

Comparison of Medicaid nursing home payment systems

by Robert E. Schlenker

This article summarizes the main findings of a study comparing three generic Medicaid nursing home payment systems: case-mix, facility-specific, and class-rate. The major comparative analyses examined patient-level case mix and quality, facility-level costs, Medicaid payment rates, and profitability. The study also analyzed case-mix payment systems in greater detail, emphasizing the

earlier systems. The results suggest advantages and disadvantages for all system types and highlight important considerations for policyplanners, particularly in States considering case-mix systems. The article concludes with a discussion of issues important to further research on nursing home payment.

Introduction

Nursing home expenditures increased from \$1.7 billion in 1965 to \$47.9 billion in 1989, and Medicaid accounted for 43 percent of the 1989 total (Lazenby and Letsch, 1990). In this context, States struggle to attain often conflicting goals of cost containment, access, and quality. The reimbursement policies and procedures forming a State's nursing home payment system are key elements in this struggle.

This article summarizes the main findings of a study comparing major Medicaid nursing home payment systems. The study was carried out from 1983 through 1988, with funding from the Health Care Financing Administration (HCFA). The primary approaches and results are covered here; a detailed presentation is provided in the final report (Schlenker et al., 1988).

Background

Payment system categories

Nursing home payment systems vary along several dimensions, and different taxonomies have been used in their analysis (Applied Management Sciences, 1976; Pollack, 1977; American Health Care Association, 1978; Spitz and Weeks, 1979; and Grimaldi, 1982). The three major types categorized and analyzed in this study were case-mix, facility-specific, and class-rate systems.

Case-mix systems are relatively new, but their use is growing. Such systems link payment for nursing home care directly to patients' care needs. Four States had case-mix systems at the start of this study in 1983 (Illinois, Maryland, Ohio, and West Virginia), and two more (Minnesota and New York) adopted case-mix systems while the study was in progress. Several other States have since implemented or are considering such

approaches. Case-mix systems also were encouraged under the Omnibus Budget Reconciliation Act of 1987 (OBRA 1987, Public Law 100-203), and further impetus is provided by HCFA's current Multistate Nursing Home Case Mix and Quality Demonstration (referred to hereafter as the Multistate Demonstration).

At present, most States use a facility-specific payment system. Although such systems vary considerably among States, their common feature is that the payment to each nursing home is linked in some way to its costs. Most of these systems now are prospective so that past costs can be used to set future payment rates, and various ceilings and efficiency incentives are typically incorporated. (An efficiency incentive is the payment of some portion of the difference between a ceiling and an actual cost per day to facilities with costs below the ceiling.) A 1983 survey (Jazwiecki, 1984) identified 13 retrospective and 25 prospective facility-specific systems.

In a class-rate system, as defined for this study, nursing homes are paid a fixed amount per patient day by class or category of patient (i.e., the current categorization of Medicaid patients into skilled or intermediate levels of care), although class rates also can be based on such nursing home characteristics as size and geographic location. Class-rate systems were fairly common in Medicaid's early years, but the previously mentioned survey identified only six such States in 1983. Despite their limited current use, class-rate systems were important for this study because of their strong incentives for nursing homes to minimize costs, possibly by admitting primarily light-care patients (thereby creating access barriers for heavy-care Medicaid patients) or by sacrificing quality.

Major study components

This study had two major components, and the results in this article are organized into the same two categories: the "comparative analyses" and the "case-mix system analyses." The basic hypothesis of the comparative analyses was that the payment systems' different financial incentives lead to different outcomes, specifically for patient-level case mix and quality and for facility-level associations between case mix and cost per day, the Medicaid payment rate per day, and profit. The specific-analysis hypotheses (discussed later with the presentation of results) drew on prior work, particularly

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by Bishop (1980), Scanlon (1980), Cotterill (1983), Palmer and Cotterill (1983), Palmer and Vogel (1983), Hawes and Phillips (1986), and Schlenker (1986).

The case-mix system analyses were conducted in recognition of the growing trend toward case-mix payment and the need for more information about such systems. These analyses emphasized the "early" mix systems, which tie payment to the need for and receipt of specific services by nursing home patients (here called "service-specific" approaches). The more recent systems use a "grouping" approach that categorizes patients on the basis of clusters of problems or conditions, also termed "resource-utilization groups" or "RUGs."

This study component first examined how closely several case-mix systems generated similar relative payment rates for different patient categories. (This step included service-specific and grouping systems.) Then, incentives for the use of selected specific services under three service-specific systems were examined in order to explore the potential of such incentives to positively or negatively affect quality. Finally, a payment rate simulation model was developed to examine whether the application of a case-mix approach to non-case-mix States would result in a redistribution of limited Medicaid funds that was more in accord with actual case mix. Although these analyses emphasized the early case-mix systems, the results are important to an overall understanding of case-mix payment, particularly if combined with future evaluations of more recent approaches, such as the planned evaluation of the current Multistate Demonstration.

