

# Case-Mix Differences Between Hospital Outpatient Departments and Private Practice

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*The belief that patients seen in hospital outpatient departments are sicker than those patients seen by private practice physicians is examined in this article. A large scale data set developed by Robert Mendenhall at the University of Southern California and modeled on the National Ambulatory Medical Care Survey (NAMCS) is used for secondary analysis. Differences in case-mix complexity were found to be slight, using two separate techniques.*

## Introduction

This article investigates the commonly held belief that patients seen in hospital outpatient departments (OPDs) are sicker than those seen in private practice. This assumed case-mix difference is said to be one of the reasons OPD per-visit costs are higher than costs in private practice. It is generally agreed that stand-by capacity and other costs peculiar to the OPD, such as social workers, overhead attributed from the inpatient portion of the hospital, and research and education costs, play a part in the OPD's greatly increased cost structure as well.

These latter variables, however, are beyond the scope of this article. Our task here is to examine in detail the case-mix component to see how much sicker—if at all—OPD patients are. Our major finding is that at most only relatively minor case-mix differences exist between the two settings. Using a descriptive method we find slight differences and indications that there may actually be *no* differences. Using a newly developed interactive model we find relatively minor case-mix differences, with the OPD patients from 5 to 15 percent sicker than their counterparts in private practice. It should be emphasized that

these differences apply to *all* OPD visits combined, including those in small or non-teaching hospitals. These account for close to half of all OPD visits. Preliminary data collected from major teaching OPDs indicate that this subset of patients may be considerably sicker.

For both analyses, we have utilized a large scale data set developed by Robert Mendenhall at the University of Southern California. This data set has been described in detail elsewhere (Mendenhall, 1978 a and b) and has been examined for reliability and validity (Perrin et al., 1978). Previous analyses have been limited mostly to the amount of primary care provided by internal medicine subspecialties (Aiken, 1981; Girard, 1979). This paper represents a first attempt to apply this data set to the issue of the relative complexity of patients seen in different settings.

This data set is the only national information currently available which compares patients in private practice with those seen in the hospital outpatient department.<sup>1</sup>

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<sup>1</sup>In this regard it is superior to the National Ambulatory Medical Care Survey, on which it is patterned, which is limited to physicians in private practice (NCHS, 1980). A detailed description of how the variables crucial to our analysis were collected and constructed is contained in the Methodology section of this paper. Preliminary findings on differences of patients of internists in private practice, salaried hospital-based internists, and residents in internal medicine were recently published (Lion, 1981).

It should be clearly understood that the sampling is of physicians. It is representative of hospital OPDs in the country only by implication. It is not possible to separate OPDs of different types for separate analysis. A subsequent study which uses the OPD as the sampling unit could overcome this limitation.

### Previous Findings on Ambulatory Case-Mix

Despite the largely contrary anecdotal evidence in the literature claiming that there are large case-mix differences between patients seen in hospital OPDs and by physicians in private practice, our previous literature review revealed several data bases which tend to support our findings. Using 1970-71 social survey data in Washington, D.C., backed up by a second survey of physicians in private practice, pre-paid group practices, and hospital OPDs and emergency rooms, investigators were unable to demonstrate that hospital ambulatory patients were any sicker than private patients (Dutton, 1979). Measures used in the Dutton study were a chronic illness index for children and, for adults, the percent reporting a medical problem. This finding of no major differences in the sickness level of the groups is all the more striking since emergency room visits are included.<sup>2</sup>

Dutton found striking socio-economic differences between OPD and private practice patients, without using race as a variable.<sup>3</sup> Compared to private practice patients, these differences were:

- Nearly twice as many patients of the OPD came from families headed by women (43 percent versus 28 percent).
- More than twice as many families of the OPD patients were below the poverty level (33 percent versus 14 percent).
- Nearly three times as many families of the OPD patients received public assistance (36 percent versus 13 percent).
- Family income in the OPD patient group was considerably less than in the private practice patient group (\$6,970 versus \$11,000).
- None of the physicians working in hospital outpatient care were "satisfied with most of their patients" while 43 percent of the physicians in private practice were.

Dutton's findings of little case-mix difference using different measures provides important corroboration for the USC-Mendenhall data while at the same time

<sup>2</sup>In the USC-Mendenhall survey, about 25 percent of the hospital-based care was rendered in the emergency room. These patients were considerably sicker and were eliminated from the analysis.

