Determinants of physician assignment rates by type of service

by Thomas Rice

In this article, the determinants of physician assignment rates under the Medicare program are examined separately for medical, surgical, laboratory, and radiology services. Data for this study include copies of all Medicare claims submitted by over 1,200 Colorado general practitioners, internists, and general surgeons during the periods both before and after they experienced a substantial change in program reimbursement rates. The results indicate that there is a significant positive relationship between changes in reimbursement and changes in assignment rates for medical, laboratory, and radiology services, but the relationship for surgical service is not significant. Furthermore, for laboratory and radiology services, only the change in medical service reimbursement is significant—reimbursement rates for laboratory and radiology services are not.

Introduction

This study analyzes the determinants of physician assignment rates for various types of services provided by physicians to Medicare beneficiaries. Specifically, this study separately examines the assignment rates for medical, surgical, laboratory, and radiology services among general practitioners, internists, and general surgeons. The potential determinants of the assignment rates that will be examined include Medicare reimbursement rates for these different types of services, physician characteristics, and characteristics of the market in which the physicians practice. The findings should help indicate if physician assignment decisions for different types of services are based on different criteria. This, in turn, may help indicate what types of public policy changes—such as increasing or reducing reimbursement rates for specific types of services—will best meet the goals of public health programs.

For those not familiar with the Medicare assignment options, a short background may be helpful. The method by which Medicare reimburses physicians for services provided to program beneficiaries depends on whether the physician accepts "assignment" from the Medicare program for delivering a particular service. If the physician accepts assignment for a service, he or she is paid the program's obligation (80 percent of the "reasonable charge," as determined by the program, after the beneficiary meets an annual deductible) directly, and bills the patient only for any outstanding deductible and/or the 20 percent coinsurance amount. By accepting assignment, the physician must agree to accept the reasonable charge as payment in full for the service. In exchange, the physician receives direct payment from Medicare, which eliminates the risk of patient delay and default on this amount. If the physician does not accept assignment for a service, he or she may receive total payments in excess of the reasonable charge, but Medicare pays its obligation to the patient, not to the physician; the latter must bill the former for the entire amount. Thus, when the physician does not accept assignment, he or she can charge (and hope to receive) any fee, but must also bill the patient for the entire amount, which could involve the risk of delay of payment or default on part or all of the bill.

The assignment decision made by physicians will have a major impact on Medicare beneficiaries' out-of-pocket expenses. Excluding the monthly premium payment for Part B coverage, a Medicare beneficiary's liability for an assigned Part B service is limited to 20 percent of the reasonable charge, after the annual deductible is met. However, a nonassigned service has an additional cost to the beneficiary: 100 percent of the difference between the reasonable charge and the physician's fee for the service. For example, assume that a patient who has met the annual deductible sees a physician who charges $25, but whose reasonable charge for the service has been calculated to be $15. If the physician assigns the service, the beneficiary will pay only $3 (20 percent of the reasonable charge). However, if the service is not assigned, the beneficiary's expenses will be $13 (20 percent of the reasonable charge, plus 100 percent of the difference between the physician's fee and the reasonable charge.) This additional liability may be especially burdensome for the beneficiary because only rarely is it covered by insurance policies purchased to supplement Medicare coverage.

A number of studies have been conducted on physician assignment rates and their determinants. All studies that have examined the impact of Medicare reimbursement rates (Hadley and Lee, 1978; Paringer, 1980; Mitchell and Cromwell, 1981; Rice and McCall, 1982) have found a positive relationship between reimbursement and assignment. In other words, they have concluded that increases in Medicare reimbursement rates result in higher assignment rates, and that decreases result in lower assignment rates, other factors held constant.

None of these studies, however, has disaggregated physician assignment decisions according to the particular types of services that are provided. The Hadley and Lee, and Paringer studies combine all types of

services into one aggregate measure of assignment; Mitchell and Cromwell use survey data based on physician responses concerning the percentage of all Medicare bills taken on assignment; and while the Rice and McCall study does look at medical and surgical assignment rates separately, it does not also examine laboratory and radiology services assignment. One other study of assignment, by Ferry et al. (1980), also aggregates data, by examining total physician claims and billed charges irrespective of service type.

