A comparison of hospital outpatient departments and private practice

by Joanna Lion, Alan Malbon, Mary G. Henderson, and Robert H. Friedman

This article addresses cost differences between primary care physicians in private practice and hospital outpatient departments (OPD's). The analysis utilizes ambulatory visit groups (AVG's), the outpatient equivalent of diagnosis-related groups (DRG's), to adjust for case mix. Major findings are that OPD's have higher per visit costs than physicians' private offices; internists are more expensive than general practitioners regardless of site; and ancillary service costs are actually slightly higher in private practice. Any prospective payment system for ambulatory care must consider these costs differences.

Introduction

This article examines the reasons for the higher cost of outpatient department (OPD) care compared with the cost of care delivered by physicians in private practice. It attempts to quantify these differences by diagnosis, specialty of physician seen, level of physician training, ancillary services ordered, and size of the site where care is delivered. A first attempt is also made to examine the use of ambulatory visit groups (AVG's) as a measure of costs related to diagnostic mix.

The cost difference between visits to OPD's and private physicians is an issue of policy importance. Hospital OPD reimbursement accounts for about $2 billion for Medicare and another $1 billion for Medicaid (Schieber, 1983). Although these expenditures are small compared with the overall Medicare and Medicaid budgets, they are escalating more rapidly than other portions of the budgets. When payments to physicians in private practice were included, reimbursement for all ambulatory care approached $5 billion for Medicare and about $2.8 billion for Medicaid in fiscal year 1983. Reimbursement rates have, until now, been determined without reference to a unified payment plan and with little knowledge of the actual costs involved or the relationship of cost to diagnosis or setting. These rates affect more than 600 million visits a year to private physicians, OPD's, and other ambulatory sites (Rosenblatt et al., 1983).

Our approach in this article is to aggregate data from a variety of secondary data sources to determine the contribution of specific variables to the overall cost differential for an ambulatory visit. The first section consists of background data that have already been reported elsewhere. This is followed by a comparison of ancillary cost data for private practice with those for OPD's, and similar data for internists compared with general practitioners, both reported here for the first time. Finally, a method of standardizing for diagnosis is developed and the entire model is presented. The model is applied both to a particular diagnosis—hypertension—and to the three specific ambulatory visit groups (AVG's) for hypertension. Using this model, we examine the impact of four variables upon cost. These are physician specialty, whether the physician is a resident or a more senior physician, size of the OPD, and size of the private physician's practice setting.

This research was supported by the Robert Wood Johnson Foundation, Grant No. 5180 and by the Health Care Financing Administration, Grants No. 18P-97905 and 18P-98300.

Reprint requests: Joanna Lion, Florence Heller Graduate School, Brandeis University, Waltham, MA 02254

Background

Using generally accepted accounting practices, costs measured in a hospital OPD are considerably higher for the same service than those found in a physician's private office. Reimbursement rates show an even greater disparity, ranging up to three times as high in an OPD. This is because, in most places, payment to hospital OPD's is based on their actual accounting costs; physicians are paid on a fee-schedule basis that is subjected to periodic limitations.

A number of reasons have been suggested for the cost differences between hospital OPD's and private practice. In general, three major areas have been assumed to account for the differences. These are patient characteristics, the location of ambulatory care services in a hospital, and the practice patterns of the physician providing the care. Most of the data have been anecdotal or have been based on only a few hospitals. Each of these areas is briefly summarized here.

Patient-centered explanations include a case mix of reputedly sicker patients in the OPD and more psychosocial and economic problems among OPD patients, leading to more intense resource use. Actually, medical case mix appears to be only slightly more complex in hospital OPD's than in private physician offices, at least for primary care (Lion, 1981; and Lion and Altman, 1982). Although medical case-mix differences do not appear to be extreme, patients with social problems have consistently been shown to be more prevalent in hospital OPD's than in private practice (Cugliani, 1978; and Dutton, 1979). These patients, however, use only slightly more physician time than those without social problems (Lion and Williams, 1983). When all direct provider time—including nurse practitioners, social workers, and interpreters—is factored in, and adjustments made for the differences in value of senior physician time and

resident time, this differential grows to about 25 percent overall. Taken as a whole, the findings on medical and social case mix indicate that only a relatively small proportion of the additional cost per visit for an OPD can be laid at the doorstep of more complicated case mix, at least for those clinics in the OPD that provide primary care.

Another cause of the differential that is usually mentioned is the costs associated with the setting. Previous research has indicated that per-visit costs are considerably higher in hospital OPD's than in private fee-for-service groups. Using 1980 cost data, the hospital OPD per-visit nonphysician cost averaged $36.92 and the group practice nonphysician cost averaged $22.17, a difference of 67 percent. However, most of the difference found was not attributable to overhead costs, but to higher direct salary costs in the OPD (Henderson and Hannon, 1983). Similar findings were later reported by a second research group using an entirely different, specifically collected data set (Miller, 1983).

Practice patterns between the two sites have received relatively little attention. Gold (1979) found no significant differences in test-ordering behavior between physicians in free-standing clinics and in hospital OPD's. Her data, however, are limited in their generalizability because both settings were within a health maintenance organization.

Current findings

The findings reported in this section come from an analysis of various secondary data sources. Each source will be briefly described as it is used in the data analysis.

Cost of ancillary services

The data for ancillary service use come from a data set developed at the University of Southern California by Robert Mendenhall. These data were patterned after the National Ambulatory Medical Care Survey (NAMCS). NAMCS is a periodic survey of the sociodemographic characteristics and resource use of patients seen by physicians in private practice (National Center for Health Statistics, 1982). The USC-Mendenhall data set includes visits to hospital OPD's, "clinics," and emergency rooms as well as to private practice. Visits to 24 specialties, sampled from American Medical Association tapes, were collected in 1977-79. This data set has been extensively described previously (Aiken et al., 1981; and Mendenhall et al., 1978a and 1978b) and some of its limitations for the purpose of case-mix analysis have previously been discussed (Lion and Altman, 1982).