<sup>3</sup>At least 90 percent of the patients in each setting were black, reflecting the Washington, D.C. population with school age children from which the sample was drawn.

indicating the importance of socio-economic factors in differentiating patients seen in the outpatient department from those seen in private practice. Whether or not these socio-economic differences contribute to increased resource use in the OPD is the subject of another special study of the larger ambulatory care project.<sup>4</sup>

### Methodology

All results reported in this paper are from a data set developed by the University of Southern California from 1977 to 1979. This was a cross-sectional survey of physicians in 24 specialties, using a stratified weighted sample from AMA tapes which makes each specialty representative of the U.S. population of practicing physicians. Overall, 19,047 physicians were surveyed and 10,372 responded.

Physicians were asked to rank each patient seen for a three-day period on a five-point scale for complexity, urgency, and severity. They also supplied primary and secondary diagnoses, lab tests, X-rays, and procedures ordered and performed, and minutes spent with patients. This article examines case-mix difference for four specialties: general practice, family practice, internal medicine and pediatrics. Obstetricians-gynecologists were also analyzed but were found to be diagnostically non-comparable, although no severity differences were found between settings. Emergency room patients are omitted from our analysis. Table 1 indicates for the four specialties the number of physicians responding and the number of patient records analyzed.

Several points should be made about how the data were collected. Physicians were mailed a questionnaire and log diary and were asked to fill out data on each patient as that patient was seen. Since three consecutive days were chosen for the patient data collection, it is possible that some patients who had return visits after a brief interval are in the sample more than once. Strictly speaking, we are analyzing patient encounters rather than actual patients. While patients are the unit of analysis, physicians are the sampling unit. Thus the 834 outpatients seen by the 18 residents in family practice represent groups of about 50 patients seen by the same doctor; the 18 residents, however, almost certainly represent 18 separate OPDs.

<sup>4</sup>In addition to Dutton, Cugliani, 1978, substantiates large socio-economic differences between patients seen in New York City OPDs and residents of New York City on the whole. Cugliani indicates that patients seen in the OPD also are sicker on self-reported measures than patients on the whole but actually offers only anecdotal evidence for this. A number of small scale studies indicate that patients seen in hospital OPDs are of lower socio-economic status than those seen in private practice (Lees et al., 1976; Rudd and Carrier, 1978; Rudnick et al., 1976). These patients also appear to have a substantial number of psycho-social problems. For example, 36 percent of an OPD pediatric sample presented with psycho-social problems *only* and an additional 52 percent with psycho-social problems in addition to physical ones (Duff et al., 1972).

TABLE 1

## Number of Physicians and Ambulatory Patients by Specialty and Type of Practice

Type of Practice	Specialty				Total
	General Practice <sup>1</sup>	Family Practice <sup>1</sup>	Internal Medicine	Pediatrics	
<b>Private Practitioners</b>					
Physicians	249	356	519	401	1,525
Patients	14,690	20,846	16,801	21,524	73,861
<b>Hospital Based Practitioners</b>					
Salaried Staff Physicians	29	64	35	68	196
Patients	1,194	2,509	938	1,453	6,094
Resident Physicians	18	60	174	46	298
Patients	834	1,732	1,063	1,014	4,643
<b>Total Physicians</b>	<b>296</b>	<b>480</b>	<b>728</b>	<b>515</b>	<b>2,019</b>
<b>Total Patients</b>	<b>16,718</b>	<b>25,087</b>	<b>18,802</b>	<b>23,991</b>	<b>84,598</b>

<sup>1</sup>Self-described on AMA tapes.

Extensive reliability studies have determined that most of the elements are reliable using a test-retest method (Perrin, et al., 1978). Some elements dealing with another portion of the questionnaire were deemed unreliable, particularly number of personnel associated with the physician. The only item connected with the analysis in this article which was found unreliable by Perrin et al. was the distinction between general practitioner and family practitioner. Physicians had a tendency to report themselves as either a GP or FP to the American Medical Association, to reverse this designation when filling out the questionnaire, and to reverse it again when replication was requested by Perrin et al. This does not appear to pose a problem for our analysis, since the findings for the GP and FP categories are practically indistinguishable.

