
Board Certification and Practice Style: An Analysis of Office-Based Care

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Background. The relationship between family practice certification and practice style has important health policy implications. We used data from the RAND Health Insurance Experiment to study the relationship between family practice certification and (1) patient characteristics including age and sex of patients, and (2) facets of practice style including probability of hospital admission, number of visits in an episode of care, number of physicians seen per episode, total charges per episode, charges per service category, and inputs per service category.

Methods. Data on health care service utilization by a sample of 5554 nonelderly individuals over a 1-year period were used to define episodes of care. Multivariate regression techniques were used to measure the association between family practice certification and patient characteristics and between family practice

certification and practice style, controlling for the effects of patient characteristics.

Results. Patients of certified family physicians were an average of 3 years younger than patients of noncertified family physicians, but other demographic characteristics were similar. Certified family physicians had higher pathology services charges and inputs, but no statistically significant differences in other measures of charges and inputs.

Conclusions. Certified and noncertified family physicians treat similar patients. Certification in family practice is not associated with major differences in total service charges, but is associated with differences in the use of laboratory diagnostic services.

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The term *family practice* is used to describe a set of general health care services provided to people of all ages by a broadly trained physician. Historically, family physicians in the United States entered practice without formal specialty training or specialty certification. In 1970, however, the American Board of Family Practice began to offer specialty certification and residency programs began providing specialty training. As a result, family physicians can now be divided into two groups: those without board certification and those with certification.

The purpose of this study was to describe the general demographic and clinical characteristics of patients who sought office-based care provided by family physicians to determine whether there were differences in the characteristics of the patients seen by certified and those seen by noncertified family physicians, and to determine

whether specialty certification was associated with differences in either the costs or the content of care.

Previous studies of the relationship between certification and practice style^{1,2} have been based on physician surveys that suffer from low response rates and data limitations. The present study took advantage of the detailed data on patient characteristics and health care utilization collected during the RAND Health Insurance Experiment, providing a comprehensive community-based view of the scope, costs, and content of family practice. To capture the problem-oriented nature of ambulatory care, the analysis was based on episodes of care rather than on visits. The episodes of care used in this study contain information on all outpatient professional services charged to the patient for treatment of a defined clinical problem.

Methods

The data used in this study were collected during the RAND Health Insurance Experiment, a federally funded, randomized controlled trial of the effect of dif-

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ferent levels of health insurance on health care use and health. The enrollees consisted of randomly chosen families from six sites in the United States: (1) Dayton, Ohio, (2) Seattle, Washington, (3) Fitchburg, Massachusetts, (4) Franklin County, Massachusetts, (5) Charleston, South Carolina, and (6) Georgetown County, South Carolina. Data were collected at different times in different sites between 1975 and 1980.

Individuals and families were excluded from the study sample if: (1) the family income was greater than \$25,000 (1973 dollars), (2) the head of the household was eligible or would become eligible for Medicare during the course of the study, (3) an individual was greater than 61 years of age at enrollment, and (4) an individual was eligible for the military medical system or he or she was indefinitely institutionalized. The major demographic characteristics of the enrollees, averaged across sites, did not differ markedly from those of the country as a whole, taking into consideration the exclusion criteria outlined above.³ Because the study population (other than the exclusion criteria) is similar to the general population, and because there were no restrictions on the enrollee's choice of physician, the study sample should be representative of family physicians who treat the nonelderly US population. In fact, the ratio of board-certified to uncertified family physicians used by enrollees was similar to that found in the United States as a whole.⁴

The unit of analysis is an episode of care. The definition of an episode of care is diagnosis specific and includes all services received by the individual that were related to that condition or problem. Episode categories were defined in terms of the purpose of the contact (eg, general medical examination) or in terms of a specific diagnosis (eg, otitis media). A total of 150 episode categories were defined, and each category was designed to represent a set of problems or conditions that would result in similar services being provided by the clinicians.^{5,6} Episode categories were defined as either acute or chronic. There could be more than one acute care episode of the same type (eg, upper respiratory tract infection) for one individual during a year, but there could be only one episode of a chronic condition (eg, hypertension) per individual per year. A detailed description of the methods used to define episodes and to assign them to specific categories is available elsewhere.⁵

Episodes of care were created from 1 year of the utilization data for each of 5554 individuals enrolled in the Health Insurance Experiment. These individuals received a total of 10,545 episodes of care that began with an office visit to a physician. For 9418 (89.3%) of these episodes there was information on the specialty status of the physician. The study sample consists of 3760 epi-

sodes of care in which the physician providing the first visit was a family physician.

For each episode, several measures of cost and practice style are examined: (1) probability of hospital admission, (2) probability of more than one visit, (3) probability of more than one physician providing care, (4) total charges, (5) charges per service category, and (6) inputs per service category.