For producing these current findings, we have limited our analysis to the four primary care specialties—general practice, family practice, internal medicine, and pediatrics—and have eliminated all visits to the emergency room. The data on ancillary service mix shown here, therefore, cannot be generalized to all specialties and all hospital-based clinics. Primary care specialties constitute slightly more than one-half (56 percent) of weighted OPD visits for the 24 specialties surveyed by USC-Mendenhall. For primary care, the data analysis appears to be comparable across sites.

The original hypothesis was that more ancillary services would be used in hospital OPD's than in private practice. This could occur in two ways: physicians in OPD's could actually be ordering the same tests on more of their patients or they could be ordering more elaborate (and thus more expensive) tests for a similar percentage of patients. The hypothesis was that both of these would occur. In actuality, however, neither occurred; no significant differences were found.

To reach this conclusion, relative value units (RVU's) were attached to all ancillary services collected by USC-Mendenhall and were summed by converting to 1980 dollars for pathology, radiology, medical procedures, and surgical procedures. This method of standardizing attributes the same cost to the same test done in different settings. Differences in costs, therefore, can be attributed to more or different tests being ordered by a particular type of practitioner in a particular setting.[1]

The procedure uses 1974 California Relative Value Units (CRVU's) applied to 1980 Medicare reasonable and customary charges for California. This procedure has been discussed in detail elsewhere (Friedman, 1982). Because it was necessary to apply considerable medical judgment in adapting the somewhat vague USC-Mendenhall ancillary service categories to the very precise CRVU's, the results must be considered less than totally precise.

For three of the four primary care specialties, physicians in private practice were ordering more tests for their unadjusted case mix than were hospital-based physicians. Moreover, when adjusted for case mix, private practitioners appeared to be slightly overordering when compared with OPD physicians, for all four specialties. These differences were not large, however.

These differences go against anecdotal evidence because they are obscured when charges or reimbursement for tests, rather than RVU's, are examined. This is because the same policies that apply to reimbursement for a visit are in effect: hospitals are usually reimbursed on a cost basis and private physicians are paid a reasonable and customary charge. Thus, under present reimbursement methods, hospital OPD's are paid more to perform the same test and therefore appear to be more expensive.

Differences by specialty

Table 1 presents the findings for all four specialties under consideration before adjusting for medical case mix. In general, physicians in private practice, regardless of specialty, order slightly more RVU's worth of tests than their hospital-based counterparts. Private practitioners in adult primary care appear to be order-

[1]The cost of prescriptions is excluded from the analysis, because insufficient data were available.

Table 1
Mean actual value of all diagnostic and therapeutic procedures, by specialty and type of practice

Specialty and type of practice	Mean dollar value[1]		Percent of visits with tests	Number of visits
	All visits	All visits with tests		
Internal medicine				
Private practice	$30.92	[2]$57.68	53.6	15,366
Salaried hospital staff	30.32	54.63	55.5	966
Residents	29.75	[2]49.11	60.6	903
Pediatrics				
Private practice	6.50	[3]20.88	31.1	16,687
Salaried hospital staff	7.15	[3]25.73	27.8	1,187
Residents	6.47	23.87	27.1	871
Family practice				
Private practice	15.34	[3]40.86	37.5	17,714
Salaried hospital staff	11.67	[3]31.11	37.5	2,141
Residents	14.36	41.40	34.7	1,482
General practice				
Private practice	15.32	[3]40.98	37.4	12,055
Salaried hospital staff	12.38	[3]31.15	39.7	997
Residents	14.35	35.35	40.6	712

[1]California Relative Value Units (CRVU's) converted to 1980 dollars. Four separate CRVU conversions representing medical, surgical, radiological, and pathological procedures were used and the dollar values summed to produce the mean actual value.
[2]Difference significant at the .05 level for private practice compared with residents.
[3]Difference significant at the .05 level for private practice compared with salaried hospital staff.

ing tests on slightly fewer of their patients, but to be ordering a more expensive battery of tests when they do order them. Some of the differences are significant because of the large number of cases, but none of them are substantial.[2]

It is striking that internists order or perform tests worth about twice as much per patient visit when compared with physicians in family practice and general practice. Internal medicine residents order about 2½ times the tests ordered by residents in family and general practice. The differences result from internists ordering tests for more of their patients and ordering more expensive tests. Pediatricians have by far the lowest ancillary costs per visit, probably because they treat a considerably healthier population.

Differences by case mix

The previous section of this article reported ancillary service costs by specialty and site of practice without consideration of case mix. This section presents the findings for ancillary service use with an adjustment for medical case mix using the AVG's that were developed at Yale. These are the same AVG's as those used by Lion and Altman when they reported their findings of a 5 to 15 percent medical case-mix difference between OPD's and private physicians. The 154 AVG's have been described extensively in an unpublished document (Fetter, 1980), and have also been used to compare case-mix differences between general practitioners and internists, between private practitioners and those who are hospital based, and between old and young patients (Lion et al., 1984). They are similar in technique and structure to the derivation of diagnosis-related groups (DRG's) for inpatient care.

Although the AVG's were developed by using physician time as the dependent variable, this particular analysis uses a dependent variable based on the value of tests. A substantial positive correlation has been shown to exist between physician time and cost of tests; that is, the visits that take longer also employ more tests, on average (Lion et al., 1984). Even though using a methodology developed upon one dependent variable to analyze differences based upon another is less than ideal, it should be remembered that this is the same technique that was used in developing and refining DRG's. In that case, inpatient groups were developed based on length of stay and were then refined based on charges for the stay. These charges were later adjusted by the cost-to-charge ratio for each hospital to produce "costs."

Column 1 (Table 2) shows the mean value of tests actually ordered by physicians in each specialty at the different sites, and column 3 shows the mean value of tests for the specialty regardless of site. Column 2 presents the expected value of tests that physicians would be expected to perform based on the case mix they actually saw. Thus, a higher value in this column indicates that the physician group (e.g., privately practicing internists) saw a population of patients that fell into AVG's requiring more expensive tests. If a group's actual value is less than the expected value, the group is treating its patients with less expensive

[2]The data report all cases. Trimming the data to exclude outliers, defined as visits with a value of $200 or more in any test category, does not improve the significance of the differences.

