composition of the county where he or she worked. Family practices appear to accommodate themselves to the communities they serve.

It is generally believed that the "graying" of a practice occurs as the patients in a practice grow older as the physician ages. Nowhere is this so clearly evident as in these data about general and family physicians. Aging of the patient population is probably much more easily detected in family practice than in obstetrics or pediatrics, in which physicians tend to restrict their practices to patients in certain age ranges. The present data document the "graying" phenomenon in a most striking manner. The average age of patients in a practice bore an almost straight-line relationship

to the average age of physician studied until physician age of 60 to 69 years, when patient age leveled off. Expressed in a different way, 75 percent of the patients of physicians under the age of 35 years were 44 years or less, while 50 percent of patients of physicians over the age of 55 years are 45 years or older. This pattern is confirmed by various correlates of age. Younger physicians were more likely to be women, were more likely to have women patients of a childbearing age, and had more new patients. The converse was true for older physicians. Such findings have implications for the education of physicians in geriatrics and may help answer common but vexing questions about why family physicians do or do not practice obstetrics. Physicians who formerly practiced obstetrics may give it up as they become older, develop more stable and full practices, and are less likely to take care of young people.

Another patient characteristic of potential policy importance is the relationship between sex of physician and sex of patient. As noted earlier, 75 percent of the patients of female physicians, compared to 59 percent of patients of male physicians, were women. When considered in relationship to the increasing numbers of women entering family practice, future effects upon the numbers of physicians needed and upon the content of family practice immediately become evident. It is possible that as more women enter family practice, there will be an overall change in the care-seeking behavior of women patients. Manpower projections need to take these factors into account. In this regard, it should be noted that all current manpower projections, including those of the Graduate Medical Education National Advisory Committee (GMENAC),²⁹ are based upon studies of or reflect the beliefs and attitudes of physicians in practice in the mid-1970s. Projections currently being used for policy purposes, particularly for family practice, are likely to be skewed to older, male physicians who see more male patients more rapidly than the physicians who will make up the bulk of family physicians in the next several years.

Productivity and Workload

Productivity, expressed here as the number of patients seen per hour, varied significantly within

the sample of physicians. The two most successful factors in explaining these differences were external demand and physician training. In counties characterized by relatively few physicians, poor health status, and poverty, family physicians saw more patients per hour, probably both to meet the increased need for services from patients and to achieve their target incomes. In addition, residency-trained physicians were less productive, tending to spend more time with each patient they saw.

Despite the large differences in productivity, there were only minor differences in the number of hours worked by different physician subgroups. Residency-trained physicians did have slightly longer work weeks than others, but for the most part the disparities were small. It appears that family physicians may vary their total workloads (the number of patients whom they see in a week) by changing the rate at which they see patients rather than the total number of hours they work.

In addition to these differences in workload and productivity, residency-trained physicians also used a different mix of diagnostic and therapeutic resources in their approach to patients. Furthermore, as noted earlier, the increasing proportion of women physicians may change the patient profile of family physicians and thus the style of practice. These data suggest that the discipline is being modified as a new breed of physician enters the ranks and that the future content and pace of family practice may be quite different from that which prevails today.

Content of Ambulatory Practice

The cluster method for grouping and analyzing diagnoses in ambulatory care developed in the course of this study enhances the comprehension and analysis of the content of ambulatory care. One half of the visits to the physicians in this study were accounted for by only 15 clusters of diagnoses. There are few surprises in this list. The diagnoses represent a spectrum of the common illnesses considered typical of ambulatory care. In addition, 80 percent of all visits are accounted for by only 60 clusters. Confidence in the data is greatly increased by the striking similarities derived by comparison with the detailed information available from NAMCS. The data from the Virginia Study,

on the other hand, have certain regional idiosyncracies and methodological limitations when compared with national sources of clinical data collected from random samples of practicing physicians.

Much has been said about the philosophical differences between family practice and other specialties. It is said, for example, that family physicians are primarily interested in simple common disorders and in the person rather than in the disease. To some extent this is true, but examination of the content of ambulatory care practice in this study suggests these beliefs are oversimplified. Common illnesses are not always simple and uncomplicated. Among the 15 most common diagnoses encountered by family physicians are ischemic heart disease, diabetes, and pregnancy, conditions characterized by relative complexity and potential severity. The major theme that emerges is that family practice is a broad specialty, oriented more to the full spectrum of illnesses with which humans are afflicted rather than to any particular subset of disease based on pathophysiology, anatomy, or demography.

This analysis demonstrates that training and environment do influence the diagnostic mix of patients seen by family physicians. Regional differences were shown to be quite important, as they proved to be throughout this study. Northeastern physicians, for example, saw relatively few obstetrical patients, especially when compared with family physicians in the North Central region.

