

Relative value scales for physicians' services

by David Juba and Jack Hadley

A key element in the construction of a physician fee schedule is the underlying relative value scale (RVS). The focus in this article is on the development and comparison of RVS's based on alternative data sources and construction methods. Results suggest that medical procedures' values are preserved across alternative charge-based RVS's. Some differences are

observed, however, when comparing procedures' values on scales derived from charges versus those derived from time data. The major conclusion is that the choice of a charge data base and method of constructing an RVS need not be a primary concern in the process of developing physicians' fee schedules.

Introduction

Over the past decade, expenditures for physicians' services in the United States grew at a rate in excess of general inflation. According to Freeland and Schendler (1984), only 57.3 percent of the growth in expenditures on physicians' services nationwide between 1972 and 1982 can be explained by general price inflation. The remainder was the result of increases in inflation-adjusted prices and increases in volume. Those large and rapid increases in expenditures resulted in much public and private concern because Government agencies, employers, and the general public found it increasingly difficult to meet the rising costs of medical care.

As a result, there is a growing interest in fee schedules as a possible tool for controlling the growth in outlays for physicians' services. Historically, the Federal Medicare program and other third-party payers reimbursed physicians under a customary-prevailing-reasonable fee approach. Reasonable levels of payment were functions of historical patterns of physicians' billings. Hence, reasonable payment levels tended to grow over time along with billings. Conversely, a fixed schedule of fees would not be subject to such automatic increases.

Among the methods for generating a fee schedule, one of the most straightforward is based on the use of a relative value scale (RVS) for physicians' services. Simply put, a relative value scale is a set of numeric values associated with an array of physicians' services; complex or otherwise important procedures have a greater scale value than simpler ones. An RVS permits cardinal ordering of procedures: Differences in ranked procedures' scale values are proportional to their "worth" along some dimension.

Although it is simple to transform an RVS to a fee schedule by multiplying scale values by dollar-per-unit conversion factors, it is important to note that they are distinct entities. The relative worth of procedures implicit in the relative value scale need not be preserved in the fee schedule. The extent to which that is the case depends on the value(s) of the conversion factor(s) that third-party payers employ to transform the RVS into a schedule of fees.

A set of relative value scales for procedures frequently sought by Medicare beneficiaries is developed and compared in this study. The objective is to assess the consistency of procedures' values across scales that were developed using difference construction methods and different data bases.

Definitions and properties

In this study, the relative value of the *i*th medical procedure is as follows:

$$RVS_i = V_i/V_n,$$

where V_i and V_n are the worth of the *i*th and numeraire (*n*th) procedures along some dimension. A property of relative value scales is that the baseline or numeraire procedure may be selected arbitrarily without affecting the rankings of procedures along the scale. Also, procedures' cardinal values on RVS's based on different numeraires will be identical up to a multiplicative constant.

Another important property of relative values is that they are insensitive to simple multiplication of the underlying scale of worth. Hence, an RVS will be unaffected by economic factors that manifest themselves via uniform multiplicative effects on the V scale. For example, general price inflation, a simple multiplier affecting all prices equally, will have no effect on relative prices. Therefore, even though price levels may increase over time, RVS's based on such levels may not. More generally, market forces that distort procedures' absolute worth may have little or no effect on RVS scores.

A fundamental task in the creation of an RVS is the identification of an appropriate dimension of worth or value. Possible dimensions include physicians' charges and practice time inputs. Other possible measures of worth depend on estimates of medical practice cost functions, the outcomes of microcosting exercises (where specific factors employed in producing medical services are identified, valued, and summed), and group decisionmaking (Hadley et al., 1983). In this study, particular charge-based, time-based, and judgment-based RVS's are compared and answers are given to the question: Are procedures' relative values sensitive to the method of scale construction or the underlying data source?