By examining the determinants of physician assignment behavior separately according to service type, several interesting questions yet to be answered can be addressed. These include:
- Do the same determinants influence medical, surgical, laboratory, and radiology services assignment rates?
- If any of these measures of physician assignment rates are sensitive to Medicare reimbursement, which reimbursement rates are they sensitive to—those for medical services or for the other services?
- If Medicare wants to change its reimbursement rates for physicians' services, how will assignment be influenced? For example, the Medicare program may wish to encourage the provision of primary (medical) service, by increasing its reimbursement, and discourage provision of ancillary services (laboratory and radiology) by lowering their reimbursement. How would these changes affect assignment rates for the different types of services?
- Are there any ways Medicare could reduce total physician payments without upsetting program assignment rates?

Methodology and data

In a longer work on this topic (Rice, 1982), a theoretical model of physician assignment decisions is developed. The purpose of the model is to determine how change in physician reimbursement rates under the Medicare program would be expected to affect assignment decisions. In the model, it is assumed that physicians desire to maximize practice profits, that their charges exceed program reimbursements, and that, other factors aside, assigned claims are advantageous to physicians because they reduce the risk of default and payment delay.

The model predicts that there will be a positive relationship between changes in reimbursement and changes in assignment. If the reimbursement rates increase, physicians will assign a greater proportion of their services; if reimbursement declines, they will assign a smaller proportion of services. An intuitive explanation of this prediction is that increases in Medicare reimbursement decrease the differential between the fee usually charged by the physician and the reimbursement rate. Consequently, the physician perceives that the advantages of assignment (assured, timely payment) outweigh the disadvantages (revenue loss) for a larger portion of patients when reimbursement rises, and thus assigns a larger proportion of services.

This model of physician assignment decisions, however, does not address several areas of interest. This model does not indicate how the determinants of assignment (such as reimbursement) differ by type of service, nor does this model say which reimbursement rates matter. For example, this model does not tell us if changes in assignment rates for radiology services are determined (in part) by changes in Medicare reimbursement rates for medical services, for radiology services, or both. These issues are addressed empirically in this study.

To test empirically the questions that surround assignment, two factors are desirable. First, an appropriate setting should be found, and, second, sufficient relevant data must be obtained. The setting for this study is a natural experiment that occurred in Colorado. Between fiscal year (FY) 1976 and FY 1977, a change occurred in Medicare's physician reimbursement methodology that had a substantial impact on the reimbursement rates for physicians in the State. Generally, physicians in the Denver area experienced a substantial relative decrease in Medicare reimbursement rates, and those in other parts of the State received a substantial relative increase. Details on this change and its magnitude have been reported in a previous issue of this journal (Rice and McCall, 1982).

The Colorado setting has several advantages in a study of how economic incentives influence physician behavior. First, the change in Medicare reimbursement rates was an exogenous one—that is, it was beyond the influence of physicians. As such, it provides a natural experiment for studying physician responses. Second, the change that occurred was a large one, which helps ensure that physicians will have responded to it. Third, as a result of the change, some physicians experienced increases in their reimbursement rates and others, decreases. This is important because it means there are substantial differences in the reimbursement variables used in the analysis. Such differences are useful for obtaining reliable estimates of the variables' impact on physician practices.

The data set includes copies of every Medicare claim submitted by all Colorado general practitioners, internists, and general surgeons between FY 1976 and FY 1978. Because the change in Medicare physician reimbursement occurred between FY 1976 and FY 1977, information is available on these physicians' Medicare practice during the year before the change (FY 1976) and the two years after the change (FY 1977 and FY 1978). (In this study, only data from FY 1976 and FY 1978 are used.) Over 2 million Medicare claims have been compiled for this study. Each claim contains information identifying the physician and the patient, an indicator of whether the claim was assigned, the submitted charge for the services delivered, the reimbursement rate (specifically, the reasonable charge) for the services, a listing of the specific procedures provided, and an indicator of whether the beneficiary was also covered by Medicaid.[1] The original source of these data was Blue

[1]Services provided to patients jointly eligible for Medicare and Medicaid usually must be assigned.

Cross/Blue Shield of Colorado, the State's Medicare carrier.

These Medicare claims provide information necessary for computing the study's dependent variables and primary independent variables. The information was used to calculate assignment rates for each type of service both before and after Colorado's change in reimbursement methodology. Consequently, the changes in reimbursement over the study period can be determined. Similarly, because each claim contains information on Medicare's reimbursement rate for the particular services provided, the physician's average Medicare reimbursement rate can be computed from the data by type of service, both before and after the change. Furthermore, because the data include every Medicare service provided by each study physician, the variables constructed must accurately represent the physician's assignment rate and financial incentives over the study period. Stated another way, sampling error is not a potential problem because all Medicare services provided by the physician, rather than a sample, have been used to construct the variables used in this study.

