Medicare Physician Referral Patterns

Dennis Shea, Bruce Stuart, Joseph Vasey, and Soma Nag

Objective. To study patterns of referral between primary and specialty care providers among Medicare beneficiaries and to identify correlates of the probability of referral.
Data Sources. The 1992 and 1993 Medicare Current Beneficiary Survey (MCBS), including associated claims data. MCBS data are linked to the Area Resource File (ARF) and the Physician Identification Master Record (PIMR).
Study Design. This is a retrospective design using cross-sectional descriptive and multivariate correlational analysis. Estimates are made for two years. Key variables include two alternative definitions of referrals, patient socio-demographic and health status, physician characteristics, and county-level descriptors.
Data Collection. The MCBS is a panel survey of a stratified random sample of Medicare beneficiaries begun in 1991. The data are linked to Medicare claims records for survey respondents. The ARF is a health resources data set that contains more than 7,000 variables at the county level, including information on health facilities, health professions, services resources and utilization, and socioeconomic and environmental characteristics. The PIMR is a record of all physicians in the United States and describes their professional characteristics.
Principal Findings. The overall rate of physician referrals in the MCBS, approximately 10 percent, is higher than that found in prior research, as is the level of self-referral to specialists at about 70 percent. Depending on the dependent variable definition, between 60 and 85 percent of all Medicare beneficiaries had at least one referral, and the average number of referrals per person per year was greater than two. Referrals show a multi-directional pattern rather than a simple pattern of primary to specialty care, with referrals between primary care physicians, referrals between specialists, and referrals from specialty to primary care being not uncommon. Strong predictors of referral include patient health and patient insurance coverage and income. Physician factors do not contribute much to explaining referrals.
Conclusions. Medicare referral patterns are similar to those found in other studies. Patient factors appear to be a more important factor in explaining referrals than was estimated from prior research. Additional research is needed to explain the more complex dynamics of referral patterns.

Key Words. Referral, physicians, Medicare, insurance

Relatively little is known about the patterns, correlates, or consequences of physician referrals in the United States (Clancy, Lanier, and Grady 1996). The

referral process can have a significant impact on outcomes such as the cost and quality of care. Appropriate use of referrals encourages prompt and correct diagnosis and treatment of conditions. Referrals also extend the capabilities of primary care physicians by giving them access to expertise they may not possess themselves. On the other hand, inappropriate use of referrals can be costly and inefficient in terms of unnecessary testing and procedures (Nutting, Franks, and Clancy 1992). As a result, physician referral has become a key issue in the development of managed care in the United States.

In this study, we examine the patterns of referral among physicians for Medicare beneficiaries in the traditional (non-managed care) Medicare system. Specifically, we characterize the level and pattern of referrals in Medicare and identify correlates of physician referral patterns in the treatment of non-institutionalized elderly and disabled Medicare beneficiaries for the years 1992 and 1993.

Our research extends the existing literature in three ways. First, most previous research has examined referrals for the general population. Referrals for the Medicare population of elderly and disabled patients have not been specifically investigated. Since there may be significant differences between our sample and the general population, simply comparing our results to the previous research is an important first step. Given the poor health of the people in our sample, we expect that referral rates would be higher in this group. Second, most research has focused on referral from primary to specialty care. We argue that referral is a much more complicated multi-directional process, with referral back to primary care, among primary care providers, and among various specialists as important components of the referral network. Given the complexity of the health problems facing our sample, we expect to find significant amounts of referral between a variety of physicians, rather than a simple unidirectional pattern of referral from primary to specialty care. Third, most previous research has used data collected from physician surveys or encounter-level data to examine referrals. Our research combines patient

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survey data with claims data, physician information, and county-level data. This permits us to examine referrals using the patient as the unit of observation. This also allows us to look at the annual number of referrals as well as to provide a more complete set of predictors across patients, physicians, and local areas in our analyses.

Much of the policy debate over referrals and access to specialist care focuses on younger persons in managed care settings. However, the Medicare population is an important and interesting one to study for several reasons. First, Medicare's elderly and disabled beneficiaries include those with the greatest need for specialty care; thus, consequences of referral patterns for this group are of great import. Second, Medicare remains the lone bastion of largely unmanaged fee-for-service care in the United States, offering an important benchmark to other sectors. Insights from studying referrals in Medicare can help us understand the impact of changes in the private insurance market and in Medicare and Medicaid managed care. Finally, with the growth of Medicare managed care and the greater choices afforded Medicare beneficiaries under the Balanced Budget Act of 1997, we are likely to see significant changes in referral patterns in future years. Examining current patterns can help lay the foundation for study of these changes.