While it is difficult to compare the data as a whole to outside sources, validity is indicated by comparison of the most common diagnoses of private practitioners with those obtained by the National Ambulatory Care Survey (NCHS, December, 1981). Time spent on specific diagnoses is also comfortably similar. Internal validity is discussed in subsequent sections of this article, specifically in the issue of severity, urgency, and complexity ratings for diagnoses considered of varying severity.

### Descriptive Findings

The major finding to emerge is that patients for all four types of specialties seen in the OPD appear to be very little, if at all, sicker than those seen by specialists in private practice. Table 2 shows the comparisons for physician-rated measures for complexity, severity, and urgency. Using the complexity measure, family practice physicians and residents in OPDs did

rate their patients as slightly more complex.<sup>2</sup> Using the severity coding, hospital-based physicians tended to rank their patients as slightly sicker than private practitioners. This was true for internal medicine only. For the overwhelming number of patients seen by physicians, the index by specialty between the two settings is the same.

<sup>2</sup>The complexity coding is based upon CPT coding developed by the American Medical Association for billing purposes. This coding is designed to approximate the amount of time the patient requires for the visit.

TABLE 2

## Complexity, Severity, and Urgency by Specialty and Type of Practice

Type of Practice	Specialty			
	General Practice	Family Practice	Internal Medicine	Pediatrics
<b>Complexity</b>				
Private Practitioners				
Salaried Staff Physicians	2.3	2.5	2.7	2.6
Residents	2.2	2.7	2.7	2.8
<b>Severity</b>				
Private Practitioners				
Salaried Staff Physicians	2.2	2.2	2.3	2.0
Residents	2.1	2.2	2.4	2.1
<b>Urgency</b>				
Private Practitioners				
Salaried Staff Physicians	2.2	2.2	2.6	2.1
Residents	2.3	2.5	2.2	2.8
Salaried Staff Physicians	2.3	2.4	2.3	2.3
Residents	2.4	2.4	2.3	2.8

It is consistent with face validity that pediatricians who see a large number of well children for preventive care rate their patients as less severely ill than adult patients. The supposition that severely ill children predominate in the hospital clinics and outpatient departments is not borne out, however. Also consistent with external validity is the finding that complexity increases somewhat as we move from the true generalists (general practice and family practice) to the primary care specialists (pediatricians and internists).

Complexity and urgency were scored on a five-point scale and severity on a seven-point scale recoded to four points.<sup>6</sup> Only whole numbers could be used, so that while most scores hover around 2.5, they are composed of large numbers of patients scored "2" and "3". The standard errors for this table are therefore quite large even though the distributions are normal.<sup>7</sup>

It can be argued that these scales may have been internally calibrated. That is, physicians may distribute their patient load relatively equally around the same mid-point regardless of how seriously ill their patients are. To test this hypothesis, essential hypertension and respiratory infection were compared for each practice setting for each appropriate specialty. As can be seen in Table 3 there appears to be general agreement that hypertensive patients are about equally sick, regardless of where they are seen or by whom. This indicates that physicians are indeed calibrating their scales in a similar way regardless of setting. If anything, patients with hypertension are considered slightly *more* ill by physicians in OPDs.

<sup>6</sup>The original scaling was:

- Complexity
1. Minimal
  2. Brief
  3. Limited
  4. Extended
  5. Comprehensive

- Severity
1. None
  2. Minor-acute
  3. Minor-chronic
  4. Moderate-acute
  5. Moderate-chronic
  6. Severe-acute
  7. Severe-chronic

- Urgency
1. None
  2. Could have been deferred
  3. Needed to see today
  4. Should have seen sooner
  5. Emergency

While complexity and urgency were used as collected, severity was recoded to a four point scale to eliminate any differences in acute and chronic care in different settings.

<sup>7</sup>An improvement in the original methodology would have been to allow interval scoring, that is, 2.1, 2.2, which would have reduced the standard error and allowed minor differences to emerge.

The data for upper respiratory infection are similar to those for hypertension, with all physicians judging upper respiratory infections as about as complex and urgent as hypertension but somewhat less severe.