Table 2
Mean expected value of all diagnostic and therapeutic procedures, adjusted for case mix, by specialty and type of practice

Specialty and type of practice	Mean actual value	Mean expected value[1]	Mean for specialty	Relative case mix complexity[2]	Relative resource intensity[3]
Internal medicine					
Private practice	$30.92	$30.51	$30.82	1.00	1.00
Salaried hospital staff	30.32	32.01	30.82	1.05	0.93
Residents	29.75	34.79	30.82	1.14	0.84
Pediatrics					
Private practice	6.50	6.46	6.54	1.00	1.00
Salaried hospital staff	7.15	7.20	6.54	1.11	0.99
Residents	6.47	7.14	6.54	1.11	0.90
Family practice					
Private practice	15.34	15.01	14.90	1.00	1.00
Salaried hospital staff	11.67	14.43	14.90	0.96	0.79
Residents	14.36	14.30	14.90	0.95	0.98
General practice					
Private practice	15.32	15.22	15.06	1.00	1.00
Salaried hospital staff	12.38	14.02	15.06	0.92	0.88
Residents	14.35	13.74	15.06	0.90	1.04

[1]Adjusted for case mix using the model in Technical Note Table A.
[2]Calculated by dividing the expected mean value by the mean for the specialty. This is then standardized with the private practitioner's value set at 1.00. A higher value indicates a more complex case mix.
[3]Calculated by dividing the actual value by the expected value. This is standardized with the private practitioner's value set at 1.00. A lower value indicates a lower intensity of resources used.

tests than would have been expected based on its case mix. Conversely, an actual value that is greater than the expected value indicates that the group treated patients with a more expensive regimen of tests than would be expected.

Using a similar method with physician time as the dependent variable, Lion and Altman (1982) found that hospital-based internists were treating a case mix that required from 5 to 15 percent more physician time when compared with all internists' visits. Using the RVU's of tests as a dependent variable, instead of time, replicates this result for internists almost exactly.

In this study, hospital-based internists are seeing a case mix that requires 5 to 14 percent more tests than the case mix seen by internists in private practice. This is shown by case-mix complexity (column 4) in Table 2 (a higher value indicates a relatively more complex case mix, based on value of tests performed as adjusted for case mix). This approximate result holds for pediatricians as well. The case mix seen by family practitioners and general practitioners in hospital settings, however, appears to be less complex than that seen by these specialists in private practice.

Another rather surprising finding with strong policy implications is that private practitioners are consistently more resource intensive than OPD-based physicians, across all four specialties. In other words, hospital-based practitioners are actually ordering and performing up to 21 percent fewer tests than would be expected, given their case mix. This is shown by the relative resource intensity column in Table 2. A lower value in column 5 indicates that fewer resources were used in diagnosing and treating patients, after adjustment for case mix.

Although the trend for private practitioners in over-ordering relative to hospital-based practitioners is consistent, the least resource-intensive, hospital-based physicians appear to be the residents when comparing internists and pediatricians, and the salaried staff physicians when comparing family practice and general practice. Previous evidence in much more restrictive settings compared hospital OPD's and free-standing clinics and found virtually no differences in test use (Gold, 1979; and Gorry, 1978). These studies, however, used specific diagnoses rather than attempting to adjust across the whole range of diagnoses. In any case, it seems probable that free-standing clinic physicians perform much more like OPD physicians than like private physicians in their test-ordering behavior (Pauly, 1981).

Although the raw data show that private practitioners order more tests than their OPD counterparts, the original small differences are much more pronounced after adjustment for case mix. In other words, the use of more sophisticated analytic techniques such as AVG's reinforces and enhances the findings of more simplistic techniques. Although both sets of findings contradict anecdotal evidence, it should be remembered that this study examines ancillary use units of consumption, rather than "costs" derived by using accounting methods.

Differences by diagnosis

Costs of diagnostic and therapeutic procedures vary, of course, by diagnosis. Diabetics, for example, would be expected to have more laboratory tests than would hypertensives. Even with a data set as large as USC-Mendenhall, however, it is not possible to examine more than a few leading diagnoses because cell size dwindles quite rapidly and even fairly large-appearing differences may not be significant.

Table 3 compares general practice with internal medicine in the percent of visits in which tests were ordered or performed for four leading diagnoses—hypertension, diabetes, neuroses, and upper respiratory infections.

A few important points to emerge from this table are:

- General practitioners are much less likely to order a test for a given diagnosis than are internists.
- Diabetics are much more apt to receive a test during a given visit than are patients with the other three diagnoses. This varies greatly by specialty and type of practice, however, ranging from 41 percent of visits to salaried general practitioners to 95 percent of visits to general practice residents.
- Private practitioners order tests on fewer of their patients than do hospital-based physicians. An explanation of the slight cost difference previously found is that they order more expensive versions of tests; for example, a blood chemistry instead of a complete blood count.

The percentages in Table 3 appear to have considerable validity when compared with those obtained by the National Ambulatory Medical Care Survey (NAMCS). It must be kept in mind that test data for NAMCS are not reported by specialty, but for all specialties combined. On a diagnosis-specific basis, USC-Mendenhall is slightly lower for percent of patients with a specific diagnosis having a test performed at time of visit (Table 4). Only neurosis shows higher percents of patients with procedures ordered or performed in the USC-Mendenhall data set. This is because psychiatrists, who rarely order laboratory tests or X-rays, are included in NAMCS, but not in this article's analysis of USC-Mendenhall. For all diagnoses combined, use of X-rays is almost identical for the two data sets and use of laboratory tests somewhat higher in USC-Mendenhall. This comparison with NAMCS is highly encouraging with regard to the integrity and generalizable nature of the USC-Mendenhall data set.

Table 3
Percent of visits with a diagnostic or therapeutic procedure for four leading diagnoses, by specialty and type of practice

Diagnosis and type of practice	Percent with a procedure		Total number of visits	
	General practice	Internal medicine	General practice	Internal medicine
Private practice				
All diagnoses	37.4	***53.6	12,055	15,366
Hypertension	19.7	***36.2	806	1,930
Diabetes	56.1	***80.8	392	1,808
Neuroses	24.8	**41.3	423	787
Upper respiratory infection	31.6	38.7	763	630
Salaried staff physicians				
All diagnoses	39.7	***55.5	997	966
Hypertension	44.4	***28.6	81	126
Diabetes	95.1	*80.0	43	65
Neuroses	42.2	39.0	45	41
Upper respiratory infection	17.9	***41.2	95	68
Residents				
All diagnoses	40.6	**60.6	712	903
Hypertension	33.9	49.5	59	103
Diabetes	41.0	**79.7	100	64
Neuroses	([1])	**35.5	44	48
Upper respiratory infection	32.8	*44.4	67	36

[1]Less than five cases with tests in this diagnostic category.