In the next section of this article, we provide a brief background on the previous research on referrals. In the subsequent section we review our data and methods. We present our results after that, followed by several summary comments.

BACKGROUND

Shortell (1972) has offered a psychological model of the referral decision based on social exchange theory. He hypothesized that each physician has a status level within his or her medical community. Physicians see different costs and rewards associated with making referrals or consultations, based on their status level and the status level of those with whom they deal on a professional basis. A follow-up study (Shortell and Vahovich 1975) attempted to apply the theory to the behavior of general practitioners and surgeons. It was thought that because general practitioners are more client dependent than surgeons, they might be more affected by client-related variables. On the other hand, surgeons might be more affected by physician-related variables. In fact, the referral behavior of both groups was most strongly affected by physician-related variables, which presumably are strongly related to self-perceived status.

Economic research has focused on referrals as a response to asymmetric information and skills in a market characterized by product differentiation and infrequent purchase (Gonzalez and Rizzo 1991; Bradford and Martin 1996). In such a market, consumers use a variety of methods to find the desired quality and price combinations, including search and reputation. Bradford and Martin (1996) find that referrals overcome market failures in the reputation signal when patient-specialist relationships are not lengthy. Referrals in economic models involve the joint determination of compensation among three agents: the referring physician, the consulting physician, and the patient. The complexity of this relationship has not permitted clear theoretical results on the optimal compensation scheme to be identified.

Previous research indicates that approximately 4 percent of all primary care visits result in a referral to specialty care. Franks and Clancy (1997) use data from the 1985–1992 National Ambulatory Medical Care Survey (NAMCS) to show that 4.5 percent of all visits to generalist physicians result in a referral to specialty care. Similar rates are found in Forrest and Reid (1997) using 1989–1994 NAMCS data.

Referral rates show clear relationships to several factors. Shortell (1975) finds that third-party coverage and greater illness severity are associated with more frequent referrals. Franks and Clancy (1997) identify male gender and HMO insurance as two key patient factors increasing the likelihood of referral to specialty care. Forrest and Reid (1997) also find a strong positive effect of HMO insurance on primary to specialty referral rates.

Physician factors also play an important role in referral. The concentration of a physician's practice in certain diagnoses reduces referral rates, while female physicians and internists (compared to general practitioners) have higher referral rates (Franks and Clancy 1997). Shortell (1975) finds that referrals are more common in large group practices. Gonzalez and Rizzo (1991) examine receipt of referrals (rather than referral out to care). Receipt of referred patients is positively related to board certification among primary care physicians, but not specialists. Less experienced physicians receive a higher proportion of their visits on referral, while foreign medical school graduates receive fewer referrals. Physicians who have a greater tolerance of ambiguity and uncertainty are known to have less intense use of services, including referrals and laboratory testing (Grol et al. 1990; Holtgrove, Lawler, and Spann 1991). More experienced physicians tend to have higher referral rates (Reynolds, Chitnis, and Roland 1991).

Market-level variables also influence referral rates. Gonzalez and Rizzo (1991) find that referrals are an important source of patients in areas with

high physician density, suggesting that competition makes referrals more important. Franks and Clancy (1997) find that rural location increases referral rates among primary care physicians.

Two important features of referral networks are often overlooked in studies of referral patterns. First, a substantial share of visits to specialists are self-referrals. Forrest and Reid (1997) find that some 30 to 50 percent of all visits by new patients to specialists are self-referred by the patient. Gonzalez and Rizzo (1991) find that 56 percent of new patient visits and 91 percent of all patient visits are not referrals. Self-referral rates are lower in HMOs than in fee-for-service plans. Only 21 percent of specialist visits in HMOs are self-referrals, while almost half of specialist visits in indemnity plans are patient self-referrals (Forrest and Reid 1997).

A second important feature is that referrals are not unidirectional from primary care to specialty care. Gonzalez and Rizzo (1991) find that even among general/family practice physicians, more than 10 percent of new visits are referrals. Referrals are made across primary care, from specialists to primary care, and across specialties.

Studies of referral patterns and its correlates are important because referrals can have such an important effect on costs, quality, and access in the health system. Previous research indicates that specialists tend to use significantly more resources than primary care physicians (Greenfield et al. 1992; Nutting, Franks, and Clancy 1992; McLeod et al. 1997). For each dollar spent on primary care, an estimated two dollars are spent on specialist care (Schneeweiss et al. 1989; Glenn, Lawler, and Hoerl 1987). However, higher costs may be justified by better patient outcomes. A number of studies have begun to document better outcomes for patients treated by specialists, compared to primary care physicians, in cardiovascular care, diabetes, and mental health (Sturm and Wells 1995; Greenfield et al. 1995; Jollis et al. 1996).