All hospitalizations in the study year were identified. The date and diagnosis assigned to the hospitalization were reviewed by a physician and it was determined whether the hospitalization was related to any episode of office-based care. The number of visits was defined as the number of face-to-face contacts with a physician that took place in an outpatient setting in which a medical or surgical service was provided. A contact in which only a pathology or a radiology service was provided was not counted as a visit. The number of physicians providing care in an episode was calculated as the number of different physicians who provided medical or surgical services during the episode. Physicians who provided only pathology or radiology services were not included in this calculation.

The dollar values used to calculate charges were drawn directly from claims submitted for outpatient services. All charges were converted to 1987 dollars using the physician fee component of the Consumer Price Index. Each service was associated with a 1974 California Relative Value Scale (CRVS) studies service code.⁷ The CRVS system identifies four separate categories of professional services: (1) medical services, (2) surgical services, (3) pathology services, and (4) radiology services. A unit value is assigned to various types of services within each of these four service categories. Not all of the services provided to the study population had a previously defined relative value, and for those services a study physician assigned a unit value.

The association between certification status and practice style was estimated using multivariate statistical techniques. Ordinary least squares regression was used when the dependent variable was continuous (eg, dollars, service units) and logistic regression when the dependent variable was dichotomous (eg, whether the episode was or was not associated with a hospitalization). Certification status was included as an independent variable, and other independent variables were included to control for the effects of patient age, sex, site, and health status measured as the general health index⁸ assessed at the time of entry into the study. Case mix was controlled for in regression analyses that contained dummy variables for different episode categories. These case mix regressions were performed on the sample of 1562 episodes in the 10 most common categories (Table 1).

Table 1. Health Care Provided by Certified and Noncertified Family Physicians, by 10 Most Common Episode Categories

| Episode Category | Noncertified Family Physicians No. (%) | Certified Family Physicians No. (%) | Total No. (%) |
|-----------------------------------|---|--|------------------|
| Medical examination | 156 (6.7) | 154 (10.6) | 310 (8.2) |
| Upper respiratory tract infection | 161 (7.0) | 99 (6.8) | 260 (6.9) |
| Pharyngitis | 117 (5.1) | 80 (5.5) | 197 (5.2) |
| Rashes | 87 (3.8) | 71 (4.9) | 158 (4.2) |
| Other signs | 95 (4.1) | 43 (3.0) | 138 (3.7) |
| Hypertension | 87 (3.8) | 40 (2.8) | 127 (3.4) |
| Injuries | 58 (2.5) | 41 (2.8) | 99 (2.6) |
| Lower respiratory tract infection | 57 (2.5) | 40 (2.8) | 97 (2.6) |
| Lacerations | 54 (2.3) | 35 (2.4) | 89 (2.4) |
| Otitis media | 48 (2.1) | 39 (2.7) | 87 (2.3) |
| All other categories | 1392 (60.2) | 806 (55.7) | 2198 (58.5) |
| Total | 2312 (100.0) | 1448 (100.0) | 3760 (100.0) |

Each physician in our sample provided an average of 10 episodes of care. A statistical package developed by The RAND Corporation that calculates the correlation within observations from a single physician and incorporates this in the estimation of the standard errors⁹ was used to correct our analysis for independence of the observations from each physician.

Results

A total of 3760 episodes of care were provided to the study population by family physicians. These episodes account for 40% of all the episodes of care that began with an office visit. Of these episodes, 1448 (39%) were provided by certified family physicians and 2312 (61%) were provided by noncertified family physicians (Table 1).

The average age of those receiving care in this sample was 29 years, and 26% were children aged 15 years or younger. Patients of certified family physicians were an average of 3 years younger than patients of noncertified family physicians ($P = .03$), and certified family physicians were more likely to treat children ($P = .04$). Sixty percent of the episodes of care were provided to women. There was no statistically significant relationship between certification status and the sex of the patient. After controlling for age, there was no statistically significant difference in underlying health status, measured as defined by the general health index, of the patients treated by the two groups of family physicians.

The episodes of care provided by family physicians were distributed over 123 episode categories, but tended to be concentrated to certain specific diagnoses. As

Table 2. Charges (in 1987 dollars) for Episodes of Care Provided by Family Physicians, by Charge Category

| Charge Category | All Episode Categories (Charges per Episode) | 10 Most Common Episode Categories* (Charges per Episode) |
|-----------------|---|---|
| Medical | 29.56 | 29.85 |
| Surgical | 3.54 | 3.57 |
| Pathology | 7.05 | 6.25 |
| Radiology | 7.05 | 5.39 |
| Total | 47.20 | 45.06 |

*See Table 1.

shown in Table 1, for both certified and noncertified family physicians, the 3 most common episode categories accounted for 20% of all episodes of care, and the 10 most common categories accounted for 42% of the episodes. Certification status was associated with significant variation in the distribution of cases across the 10 most common episode categories ($P = .007$).