Three sources of physicians' charge data used in this study are the 1982 prevailing charge file of the Health Care Financing Administration (HCFA), the

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1974 and 1978 files of the Urban Institute (UI) on Medicare and Medicaid claims from a sample of California physicians, and the surgical prevailing charge file for 1978 of the Health Insurance Association of America (HIAA). The HCFA file contains median values of the customary fees charged by physicians in 238 areas across the country for each of 103 procedures and the corresponding adjusted and unadjusted Medicare prevailing charges. Physicians' customary fees are their median charges for a service in the calendar year immediately preceding the July-June fee screen year. The unadjusted prevailing charge for a procedure is the 75th percentile on the areawide distribution of customaries. Adjusted prevailing fees result from application of HCFA's Medicare economic index, which restricts the permissible annual rate of increase in local prevailing fees (Paringer, 1981).

Both Urban Institute files include data on sampled physicians' average billings, Medicare reimbursements, and the corresponding customary and locally prevailing fees for each of 443 procedures. The latter account for over 90 percent of all services provided to California Medicare beneficiaries in each time period. HIAA developed its surgical charge file from data provided by 22 commercial insurers for 1978.¹ Among those data were means, medians, and other points on regional distribution of surgical charges in 250 geographic areas across the country.

Also developed here is a time-based RVS from descriptive data on physicians' practices from a nationwide survey conducted by researchers at the University of Southern California (USC) between 1974 and 1978. Those researchers distributed log diaries to approximately 10,000 medical and surgical specialists (Mendenhall et al., 1978). Attention in this study is restricted to responses recorded by members of five specialties—general practice, family practice, internal medicine, general surgery, and pediatrics. Among the data collected during the survey was information on the physician-patient encounter including the amount of time physicians spent with patients, the location of the encounter, and the complexity of the procedure.

To contrast alternative RVS's, it is necessary to evaluate a common set of procedures on each scale. Unfortunately, the USC survey on physicians' time does not identify particular procedures by code number. To compensate, the available survey data were used here to assign plausible CPT-4 codes for 15 different types of visits to the physician-patient encounters.² Assigning codes for diagnostic and therapeutic procedures is more difficult because descriptions recorded on the survey instruments are much less precise than in the CPT-4 manual. As a result, only 13 nonvisit procedures along the time-based RVS were evaluated.

Finally, in this study use was made of an existing judgment-based scale developed by Mountain Medical Affiliates (MMA), a physicians' practice association in

Denver, Colo. MMA reports that committees of physicians developed that RVS by adjusting and refining the 1975 and 1976 versions of the Colorado relative value scale to better represent the complexity, training, skill, outcome, and cost associated with each procedure (Mountain Medical Affiliates, 1981).

Methods

Alternative relative value scales

To investigate the degree of correspondence among procedures' values on RVS's derived from common data sources, 12 charge-based scales from both the HCFA and 1978 Urban Institute files were developed. As reported in Table 1, the different scales correspond to different choices of representative charge per procedure. The 12 scales were developed by defining four representative points (mean, median, 75th percentile, and 90th percentile) on the distributions of 3 types of charges for each procedure. Charges include regional median customary fees; adjusted and unadjusted prevailing charges on the HCFA file; and physicians' mean billings, mean reimbursements, and customary fees on the 1978 UI file.

Relative values are ratios of each procedure's representative charge to that of a chosen numeraire. A well-defined, frequently performed procedure was selected as numeraire (brief office visit: established patient).

Also constructed were charge-based RVS's from the 1974 UI and 1978 HIAA surgical procedure files. In the former case, the 75th percentile points on samplewide distributions of physicians' mean billings per procedure serve as representative fees. The 75th percentile points on nationwide distributions of local median surgical charges serve that purpose for the HIAA data-based scale.

Four time-based RVS's were also constructed using data from the USC survey. The four are based on the mean, median, 75th and 90th percentile points on distributions of reported average time per procedure. Relative values are the ratios of representative time per procedure to that of the numeraire, limited office visit: established patient.

Analytic methods

A purpose of this study is to determine the extent to which pairs of RVS's contain the same salient information. Clearly, identical procedures' scores imply identical scales. Furthermore, the norm that a scale's information content is preserved under linear transformation is adopted here. That is, multiplying each procedure's score by a constant or adding a constant to each scale value leaves the salient information on the scale unchanged.