Previous empirical work has not explicitly addressed the patterns of referral in the Medicare population, an important group for study. In addition, it has been based primarily on surveys of physicians or on surveys of isolated encounters with physicians. No study has combined detailed patient-level survey data with claims information on a patient's visits over an extended period. Most research has also focused exclusively on referral from primary to specialty care, ignoring the multi-directional nature of the referral process. Our research directs attention to these important areas.

METHODOLOGY

Our purpose is to study referral patterns in Medicare using a patient unit of analysis. Although we see our work as primarily descriptive and exploratory, we do have certain preliminary hypotheses we wish to explore in the regression models. To understand these hypotheses, we consider a theoretical foundation that has been established by others.

Referrals obviously involve interactions among patients, physicians, and the wider health system. Few detailed conceptual models exist to guide empirical work. Shortell's (1972) initial work is obviously a guide. More recently Franks and Clancy (1997) have proposed a simple model, in which referrals are influenced by patient factors (e.g., gender, age, insurance), physician practice style factors (e.g., age, training), and the local market for care (e.g., urban/rural location, physician density, alternative resources). Grembowski et al. (1998) recently offered a more detailed three-level model, with a particular focus on referral in managed care settings. In that model, referrals are influenced by (1) structural factors that include the practice characteristics, physician characteristics, patient characteristics, and managed care organization characteristics; (2) managed care constraints and incentives, including benefits and cost sharing, financial incentives, utilization management, clinical guidelines, and network characteristics; and (3) the referral process, which includes influences, constraints, and informational issues.

For the Medicare non–managed care population, we expect several results based on these models. First, we expect that patient economic factors (income and insurance) will play a far greater role in determining referrals. Past referral research has had very limited information on patient income and insurance, and we expect that this lack reflects the poor measures available in those data sets more than it does the importance of these factors. Past research also focuses on referrals from a source perspective in which physician characteristics may be more important. Once patient compliance and self-referral are considered—as they must be from a target perspective—it is likely that patient factors become more prominent

Second, we expect that patient and system factors, particularly income, education, and urban/rural indicators, will play a larger role in determining referrals in the broad measure than in the narrow measure. Since the broad measure includes a number of visits that may be patient-initiated self-referrals, it will focus most closely on those patient factors.

Third, although our physician measures are weaker than many, we do expect that physician factors, especially physician specialty, will be important predictors of referral among Medicare beneficiaries. It is unlikely that the target perspective completely removes the role of the physician in the referral process.

DATA

The base data set we use is the Medicare Current Beneficiary Survey (MCBS), a nationally representative in-home panel survey of aged and disabled Medicare beneficiaries begun in 1991. We use data from the 1992 and 1993 MCBS. We exclude MCBS respondents who were in an HMO or in an institution. In addition, for the regression analysis, we exclude persons missing data on one or more of the explanatory variables as well as persons with no physician visits. This leaves us with a sample of 10,794 and 10,985 for our descriptive analysis in 1992 and 1993, respectively. Sample loss for the regression sample occurs for three reasons. First, some individuals (1,336 in 1992 and 1,218 in 1993) have missing data on one or more of the MCBS survey items used in our study. Second, our address information, which allows a match to the ARF for county-level information, is available only for persons who began the study in 1991. Thus, we lose 2,120 persons for this reason in 1992 and 3,434 in 1993 for this reason. Finally, matching the data to the UPIN to gather physician specialty and other information results in a loss of 1,718 persons in 1992 and 1,420 in 1993. Our samples for the regression analysis vary between 4,700 and 5,200 persons depending on the year and the dependent and independent variables used.

The MCBS interviewers collect extensive information on individuals' use and expenditures of health services, source of payment, type of health insurance, access to care, health and functional status, and socioeconomic and demographic characteristics. The MCBS is also linked to the Health Care Financing Administration's claims data on utilization and expenses for Medicare covered expenses.

The MCBS does not have extensive data on the characteristics of the local market. Thus, we supplement the MCBS with data from the Area Resource File, linking each individual to characteristics of the county in which he or she resides. The ARF is a health resources data set that contains more than 7,000 variables at the county level, including information on

health facilities, health professions, services resources and utilization, and socioeconomic and environmental characteristics. We supplement the MCBS with data on physician density, hospital beds, county per capita income, and an urban/rural categorical variable that characterizes counties into one of ten categories based on population and adjacency to metropolitan areas (the Human Resource Profile County Adjacency Code or HRPCAC; this was later collapsed to six categories for sample size reasons).

Data on physician characteristics were obtained from the Physician Identification Master Record file. This file consists of records of all physicians in the United States and describes their professional characteristics. Physicians identified through the claims record in the MCBS were linked to this file, and data on their age, experience, foreign medical school graduate status, group practice status, and specialty were extracted.