In the full sample of 3760 episodes, 2879 (77%) contained one visit; 3562 (95%) involved one physician; and 106 (3%) were associated with a hospitalization. The analysis that controlled for differences in selected demographic and health status characteristics of the treated populations showed no statistically significant relationship between certification status and the likelihood of more than one visit per episode, more than one physician per episode, or hospitalization. Controlling for differences in case mix, analysis of care for the 10 most common episode categories indicated that board certification was associated with a greater likelihood ($P = .02$) of providing episodes of care that involved more than one physician, but there was no significant association between certification status and the probability of a hospitalization or of a multi-visit episode.

The average total charge (in 1987 dollars) for an episode of care provided by a family physician was \$47.20 across all episode categories and \$45.06 for the episodes in the 10 most common episode categories (Table 2). Charges for medical services accounted for an average of about two thirds of the total charges, and ancillary services averaged an additional 25% to 30%. Surgical services accounted for 8% of total charges.

There was no statistically significant difference between certified and noncertified family physicians when comparing their average total charges in either the analysis that controlled for differences in demographic and general health status characteristics of the patients or in the analysis that controlled for these differences as well as for case mix (Table 3).

The results of the analysis of the relationship between certification status and charges for the different service categories are presented in Table 4. The small

Table 3. Adjusted Average Charges (in 1987 dollars) per Episode of Care for Certified and Noncertified Family Physicians

| | Noncertified Family Physicians | Certified Family Physicians | Difference Between Certified and Noncertified | <i>t</i> Value |
|---|--------------------------------------|-----------------------------------|---|-------------------|
| Adjusted for difference in demographic characteristics and general health status | 46.37 | 47.71 | 1.34 | 0.36 |
| Adjusted for difference in demographic characteristics, general health status, and case mix | 43.13 | 46.78 | 3.64 | 1.17 |

number of surgical charges made meaningful multivariate analysis of this category of services impossible. Our analysis is therefore limited to medical, pathology, and radiology services. The only statistically significant difference was a higher charge (approximately \$2 more) for pathology services in episodes of care provided by certified family physicians. This difference was found in the analysis that controlled for differences in patient characteristics but not in the analysis conducted for case mix. The point estimate was similar in the analysis that controlled for case mix as well, but the difference did not reach conventional levels of statistical significance.

Table 5 presents a summary of the results for the analysis of the effect of board certification on services, which were measured as CRVS units rather than as charges. The pattern of results for services is consistent with that for charges. There is no statistically significant difference in the use of either medical or radiology services. The analysis that controlled for patient factors but not case mix showed a statistically significant 30% difference in pathology services for certified family practitioners compared with noncertified family physicians. The case mix adjusted analysis revealed an estimated 35%

Table 4. Estimated Effect of Board Certification vs Noncertification on Charges per Episode, by Service Category

| Service Category | Adjusted for Differences in Demographic Characteristics and General Health Status, in 1987 dollars | <i>t</i> Value | Adjusted for Differences in Demographic Characteristics, General Health Status, and Case Mix, in 1987 dollars | <i>t</i> Value |
|------------------|--|----------------|---|----------------|
| Medical | 2.12 | 0.68 | 2.27 | 1.31 |
| Pathology | 2.00 | 2.52 | 2.21 | 1.95 |
| Radiology | -1.62 | -1.33 | -1.05 | -0.86 |

Table 5. Estimated Effect of Board Certification vs Noncertification on Services per Episode, by Service Category*

| Service Category | Adjusted for Differences in Demographic Characteristics and General Health Status, in CRVS Units* | <i>t</i> Value | Adjusted for Differences in Demographic Characteristics, General Health Status, and Case Mix, in CRVS Units* | <i>t</i> Value |
|------------------|---|----------------|--|----------------|
| Medical | 0.3 | 0.42 | 0.6 | 1.41 |
| Pathology | 1.7 | 2.30 | 2.0 | 1.84 |
| Radiology | -0.4 | -1.76 | -0.2 | -1.17 |

*CRVS denotes California Relative Value Scale. The CRVS identifies four separate categories of professional service. A unit value is assigned to various types of services within each of these four service categories. For example, a brief examination of an established patient is given a value of 3.5 medical service units, a single view chest film is assigned a value of 2.5 radiology service units, and a hematocrit is assigned a value of 5.0 pathology service units.

difference in pathology services, but this difference did not reach conventional levels of statistical significance.