**TABLE 3**  
**Essential Hypertension**

Type of Practice	Specialty		
	General Practice	Family Practice	Internal Medicine
<b>Complexity</b>			
Private Practitioners	2.3	2.5	2.5
Salaried Staff Physicians	2.4	2.4	2.5
Residents	2.6	2.7	2.8
<b>Severity</b>			
Private Practitioners	2.6	2.5	2.3
Salaried Staff Physicians	2.8	2.7	2.4
Residents	2.6	2.5	2.6
<b>Urgency</b>			
Private Practitioners	2.1	2.3	2.0
Salaried Staff Physicians	2.0	1.9	2.0
Residents	2.4	2.2	2.2

Another measure of case-mix is available comparing the illness level of patients in the OPD with those in private practice—percent of patients with a secondary diagnosis. Table 4 shows percent of patients with a secondary diagnosis. The findings indicate few consistent differences by site for all four specialties. This lack of consistency by site is true for essential hypertension and upper respiratory problems as well. For hypertension, between a third and a half of all patients have a secondary diagnosis compared with about 10 to 20 percent for upper respiratory infection. Taken together, the results indicate that pediatrics is the only specialty with a noticeable difference, and that difference is relatively minor.

**TABLE 4**  
**Percent of Ambulatory Patients with One or More Secondary Diagnoses**

Type of Practice	General	Family	Internal	Pediatrics
	Prac-tice	Prac-tice	Medi-cine	
Private Practitioners	20.5%	24.7%	38.9%	20.3%
Salaried Staff Physicians	19.3%	24.3%	24.6%	26.6%
Residents	22.8%	26.0%	47.3%	29.9%

## Caveats

Number of minutes spent per patient has also been analyzed. This item can be looked at as a measure of the relative efficiency of the various settings if it is conceded that case-mix is indeed similar and that "efficiency" includes such items as teaching. Stand-by time is ideally excluded by the log diary method.

Table 5 shows consistent differences in time spent with patients even when controlling for diagnosis. In all but one case, the time spent by residents was considerably longer than the time spent by salaried staff physicians in the OPD. This may illustrate the importance of a learning function for residents. With few exceptions, salaried staff physicians in OPDs spent more time than physicians in private practice. This may illustrate problems in scheduling patient load, either because of no-shows or because physicians may have less incentive to schedule rapidly. The time spent teaching residents is also included here.

Data on X-rays and laboratory tests exist only in a crude state in this data set<sup>a</sup> and will not be reported in detail. In general, when diagnosis was controlled for, residents tended to order the most tests and physicians in private practice the fewest. This difference reaches its peak in pediatrics, where residents order nearly twice as many X-rays and tests as physicians in private practice.

<sup>a</sup>An attempt is now being made to apply relative value units to tests, X-rays, and procedures. These were reported on a visit basis with each procedure weighted the same but will be transformed to RVUs used.

We realize that the findings of this paper are controversial and of great policy importance. Some of the controversy already generated has come from practitioners in the field, especially MDs, whose experience has been of a much sicker case mix in their hospital outpatient practice than in their private practice. In going against commonly accepted tenets in any field, it is always wise to consider the caveats. This is especially true with a first study which challenges established wisdom.

Six major objections have been raised thus far. These caveats and our responses to them are as follows:

1. **Caveat:** Emergency rooms, where the sickest OPD patients were seen, were not included. **Response:** Emergency rooms *should not* be included. Studies in the past have included them, usually by fiat, since with most social survey methodologies it is impossible to omit them. There is no question that the 25 percent of their patient practice seen by hospital-based physicians in the emergency room as well as the 10 percent seen by private physicians are much sicker. These issues cloud the anecdotal evidence.

It should be noted here that while excluding the emergency room weakens a hospital's claim for additional costs incurred for stand-by capacity, it by no means eliminates the claim. Long waits, no-shows for appointments, and disrupted treatment schedules, longer hours and unusual staffing requirements are much more common in hospital outpatient departments than in private practice.

**TABLE 5**

**Mean Minutes of Physician Time for All Ambulatory Patients, Those with Essential Hypertension, and Those with Upper Respiratory Infections**

Type of Practice	Mean Minutes Per Patient			
	General Practice	Family Practice	Internal Medicine	Pediatrics
<b>All Ambulatory Patients</b>				
Private Practitioners	12.6	12.6	18.9	12.3
Salaried Staff Physicians	13.0	13.5	21.8	15.8
Residents	16.5	16.5	23.9	17.8
<b>Essential Hypertension</b>				
Private Practitioners	12.0	12.6	17.6	not applicable
Salaried Staff Physicians	12.4	11.2	17.2	not applicable
Residents	17.5	13.0	21.2	not applicable
<b>Upper Respiratory Infections</b>				
Private Practitioners	10.1	9.9	12.9	10.8
Salaried Staff Physicians	10.5	11.2	14.4	12.0
Residents	14.5	13.0	11.3 <sup>1</sup>	30.0

<sup>1</sup>Based on less than 50 unweighted cases.