MEASURES

Referrals can be studied from the perspective of a target (i.e., a physician receiving a referral) or a source (a physician making a referral), with data collected from physicians, patients, or other sources. Most recent research on referrals has used the NAMCS, an encounter-based data set that asks physicians to complete a patient record after a visit. The NAMCS has questions that identify whether the patient was referred to another physician, viewing referrals from the source perspective as well as data on whether the patient was referred from another physician. Thus, the NAMCS does allow investigation of referrals from both the source and the target perspective, but the target perspective in NAMCS has not been used in empirical research. The NAMCS also represents an isolated patient encounter and cannot be viewed in the context of a patient's episode of care. Nonetheless, as the major national data set that has been used in most previous studies of referrals, the NAMCS is an important benchmark for our study.

In the context of the claims data in the MCBS, we have a reasonably complete record of the patient's encounters with all physicians over a period of many months. Ideally, we might examine each visit in its relationship to other visits and use some decision mechanism to identify certain visits as referrals. Although this idea has significant merit, it is quite difficult to implement. Thus, for our initial view of referrals in Medicare, we have chosen to use two possible definitions of referrals, which we label our "narrow" and "broad" definitions.

Our more restrictive narrow definition of a referral is derived from information in the MCBS claims files. Each claim record specifies both a referring and a service-providing physician. Using these data, a referral occurs if both a referring and a service-providing physician are specified and are different from one another. This measure is very similar to the target perspective referral question that has been asked in the NAMCS, but has rarely been used in research.

A problem with the target measure referred to earlier may be that the physician or person who is entering the claim information does not know if the patient was referred (similarly, in the source perspective data in NAMCS we never know if the patient actually complied with the referral). Thus, focusing only on the narrow definition and measure might give an unnecessarily restrictive view of the determinants of referrals. Given the early stage of referral research we thought it was important to consider an alternative, more inclusive, definition of referrals that might provide an upper bound in our analysis. We chose to use data from the survey and claims records to create a "broad" measure of referrals. This approach to studying referrals considers whether a service is provided by a beneficiary's usual physician or by some other doctor. A usual physician is defined as the physician who provides a beneficiary's basic care. The usual doctor was inferred from the beneficiary's self-report of his or her usual doctor's specialty and the frequency of physician IDs and specialties in the beneficiary's claims. One of the MCBS survey items asked the specialty of the beneficiary's usual doctor. For individuals who responded, a search was made of the claims data for referring or service-providing physicians of this specialty. If only one referring physician of the specified type was found, that person was designated as the usual doctor. If two or more physicians were identified, the doctor with the greatest number of visits was designated.

In some cases a beneficiary did not identify the specialty of his or her usual physician or did not identify a usual physician. Since identifying referrals in this approach requires specifying a usual physician we infer the identity of the usual physician on the basis of the most frequent visits to a service provider in a hierarchical manner from primary care to specialty care. The most frequently occurring service provider who was a general or family practitioner or an internal medicine specialist was identified as the usual physician. If none of these physicians occurred in a beneficiary's claim, then the most frequently occurring surgeon or specialty medicine practitioner was assigned as the beneficiary's usual physician. This has the effect of conservatively estimating referrals from specialty back to primary care.

Given this specification of the patient's usual physician, we define a visit broadly as a referral if the visit is NOT to the patient's usual physician. Obviously, this is quite an expansive definition of a referral and would require much greater work before it could be considered an acceptable measure. We regard it largely as an upper-bound estimate that includes many patient initiated visits (self-referrals) that might help to illuminate a more inclusive referral definition that took account of self-referral and might affect our results.

In examining referrals, we group physicians into one of six specialty groups: general and family practice, internal medicine, general surgery, specialty medicine, specialty surgery, and hospital-based and other. The first three groups are self-explanatory. Specialty medicine represents non-surgical specialists (e.g. cardiology, geriatrics), while specialty surgery represents the surgical specialists such as thoracic surgeons. We often refer to the first two categories as primary care providers and to the next three as specialists.

ANALYSES

Our descriptive analyses include cross-tabulations of referrals by patient, physician, and location factors. For this article, we merely present some summary information on the total number of referrals and patterns of referrals across physician groups. Multivariate logistic regressions predicting the likelihood that the patient had a referral during the year were estimated to identify important predictors of referral. The independent variables examined are enumerated in Table 1.

RESULTS

Table 2 provides an initial descriptive view of referrals in the 1992 and 1993 MCBS data. For both definitions of referral described earlier, the table shows total visits and referred and nonreferred visits. Using the narrow definition of referrals we find that 16 to 17 percent of all visits made by Medicare beneficiaries were referrals, whereas by using the broad definition, we find slightly less than half of all visits to be referrals.