Design, data, and methods

Design overview

A major study objective was to identify differences across generic payment system types. Unfortunately, any payment system classification is somewhat arbitrary, because each State's system has many unique features. Further, the payment system is part of a larger long-term care system with many different socioeconomic, provider, and policy factors (some not measurable). To deal with this variability, a large number of States and facilities in each State is desirable. This would allow for several States to represent each payment system type and for the inclusion of covariates (for multivariate analysis) representing other relevant State factors. A large number of facilities within each State would allow the incorporation of many facility characteristics that may affect provider behavior (such as ownership, location, payer mix, and area bed supply).

Another study objective was to utilize patient-level data to measure individual patient characteristics based on uniform data definitions and collection procedures. Ideally, such patient-level data would be obtained for all patients in each sample facility so that no sampling error would be involved when aggregate patient-level data are used to measure facility-level characteristics such as case mix. This required the design, testing, and implementation of an extensive set of primary, patient-level instruments and protocols, and such a primary data collection effort is quite costly.

Finally, a longitudinal approach would be ideal for such a study. This would follow States over time, particularly States implementing new systems (for before-and-after analyses). Patient cohorts within facilities would also be followed over time so that longer run effects on rehabilitation and other outcomes could be discerned.

Unfortunately, study resources (both funding and time) were less than required for the ideal design. Therefore, several compromises were made. The study was cross-sectional, with most data collected in 1985 and some followup data obtained in 1986. A major investment was made to design primary data instruments and obtain indepth patient-level information. In exchange, the State, facility, and patient sample sizes were constrained. The procedures used in the analyses to compensate for the sample constraints are discussed later. Recommendations for future research suggested at the end of this article address some of these issues again.

Study States

The costs of extensive primary data collection limited the number of study States to seven, although supplemental information was obtained on additional States. Maryland, Ohio, and West Virginia were selected to represent case-mix States; Colorado and Florida, the facility-specific States; and Texas and Utah, the class-rate States.

The three case-mix States comprised three of the four case-mix systems in operation when the States were selected in 1984. The remaining case-mix State, Illinois, was undergoing significant system changes and therefore was not included. Maryland's system uses case-mix information to set patient-specific rates by service, whereas Ohio and West Virginia use case mix to set ceilings on facility average payment rates. Maryland and West Virginia establish payment rates prospectively, and Ohio, retrospectively.

As noted earlier, most States used facility-specific systems at the time of the study (and currently). This was thus the most difficult payment system category to represent with only a few study States. After an extensive selection process, Colorado and Florida were chosen to represent the facility-specific category. To reduce variability among facility-specific payment systems in the study, the inclusion criteria were narrowed to States that set rates prospectively based on facility average costs up to ceiling amounts, treated the direct patient care cost category separately (such as with a higher ceiling), and included efficiency incentives. It was felt that Colorado and Florida provided a limited but reasonable cross section of States meeting these criteria.

In contrast to the large number of facility-specific States, only six had class-rate methodologies during the selection period. The two States ultimately selected were Texas and Utah. (Texas subsequently adopted a case-mix payment system, but not until 1989 after the study was completed.) These States were similar in that they paid fixed rates by patient level of care (intermediate or skilled).

Table 1 presents selected characteristics for the seven study States and the Nation. Although the data pertain to

Table 1
Descriptive characteristics of the study States and the Nation, by selected years: 1981, 1983-86

Characteristic	Case-mix systems				Facility-specific systems		Class-rate systems	
	Nation	Maryland	Ohio	West Virginia	Colorado	Florida	Texas	Utah
Percent of population 65 years or over (1984)	11.6	10.3	11.9	13.1	8.8	17.6	9.5	7.7
Nursing home beds per 1,000 population 65 years of age or over (1985)	52.4	51.4	63.3	28.3	63.1	24.0	66.2	44.1
Nursing home beds per 1,000 Medicaid recipients 65 years of age or over (1986)	590	534	812	358	516	413	461	772
Number of certified nursing homes (1984)	13,326	174	856	74	173	306	976	80
Percent of certified nursing homes by ownership status (1981):								
Profit	70.2	67.2	82.2	63.5	65.9	74.2	89.7	81.3
Government	7.9	6.3	3.7	8.1	9.8	4.9	1.5	11.3
Other non-profit	21.9	26.4	14.0	28.4	24.3	20.9	8.8	7.5
Medicaid nursing home recipients in thousands (1983):								
Skilled nursing facility	573.5	0	31.9	0	5.0	13.1	7.1	0.6
Intermediate care facility ¹	792.7	18.2	26.6	9.1	9.7	24.9	72.3	4.0
Medicaid nursing home days of care in millions (1983):								
Skilled nursing facility	123.1	0	8.36	0	1.05	1.98	1.11	0.07
Intermediate care facility ¹	201.2	4.68	7.71	1.48	2.59	5.90	19.48	1.08
Average Medicaid rate per patient day (1985):								
Skilled nursing facility	\$51.73	\$51.72	\$46.54	\$63.98	\$38.54	\$44.29	\$41.16	\$47.38
Intermediate care facility	41.65	51.72	40.62	42.93	38.54	44.29	30.73	39.15
Weighted ²	45.48	51.72	43.70	42.93	38.54	44.29	31.29	39.68