Under that norm, pairs of RVS's will be considered to convey identical information on medical procedures if one scale is a linear transformation of the other. The Pearson product-moment correlation coefficient (r) is a well-known measure of how well a linear model fits the data on procedures' scores on two

¹The year covered spans September 1977 through August 1978.

²The American Medical Association's Current Procedure Terminology (CPT-4), a detailed set of procedures and accompanying code numbers.

scales. For that reason, correlation analysis is the primary tool for this investigation.

It will prove useful to define the Pearson correlation coefficient between two scales X and Y as follows:

$$r = b_{yx}(s_x/s_y),$$

where b_{yx} is the slope of the least squares regression of Y on X , and s_y and s_x are the standard deviations of procedures' values on the respective scales.³

The Pearson coefficient is proportional to the slope of the least squares regression between the scales but, unlike the slope, is constrained to vary between -1.0 and 1.0 in value. That property facilitates comparison of the relationship among several pairs of scales and makes correlation analysis somewhat more useful than regression analysis for this article.

It is also informative to focus on the rankings of procedures on the alternative scales. Therefore, the study also computes Spearman rank order correlations, interpretable as the product-moment correlations between procedures' rankings on RVS's.⁴

Statistically significant Pearson and Spearman correlations close to 1.0 in value are evidence that the RVS's in question are substitutable in many empirical applications such as generating physicians' fee schedules.

³Alternative definitions of correlation coefficients and a discussion and interpretation of correlation and regression analyses is presented in Blalock (1972).

⁴Blalock (1972) provides a description of the Spearman correlation coefficient and interpretation of its meaning.

Results

Comparing scales from a common data base

Correlation analysis supports the assertion that the set of 12 RVS's based on HCFA charge data provides the same salient information on the value of medical procedures. That assertion also holds for the set of 12 RVS's based on the 1978 UI California data and, to a lesser degree, for the 4 time-based scales.

Pearson and Spearman coefficients between pairs of HCFA data-based scales were always statistically significant and in the range of 0.96 to 0.99 in value. Similarly, significant (99-percent level) correlations held between pairs of RVS's based on the UI California data. Pearson and Spearman coefficients were uniformly between 0.95 and 0.99 in those analyses. With one exception, correlations between pairs of time-based scales followed that pattern. For all but one case, correlations between procedures' values on the time-based scales ranged between 0.90 and 0.99 in value. The one exception was a Pearson correlation value of 0.81 between the RVS's based on the median and 90th percentile points on the distribution of average time per procedure.

Table 1
Description of charge-based and time-based relative value scales

Data source	Unit of observation	Charge types	Representative charge defining a scale
HCFA ¹ 1982 prevailing charge file	Charges for 103 procedures in 238 areas nationwide	Median of regional customary fees	On the nationwide distribution of regional fees mean
		Adjusted regional prevailing charge	median 75th percentile
		Unadjusted regional prevailing charge	90th percentile
Urban Institute 1974 and 1978 California claims files	Charges of sampled physicians for 443 procedures	Physician's mean billing	On samplewide distribution of charges mean
		Physician's mean reimbursement	median 75th percentile
		Physician's customary fee	90th percentile
HIAA ² 1978 surgical prevailing charge file	Charges for surgical procedures in 250 areas nationwide	Regional median charge	On the nationwide distribution of regional charges 75th percentile
University of Southern California 1978 survey	Log diaries from approximately 10,000 physicians	Mean time per procedure	On samplewide distribution of mean times mean median 75th percentile 90th percentile

¹Health Care Financing Administration.

²Health Insurance Association of America.

The foregoing results support the conclusion that the point on charge or time distributions selected as representative will not appreciably affect RVS scores. Similarly, the type of charge underlying the charge-based scales has little effect on procedures' relative values. Implicitly, any reasonably well constructed RVS will serve as representative of the class of possible scales derivable from a single source of data on charges or physicians' time input.