NOTE: Differences between general practice and internal medicine are significant at the following levels: * = .05; ** = .01; *** = .001.

Table 4
Comparison of data from National Ambulatory Medical Care Survey (NAMCS) with data from USC-Mendenhall on percent of tests for specific diagnoses

Diagnosis and type of test	NAMCS—all private practitioners[1]	USC-Mendenhall private practitioners[2]			
		All primary practitioners	Internal medicine	General practice	Family practice
		Percent of tests			
Hypertension					
Lab test	22.7	19.0	30.5	16.0	16.6
X-ray	5.1	5.2	13.6	3.2	2.3
Diabetes					
Lab test	69.0	58.5	78.3	53.8	51.9
X-ray	4.5	2.8	13.6	0.3	1.2
Neurosis					
Lab test	8.6	19.6	31.8	16.6	16.0
X-ray	3.1	6.5	22.0	2.4	4.7
Upper respiratory infection					
Lab test	25.3	20.9	29.5	18.5	20.6
X-ray	3.6	3.0	8.0	1.8	1.5
All diagnoses					
Lab test	23.2	30.0	41.3	28.6	16.0
X-ray	8.2	8.3	20.1	5.3	5.6

[1]NAMCS is sampled proportionately to physicians in private practice throughout the U.S. Of these, 41.3 percent are general or family practitioners and 10.9 percent are internists.
[2]Mendenhall is similarly sampled, but the other 47.8 percent of subspecialists who may treat these diagnoses is not part of this analysis. The three practitioner sets have been combined and weighted appropriately to estimate the number of primary practitioners. Each visit to a general practitioner (GP) in private practice in this set represents visits to 130.91 GP's, to a family practitioner (FP), 17.37, and to an internist 36.96. General and family practitioners thus comprise 80.0 percent of the USC-Mendenhall weighted sample and internists 20.0, almost exactly their weighting in NAMCS if other practitioners could be included in the USC-Mendenhall analysis.

SOURCE: Adapted from National Center for Health Statistics, 1982.

Table 5
Per visit dollar value of diagnostic or therapeutic procedures for four leading diagnoses, by specialty and type of practice

Diagnosis and type of practice	General practice	Internal medicine
Private practice		
All diagnoses	$15.32	$30.92
Hypertension	6.33	23.39
Diabetes	15.83	35.29
Neuroses	6.45	31.12
Upper respiratory infection	4.96	9.22
Salaried staff physicians		
All diagnoses	12.38	30.32
Hypertension	14.84	17.80
Diabetes	31.06	37.69
Neuroses	10.12	20.21
Upper respiratory infection	3.03	10.99
Residents		
All diagnoses	14.34	29.75
Hypertension	5.54	34.84
Diabetes	9.44	27.16
Neuroses	(1)	25.64
Upper respiratory infection	4.90	8.65

[1]Less than five cases with tests in this diagnostic category.

Table 5 shows the actual costs of tests on a diagnosis-specific basis for general practice compared with internal medicine. These comparisons show one finding of striking policy importance and one equivocal finding. Of great importance to those setting third-party reimbursement rates is the finding that general practitioners order tests that cost much less for the same diagnosis than those ordered by internists. This difference is nearly fourfold for hypertension and three times as much for diabetes.

The finding that is more difficult to understand or explain is that, although private practitioners order slightly more expensive tests than do hospital-based physicians overall, this cannot be borne out by examining the four diagnoses we have chosen. Private practitioners are, in fact, the highest for only two of the most common diagnoses—neuroses for internal medicine and upper respiratory infection for general practice. Logically, the less common diagnoses have more expensive tests in private practice than they do in OPD's, but further examination of this hypothesis is beyond the scope of this article.

Ambulatory visit groups

Another way of analyzing the cost of ancillary services by diagnosis is to use the individual AVG's developed at Yale. This classification scheme controls

for such factors as whether the visit is for a new or returning patient and for a new or previously confirmed diagnosis. Holding diagnosis constant, new patients and returning patients with a new diagnosis would be expected to use more tests than returning patients with a previously confirmed diagnosis. The autogrouping technique that created the AVG's expresses this concept when it splits on these variables as well as on major diagnostic category and other diagnosis-related variables.[3] Although this approach to reimbursement needs much more extensive work before its feasibility is known, preliminary data are presented here.

Of the leading diagnoses, only essential hypertension falls into a few specific AVG's. Diabetes, neuroses, and upper respiratory infections fall into many AVG's, usually giving cell sizes too small to permit analysis. This is because major diagnostic categories, the current starting point of AVG's, are not synonymous with diagnoses. Diabetes, for example, is autogrouped with other diseases of the endocrine and metabolic system so that the resulting AVG's, when not too small, are too vague, containing other diagnoses as well.

Table 6 indicates the distribution of visits for the three hypertension AVG's. These AVG's capture 97 percent of the hypertensives seen by both internists and general practitioners (GP's). The majority of the visits for both groups are from previously diagnosed hypertensives returning to a known practitioner. Of the newly diagnosed hypertensives, a minority are new patients; most are already known to the practitioner and have had the problem detected on a routine visit.

[3]Of the 154 AVG's, 27 are formed by a split that involves chief complaint. Focus and etiology variables available in the USC-Mendenhall data set can be used to produce chief complaints or presenting problems equivalent to those that split 16 AVG's. This leaves 11 AVG's (about 7 percent of the total) that are missing from the final analysis.