2. **Caveat:** The clinics represented a broad mix of hospital OPDs, and were not limited to teaching hospitals or to big cities, where the sickest OPD patients are seen.

**Response:** All outpatient departments *should* be included. Anecdotal evidence from the larger, more complicated ones does not cancel a case-mix which is not as sick in the smaller, less complicated OPDs.

Data from the American Hospital Association indicates that, *even when emergency room visits are excluded*, almost half (44.0 percent) of outpatient department visits take place in hospitals of under 300 beds and 11.4 percent take place in hospitals of less than 100 beds (AHA, 1982). While some of these visits involve only tests (the so-called private referred portion), visits involving only tests are common to large hospitals as well. Student health services, which make up a large proportion of small, non-teaching hospital visits, are also excluded.

In short, while the anecdotal evidence supports case-mix being more serious in large urban hospitals, there is little or no evidence about smaller suburban hospitals and HMOs connected with hospitals. If both *our* findings from USC-Mendenhall *and* the anecdotal evidence about case-mix in large urban hospitals are correct, then patients in HMOs and smaller hospital OPDs are actually *less* sick than patients in private practice as a whole. This concept is a new one and is well worth pursuing.

3. **Caveat:** Socio-economic and other explanatory data were not available for patients. **Response:** It is a shortcoming of any secondary analysis that variables important to the point being examined are not included in the original study design. It should be noted, though, that the case-mix differences we attempted to substantiate were physical, rather than socio-economic in nature. Socio-economic variables become important only if a primarily medical explanation of case-mix differences cannot be demonstrated and only if we assume that socio-economic problems make a patient more difficult to treat. Dutton's finding that outpatient department physicians do not like to treat these patients points in this direction, but the particular reasons leading to a "more difficult to treat" designation have not been isolated. If socio-economic problems are a factor in case-mix differences, we should find patients with the same severity of diagnosis using more physician time and hospital resources when they have these problems.

To this end we are in the process of designing a small supplementary project in the Boston area which will replicate the USC-Mendenhall study design and will add to it the following variables:

- Presenting complaint
- Payment source
- Public assistance status
- Race
- Occupation of head of household
- Native language (degree of difficulty speaking English)
- Psychological problems
- Socio-economic problems
- Environmental problems

A specific question about socio-economic and environmental problems was actually asked by the USC-Mendenhall study, but only the primary reason for seeking care could be coded. Medical, surgical, and preventive problems are almost always the presenting problems. Only 2 percent of hospital outpatients seen by internists sought care for a socio-economic, psychological, or environmental problem as their *primary problem*. The percent would have been far higher if a secondary reason for the presenting problem could have been expressed as well.

4. **Caveat:** The physician may have internally calibrated the mid-point for rating complexity, urgency, and severity in different ways depending on his experience in the setting. A corollary of this is that, *even for specific diagnoses*, this internal calibration may have an effect. For example, a hospital-based physician who sees extremely ill diabetics on an inpatient basis may rate his diabetics seen in the OPD as not very ill even though they have clinical signs and symptoms far more severe than those ambulatory diabetics seen in private practice.

**Response:** While the argument that physicians in different settings may have internally calibrated their mid-points for severity, complexity, and urgency around different scales is potentially valid, a series of special analyses we conducted does not seem to support it. Specifically:

- Four diagnoses—essential hypertension, diabetes, neuroses, and upper respiratory infections—were analyzed in detail. Hospital-based physicians scored all four as about as sick as patients with the same diagnosis

## Ambulatory Patient Groups Formed by Autogrouping

seen in private practice. It is possible to argue that the patients with hypertension and diabetes had more serious forms of these illnesses, yet were evaluated as no more sick than private patients because of the hospital-based physician's greater experience with very sick inpatients with these diagnoses. This argument cannot be made, however, for the upper respiratory infections, and probably not for neuroses.