Comparing scales from different data bases

How similar are RVS's developed from data collected in different areas or at different points in time? To investigate that question, procedures' values on five scales are contrasted. Three are charge-based scales developed from the HCFA and the two Urban Institute California data files, the fourth is based on HIAA surgical charge information, and the fifth is the judgmental scale constructed by Mountain Medical Affiliates, Incorporated. In particular, values per procedure on the HCFA scale are 75th percentiles on nationwide distributions of regional median customary charges. On the second scale (78CAL) procedures' values are 75th percentiles of California physicians' mean billings in 1978. Replacing that data with analogous 1974 values generates the third scale (74CAL). Surgical procedures' values on the fourth scale (HIAA) are set at the 75th percentile of nationwide distributions of regional median surgical charges in 1978. Procedures' values on the five scales are normalized by expressing them relative to the representative value of the numeraire (needle puncture of bursa).

In this study, Pearson and Spearman correlation coefficients for procedures' values on pairs of scales were computed. Those are in Table 2 along with information on the number of procedures common to the scales in each pair. Because a coefficient of 1.0 indicates perfect correlation, those results indicate strong similarities in values of procedures among the five scales; the produce-moment and rank-order coefficients exceed 0.94, uniformly. A companion analysis investigated correlations among RVS values for procedures in four particular categories—medicine, surgery, radiology, and pathology. Of the 56 Pearson and Spearman coefficients in that analysis, 45 exceeded 0.90, and the remainder ranged between 0.82 and 0.89 in value. That suggests that outliers (procedures with extremely large or small RVS's) are *not* generating spuriously large correlations because high levels of correlation are observed across procedures in groups with low, middle, and high relative values on average.

As already discussed, the Pearson coefficient (r) is one measure of how well a linear model captures the inherent relationship between pairs of RVS's. However, that discussion also revealed that the coefficient is the product of two elements: the slope of the linear regression line between scales and the ratio of corresponding standard deviations of procedures' values on them. It is possible that the observed strong correla-

Table 2
Correlations among relative value scales constructed from different data bases

Data source	Pearson product moment correlations			
	MMA	HIAA ²	78CAL ³	74CAL ³
HCFA ¹	.978 (95)	.952 (21)	.998 (83)	.998 (82)
MMA	—	.972 (21)	.982 (77)	.979 (76)
HIAA	—	—	.999 (13)	.999 (13)
78CAL	—	—	—	.999 (82)

Data source	Spearman rank-order correlations			
	MMA	HIAA ²	78CAL ³	74CAL ³
HCFA ¹	.948 (95)	.978 (21)	.979 (83)	.975 (82)
MMA	—	.963 (21)	.960 (77)	.965 (76)
HIAA	—	—	.994 (13)	.996 (13)
78CAL	—	—	—	.994 (82)

¹Constructed from the 75th percentile of the distribution of median customary fees across areas.

²Constructed from the 75th percentile of the distribution of median surgical charges across areas.

³Constructed from the 75th percentile of the distribution of mean billed charges across physicians.

NOTES: Construction limited to procedures common to all 5 RVS's. All correlations are significant at the .0001 level. Numbers of observations are shown in parentheses. HCFA = 1982 prevailing charge file of the Health Care Financing Administration. MMA = judgment-based scale developed by Mountain Medical Affiliates. HIAA = surgical prevailing charge file for 1978 of the Health Insurance Association of America. 78CAL = 1978 files of Medicare and Medicaid claims from a sample of California physicians. 74CAL = 1974 files of Medicare and Medicaid claims from a sample of California physicians.

tions of Table 2 were driven more by the variability of procedures' scores on the scales (i.e., by large s_x/s_y ratios) than by a strongly linear relationship.

To investigate that possibility, ordinary least-squares regression estimates of linear relationships between the 10 pairs of scales were generated as follows:

$$Y = a + bX$$

Standard deviations of the values of procedures common to the scales in question were also computed. The estimated values of the slopes (b) and corresponding ratios of standard deviations (s_x/s_y) are in Table 3.