In addition to the claims data, information on each physician's characteristics have been obtained from the Medicare provider files of Blue Cross/Blue Shield of Colorado and from the directories of the American Medical Association (AMA) and the American Osteopathic Association (AOA). Data on the counties in which each physician practiced were obtained from the Area Resource File and the Bureau of the Census.

The sample of physicians used in the study includes all 1,264 practicing Colorado physicians from FY 1976 to FY 1978, who were general practitioners, internists, or general surgeons, and who did not move or change specialties during the study period.

Dependent variables

There are two common definitions of the assignment rate: the total rate and the voluntary rate (Paringer, 1980). The total rate is simply the percentage of all Medicare services or relative value units (RVU's[2]) assigned: included in both the numerator and denominator are services provided to individuals eligible for both Medicare and Medicaid (that is, the elderly poor), which usually must be treated on assignment. Since the voluntary assignment rate excludes these services, the focus has been on the total assignment rate because it is the broadest measure of physician participation in Medicare. If physicians react to lower reimbursement rates either by assigning fewer services or

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[2]Each procedure is assigned an RVU value that represents the intensity of the procedure. An RVU represents a standard unit of quantity across different procedures. They are constructed separately for medical, surgical, laboratory, and radiology services, so procedures in different service categories are not comparable.

by treating fewer joint Medicare-Medicaid eligibles, this will be apparent through examining the total assignment rate.

Assignment rates will be examined separately for the four types of services that can be provided: medical, surgical, laboratory, and radiology.[3] For each service, the change in the percentage of RVU's delivered on assignment between FY 1976 and FY 1978 will be examined. RVU's, rather than services, are used because they provide a relatively homogenous unit of quantity. Consequently, more highly intensive services are given a higher weight and, thus, have a larger impact on the physician's average assignment rate than less highly intensive services.

Before going on, it is important to point out that the Medicare program prohibits physicians from assigning only a portion of services that are delivered to a beneficiary at the same place on the same occasion. The intent of this policy is to prevent physicians from fragmenting their bills. Although this rule is probably difficult to enforce, its adherence would imply that laboratory and radiology services that are provided at the same time as medical services will probably have the same assignment status as that for the medical services. This further implies that the same determinants of the medical service assignment rate will also be the determinants of the other service rates.

The four primary variables that will be used to capture changes in physician assignment rates are defined more precisely in Table 1.

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[3]The data base includes a laboratory or radiology service only if it is billed by one of the sample physicians (i.e., a general practitioner, internist, or general surgeon). This occurs when that physician actually provides the service or when he or she orders the service and contracts with a laboratory or other facility to provide it.

Table 1

Dependent variables

Variable	Definition
Medical assignment rate	Change in the percentage of total medical relative value units (RVU's) assigned by the physician between FY 1976 and FY 1978
Surgical assignment rate	Change in the percentage of total surgical RVU's assigned by the physician between FY 1976 and FY 1978
Laboratory assignment rate	Change in the percentage of total laboratory RVU's assigned by the physician between FY 1976 and FY 1978
Radiology assignment rate	Change in the percentage of total radiology RVU's assigned by the physician between FY 1976 and FY 1978

Independent variables

Three sets of independent variables would be expected to influence the assignment rate variables: changes in the Medicare reimbursement rate, costs to the physician of providing Medicare services, and demand for Medicare services.

An appropriate measure of the Medicare reimbursement rate is the physician's average "reasonable charge," as defined by the Medicare program. These averages are calculated separately for each of four types of services: medical, surgical, laboratory, and radiology. As with the dependent variables, these averages are specified as the change between FY 1976 and FY 1978 values.