- Patients with these four relatively uncomplicated diagnoses account for about the same 25 percent of the practice for patients of hospital-based and private physicians, indicating that the rest of the practice distribution may also be the same.
- Other measures of severity such as percent of all patients with secondary diagnoses are similar across practice settings.

5. **Caveat:** The data apply only to general practitioners, family practitioners, internists, and pediatricians; tertiary specialists are not included. The very sick and terminally ill patients of these specialists may be treated overwhelmingly in the OPD.

**Response:** While this hypothesis is appealing, it should be pointed out that the four tertiary specialties expected to have the sickest patients—medical oncology, neurology, nephrology, and hematology—account for only 4.4 percent of all patients seen in the OPD, hardly enough to make much overall difference.

6. **Caveat:** The anecdotal evidence is very strong and compelling to MDs, particularly to those practitioners who actually work in large inner city OPDs.

**Response:** As indicated, large hospital OPDs account for only about half of all OPD visits. In addition, these OPDs, like smaller ones, are prone to several other phenomena which dilute the severity of their case-mix: patients referred to the OPD to have stitches removed or other medical conditions checked and patients referred after hospitalization because they do not have a primary physician. Neither of these groups of patients is particularly sick or particularly memorable.

The anecdotal evidence probably applies, then, to a select group of patients seen in a select group of hospital outpatient departments. These are the highly technically sophisticated OPDs which are sometimes assumed to be representative of all OPDs.

The previous findings and caveats have been based upon a descriptive and straightforward analysis of the data. In a follow-up study, we subjected the same data to an interactional model which is in the process of development at Yale (Fetter, 1980). This system of autogrouping is similar to the more established and better known diagnostic-related group (DRG) system for inpatient services also developed at Yale.

Using time spent with the physician as the dependent variable, an Automatic Interaction Detector program divides patient visits into 14 broad groups based on organ system and etiology using the primary diagnosis and then into 154 subgroups based upon nine independent variables which influence patient care time. The separate groupings were designed to form groups with the greatest possible between-group variance and the least possible within-group variance. That is, the patients in the final groups very closely approximate each other in terms of time spent with the physician. The variables used are:

- Presenting problem as defined by chief complaint
- Primary diagnosis
- Secondary diagnosis
- Age of patient
- Had the physician seen the patient before?
- Was the problem acute or chronic?
- Was the care provided well child or adult care, prenatal care, postnatal care, post-operative care, or none of these?
- Had the patient been seen on referral?
- Was psychotherapy provided as part of the visit?

Sex and race were also available as variables, but did not account for any splits and were therefore discarded. The Yale system was developed and refined on National Ambulatory Medical Care Survey (NAMCS) data. In order to use it for our analysis, we performed the following modifications.

1. The three types of care—private practice, residents in the outpatient department, and salaried staff physicians in the outpatient department—were run separately and then were summed with weights applied to make the total representative of the U.S. population of practicing physicians.
2. The four specialties—general practice, family practice, internal medicine, and pediatrics—were treated separately, as in the previous analysis.
3. The splits occurring in the NAMCS data were “frozen” and assumed to be the ones which would occur naturally in the Mendenhall data.

4. The minimum terminal group size was set at ten, rather than 25, in order to accommodate the smaller Mendenhall data set.
5. Presenting complaint was not available in the Mendenhall data set, thus reducing the number of subgroups which could be formed by about 50.
6. Data were "trimmed" to eliminate the outliers on both high and low sides of the distribution. These amounted to 3 to 5 percent of the total cases in each category.

As Table 6 indicates, this alternate, more statistically complex method produces results similar to the basic analysis reported previously. That is to say, the patients of salaried internists are about 5 percent sicker than those of private practitioners, and the patients of residents are about 13 percent sicker. This more sophisticated analysis thus quantifies the minor differences previously suspected.

For the autogrouping analysis producing this table, all patients are divided into the final groups developed at Yale and then are redistributed into the three practice settings under consideration. This produces the actual mean length of encounter for each group (19.32 minutes for residents, for example) compared with internists as a whole (15.59).