Discussion

The relationship between family practice certification status and the costs and content of care has important health policy implications. We were able to use the detailed and comprehensive data collected during the Health Insurance Experiment to study this issue. These data provided more details of patient characteristics and utilization than the data used in previous studies of family practice certification. Furthermore, the longitudinal nature of the database made it possible to construct episodes of care; other studies were based only on visits.^{1,2}

The use of the Health Insurance Experiment data also resulted in some study limitations. One important limitation is that elderly patients were excluded from the analysis. Elderly patients account for about 20% of the office visits made to physicians in the United States,¹⁰ and there may be important differences in how they are treated by certified and noncertified family physicians that cannot be examined in our study. Another potentially important limitation is that the data used for our study are at least one decade old. Care should be taken in generalizing the results of our analysis of historical data to the current role and function of family practitioners.

A third limitation is that our study, like previous research dealing with the relationship between certification and practice style,^{1,2} is based on observational data. It is unlikely that this issue will ever be studied in a randomized controlled trial, and our understanding of the relationship will have to be based on observational studies. It is important to remember that observational

studies provide information on association rather than causation, and that the observed differences between certified and noncertified family physicians may be the result of factors other than certification status.

The term *family practice* is synonymous with the delivery of primary care services to a broad population of patients. The results of our study indicate that this theoretical view of family practice is reflected in the care provided by family physicians. Family physicians provided 40% of the office-based episodes of medical care received by the study population; they treated children and adults of both sexes; and, although they treated a wide range of problems, care was concentrated in a limited number of diagnostic categories that represented typical primary care problems. Three quarters of the episodes of care involved a single visit, the vast majority involved only care provided by the family physician, and few visits resulted in hospitalization.

Family physicians can be divided into two categories: those who are board certified by the American Board of Family Practice and those who are not. The major purpose of our study was to determine whether there were significant differences in practice style between these two groups of physicians. Our observational study provides information on the degree of association between board certification status and different facets of practice style. The observed differences cannot be attributed directly to certification, but may represent the effect of factors other than training. It should be remembered that physicians with certification in family practice are younger than noncertified family physicians, are less likely to be in solo practice, and may differ on a wide range of other factors that can affect practice style.¹

The patient populations served by certified and noncertified family physicians were not completely equivalent, but they were similar in many ways. There were differences in specific elements of case mix and in the age of patients, but no difference in the general health status of patients or in the proportion of female patients. Because the patients served by certified and uncertified family physicians are not identical, analysis of the relationship between certification status and practice style should take these differences into account. Our analysis used multivariate techniques to estimate the relationship of certification status to features of practice style, controlling for both demographic characteristics of patients and case mix.

Using these multivariate techniques, we showed that certified and noncertified family physicians did not differ significantly in overall patterns of care, other than in an increased likelihood that episodes of care that were provided by certified family physicians involved more than one physician. Certified family physicians are more likely

to be in group practice.¹ It is possible that this may explain the greater likelihood of their providing multi-physician episodes of care.

There was no statistically significant difference between certified and noncertified family physicians in the estimated average total charge per episode of care. The point estimates for average charges were higher in certified than in noncertified family physicians. Although it is not possible to conclude from our analysis that certified and noncertified family physicians have the same average total charges, the results of the study do suggest that differences of more than 20% are unlikely.

There was no statistically significant difference between certified and noncertified family physicians in the charges for medical services. Since medical services account for about two thirds of total charges, the lack of a significant effect on medical charges is an important factor in explaining the lack of a significant effect on total charges. Further analysis indicates that there was no significant difference in the units of medical services provided.

While the analysis does not indicate any significant differences in charges for medical services, there are differences in pathology charges. In this study, charges for clinical chemistry and toxicology, hematology, immunology, microbiology, cytopathology, and surgical pathology were included as pathology charges. Certified family physicians had significantly higher charges for these services in the analysis that controlled for differences in demographic characteristics of patients, but not in the analysis that controlled for case mix. The analysis that controlled for differences in case mix revealed a similar point estimate for the effect of certification, but this difference was not statistically significant. A \$2.00 difference in charges is equivalent to about 30% of average pathology charges, but only about 5% of average total charges. This may explain why the difference in pathology charges did not translate into a significant difference in total charges. Further analysis indicated that the difference in pathology charges was accompanied by differences in the units of pathology services provided. This difference in pathology services provided is consistent with the results from a previous study based on a physician self-report survey.¹

In summary, our study suggests that board certification in family practice is not associated with large differences in total charges per episode of care. This does not mean that there are not differences in the specific content of care. In particular, our study indicates that family practice certification is associated with higher charges for pathology services and with the provision of more pathology services. The impact on quality of care of

these and other possible differences in practice style deserves further investigation.

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