Inclusion of each of the four reimbursement variables in each model is not practical because it results in too small a sample size. Many physicians, for example, do not bill for surgery, laboratory or radiology services; if each reimbursement variable were included, missing values would have to be generated for many physicians because Medicare establishes a reimbursement rate only if a physician provides a service a minimum number of times in a year. Fortunately, this problem can be circumvented while still retaining the most important reimbursement variables for the models. This is done by including the reimbursement rate for medical service in each model, as well as the rate for the service being examined. The medical reimbursement rate is important because the physician may use it as a barometer for assessing changes in reimbursement rates for all types of services—surgical, laboratory, and radiology, as well as medical. Furthermore, as noted earlier, if laboratory and radiology services provided during the same visit as medical services have the same assignment status, then the medical reimbursement rate might be expected to have a major influence on the assignment rates of these other services. Nevertheless, it would still be expected that the reimbursement rate applicable to a particular service is an important determinant of physician behavior. For example, in determining the assignment rate for laboratory service, the physician would take into account the laboratory reimbursement rate.

Using this methodology, the models are constructed as follows: For the dependent variable representing the medical assignment rate, only the medical reimbursement rate is used. For the variable involving surgery service, both the medical and surgical rates are included. For the variable involving laboratory service, both the medical and laboratory rates are used. Similarly, for the radiology variable, the medical and radiology reimbursement rates are used. It should be noted that because the partial correlations between changes in medical reimbursement rates and changes in the other rates are very small (0.08 for surgery service, 0.05 for laboratory service, and 0.17 for radiology service), inclusion of more than one of these reimbursement variables in a given equation will not result in multicollinearity.

In order to account for factors outside of the change in reimbursement that may have affected assignment rates over the study period, several other variables are included in the models. In general, these variables represent the demand for and costs (both explicit and opportunity costs) of providing services. Looking first at opportunity costs, the data set includes several physician characteristics that are measures of the value of physician time: number of years of experience, board certifications, specialty, sex, medical school, whether the physician is an osteopath, and whether the practice is solo or group affiliated. Holding other factors constant, higher opportunity costs, in terms of implicit wage rates, would be expected for board-certified physicians, specialists, males, graduates of domestic medical schools, more experienced physicians (up to a certain point), and nonosteopaths. It would have been ideal to have measures of how these opportunity costs changed over the study period. Unfortunately, the variables in the study did not change. Nevertheless, the measures of opportunity costs in the study permit the examination of a useful question: Holding other factors constant, how do these physician characteristics affect changes in assignment?

The data set includes two measures of direct (i.e., nonopportunity) costs related to the characteristics of the market in which the physicians practice: the urbanization level and the change in the wage income of health personnel in the physician's geographic area over the study period. Furthermore, one variable indicating demand was included: the change in physicians per 1,000 population in the physician's geographic area over the study period. Although it would have been desirable to also include a variable for changes in per capita income over the study period, such data could not be obtained. Even if they could have been, it is not clear that such a variable would accurately reflect changes in aged population income. A variable indicating the level of per capita income was not included because it was highly correlated with the urbanization variable. Because the primary purpose of all of these variables is to hold constant nonreimbursement factors, the focus in the results is on the impact of the reimbursement variables on assignment decisions. Definitions of the independent variables appear in Table 2.

Regression results

In the models, the dependent variables in Table 1 are regressed on the independent variables in Table 2, although, as noted earlier, not all of the reimbursement variables will be included in each model. In the models, a physician practice is the unit of analysis.[4]

[4]Some physicians, primarily those who had both solo and group practices, may have had more than one code number. Because this code number is the analysis unit, physicians with two such codes during both 1976 and 1978 accounted for two records on the analysis file.

Table 2
Independent variables

Variable	Definition	Source
Reasonable charge per medical RVU	Change in the average[1] reasonable charge per RVU, for medical service, between FY 1976 and FY 1978	Colorado Medicare Claims Files
Reasonable charge per surgical RVU	Change in the average reasonable charge per RVU, for surgical service, between FY 1976 and FY 1978	Colorado Medicare Claims Files
Reasonable charge per laboratory RVU	Change in the average reasonable charge per RVU, for laboratory service, between FY 1976 and FY 1978	Colorado Medicare Claims Files
Reasonable charge per radiology RVU	Change in the average reasonable charge per RVU, for radiology service, between FY 1976 and FY 1978	Colorado Medicare Claims Files
Experience	Number of years between 1977 and the year the physician graduated from medical school	American Medical Association and American Osteopathic Association (AMA/AOA) Directories
Board certification	A dummy variable indicating whether the physician has one or more board certifications	AMA and AOA Directories
Specialty:		Colorado Medicare Provider Files
Internal medicine	A dummy variable indicating that the physician's primary specialty is internal medicine	
General surgery	A dummy variable indicating that the physician's primary specialty is general surgery	
General practice	The control group for specialty, indicating that the physician's primary specialty is general practice	

See footnote at end of table.