Table 6
Distribution of visits for hypertension among ambulatory visit groups (AVG's), by specialty

AVG number	AVG descriptions	Number of visits: Internists	Number of visits: General practitioners
AVG 42	A primary diagnosis of hypertension in a new patient who was not referred.	142	50
AVG 48	A primary diagnosis of hypertension in a returning patient for a previous diagnosis.	1,543	641
AVG 55	A primary diagnosis of hypertension in a returning patient with a new problem.	418	230
Total visits for hypertension		2,103	921

Of considerable interest is how internists and GP's order tests and therapeutic procedures for hypertensive patients. Table 7 indicates that, as expected, internists are considerably more expensive than GP's in treating the same diagnosis. This difference is as high as twelvefold ($64.72 versus $5.51) in the case of the cost of ancillary services for a patient new to the physician. Internists also spend more time with hypertensives in all three of these AVG's than do general practitioners.

This issue is of great policy importance. Clearly, an AVG that disaggregates a specific diagnosis into a more homogeneous unit is a better measure of diagnostic complexity than the simple diagnosis itself. This is probably not true, however, for AVG's that combine diagnoses. This criticism of the AVG concept has, in fact, been specifically made by Mitchell and Cromwell (1982).

Table 7
Mean minutes of physician time and mean dollar values for ancillary services for visits for hypertension in three ambulatory visit groups (AVG's), by specialty and type of practice

Specialty and type of practice	AVG 42: Physician minutes	AVG 42: Test costs	AVG 48: Physician minutes	AVG 48: Test costs	AVG 55: Physician minutes	AVG 55: Test costs
Private practitioners						
Internal medicine	29.5	$64.72	14.3	$18.83	19.0	$24.31
General practice	12.0	5.51	9.8	5.33	11.0	7.90
Salaried staff physicians						
Internal medicine	33.0	24.73	17.1	20.94	17.5	9.45
General practice	(1)	(1)	16.7	13.93	10.3	12.96
Residents						
Internal medicine	39.2	93.60	16.6	19.61	12.2	10.67
General practice	21.7	(1)	11.3	6.07	7.5	2.00

[1]Fewer than 10 cases.

Cost of physician time

Previous portions of this article have indicated that the cost of ancillary services varies for visits with the same diagnosis, depending upon the specialty of the physician as well as upon whether the physician is in private practice or is based in a hospital OPD. It had previously been found that the time a physician takes to see a patient (with the same diagnosis) varies by specialty as well as by site of practice (Lion and Altman, 1982). If physician time were to be quantified as a monetary variable, it could be added to the value of tests to give a site-specific figure that would approximate cost. This estimate excludes overhead and could be identified as the physician direct cost of the visit.

To quantify the value of physician time, the number of hours per week the physician spends on direct patient care, and the amount the physician earns from direct patient care are required.

Table 8 shows 1980 net incomes for the specialties by site of practice, along with the net cost of the physician's time per minute. The data are derived from a variety of sources and are not exactly comparable. Sources are shown at the bottom of the table. The value of a minute of time should be taken as an approximation rather than as an exact amount.

Physicians are assumed to earn their net incomes during the time they are actually seeing patients or performing other direct, patient-care duties. Private practitioners provide direct patient care 91 percent of the time compared with 65 percent of the time for salaried staff practitioners and 79 percent for residents. Because of this, the value of a minute of salaried staff physician time is considerably higher than if a straightline method had been used.

Physician direct costs by diagnosis

This section combines the work of the previous sections to apply values to visits for specific diagnoses. For simplification, only two specialties (internal medicine and general practice) and two diagnoses (hypertension and upper respiratory infections) are used. Table 9 builds on the previous tables to produce physician direct costs. It can immediately be noted that general practitioners not only have a lower value for a minute of time and order a less expensive set of tests than do internists, but they also see their patients for a shorter period of time.

Model for estimated total costs

The cost data for physicians in private practice used in this section come from a 1981 survey of 122 private group practices located throughout the country. These practices were members of the Medical Group Management Association, and they had a minimum of three full-time equivalent physicians and a mean of 24 physicians. For purposes of this model, the groups were divided into three sizes and the smallest and largest groups were compared.

The cost data for hospital OPD's come from 106 short-term general hospitals in California that reported to the California Health Facilities Commission, using uniform accounting and reporting principles. For purposes of this model, a small hospital OPD is defined as being a hospital with fewer than 130 beds; a large hospital with an OPD has at least 300 beds.

Limitations of the model

There are, of course, a number of limitations to this model; some of them because of its nature and others because of the lack of available data. In particular, the visit minutes and type of test data come from one source, USC-Mendenhall. The cost of visit data come from a variety of other sources (American Medical Association, *Medical Economics* and Council on Teaching Hospitals). The cost of test data come from yet another source (*Medicare Directory of Prevailing Charges for California*), and the facility portion of the charges from two entirely different sources (the Medical Group Management Association for the private physician groups and the California Health Facilities Commission for the hospital OPD groups).

Although all of these sources were matched as closely as possible, for example, by inflation-adjusting all costs to fiscal year 1980 figures, the possibility of attributing spurious precision to our results is strong.

An additional difficulty is that it is impossible to segregate primary care visits from other visits in either data base. Thus, because visits to tertiary specialists are assumed to cost more, facility costs are probably overstated for both private practice groups and hospital OPD's. This is a problem only if the percent of visits to primary care practitioners is substantially different in private practice when compared with hospital OPD's. This percent could not be determined for either data base, however, nor is it available for OPD's for the country as a whole. Even while arguing that small differences in the model should be disregarded, the magnitude of most of the differences is so great that we believe we have provided a basis for thoughtful comparison for what would be involved if outpatient care were to be reimbursed by third-party payers on a diagnostic-specific basis. With these caveats in mind, Table 10 produces estimated costs for a visit for hypertension to a physician in private practice in a small group compared with a large group, and for salaried staff physicians and residents in the OPD's of small and large hospitals.

A policy-relevant omission from the model is the differential in net earnings between board-certified and nonboard-certified internists. Although the potential existed to obtain these data from both USC-Mendenhall and *Medical Economics*, it seemed more than the model could comfortably accommodate at this point. If the model were to be further refined, however, this might be included, along with its other two omissions: the cost of prescription drugs and the overhead costs that make hospital-generated laboratory tests more expensive than those generated by a physician's laboratory.