Those results show that the strong correlations in Table 2 are more a function of the inherent linearity between pairs of RVS's under investigation than of any gross differences in the variation of procedures' scores. All estimated slopes were significant at the 99-percent level, and they took values in the range 0.71 to 1.29. As the Pearson coefficients are the product of those values and corresponding ratios of standard deviations, the latter must necessarily fall into a relatively narrow range around 1.0. That is confirmed by the data in Table 3; computed s_x/s_y ratios range between 0.753 and 1.413 in every case. Policymakers are also interested in the estimates of the constant term (a) in the regressions. If that additive term is *not* statistically different from zero, then

the relationship between the associated RVS's is essentially multiplicative. In that case, equivalent fee schedules can be generated from either scale by using scale-specific conversion factors that are simple multiples of each other. Regression estimates of the additive constants (*a*) suggest that is the case. In 7 of 10 regressions, the estimated constant was not statistically significant even at the 90-percent confidence level. In the three cases where the constant was significant at the 90-percent level or better, the absolute magnitude of the estimate was small, less than 0.90. By comparison, mean values of procedures on the scales in question ranged between 5.5 and 10.7.

Reestimation of the 10 regression equations with the constant term suppressed confirmed the insensitivity of estimated slopes to the presence or absence of the constant. Corresponding estimates of (*b*) with and without the latter were virtually identical.

Comparing time-based and charge-based scales

Values on representative time- and charge-based relative value scales are also contrasted here. Physicians' time is but one of many inputs to the production of medical services. Consequently, it is but one element contributing to the underlying value of a particular procedure. If a strictly time-based RVS is to have validity, one must presume that the values of the other inputs are directly proportional to the value ascribed to the time input. That condition may hold for such time-intensive procedures as visits, but it may be less plausible for such capital-intensive services as radiology and pathology. On the other hand, in theory, physicians' charges are likely to be proportional to the total value of all inputs. For that reason, some procedures might be valued differently on time- and charge-based scales.

Another reason for possible differences in procedures' values on the two types of scales is the possibility that the value of a unit of time might vary across physicians. Practitioners with the greatest investment

in training, experience, or other determinants of human capital might place a higher value on their time than other physicians do—that is, they might set a higher implicit wage and charge accordingly.

To investigate the possible differences between time- and charge-based RVS's, representatives of each class are developed. The time-based scale is based on mean time per procedure as reported in the University of Southern California (USC) survey. Underlying the representative charge-based scale are mean unadjusted prevailing fees from the HCFA data file. Representative fees per procedure are expressed relative to the corresponding fee for the numeraire procedure (limited office visit: established patient).

Relative values for the 24 procedures common to both scales in the order of their rank on the time-based scale are shown in Table 4. The consistency between the rankings on the two scales is captured by the relatively high Spearman coefficient, 0.90. The corresponding 0.81 value of the Pearson coefficient suggests that there are some discrepancies between certain procedures' values on the two scales. Separating them into visits and nonvisits is informative. Subsequent correlation analysis generated a Pearson value of 0.88 between values of visits on the two scales, but it generated a value of only 0.71 between values of nonvisits.

Ratios of charge-based and time-based scale values further illuminate differences. Ratios for procedures in each of four groups (office visits, hospital visits, operations, and all others) are computed here. If the two scales are substantially the same (that is, all physicians' time valued equally and all nonphysician costs proportional to it), then ratios of scale values should be approximately identical across procedure categories. In fact, that is not the case. Mean charge-based relative values are about 6.0 times greater than mean time-based values for surgical procedures, 45 percent greater than those for hospital visits, 20 percent greater than those for office visits, and approximately equal to those for the remaining procedures.

Several factors could explain that result. Two have already been mentioned: differences across physicians in the amounts of training and skill needed to provide different types of procedures, and differences in the kinds and costs of equipment and other personnel included in physicians' charges for procedures in the groups. A third factor may be variations in insurance coverage for different classes of procedures. For example, hospital visits may be covered more often, and more fully, than office visits.