Table 2—Continued
Independent variables

Variable	Definition	Source
Female	A dummy variable indicating whether the physician is female	Hand-coded
Foreign medical school	A dummy variable indicating whether the physician graduated from a medical school outside of the United States or Canada	AMA and AOA Directories
Osteopath	A dummy variable indicating whether the physician is an osteopath	AMA and AOA Directories
Group practice	A dummy variable indicating whether the physician is in a group practice	Colorado Medicare Provider Files
Urbanization:		Area Resource File
Large SMSA	A dummy variable indicating that the physician practices in a Standard Metropolitan Statistical Area (SMSA) of more than 1 million population	
Small SMSA or adjacent	A dummy variable indicating that the physician practices in a smaller SMSA or in a country adjacent to an SMSA	
Semirural or rural	The control group for urbanization, indicating that the physician practices in a semirural or rural county	
Wage income of health sector employees	Change in the average wages among health sector employees in the physician's geographic area between 1976 and 1978	Census Bureau
Physician density	Change in the number of non-Federal physicians per 1000 population in the physician's county between 1975 and 1977	Area Resource File

[1]These averages are calculated by summing the total number of RVU's delivered and dividing this by the total reasonable charges, paid by Medicare, for providing these procedures. This average is therefore weighted by the intensity of procedures provided since RVU's are a measure of procedure intensity.

Ordinary least squares (OLS) regression should provide unbiased, consistent estimated coefficients for the following reasons: the dependent variables are continuous; no simultaneities exist, and the error term should be uncorrelated with the independent variables of major interest. The fact that regression residual plots showed normal-shaped distributions implies that the OLS estimates of coefficients are also efficient.

Mean values and standard deviations of the independent variables appear in Table 3. Mean values for the dependent variables appear near the bottom of their respective regression tables.

Before the regression results are presented, however, it is interesting to see how aggregate assignment rates for sample physicians changed between FY 1976 and FY 1978. As shown in Table 4, assignment rates for all types of services declined between 5.1 percent and 6.5 percent over the study period. The regression equations will isolate the factors that have influenced these changes.

Medical assignment rates

The results for the medical assignment rate regression are shown in Table 5. As predicted, the change in the Medicare reimbursement rates for medical service is a positive determinant of the change in the assignment rates; this result is statistically significant at the

1-percent confidence level. That is, increases in reimbursement will result in higher physician assignment rates; decreases will result in lower assignment rates.

The magnitude of this impact is also of interest. The results show that a $1 change in the reasonable charge per medical RVU will result in a unit change of 6.8 percent in the proportion of RVU's assigned. This magnitude can be more easily understood if the results are converted to percentages. Stated in these

Table 4

Changes in total assignment rates, by type of service: Between FY 1976 and FY 1978

Type of service	Assignment rate [1]		Change
	1976	1978	
Medical	44.7	38.2	− 6.5
	(33.6)	(31.6)	
Surgical	42.0	36.9	− 5.1
	(36.9)	(35.7)	
Laboratory	36.1	30.4	− 5.5
	(35.3)	(32.3)	
Radiology	36.9	30.4	− 6.5
	(37.1)	(34.5)	

[1]Defined as percentage of relative value units assigned.
NOTE: Standard deviations are in parentheses.

Table 5

Regression results: Change in assignment rates for medical service (N = 1,260)

Independent variables	Coefficient	Standard error
Change in reasonable charge per medical relative value unit (RVU)	*** .068	.024
Specialty:		
General practice	—	—
Internal medicine	.005	.018
General surgery	− .018	.019
Experience (10's of years)	.003	.020
Experience squared (100's of years)	− .001	.004
Board certified	− .010	.016
Female	− .007	.040
Foreign medical school	.055	.043
Osteopath	.002	.022
Group practice	.004	.017
Urbanization		
Large Standard Metropolitan Statistical Area (SMSA)	− .014	.016
Small SMSA or adjacent	− .018	.021
Semirural or rural	—	—
Change in wage income of health sector personnel ($100's)	− .019	.014
Change in physician density	* .102	.057
Constant	− .051	.047
Mean of dependent variable	− .065	
R^2	.020	
F	** 1.83	