Cost of a visit

Table 11 indicates the hierarchy of costs that would be incurred in treating hypertension in different settings. There is almost a threefold difference between the lowest and the highest cost visit. Specialty, site, and size of the site all interact in producing the hierarchy; the lowest cost visits were made to general practitioners, and the highest cost visits to internists in an OPD setting or to a salaried general practitioner in a large OPD.

Less than one-half of the difference between the $32.45 average for a hypertension visit to a resident in general practice in a small OPD and the $86.79 to a resident in internal medicine in a large OPD is because of the cost of the OPD itself. Actually, the

Table 8
Value of physician time, by specialty and type of practice: 1980 dollars

Specialty and type of practice	Annual net earnings[1]	Hours per week	Percent in direct patient care	Value of a minute of time
Private practice[2]				
Internal medicine	$84,582	52.2	91	$.61
General practice	68,820	48.2	92	.53
Salaried staff physicians[3]				
Internal medicine	62,900	59.4	65	.55
General practice	52,350	59.4	65	.46
Residents				
Internal medicine	20,226	71.4	79	.12
General practice	20,226	71.4	79	.12

[1]Includes fringe benefits.
[2]All private practice physician data from the American Medical Association *Periodic Survey of Physicians*, 1979.
[3]Salaried staff physician earnings from Owens, A.: Hospital jobs vs. private practice, *Medical Economics*, May 10, 1982. Other salaried staff physician data from USC-Mendenhall survey of internists.
[4]All resident data from Hough, D. E.: *The economic status of resident physicians: Results from the Survey of Resident Physicians. Profile of Medical Practice.* American Medical Association, 1981.

Table 9
Cost of physician time and cost of ancillary services, by diagnosis, specialty, and type of practice

Diagnosis, specialty, and type of practice	Minutes per visit[1]	Value of a minute of time	Cost of physician time	Cost of tests	Total physician direct cost
Hypertension					
Private Practice					
Internal medicine	17.6	$.61	$10.74	$23.39	$34.13
General practice	12.0	.53	6.36	6.33	12.69
Salaried staff physicians					
Internal medicine	17.2	.55	9.46	17.80	27.26
General practice	12.4	.46	5.70	14.84	20.54
Residents					
Internal medicine	21.2	.12	2.54	34.84	37.38
General practice	17.5	.12	2.10	5.54	7.64
Upper respiratory infections					
Private practice					
Internal medicine	12.9	.61	7.87	9.22	17.09
General practice	10.1	.53	5.35	4.96	10.31
Salaried staff physicians					
Internal medicine	14.4	.55	7.92	10.99	18.91
General practice	10.5	.46	4.83	3.03	7.86
Residents					
Internal medicine	11.3	.12	1.36	8.65	10.01
General practice	14.5	.12	1.74	4.90	6.64

[1]Data derived from USC-Mendenhall.

Table 10
Simulated total cost of a visit for hypertension, by specialty and type of practice

Specialty and type of practice	Physician direct	Facility direct	Counterpart: Plant	Counterpart: Other	Non-counterpart[1]	Total facility	Grand total[2]
Private practice							
Small group							
Internal medicine	$34.13	$14.38	$5.67	[3]		$20.05	$54.18
General practice	12.69						32.74
Large group							
Internal medicine	34.13	17.30	7.78	[3]		25.08	59.21
General practice	12.69						37.77
Hospital based							
Small hospital outpatient department							
Salaried in internal medicine	27.26	13.21	4.14	$4.97	$2.49	24.81	52.07
Salaried in general practice	20.54						45.35
Resident in internal medicine	37.38						69.19
Resident in general practice	7.64						32.45
Large hospital outpatient department							
Salaried in internal medicine	27.26	30.79	7.62	6.21	4.79	49.41	76.67
Salaried in general practice	20.54						69.95
Resident in internal medicine	37.38						86.79
Resident in general practice	7.64						58.04

[1]Noncounterpart costs are those costs unique to a hospital outpatient department (OPD) setting such as a subsidized cafeteria, the hospital chaplain's office, or security guards. One component of noncounterpart costs—those from research and education activities—were found only in the large hospitals.
[2]Sum of physician direct and total facility.
[3]It was impossible to separate these expenses for physician group practices from direct costs using accepted accounting practices. In a hospital OPD, these indirect costs include such items as administration and medical records.

much higher cost of tests ordered by a resident in internal medicine in the OPD setting more than outweighs facility costs. This finding is consistent with a comparison made of family practice residents and other residents rotating through the primary care clinics of a large teaching hospital, which indicated that the family practice residents used slightly fewer tests (Henderson, 1983).

Table 12 contrasts the distribution of the components of cost between the least and most expensive visit for hypertension. For this diagnosis, physician time costs are almost the same for general practice and internal medicine residents in the OPD. Facility costs are about twice as high in the large OPD, but test costs are almost seven times higher for an internal medicine resident in a large OPD than for a general practice resident in a small OPD. Expressed this way, when both site and specialty vary, tests are the most changeable of the elements in examining the components of the visit.

The cost of a visit for an upper respiratory infection is somewhat less than the cost for hypertension. This is because tests are substantially cheaper and provider time somewhat shorter. Constructing the same hierarchy as for hypertension, the cheapest

Table 11
Hierarchy of costs of a visit for hypertension, by specialty and site of practice

Specialty	Site of practice	Cost per visit
Resident in general practice	Small OPD	$32.45
General practitioner	Small private	32.74
General practitioner	Large private	37.77
Salaried general practitioner	Small OPD	45.35
Salaried internist	Small OPD	52.07
Internist	Small group	54.18
Resident in general practice	Large OPD	58.04
Internist	Large private	59.21
Resident in internal medicine	Small OPD	62.19
Salaried general practitioner	Large OPD	69.96
Salaried internist	Large OPD	76.67
Resident in internal medicine	Large OPD	86.79

Table 12
Relative proportions of physician time, tests, and facility costs in outpatient departments (OPD's)

Proportions of cost	Resident in general practice in small OPD: Amount	Resident in general practice in small OPD: Percent	Resident in internal medicine in large OPD: Amount	Resident in internal medicine in large OPD: Percent
Total	$32.45	100.0	$86.79	100.0
Physician time	2.10	6.5	2.54	2.9
Tests	5.54	17.1	34.84	40.2
Facility costs	24.81	76.4	49.41	56.9

upper respiratory infection visit, at $30.36, is to a general practitioner in a small group; the most expensive, at $68.32, is to a salaried internist in a large OPD. The disparity between hypertension and upper respiratory infection is much greater at the more expensive end of the scale. A hypertension visit to a resident in internal medicine in a large OPD costs 46 percent more than a visit for an upper respiratory infection. Conversely, a hypertension visit to a GP in a small private practice costs only 8 percent more than the $30.36 cost for an upper respiratory infection. In other words, diagnosis, setting, and specialty of physician all influence the cost of a visit.