Another possibly important factor influencing charge-based relative values is differences in interphysician competition by procedure type. Looking at relative values for office and hospital visits, competition among physicians and patients' price sensitivity are probably greater for office visits than for hospital visits. Once the patient is hospitalized, the physician is much closer to being a monopoly provider. As a result of those market forces, charges for time spent providing office visits might be lower than charges for time spent providing hospital visits, even

Table 3
Estimated slope of linear relationship between pairs of relative value scales

Dependent scale Y	Explanatory scale X			
	MMA	HIAA	78CAL	74CAL
HCFA	0.86 (1.131)	0.90 (1.057)	0.72 (1.381)	0.89 (1.125)
MMA	—	1.29 (0.753)	0.89 (1.099)	1.09 (0.896)
HIAA	—	—	0.71 (1.413)	0.88 (1.129)
78CAL	—	—	—	1.23 (0.815)

NOTES: In all regressions, coefficients were significant at the 0.99-percent level or better. All unadjusted R-square values are greater than or equal to 0.96. Corresponding ratios of standard deviations are shown in parentheses. HCFA = 1982 prevailing charge file of the Health Care Financing Administration. MMA = judgment-based scale developed by Mountain Medical Affiliates. HIAA = surgical prevailing charge file for 1978 of the Health Insurance Association of America. 78CAL = 1978 files of Medicare and Medicaid claims from a sample of California physicians. 74CAL = 1974 files of Medicare and Medicaid claims from a sample of California physicians.

if the physician's other costs are higher in the office than in the hospital.

Sorting out the full effects of those factors is beyond the scope of this study. However, other data from the USC file provide information pertinent to the issue by permitting comparisons of several characteristics of office and hospital visits with similar nominal designations—brief, limited, extended, and comprehensive. The characteristics available from the log diaries were severity of illness, urgency of visit, physician's primary specialty, and an indicator of board certification of physician. (All terms used in the definition of severity and complexity are taken directly from the log diary reporting form.)

As shown in Table 5, within each nominal visit category, hospital visits compared with office visits had higher proportions of more severe and more urgent cases and were more likely to be provided by physicians with specialty training or board certification. A comparison of limited office and hospital visits (for established patients) is instructive. These two are the most frequently performed of the hospital and office visits reported in Table 5. Furthermore, the differences in their characteristics are representative of the reported differences between all pairs of hospital and office visits. The likelihood that hospital visits require more (or more sophisticated) medical treatment per episode than office visits do is reflected in the relative frequency of severe cases in each. Almost 25 percent of limited hospital visits are so categorized,

Table 4
Relative and absolute values for 24 procedures common to both the time-based and charge-based relative value scales.