The descriptive analysis also illustrates two important points made earlier. When we use either definition, a significant number of referrals are not from primary care to specialists. In 1993, using the narrow definition, just 32 percent of the total referrals are from a primary care physician to a specialist. The most frequently occurring other referrals are between two

Table 1: Independent Variables

Predicators (source)	*Variable*
Demographics (MCBS)	Sex, age, race, educational attainment, income, marital status
Insurance (MCBS)	Medicaid, other public insurance, employer-sponsored insurance, directly purchased personal insurance
Health status (MCBS)	Self-reported health status, self-reported disease conditions
Physician characteristics (Physician Identification Master Record)	Age of physician, number of years in practice, U.S. or foreign medical school graduate
County characteristics (ARF)	Urban/rural indicator obtained from the Human Resource Profile County Adjacency Code, per capita income of county doctor-to-population ratio, short-term hospital beds-to-population ratio

Table 2: Referrals in MCBS

	Broad Referral Definition Number of Referrals (% of All Visits)			
	1992		*1993*	
Total visits	74,880	(100%)	76,735	(100%)
Non-referred visits	40,470	(54.0%)	39,485	(51.5%)
Referrals	34,410	(46.0%)	37,250	(48.5%)
	Narrow Referral Definition Number of Referrals (% of All Visits)			
	1992		*1993*	
Total visits	74,880	(100%)	76,735	(100%)
Non-referred visits	61,928	(82.7%)	64,102	(83.5%)
Referrals	12,952	(17.3%)	12,633	(16.5%)

specialty medicine providers (2,030 total referrals) or between two primary care providers (2,156 total referrals), representing more than one-quarter of all referrals. Similarly, using the broad definition, just 36 percent of referrals are from primary care to specialists; primary care to primary care and specialty medicine to specialty medicine referrals represent 45 percent of all referrals using this measure. Specialist to primary care referrals represent approximately 4 percent of referrals, while other within-specialty referrals represent the balance.

Table 3: Referral Rate from Primary to Specialty Care, 1993

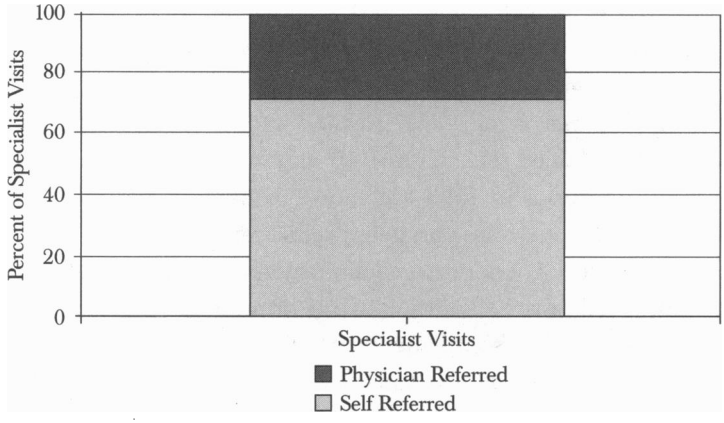
Total generalist visits, 1993	40,316
Total referrals to specialists by generalists, 1992	4,061
Referral rate	10.1%

To compare our data to prior research, we use the MCBS data to calculate referral rates similar to those from the NAMCS (Table 3). Although we do not have the same sampling frame and variables as those data, we counted all visits to primary care physicians by the MCBS respondents, and then counted, using our narrow definition, all referrals in which the referring physician was a primary care physician and the physician referred to was a specialist. Although this does not provide a measure of the percentage of generalist visits that actually resulted in a referral, it does provide a ratio of specialist referrals to primary care visits, which we call a referral rate. Using that measure, we find that the ratio of specialist referrals to primary care visits in the MCBS is 10.1 percent. This referral rate is somewhat higher than previous studies, which show referral rates usually between 3 and 7 percent. It is perhaps not surprising that this referral rate is higher; after all, Medicare beneficiaries represent a population quite ill compared to the population at large.

Figure 1 explores another comparison to prior research. Previous studies showed that a significant number of visits to specialists are self-referrals. Although our study uses a patient-level claims database, rather than a physician- or encounter-level database, our research using Medicare data confirms this finding. We count all specialist visits in the MCBS data and then, using our narrow definition, identify those visits that are referred and those that are not referred. We find that more than 70 percent of all visits to specialists in our data set are not referred from other physicians, confirming the importance of the process of self-referral. Even if we use our broad definition of referrals, we find that more than one-third of all specialist visits are self-referred. In an unmanaged fee-for-service setting, patient self-referral to specialist physicians is an important phenomenon in its own right and needs to be studied as much as does the process of referral between physicians.