The previous discussion, of course, concerns a "bundled" visit, that is, a visit including associated tests. Third-party payers, however, usually reimburse for an unbundled visit and then pay for tests separately. Conceived of in this way, the site of the visit—the higher cost of a large OPD setting compared with a small one and the higher cost of any OPD setting compared with private practice—is far and away the most important determinant.

The policy implications of bundling or unbundling and of reimbursing on a case-mix-specific basis for a visit are immense. Obviously, general practitioners would choose to have all physicians reimbursed the same amount when treating the same diagnosis; internists would prefer greater compensation for their more extensive training. This issue becomes even more important if the unit for reimbursement is a bundled visit, because internists' costs are always proportionately higher for a bundled visit than for an unbundled one when compared with general practice.

Clearly, large OPD's would expect more money for a visit with a particular diagnosis, whether that visit is bundled or unbundled, than would private practitioners in small groups. The private practitioners might argue, following the rationale for DRG's, that the same diagnosis should be reimbursed the same amount regardless of location. The OPD's would argue for an additional payment using the same rationale as that used for teaching facilities and capital expenditures under DRG's.

Large and small OPD's might be pitted against each other, depending upon the criteria developed for paying OPD's additional amounts above and beyond private practice. It is much less likely that this would occur for private practitioners, except in the already mentioned area of specialty.

Diagnosis alone is a fairly crude measure. Reimbursing on an AVG basis, rather than on a simple diagnostic basis, makes the spread even greater. This is indicated in Table 13, for hypertension. This table works through the cost of the physician time and tests associated with a visit by a new patient with hypertension versus the followup on a return visit. Applying the figures in Table 13 to the model gives a considerably larger range than when hypertension is considered as a single entity. A followup of hypertension with a general practitioner in a small group averages out to $30.56.[4] Conversely, the cost for a new hypertensive patient seen for the first time by a resident in internal medicine in a large OPD would be $147.71.[5] In other words, the high becomes almost five times the low.

[4]AVG 48 costs of $10.51 plus facility costs of $20.05.
[5]AVG 42 costs of $98.30 plus facility costs of $49.41.

Table 13
Comparison of physician-related costs for two hypertension ambulatory visit groups (AVG's), by specialty and type of practice

Specialty and type of practice	Time in minutes	Cost of time in minutes	Total cost of time	Cost of tests	Total direct physician costs
New patient with hypertension (AVG 42)					
Private practitioner					
Internist	29.5	$.61	$17.99	$64.72	$82.71
General practitioner	12.0	.53	6.36	5.51	11.87
Salaried staff					
Internist	33.0	.55	18.15	24.73	42.88
General practitioner	(1)	(1)	(1)	(1)	(1)
Resident					
Internal medicine	39.2	.12	4.70	93.60	98.30
General practitioner	(1)	(1)	(1)	(1)	(1)
Revisit for hypertension (AVG 48)					
Private practitioner					
Internist	14.3	.61	8.74	18.83	27.57
General practitioner	9.8	.53	5.18	5.33	10.51
Salaried staff					
Internist	17.1	.55	9.39	20.94	30.33
General practitioner	16.7	.46	7.69	13.93	21.62
Resident					
Internal medicine	16.6	.12	1.99	19.61	21.60
General practitioner	11.3	.12	1.35	6.07	7.42

[1]Fewer than 10 cases.

Obviously, much more work remains to be done on the AVG's. At present, because AVG's group visits that consume similar amounts of resources, patients with very different diagnoses can be placed in the same AVG. In addition, patients with the same diagnosis can fall into one of many different AVG's depending upon their other characteristics. Finally, 154 groups seem unnecessary for dealing with the relatively small costs of outpatient care. In the DRG system, which subdivides hospital discharges over a much larger range of costs, 467 groups are used. It is apparent, though, that AVG's show promise in further discriminating components of an ambulatory visit.

Conclusions

This article has investigated the reasons for an ambulatory care visit costing substantially more in an OPD than it does in private practice. It has made an attempt to standardize for diagnosis and to attach actual figures to all components of a visit, including physician time, ancillary services, and the direct and indirect costs of the setting in which a service is performed.

The important components of the cost differential appear to be the diagnosis, the specialty of the physician, whether the visit is to an OPD or to a private practice, and the size of each of these settings. Ancillary test use was shown to vary greatly by diagnosis and by specialty, but not by setting. Although a preliminary attempt has been made to attach weights to these factors, further research is clearly needed. In particular, the ambulatory visit group (AVG) approach should be pursued because it appears to be more discriminating than a simple diagnostic approach. At present, the Health Systems Management Group at Yale is producing a revision of the current AVG's. It should be available in about a year.

Of course, the higher cost per visit in hospital OPD's reflects costs necessary for medical education. Hospital OPD's, whether teaching ones or not, provide access in many locations that cannot attract private practitioners. Obviously, the policy import of the differences found is not that all practitioners should be paid the same in all settings. Rather, the value of this article is to quantify, for descriptive purposes, the great differences in cost per visit that presently appear to exist, and to begin a dialogue on how to reimburse for ambulatory care in an equitable fashion.

In addition to all the other problems of equity already discussed, there is a final issue under reimbursement on a case-specific-visit basis that parallels one currently being faced with DRG's: visits for some diagnoses may be much less profitable than for others, with a concurrent shift to settings that are unable to refuse to accept these particular types of visits. These settings are, of course, the OPD's and emergency rooms of inner city hospitals, which would be the biggest losers under an AVG-based system for all the reasons previously enumerated.