Procedure (CPT-4 code)	Time-based ¹			Charge-based ²		
	Relative value	Scale rank	Absolute value	Relative value	Scale rank	Absolute value
Brief hospital visit established patient (90240)	0.68	(1.00)	8.04	0.96	(3.00)	\$15.52
Minimal office visit, established patient (90030)	0.72	(2.00)	8.61	0.51	(1.00)	8.26
Brief office visit, established patient (90040)	0.77	(3.00)	9.13	0.85	(2.00)	13.72
Brief office visit, new patient (90000)	0.85	(4.00)	10.08	1.32	(8.00)	21.34
Limited hospital visit, established patient (90250)	0.96	(5.00)	11.44	1.25	(5.00)	20.11
Limited office visit, established patient (90050)	1.00	(6.00)	11.87	1.00	(4.00)	16.10
Brief hospital visit, new patient (90200)	1.11	(7.00)	13.13	2.46	(15.00)	39.69
Chemotherapy (96030)	1.17	(8.00)	13.88	1.30	(6.00)	20.91
Limited office visit, new patient (90010)	1.23	(9.00)	14.63	1.70	(12.00)	27.38
Electrocardiogram (93000)	1.36	(10.00)	16.19	1.71	(13.00)	27.68
Extended hospital visit, established patient (90270)	1.40	(11.00)	16.67	2.12	(14.00)	34.18
Extended office visit, established patient (90070)	1.50	(12.00)	17.85	1.65	(11.00)	26.71
Brief home visit, established patient (90140)	1.52	(13.00)	18.08	1.30	(7.00)	20.92
Limited home visit, established patient (90150)	1.69	(14.00)	20.04	1.52	(9.00)	24.54
Arthrocentesis (20610)	2.03	(15.00)	24.12	1.59	(10.00)	25.62
Comprehensive office visit, new patient (90020)	2.16	(16.00)	25.68	3.14	(18.00)	50.71
Comprehensive office visit, established patient (90080)	2.27	(17.00)	26.98	2.68	(16.00)	43.25
Comprehensive hospital visit, new patient (90220)	3.14	(18.00)	37.30	3.73	(19.00)	60.18
Herniorrhaphy (49505)	3.52	(19.00)	41.82	27.2	(20.00)	439.38
Thoracentesis (32000)	3.71	(20.00)	44.11	3.08	(17.00)	49.75
Hysterectomy (58265)	4.73	(21.00)	56.13	53.3	(23.00)	861.21
Cholecystectomy (47600)	5.02	(22.00)	59.62	43.7	(22.00)	705.65
Colon resection (44140)	8.27	(23.00)	98.25	60.20	(24.00)	972.29
Heart catheterization (93527)	10.20	(24.00)	120.92	33.00	(21.00)	532.28

¹Mean time per procedure are in minutes.

²Mean Health Care Financing Administration (unindexed) prevailing charges are in dollars.

NOTES: The time-based and charge-based means for all procedures are 2.54 and 10.47, respectively. The time-based and charge-based standard deviations for all procedures are 2.37 and 17.85, respectively. The Pearson and Spearman correlations between the two scales are 0.81 and 0.90, respectively.

in contrast to only 4.3 percent of the limited office visits (Table 5). Furthermore, physicians judged 82.5 percent of the hospital visits to require same-day treatment; the corresponding figure for office visits was only 53.4 percent.

Even if hospital and office visits were of the same urgency and severity, and even if they consumed equal amounts of physicians' time, their relative values might differ as a result of differences in the training or skill levels of the attending physician. Of the providers performing limited hospital visits, 28.4 percent were board-certified in contrast to the 12.1 percent of the physicians performing the limited office visits. Also, proportionately fewer general practitioners were among the physicians performing hospital (in contrast to office) visits. From a normative perspective, if one permits physicians' charges to vary directly with case complexity or with differences in training costs, then at least some of the differences in the ratios of charge-based to time-based relative values may be appropriate.

Discussion and policy implications

This study examined alternative methods of constructing relative value scales for physicians' services. Its results suggest that relative value scales constructed from charge data are quite robust with respect to the source of the data and the method of construction. The study also contrasted time-based and charge-based scales. The correlation between them was not as high as in comparisons of charge-based scales.

There are at least two possible reasons for those findings. First, averaged observed physicians' time per procedure may not sufficiently capture variations in the value of different physicians' time or the cost of complementary inputs to the production of medical care. Second, comparison of characteristics of office and hospital visits showed the latter to be more difficult, more urgent, and more likely to be provided by specialists. Thus, both theory and evidence suggest that relative values derived from charge data might be better indicators of the myriad factors that influence procedures' values than are relative values derived solely from time inputs.

Developing a relative value scale is important, because it is a key element in the construction of a physician's fee schedule, although the RVS is not identical to such a schedule. This research contributes to the debate about the possibility of implementing a Medicare fee schedule for physicians' services by suggesting that the issues of how to construct an RVS

and whether different scales are needed for different purposes need not be priority considerations.