The data for each type of practice are then rerun through the program and are recalculated based on the percent of visits for that type of practice in each of the final groups multiplied by the mean time it takes for all patients in the group to be seen. This figure is the expected length of encounter. In other

words, the expected length of encounter was calculated by determining for each type of practice what proportion of their patients was in each of the final groups and then multiplying that proportion by the mean encounter time for the group. For residents, the figure was 17.32 minutes. The calculation indicates that residents should be taking only 17.32 minutes to see their particular mix of patients compared to the 19.32 minutes they are actually taking. In fact, both types of OPD physicians spent significantly more time with their patients than indicated if they were adhering to the mean times established for all patients for each of the groups.

The formal relationship for the time residents take to treat their patients is shown by the ratio of actual time to expected time, which is 1.115, indicating that residents are taking 11.5 percent longer to treat their patients than indicated by their case-mix. More important for this paper, the expected length of encounter for residents is longer than the group average length of encounter, giving a ratio of 1.111. This indicates that residents in internal medicine actually have a case-mix 11 percent sicker than the average and about 13 percent sicker than internists in private practice, who have an expected length of encounter slightly less than the group average and a case-mix ratio of .983.

This 13 percent sicker estimation is, probably coincidentally, the same one which would be arrived at if the severity rating were compared for residents (2.7) and private internists (2.3), indicating that the more simplified data, despite its large standard error and descriptive approach, is comparable to this way of examining the data.

**TABLE 6**  
**Comparison of Case-Mix for Internists Using Autogrouping**

Type of Practice	Actual Length of Encounter	Expected Length of Encounter	Average for all Internists	Physician Ratio <sup>1</sup> (Efficiency)	Case-Mix Ratio <sup>2</sup> (Complexity)
Private Practitioners	15.10	15.33	15.59	.985	.983
Salaried Staff Physicians	18.08	16.18	15.59	1.117	1.038
Residents	19.32	17.32	15.59	1.115	1.111

<sup>1</sup>Column 1 divided by Column 2.

<sup>2</sup>Column 2 divided by Column 3.



Table 7 indicates that for seven of the eight comparisons possible, patients seen in the OPD were both more complex to treat and took longer to treat, *even considering their complexity*, than patients in private practice. In the one aberrant case, general practice complexity, the differences were very small across sites. The two specialty primary practices, internal medicine and pediatrics, showed greater differences, again consistent with anecdotal evidence.

### Conclusions

The important point of this article is that a 5 to 15 percent case-mix difference overall, even if it can be substantiated for other specialties, is not very large. It is far smaller than generally supposed and far smaller than needed to explain cost differences which range up to two or three times as high in hospital OPDs. Obviously, these overall case-mix differ-

ences obscure a great range within OPDs by size and teaching status.

It is quite possible, for example, that the most complicated large, inner city OPDs have a case-mix twice as medically sick as a private physician's office while small suburban OPDs have the same or even a less sick case-mix. If only 10 percent of OPD visits occur in large urban teaching hospitals, then the 5 to 15 percent overall finding might be accurate.

Recognizing these differences among OPDs suggests that we do not treat all OPDs in a similar manner in any reimbursement reform. Further research on case-mix differences in urban teaching and community hospitals would allow us to classify institutions according to case-mix for reimbursement purposes. A pilot study which addresses this subject is now underway as part of our overall ambulatory care project.

**TABLE 7**  
**Comparison of Case-Mix by Specialty,**  
**with Percent Differences, Using**  
**Autogrouping**

Specialty and Type of Practice	Actual Length of Encounter	Expected Length of Encounter	Average for Specialty	Percent More Complex	Percent Less Efficient
<b>Private Practice</b>					
Internal Medicine	15.10	15.33	15.59	—	—
Pediatrics	9.18	9.43	9.59	—	—
Family Practice	9.07	9.38	9.48	—	—
General Practice	9.06	9.36	9.39	0.5%	—
<b>Salaried Staff</b>					
Internal Medicine	18.08	16.18	15.59	5.8%	13.4%
Pediatrics	12.00	10.79	9.59	15.0%	14.2%
Family Practice	9.79	9.57	9.48	2.0%	5.5%
General Practice	10.50	9.31	9.39	—	16.7%
<b>Residents</b>					
Internal Medicine	19.32	17.32	15.59	13.0%	13.2%
Pediatrics	13.18	10.67	9.59	12.9%	27.3%
Family Practice	13.01	10.21	9.48	9.1%	31.3%
General Practice	12.38	9.50	9.39	1.8%	34.3%

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