Acknowledgments

We wish to thank Stuart Altman, Stanley Wallack, and Christine Bishop of the Heller School for their extensive comments on our work as it was in progress. We are also grateful to Andrew Bergman, research analyst on the project for the countless statistical and editorial tasks he performed on various versions of the manuscript and to Russell Hereford for final revisions.

This work would not have been possible without the generous support, both monetary and philosophical, of Robert Blendon of the Robert Wood Johnson Foundation and Jim Vertrees and John Petrie, our project officers at the Health Care Financing Administration.

Finally, our thanks go to James C. Beebe and three anonymous reviewers whose helpful suggestions shaped the final article. Any remaining errors are, of course, the responsibility of the authors.

Technical note

The numbers in Table A were constructed to illustrate the technique used in Table 2. The actual model

Table A
Simplified explanatory model of calculation of mean expected value for ambulatory visit groups (AVG's)

	Mean cost of tests by site of practice											
	Private			Salaried in OPD			Resident in OPD			All sites		
AVG	Percent	Cost	Number	Percent	Cost	Number	Percent	Cost	Number	Percent	Cost	Number
1	25	$1.00	21	25	$2.00	2	10	$1.00	1	24	$1.08	24
2	25	2.00	21	25	4.00	2	25	2.00	2	25	2.16	25
3	25	3.00	21	25	6.00	2	25	3.00	2	25	3.24	25
4	25	4.00	21	25	8.00	2	40	4.00	3	26	4.30	26
Actual mean		2.50	84		5.00	8		3.00	8		2.73	100
Expected mean		[1]2.70			2.70			3.18			2.73	

[1]This expected mean cost of $2.70 was calculated as follows: (.25 x 1.08) + (.25 x 2.16) + (.25 x 3.24) + (.25 x 4.30) = $2.70. Thus the actual mean cost was 7.4 percent lower than expected.

utilizes the numbers of visits actually shown in Table 2 as well as 154 AVG's. This example uses the method employed by Pettingill and Vertrees (1982) in calculating expected means for DRG's.

References

Aiken, L. H., Lewis, C. E., Craig, J., Mendenhall, R. C., and Blendon, R. J.: The contribution of specialists to the delivery of primary care: A new perspective. N Engl J Med (300)24:1363-70, June 14, 1979.

Cugliani, A.: Patterns of hospital based ambulatory care. *Soc Sci and Med*, Vol. 12, 1978.

Dutton, D.: Patterns of ambulatory health care in five different delivery systems. *Med Care* 17(3), Mar. 1979.

Fetter, R.: *Ambulatory Patient Related Groups*. New Haven. Yale University, 1980. Unpublished.

Friedman, R.: A Description of the Methodology Used to Determine Costs for Diagnostic and Therapeutic Procedures. 1982 Unpublished.

Gold, M.: Hospital based versus free-standing primary care costs. *Journal of Ambulatory Care Management*, 2(1), Feb. 1979.

Gorry, G. et al.: Care for hypertensives in a neighborhood clinic and a hospital outpatient department: A comparison. *Journal of Ambulatory Care Management* 1(2), Apr. 1978.

Henderson, M. G.: *Patient and Provider Characteristics Associated with Variations in Resource Use in the Primary Care Center at Boston City Hospital.* Unpublished master's thesis. Brandeis University, 1983.

Henderson, M. and Hannon, F.: Ambulatory care costs in alternative settings. In Altman, S., et al., eds. *Ambulatory Care: Problems of Cost and Access*. Lexington. Lexington Books, 1983.

Lion, J.: Commentaries: Case mix differences among ambulatory patients seen by internists in various settings. *Health Services Research*, 16(4), Winter 1981.

Lion, J. and Altman, S.: Case-mix differences between hospital outpatient departments and private practice. *Health Care Financing Review*. Vol. 4, No. 1. HCFA Pub. No. 03146. Office of Research and Demonstrations, Health Care Financing Administration. Washington. U.S. Government Printing Office, Fall 1982.

Lion, J. and Williams, J.: Medical and socio-economic case mix in hospital outpatient departments. In Altman, S., et al., eds. *Ambulatory Care: Problems of Cost and Access*. Lexington Books, 1983.

Lion, J., Henderson, M. G., Malbon, A., et al.: Ambulatory visit groups: A prospective payment system for outpatient care, *J Ambulatory Care Manage, Special Issue: Ambulatory Care Financing* 7(4), Nov. 1984.

Mendenhall, R., et al.: A national study of medical and surgical specialties: I. Background, purpose and methodology. *Journal of the American Medical Association* 240(9), Sept. 1978a.

Mendenhall, R., et al., A national study of medical and surgical specialties: II. Description of the survey instrument. *Journal of the American Medical Association* 240(11), Sept. 1978b.

Miller, H.: *Evaluation of Methodologies to Measure the Cost of Hospital-Based Ambulatory Care*, Columbia, MD. Center for Health Policy Studies, Apr. 20, 1983.

Mitchell, J. B., and Cromwell, J.: Alternative methods for describing physician services performed and billed. First Year Report. Contract No. 500-81-0054. Prepared for Department of Health and Human Services. 1982.

National Center for Health Statistics, Series 13, No. 66, *The National Ambulatory Medical Care Survey, United States, 1979 Summary*, USHHS, Hyattsville, MD. Sept. 1982.

Pauly, M.: Measuring ambulatory care costs. *Health Services Research* 16(4), Winter 1981.

Pettingill, J. and Vertrees, J.: Reliability and validity in hospital case-mix measurement. *Health Care Financing Review*, Vol. 4, No. 2. HCFA Pub. No. 03149. Office of Research and Demonstrations, Health Care Financing Administration. Washington. U.S. Government Printing Office, Dec. 1982.

Rosenblatt, R., Cherkin, D. C., Schneeweiss, R., et al.: The content of ambulatory medical care in the United States: An interspecialty comparison. *N Engl J Med* 309(15), Oct. 1983.

Schieber, G.: Paying for ambulatory care: A Medicare and Medicaid perspective. In Altman, S. et al., eds. *Ambulatory Care: Problems of Cost and Access*. Lexington Books, 1983.