***Significant at the 1-percent level.
**Significant at the 5-percent level.
*Significant at the 10-percent level.

Table 3

Mean values and standard deviations of the independent variable

Variable	Mean	Standard deviation
Change in reasonable charge per medical relative value unit (RVU)	.268	.295
Change in reasonable charge per surgical RVU	.379	1.26
Change in reasonable charge per laboratory RVU	.145	1.04
Change in reasonable charge per radiology RVU	.484	.768
Specialty: [1]		
General practice [2]	.450	.497
Internal medicine	.340	.474
General surgery	.210	.407
Board certified [1]	.459	.474
Experience (years)	20.3	11.3
Experience squared (years)	540	550
Female [1]	.030	.162
Foreign medical school [1]	.024	.153
Osteopath [1]	.129	.319
Group practice [1]	.202	.401
Urbanization: [1]		
Large standard metropolitan statistical area (SMSA)	.537	.499
Small SMSA or adjacent	.219	.414
Semirural or rural [2]	.244	.429
Change in wage income of health sector personnel	239	52.3
Change in physician density (physicians per 1000 population)	.216	.115

[1]This is a dummy variable; the mean, therefore, represents the percentage of sample physicians with that characteristic.
[2]This variable is used as a reference group in the regression; it does not appear in the equations.

terms, a 1-percent change in the reasonable charge will result in a 0.14-unit change in the assignment rate.[5]

The change in number of physicians per 1,000 population is a positive determinant of assignment rates, significant at the 10 percent confidence level, as shown in Table 5. A 1 percent increase in physician density will result in a .25 unit increase in physician assignment rates.[6] Since physician density is expected to increase rapidly in the coming decade, this finding is particularly interesting. It indicates that physicians may react to increasing competition by accepting assignment more often; in effect, this would be equivalent to lowering fees. This finding therefore lends credence to the belief that increasing the number of physicians may lead to a more competitive health care market.

The assignment models, however, do not explain much of the total variation in assignment rates—the R^2 values range between 2 percent and 5 percent. Most of the remaining variation probably is explained by a number of other changes in physician practices that could have occurred between FY 1976 and FY 1978. These changes include: changes in the mix of patients served by the physician, changes in average assignment rates (declining throughout the period; Table 4), changes in assignment rates as new physicians begin to establish consistent billing patterns, and random variation in assignment among physicians with small Medicare practices. It is unlikely that any of these changes are related to any of the independent variables in the assignment rate models. This low explanatory power results, in part, from our use of "change" data: by examining changes in assignment rather than confidence levels, a great deal of explanatory power is lost. However, the method used in this paper eliminates much bias from the estimates.

Surgical assignment rates

The results for the surgical assignment rate regressions are shown in Table 6. In this model, none of the independent variables is a statistically significant determinant of the dependent variable, even at the 10-percent confidence level. It is interesting to examine whether changes in the medical or in the surgical reimbursement rate was the more important determinant of changes in surgical assignment rates. Neither variable turns out to have had a significant effect.

Nevertheless, the fact that surgical assignment rates are relatively insensitive to reimbursement rates is an important finding. It may indicate that governmental efforts to reduce Medicare costs through lowering surgical reimbursement rates will not have the deleterious

Table 6

Regression results: Change in assignment rates for surgical service

(N = 1,015)

Independent variables	Coefficient	Standard error
Change in reasonable charge per medical relative value unit (RVU)	.059	.038
Change in reasonable charge per surgical RVU	.006	.008
Specialty:		
General practice	—	—
Internal medicine	−.007	.027
General surgery	−.032	.027
Experience (10's of years)	−.009	.031
Experience squared (100's of years)	.001	.006
Board certified	−.015	.024
Female	−.095	.062
Foreign medical school	.017	.064
Osteopath	−.023	.033
Group practice	.019	.026
Urbanization		
Large Standard Metropolitan Statistical Area (SMSA)	−.029	.025
Small SMSA or adjacent	.004	.032
Semirural or rural	—	—
Change in wage income of health sector personnel ($100's)	−.008	.021
Change in physician density	.042	.085
Constant	−.028	.071
Mean of dependent variable	−.051	
R2	.015	
F	1.03	

***Significant at the 1-percent level.
**Significant at the 5-percent level.
*Significant at the 10-percent level.

result of decreased assignment rates. One reason for this insensitivity may be that surgical procedures tend to be costly and, consequently, physicians are not willing to risk patient default (which can result when claims are not assigned), even in the wake of declining Medicare reimbursement rates.