Moving toward examining referrals from the point of view of our beneficiary-based data set, a view that encounter-based data sets cannot provide, we find that whether we use the narrow or the broad definition of referral, referral is a common phenomenon for patients (Figure 2). Although

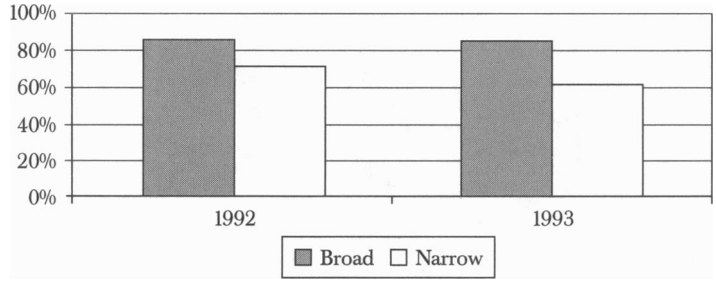
Figure 1: Self-Referral to Specialists, 1993



previous research might make it seem that referral is rare, occurring in just 5 percent or so of all patient visits, our results show that some 60 to 80 percent of all Medicare beneficiaries have at least one referral in a year. Assuming that referral is unimportant because it is unlikely in a given encounter ignores evidence that over multiple encounters, the likelihood of specialty referral cumulates. Over a two-year period, using the Medicare population, almost every person is referred at least once for specialty care, even using our narrow definition.

Previous research, because it was largely based on physician or encounter data, could also not assess the number of referrals per person, since they did not include data on a set panel of persons over time. As shown in Figure 3, we can assess this measure of referrals using the MCBS data.

Figure 2: Percent of Persons with a Referral



On average, Medicare beneficiaries have slightly more than two referrals per year, using our narrow definition, and approximately five referrals per year using our broad definition. Clearly, for this population, physician referral is a common phenomenon.

Finally, we ran a logistic regression model to identify independent variables that explained referrals in 1992 and 1993. The results for the broad and narrow definitions in 1993 are shown in Table 4 (results for 1992 are similar). Several health status variables predict referral using either definition, including good, very good, or excellent health, cancer, and diabetes; several other health variables are significant in one or more of the regressions run. In addition, the presence of supplemental insurance, in the form of either Medigap coverage or Medicaid (which may also be a proxy for disability) predict referral in the expected direction. The presence of supplemental insurance increases the odds ratio for referral from 32 and 69 percent. Having income greater than $25,000 is also a significant explanatory variable, increasing the odds ratio by 20 to 40 percent, and higher levels of educational attainment also predict referral. The physician variables and our county-level resource variables generally do not predict referral, except for the physician density in the broad referral definition. We do not find significant effects of age, gender, marital status, or race, although race approaches significance in all of the models.

Several urban/rural variables show some interesting differences across the models worthy of further exploration. The likelihood of referral is much lower in smaller metropolitan and suburban regions compared to metro core regions using the narrow definition (but not using the broad definition). This may represent these residents as recognizing the lack of physician referral and seeking out other providers on their own.