Other important influences on the clinical context of family practice are the scope of family practice training in different parts of the country, the relative supply of competing specialists, and prevailing norms of practice. Presumably, the tendency of physicians in the Northeast and the South to exclude obstetrics from their clinical repertoire reflects local tradition as well as a relatively abundant supply of obstetricians in those parts of the country. The environment in which the family physician works has a pervasive influence on what he or she does. One of the more profound findings of this study is that family medicine is perhaps a uniquely flexible discipline, adapting not only to patient needs but to competing resources. If true, this certainly has implications for future family practice. Most experts agree that there will be an increasing oversupply of physicians in the near future. To the extent that oversupply results in practice patterns like those observed in regions

of the country with higher physician-population ratios, future family physicians may have more rather than less difficulty practicing the broad range of their specialty as they were trained to do.

Content of Inpatient Practice

Inpatient care was an important part of general and family practice in the group of physicians evaluated in this study. Not only did virtually all physicians studied have hospital privileges, but a much larger proportion of their patient encounters were with patients in the hospital than is generally believed or was expected by the investigators. An average of 23 percent of all encounters took place in the hospital, and only 7.8 percent of physicians reported no hospital encounters during the three-day study period. Whereas board-certified physicians were apparently more likely to admit patients to the hospital, when other potentially important variables were controlled for only patient and environmental characteristics remained significantly associated with hospital workload. Physicians in the Northeast systematically excluded obstetrical care from their practices (only 6 percent of them practiced obstetrics compared with 45.7 percent overall), markedly reducing their inpatient loads. As would be expected, physicians who had older patients were more likely to have a larger proportion of their patient care encounters in the hospital. Physicians with larger numbers of new patients had fewer hospital encounters. This was so despite the fact that younger, residency-trained physicians, the group most likely to have new patients, devoted more of their energy to the care of complex medical problems when they did have patients in the hospital, presumably because they were better trained to use intensive care units and other technology with comfort and competence. On the other hand, older physicians were more likely than younger physicians to admit patients to the hospital for surgical procedures, including some major intra-abdominal surgery, and for orthopedics. This is consistent with the content of the training programs of younger family physicians in which surgical work tends to receive less emphasis than was customary when many older general physicians entered medical practice.

The clinical content of inpatient practice dif-

fered appreciably from that of outpatient practice. Only ischemic heart disease, pregnancy, and diabetes were among the most common diagnoses seen in both the inpatient and outpatient practices. Residency-trained physicians were more likely than those without residency training to care for psychosocial disorders in the office as well as the hospital, again reflecting hoped-for effects of training.

The data on obstetrical practice by general and family physicians are of special interest. Almost one half of the physicians studied provided obstetrical services, including, most often, those practicing in rural areas, those who were younger, those in group practices, and those practicing in counties with a larger proportion of patients from lower socioeconomic groups. The most influential factor affecting the practice of obstetrics by general and family physicians was the region of the country in which they resided. Physicians in the Northeast United States did little or no obstetrics. Physicians who were in middle life, in single-specialty groups, in the North Central United States, and who practiced in rural areas were most likely to do so. After controlling for interacting variables, location (both regional and urban or rural), socioeconomic status of the practice population, and the overall supply of physicians in the county were most likely to predict obstetrical practice.

These findings cast some light upon, but do not settle, the controversy over the practice of obstetrics by family physicians. Many obstetricians who provide training for family physicians, knowing that only about 50 percent of family physicians currently in practice provide obstetrical care, may wonder why they are asked to commit a training slot to family physicians who may never use their obstetrical skills. Family physicians, believing that the process of pregnancy, labor, delivery, and follow-up care of baby and family is the unique model of family medicine, view the experience as an essential training component even if never practiced by a given individual. The newer residency-trained physicians are more likely to be trained in and to practice obstetrics, but whether this reflects their ages and the ages of their patients, or is an ingrained characteristic that will influence family practice in the future, is unknown. It is clear that further study and follow-up of larger numbers of newly trained family physi-

cians than were included in the present study will be essential if the questions about the practice and manpower issues raised by these data are to be answered.

Resource Use

The way in which physicians use diagnostic and therapeutic resources has enormous implications for the cost and quality of medical care.^{30,31} In this study, wide differences were found among physicians in the way they marshaled these resources in the care of patients. Younger, board-certified, residency-trained physicians in group practices used more diagnostic resources and a different mix of therapeutic resources than their older, non-residency-trained colleagues in solo practice. In general, there appears to be a trade-off between diagnostic tests and therapeutic procedures. The best example is the reciprocal relationship between the use of cultures and medications in the treatment of pharyngitis and tonsillitis.