Laboratory assignment rates

The regression results for laboratory assignment rates are shown in Table 7. A particularly interesting finding is that changes in the medical reimbursement rates are a positive determinant of changes in laboratory assignment rates (significant at the 1-percent confidence level), but changes in the laboratory reimbursement rates are not significant. Specifically, a 1-percent change in medical reimbursement rates will result in a change of .14-unit change, in the same direction, for laboratory assignment rates.[7]

This result implies that physicians decide whether to assign a laboratory service not according to the reimbursement rate for that service, but according to the reimbursement rate for medical service. When this finding is coupled with the results from Table 5 (medical assignment rates), it seems clear that, when physicians experience a change in their reimbursement

rates for medical (e.g., office and hospital) service, their assignment rates for both medical and laboratory services are affected, regardless of changes in the reimbursement rate for laboratory service (as discussed later, there is a similar pattern for radiology service). From a policy-oriented standpoint, this result suggests that if the Medicare program wishes to increase the assignment rates for both medical and laboratory services, it could attempt to do so, at little overall cost, by increasing reimbursement rates for medical service and lowering them for laboratory service.

Two other variables were significant determinants of changes in laboratory assignment rates over the study period, as shown in Table 7. Most notably, increasing personnel wages resulted in lower laboratory assignment rates; a 1-percent increase in health sector wages results in a .58 unit decrease in laboratory assignment rates, a result significant at the 5-percent level.[8] The results also show that graduates of foreign medical schools increased their laboratory assignment rates by 7.7 units more than other physicians over the study period. Most likely, however, this result is simply a statistical artifact from the small number of such physicians in our sample.

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[8]The elasticity equals 1.60

Table 7
Regression results: Change in assignment rates for laboratory service (N = 1,002)

Independent variables	Coefficient	Standard error
Change in reasonable charge per medical relative value unit (RVU)	***.066	.027
Change in reasonable charge per laboratory RVU	.006	.007
Specialty:		
General practice	—	—
Internal medicine	.007	.018
General surgery	−.001	.023
Experience (10's of years)	.008	.021
Experience squared (100's of years)	−.0003	.004
Board certified	−.012	.017
Female	−.032	.041
Foreign medical school	*.077	.045
Osteopath	.024	.023
Group practice	.029	.018
Urbanization		
Large Standard Metropolitan Statistical Area (SMSA)	−.018	.018
Small SMSA or adjacent	.010	.023
Semirural or rural	—	—
Change in wage income of health sector personnel ($100's)	**−.028	.014
Change in physician density	.002	.060
Constant	−.038	.050
Mean of dependent variable	−.057	
R[2]	.022	
F	1.46	

***Significant at the 1-percent level.
**Significant at the 5-percent level.
*Significant at the 10-percent level.

Radiology assignment rates

The regression results for the radiology assignment regressions are shown in Table 8. As for laboratory service, there is a positive relationship between changes in the reimbursement rate for medical service and changes in the assignment rate for radiology service, significant at the 1-percent confidence level. The magnitude is such that a 1-percent change in medical reimbursement rates will esult in a .30-percent change in radiology assignment.[9] Once again, the medical reimbursement rate is the determinant of assignment; the radiology reimbursement rate has no significant effect. Thus, it again appears that changes in the reimbursement rate for medical service affect assignment rates for other services as well.

Some other variables are also statistically significant. There is a positive relationship between changes in physician density and changes in assignment, which, as explained before, appears to indicate that increased competition stimulates assignment. In addition, there is a negative relationship between changes in health personnel wages and changes in assignment, indicating once again that increased costs tend to result in decreased assignment rates. Finally, radiology

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[9]The elasticity equals 0.92.