Figure 3: Referrals per Person

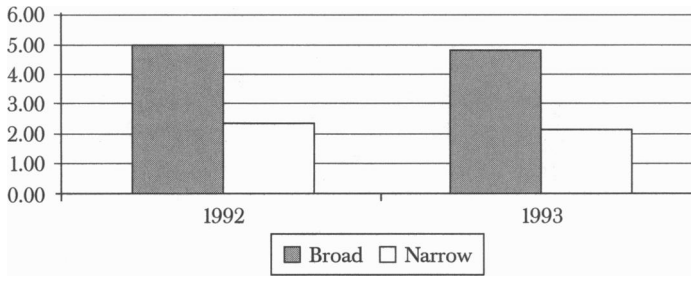


Table 4: Logistic Regression Estimates for Referral Probability in 1993 MCBS

	Narrow Referral Definition		*Broad Referral Definition*	
	Dependent Variable: 1 or more referrals in 1993		*Dependent Variable: 1 or more referrals in 1993*	
Independent Variable	*Parameter Estimate*	*Odds Ratio*	*Parameter Estimate*	*Odds Ratio*
Age	−.0055	.9945	.0022	1.0022
Female	−.0972	.9074	.0825	1.0860
African American	−.1796	.8356	−.2121	.8089
Other race	−.0555	.9460	−.1890	.8278
Divorced/Separated/Widowed	−.0079	.9921	.1183	1.1256
Never married	−.2281	.7960	−. 2147	.8068
Income > $25,000	.1822**	1.1999	.3570***	1.4291
8–11 years education	.2670***	1.3060	.1445	1.1554
12 years education	.1845*	1.2027	.1303	1.1391
13–15 years education	.1711	1.1866	.4204**	1.5226
16+ years education	.1374	1.1473	.1451	1.1562
Education unknown	−.2425	.7846	−.4407	.6436
Good, very good, or excellent health	−.3654***	.6939	−.3758***	.6867
Health unknown	1.6776	5.3528	3.2581	26.0010
Hardening of arteries	.1077	1.1137	.2736**	1.3147
High blood pressure	.0449	1.0460	.0035	1.0035
Myocardial infarction	.2043	1.2267	.5600*	1.7506
Congestive heart disease	.2491	1.2828	.1608	1.1745
Other heart conditions	.4381***	1.5498	.2426	1.2746
Stroke	.3300*	1.3910	.0541	1.0556
Skin cancer	.2380	1.2688	.4255*	1.5304
Cancer	.9581***	2.6068	1.2490***	3.4869
Diabetes	.1517*	1.1638	.3832***	1.4669
Rheumatoid arthritis	.0674	1.0697	.0567	1.0584
Arthritis	.0450	1.0697	.1394	1.1496
Osteoporosis	.1840*	1.2020	.1781	1.1950
Emphysema	−.0266	.9737	.1228	1.1306
Privately purchased insurance	.2818***	1.3255	.4328***	1.5416
Employment-related insurance	.3158***	1.3713	.5115***	1.6678
Medicaid	.4018***	1.4945	.5264***	1.6929
Other public insurance	.0884	1.0924	.4125	1.5106
Usual doctor, internal medicine	–	–	−.0586	.9431
Usual doctor, surgeon	–	–	.2913	1.3381
Usual doctor, specialty medicine	–	–	.0160	1.0162
Usual doctor, hospital-based or other	–	–	−.1474	.8630
Foreign medical school graduate	–	–	.0246	1.0249
Physician age	–	–	.0064	1.0064
Physician years in practice	–	–	−.0099	.9901
Physician in group practice	–	–	.0879	1.0919
Large metro fringe county	−.0152	.9849	−.1017	.9033

Continued

Table 4 (*Continued*)

Medium metro county	−.1586*	.8533	.1680	1.1829
Lesser metro county	−.3521**	.7032	.1715	1.1870
Nonmetro urban county	−.4690***	.6257	.0829	1.0864
Nonmetro nonurban county	−.0565	.9451	.1010	1.1063
Thinly populated county	−.0130	.9871	−.2998	.7409
County doctor-to-population ratio	.0057	1.0057	.0122**	1.0123
County short-term beds-to-population ratio	.00009	1.0001	−.00003	1.0000
County per capita income	.000009	1.0000	.0000002	1.0000

* $p \leq .01$; ** $p \leq .05$; *** $p \leq .10$.

SUMMARY AND CONCLUSIONS

Our results examine patterns of referral within Medicare support and extend previous and ongoing work with other data sets. Overall referral rates and patterns in the Medicare population appear to be consistent with previous studies, although somewhat higher. Overall the referral rate is about 10 percent. Our Medicare data confirm a heavy level of self-referral to specialty care, with one-third or more of all specialist visits being self-referred.

In addition, the Medicare data highlight several important issues that emphasize the need for better conceptual models as well as better data and analysis. Most current conceptual models offered do not consider the complexity of referral. Referral within primary care and among various specialists and referral from specialty care back to primary care are also important. A recent study characterized referrals as "passing the baton," conveying the image of an orderly transfer of care and responsibility (Forrest and Reid 1997). Referral is not a linear path from primary care to specialty care. Conceptual and empirical research must further focus on the movement of patients between physicians of various specialties. Referral is a dynamic, complex, nonlinear process, and focusing solely on isolated rates of transfer from primary to specialty care in isolated physician encounters fails to capture this dynamism.

In addition, conceptual models and research must also focus on the decision by patients to comply with referrals, to self-refer to a specialist, and to choose a specialist as their primary physician (since this latter may, in fact, affect whether a primary care physician tends to refer), especially in systems that permit more open networks. In our Medicare sample, 24 percent of Medicare beneficiaries have a specialist as their usual physician. Our results

also highlight several predictors of referral that have not been the focus of prior research, particularly at the individual patient level. Despite limited cost sharing in Medicare supplemental insurance variables were highly predictive of referral, and income affects referral, too. In previous research these measures have not received as much attention as physician factors. In addition, we find patient educational attainment to be important. This variable is not mentioned at all in previous conceptual models. In our models, these patient variables appear to be more important predictors than physician or area variables, although we have weaker measures in this area. Referral is a process that involves patients, too, and focusing primarily on physician characteristics or system features ignores this factor.