Environmental characteristics, particularly measures of health status, poverty, and region, are the most powerful variables in explaining observed variance in the use of resources. Physicians who worked in counties with wealthier and healthier populations used more diagnostic tests for both acute and chronic conditions, tended to spend more time with their patients, and gave fewer injections. This same pattern prevailed in areas abundantly supplied with physicians. It appears safe to conclude that the way a physician approaches a patient is determined not only by the disease process but by local professional norms and the economic and health status of the patients.

In addition, residency training seemed to exert an independent effect on the way a physician practiced, even after controlling for physician age and environmental factors. This tends to support the assumption that training does influence practice patterns. It must be remembered, however, that environmental factors exert an even more powerful influence. No matter how good, explicit, or prolonged residency training is, the evidence suggests that where a physician works and who he or she cares for are factors more important than training.

Finally, having the capacity to do a test is asso-

ciated with doing it more often. Although not surprising, this fact does mean that as more physicians acquire in-office laboratory capability, the use of diagnostic tests is likely to increase.

Discussion

These data give rise to several policy and educational considerations and point out some important areas for additional prospective research. First, the degree to which women are entering the field of family practice needs to be determined. Such data are available in the records of the National Intern and Resident Matching Plan, but would require a special study. Female family physicians see more women patients than do male family physicians, but other characteristics of their practice are not known. One intuitively suspects that this emphasis upon women patients occurs partly because women prefer female physicians for their obstetrical or gynecological care, but it is not known whether female family physicians are more or less likely to practice obstetrics than are male family physicians. Further, residency-trained physicians, men and women alike, are less productive than non-residency-trained physicians. If lower productivity is a product of training, as it appears to be, it is likely to be a persistent trend and may have implications for manpower projections. If the cohort of younger physicians who will enter family practice in the next several years see fewer patients per unit of time than do the older physicians who served as the basis for the projections of oversupply of family physicians, then those projections may well be in error. Only longitudinal studies of cohorts of family physicians now in practice and entering practice in the next several years will answer this important question.

The "graying" of a practice with the increasing age of the physician is another finding that has both manpower and educational implications. Younger physicians will meet and care for much different health care problems than will older physicians. Indeed, geriatrics appears to be a major, but by no means exclusive, part of the workload of older physicians. One can question how effective the recent attempt to include geriatrics education in medical school curricula and in

family practice residencies will be, especially if it is not reinforced by the practice experiences of the new graduate. How to decide the value of including any given set of materials in a medical school curriculum is something over which faculties have argued for years, and educational specialists have not been able to provide educators of family physicians with an answer. At the very least, the finding that older patients are more likely to be taken care of by older physicians suggests that more effort should be put into developing and evaluating improved techniques for continuing education than is being done currently. It may well be that the best time to teach about the care of elderly people is as physicians themselves grow older.

An important surprise in the study was the large proportion of clinical effort family physicians devoted to inpatients. Over one quarter of the physicians' work week was spent in the inpatient setting seeing hospitalized patients. This suggests, both to those who know the field and to those who dismiss it as "outpatient triage," that family practice should do everything it can to shore up the quality, intensity, and perhaps the length of inpatient training. Family practice is not just an outpatient, ambulatory care specialty. Family physicians need sound grounding in inpatient internal medicine and obstetrics at the very least and must maintain competence to practice with other specialists in the hospital according to each other's limits of competence. Such findings are particularly important as the country enters an era in which the growing number of physicians will heighten competition for hospital appointments and hospital privileges. The family physician's best defense in the hospital is a high level of medical competence.

Finally, these studies say something important about the training programs in family medicine, even though only a relatively small number of residency-trained graduates were included in the sample evaluated. The "new breed" differs significantly from their predecessors. Residency-trained physicians take more time with their patients, use more counseling, are more likely to practice obstetrics, care for more complex medical, as compared with surgical, problems, use fewer injections, and use more elaborate diagnostic procedures in the outpatient setting than are older, non-residency-trained family physicians. Not all of these characteristics are unequivocally associated with higher quality of medical practice,

but many are. That family physicians appear to be practicing as they have been trained to practice suggests that what is taught has an effect. Family physician educators must be diligent in maintaining high-quality training programs.

This study also underscores the pervasive influence of the practice environment in shaping both the content and process of medical care. Family physicians adapt their practices to fit the community. Their practices are sensitive to the demographic mix of the population, the relative supply of physician and hospital resources available in the immediate surroundings, and the socioeconomic and health status of the patients they serve. Excellent training in and of itself will not ensure high-quality or appropriate practice. Academically oriented family physicians have an obligation to be sensitive to the demands and pressures of the practice world. In and of itself, excellent training is inadequate to assure that physicians will continue to use what they have learned. A social and medical environment must be built to reward the physician for thorough, compassionate, and cost-effective medical care if family medicine as a discipline is to achieve its full potential.

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