Table 8
Regression results: Change in assignment rates for radiology service (N = 592)

Independent variables	Coefficient	Standard error
Change in reasonable charge per medical relative value unit (RVU)	***.142	.044
Change in reasonable charge per radiology RVU	−.006	.015
Specialty:		
General practice	—	—
Internal medicine	−.024	.029
General surgery	−.029	.037
Experience (10's of years)	−.034	.036
Experience squared (100's of years)	.010	.008
Board certified	−.019	.027
Female	−.016	.063
Foreign medical school	.055	.076
Osteopath	−.016	.036
Group practice	.011	.025
Urbanization		
Large Standard Metropolitan Statistical Area (SMSA)	*−.053	.029
Small SMSA or adjacent	**−.083	.038
Semirural or rural	—	—
Change in wage income of health sector personnel ($100's)	**−.059	.027
Change in physician density	**.207	.106
Constant	.073	.094
Mean of dependent variable	−.066	
R[2]	.052	
F	***2.12	

***Significant at the 1-percent level.
**Significant at the 5-percent level.
*Significant at the 10-percent level.

assignment rates for physicians in large and small Standard Metropolitan Statistical Areas (SMSA's) decreased more than rates for physicians in nonurban areas (the reference group). This result, however, may be a statistical artifact resulting from the small number of rural physicians in the sample who billed for radiology service.

Summary of results

The regression results presented have provided evidence for answering several of the questions posed earlier. Among our sample of Colorado general practitioners, internists, and general surgeons, the following has been found:

- Changes in Medicare reimbursement rates are a positive determinant of changes in physician assignment rates for medical, laboratory, and radiology services. However, these changes appear to be less important with regard to surgical service.
- Changes in assignment rates for laboratory and radiology services appear to be determined not by changes in the reimbursement rates for these services but, rather, by changes in the reimbursement rates for medical services. In effect, physicians determine not only their medical assignment rates, but also their laboratory and radiology assignment rates, according to their reimbursement rates for medical service.
- In two of the regressions (for medical and radiology services), changes in physician density were a positive determinant of changes in assignment rates. This result indicates that increased competition in the physician market tends to increase assignment rates. In addition, two regressions also found that increases in personnel wages (i.e., costs) have a negative impact on assignment.
- None of the other independent variables was statistically significant in more than one of the four regressions.
- The results are consistent with the predictions of the assignment model. The model predicted a positive relationship between changes in reimbursement and changes in assignment rates. This was found to be the case in three of four equations; in the fourth, the relationship was positive, but the estimated coefficients were not statistically significant.

Discussion

The fact that assignment rates are sensitive to Medicare reimbursement rates is not a new finding—all previous studies have found this to be the case. The results presented in this paper, however, provide additional information on how physicians are affected by reimbursement rates. Perhaps the most important finding among this sample of general practitioners, internists, and general surgeons is that assignment rates for primary (medical) service and for ancillary service (laboratory and radiology) are sensitive to changes in the reimbursement rate for medical service, but not to changes in the reimbursement rates for ancillary services. In addition, the results indicate that

surgical assignment rates are not very sensitive to changes in Medicare reimbursement.

The importance of the reimbursement rate for medical service in determining physician assignment decisions has some interesting policy implications. For example, if cuts in Medicare expenditures result in lower reimbursement rates for routine medical service such as office and hospital visits, assignment rates would be expected to drop not only for this service, but for ancillary services as well, irrespective of what changes take place in the ancillary services reimbursement rates. On the other hand, simply by increasing the reimbursement rates for medical service, Medicare assignment rates for most services would rise. Consequently, to the extent that these results would hold among other samples, the Medicare program could be successful in increasing assignment rates without increasing total physician payments. Since the findings show that assignment rates are not particularly sensitive to changes in the reimbursement rates for surgical, laboratory, and radiology services, it might be possible to lower these reimbursement rates and raise the rate for medical service, without reducing—and perhaps even increasing—overall assignment rates.

It is questionable whether Medicare should attempt this sort of fine tuning, however, because such changes may have some undesirable repercussions. In another paper (Rice, 1982), for example, the author found that reductions in surgical and laboratory reimbursement rates appeared to result in an increase in "physician-induced" demand, which increases Medicare costs. Furthermore, even if fine tuning of reimbursement rates was an effective policy in the short run, it seems unlikely that Medicare could induce physicians into raising their assignment rates in the long run without actually increasing the total revenue provided to physicians by the program.

As this study indicates, there appears to be no quick fix that the Medicare program can implement that will simultaneously increase program assignment rates and contain Medicare costs. In order to identify the most promising policy options, further research is necessary. One area of particular importance is understanding what changes in fee-for-serve financing of medical care can be enacted that will stimulate physicians to provide less costly services. In addition, research should continue on ways to implement alternatives to the fee-for-service system. Continued research in these areas will be of great help in formulating policy options for dealing with health care cost containment.

Acknowledgments

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