Finally, differences in our models of referral using our two measures highlight potential areas for important research on the process of referral on the basis of some system characteristics. In particular, referral processes in urban/rural areas would appear to be worth investigating, since by our narrow definition these predict low levels of referral, but this is reduced using our broad measure. Future research needs to consider referrals from both a source and target perspective and to consider self-referrals as an important part of the referral process.

REFERENCES

Bradford, W., and R. Martin. 1996. "An Economic Theory of Referrals: Applications to the Medical Profession." University of New Hampshire Department of Economics Working Paper.

Clancy, C., D. Lanier, and M. Grady. 1996. *Research at the Interface of Primary and Specialty Care.* Agency for Health Care Policy and Research Conference Summary Report. Pub. No. AHCPR 96-0034. Rockville, MD: AHCPR.

Forrest, C., and R. Reid. 1997. "Passing the Baton: HMOs' Influence on Referrals to Specialty Care." *Health Affairs* 16 (6): 157–62.

Franks, P., and C. Clancy. 1997. "Referrals of Adult Patients from Primary Care: Demographic Disparities and Their Relationship to HMO Insurance." *Journal of Family Practice* 45 (1): 47–53.

Glenn, J., F. Lawler, and M. Hoerl. 1987. "Physician Referrals in a Competitive Environment: An Estimate of the Economic Impact of a Referral." *Journal of the American Medical Association* 258 (14): 1920–23.

Gonzalez, M., and J. Rizzo. 1991. "Physician Referrals and the Medical Market Place." *Medical Care* 29 (10): 1017–27.

Greenfield, S., W. Rogers, M. Mangotich, M. Carney, and A. Tarlov. 1995. "Outcomes of Patients with Hypertension and Non-Insulin Dependent Diabetes Mellitus Treated by Different Systems and Specialities." *Journal of the American Medical Association* 274 (18): 1436–44.

Greenfield, S., E. Nelson, M. Zubkoff, W. Manning, W. Rogers, R. Kravitz, A. Keller, A. Tarnov, and J. Ware. 1992. "Variations in Resource Utilization Among Medical Specialties and Systems of Care." *Journal of the American Medical Association* 267 (12): 1624–30.

Grembowski, D., K. Cook, D. Patrick, and A. Roussel. 1998. "Managed Care and Physician Referral." *Medical Care Research and Review* 55 (1): 3–31.

Grol, R., M. Whitfield, J. De Maeseneer, and H. Mokkink. 1990. "Attitudes to Risk Taking in Medical Decision Making Among British, Dutch, and Belgian General Practitioners." *British Journal of General Practice* 40: 134–36.

Holtgrave, D., F. Lawler, and S. Spann. 1991. "Physicians' Risk Attitudes, Laboratory Usage, and Referral Decisions: The Case of An Academic Family Practice Center." *Medical Decision Making* 11: 125–30.

Jollis, J., E. DeLong, E. Peterson, L. Muhlbaier, D. Fortin, R. Califf, and D. Mark. 1996. "Outcome of Acute Myocardial Infarction According to the Specialty of the Admitting Physician." *The New England Journal of Medicine* 335 (25): 1880–87.

McLeod, P., R. Tamblyn, D. Gayton, R. Grad, L. Snell, L. Berkson, and M. Abrahamowicz. 1997. "Use of Standardized Patients to Assess Between-Physician Variations in Resource Utilization." *Journal of the American Medical Association* 278 (14): 1164–68.

Nutting, P., P. Franks, and C. Clancy. 1992. "Referral and Consultation in Primary Care: Do We Understand What We're Doing?" *The Journal of Family Practice* 35 (1): 21–23.

Reynolds, G., J. Chitnis, and M. Roland. 1991. "General Practitioner Outpatient Referrals: Do Good Doctors Refer More Patients to the Hospital?" *British Medical Journal* 302: 1250–52.

Schneeweiss, R., K. Ellsbury, L. Hart, and J. Geyman. 1989. "The Economic Impact and Multiplier Effect of a Family Practice Clinic on an Academic Medical Center." *Journal of the American Medical Association* 262 (3): 370–75.

Shortell, S., and S. Vahovich. 1975. "Patient Referral Differences Among Specialties." *Health Services Research* 10 (summer): 146–61.

Shortell, S. 1972. "A Model of Physician Referral Behavior: A Test of Exchange Theory in Medical Practice." Research Series No. 31. Center for Health Administration Studies, Chicago.

Sturm, R., and K. Wells. 1995. "How Can Care for Depression Become More Cost-Effective?" *Journal of the American Medical Association* 273 (1): 51–58.