If the RVS is accepted as given, then two other issues dominate the debate. One is the question of the absolute levels of fees to be established under the schedule. This is essentially a physicians' earnings versus insurers' cost issue, because relative fees would remain the same for any dollar-per-unit conversion factor. The second issue is the use of multiple factors to transform relative values into relative fees. This is a more complex issue, having both equity and efficiency aspects. On equity grounds, one could argue that different conversion factors should be used because of real differences in practice costs across regions or specialties. Differential rewards or penalties should not be imposed on physicians because of factors largely outside the implicit benefit-cost calculations that should be influenced by a fee schedule. The efficiency argument for different conversion factors is that some procedures are either over- or under-provided and relative fees need to be manipulated to correct such distortions. For example, if preventive or so-called cognitive services lead to better health outcomes (at equal or lower cost) than therapeutic or noncognitive services, then procedures in the former categories should have larger multipliers than those in the latter.

The other side of the coin in this debate concerns physicians' likely responses to variations in relative fees. Empirical studies have shown that physicians might be influenced by relative fees when deciding whether or not to treat Medicaid recipients, or to accept assignment of Medicare patients (Hadley, 1979; Sloan et al., 1978; and Paringer 1980). Other studies suggest that physicians' location decisions are influenced by income opportunities which, presumably, are affected by regional fee differences (Hadley, 1980 and 1982). The evidence regarding the impact of fees and incomes on specialty choices is that there is, at best, a small influence, although there has been relatively little work in that area (Hadley, 1980; Lee, 1980; and Fruen et al., 1980). Finally, no research on the impact of relative fees on physicians' choices of medical procedures was uncovered in this study.

Constructing relative fee schedules that differ from the underlying relative value scale in order to influence physicians' behavior probably requires more research on how physicians respond to relative fees. In the short run, however, pressures to reduce spending for physicians' services and the rate of inflation of physicians' fees may lead to the adoption of fee schedules as cost cutting measures.

Table 5

Number of office and hospital visits and percent distribution, by procedure characteristic and physician specialty

Procedure	Number of encounters	Severity ¹			Urgency ³			Primary specialty of physician ⁴				Percent of physicians board certified
		None or minor ²	Moderate ²	Severe ²	None or deferrable	Same day	Sooner or emergency	Family or general practice	General surgery	Internal medicine	Pediatrics	
All visits	80,418	50.4	39.2	10.2	38.3	Percent distribution 55.8		41.0	6.5	23.5	25.4	14.5
Brief office visit, established patient (90040)	26,843	73.5	24.0	2.2	49.1	48.2	2.3	52.1	5.7	15.6	23.9	9.1
Brief hospital visit, new patient (90200)	3,949	38.1	46.6	14.9	19.6	71.0	8.4	23.2	12.8	33.9	24.9	19.2
Limited office visit, established patient (90050)	29,736	53.2	42.4	4.3	42.6	53.4	3.5	38.8	3.5	19.2	35.7	12.1
Limited hospital visit, established patient (90250)	7,905	19.3	56.1	24.6	12.3	82.5	4.7	28.7	13.0	41.3	12.0	28.4
Extended office visit, established patient (90070)	3,595	19.8	61.1	18.8	39.0	53.0	7.2	43.5	6.2	31.4	12.8	20.5
Extended hospital visit, established patient (90270)	4,571	4.9	52.2	42.8	9.3	72.1	18.1	33.3	15.1	37.5	8.5	20.8
Comprehensive office visit, new patient (90020)	1,485	36.7	48.1	14.7	45.8	33.3	20.4	35.2	8.2	29.4	20.4	16.3
Comprehensive office visit, established patient (90080)	1,246	29.1	44.5	26.2	48.7	41.7	8.3	31.8	2.8	47.6	12.9	33.5
Comprehensive hospital visit, new patient (90220)	1,088	8.1	30.3	61.3	8.1	46.5	45.2	18.8	6.3	50.9	14.3	26.7

¹Percent distribution of encounters in each procedure by severity.

²Combines acute and chronic conditions.

³Percent distribution of encounters in each procedure by urgency.

⁴Percent distribution of primary specialties of physicians providing encounters.

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