¹Excludes Medicaid recipients and days of care in intermediate care facilities for the mentally retarded.

²Weighted rates were calculated using 1983 data on Medicaid nursing home days by level of care presented in this table.

SOURCES: (Ruther, et al. 1987); (Howe and Terrell, 1987); (Harrington, Swan, and Grant, 1988); and (Institute of Medicine, 1986).

the early to mid-1980s, the values for most of the variables change slowly and were thus presumed to be relevant to the time period covered by the study. The table reveals considerable variation across the study States, which was taken into account, to the extent possible, through the use of multivariate statistical techniques. In addition, case studies (including site visits) were conducted for all study States and for three additional case-mix States (Illinois, Minnesota, and New York) in order to assess specific State features and their implications for interpreting the empirical results. (The case study findings for the six case-mix States are reported in Butler and Schlenker, 1989.)

Samples and data collection

Stratified random samples of facilities and patients were selected for primary data collection. In each State, a "basic-facility sample" and an "urban-profit subsample" were obtained. As noted earlier, larger facility samples were desirable, but study resource constraints required a more limited approach. Therefore, the objective was to emphasize nursing home types that were both highly prevalent and highly responsive to payment system incentives. This led to both stratification and the exclusion of certain categories of nursing homes. A stratified random sample in each State was selected, using the four cells created by the two dimensions of profit or non-profit ownership (excluding government facilities)

and urban or rural location (urban areas were defined as standard metropolitan statistical areas).

The urban-profit cell was judged to be the most important. Urban-profit nursing homes represent the predominant category of nursing homes and were expected to be the most responsive to payment system incentives. Freestanding, non-government general care facilities were selected, and further selection criteria included a bedsize between 40 and 240 beds, and a relatively high occupancy rate (over 70 percent). Most sample facilities also had a fairly high percent of Medicaid patients (at least 50 percent). Once a State's universe of nursing homes meeting these criteria was identified, facilities were randomly selected until cell quotas were filled. The target was to obtain 20-25 facilities in all States but West Virginia. (Because of West Virginia's small universe, its target was 12-13 facilities.) Approximately two-thirds of the facilities were to be selected from the urban-profit cell, in order to provide reasonable degrees of freedom for this subgroup.

Random samples of 25-30 patients were selected from each sample facility, and most data were collected in 1985. All payer categories were included, with the requirement of a minimum of 10 Medicaid patients (the actual average was about 17 Medicaid sample patients per facility). Research team members trained nursing personnel in each facility (through on-site visits) to collect the patient-level data utilizing standardized protocols and data collection instruments developed for the study. The patient-level instruments obtained detailed

information on each patient's demographic characteristics, functional status, long-term care conditions, and services received.

The data collection instruments also were designed to capture the specific details necessary to allow patients in all seven study States to be classified under the Maryland, Ohio, or West Virginia case-mix systems. This was critical to the development of the study's rate simulation model of case-mix payment systems. The model utilized patient-level primary data to calculate the case-mix payment rate (adjusted for geographic wage rate differences) that would result for each patient under the Maryland, Ohio, and West Virginia systems. In addition, the data collection instruments were subsequently refined to allow sample patients in the study States to also be classified according to the then newly implemented New York and Minnesota RUG systems. (The necessary data were obtained in a followup data collection effort in 1986.)

To augment the patient-level data, facility-level questionnaires covering certification status, bed size, staffing, wage rates, service availability, and related items were completed by the administrator and director of nursing at each sample nursing home. Medicaid cost reports (audited whenever possible) and payment rate data (from State Medicaid agencies) also were obtained for each sample facility. Additional data on local area characteristics (primarily county data) were obtained from secondary sources.

The final basic sample included 135 nursing homes and 3,508 patients, of which 2,320 (66 percent) were

Medicaid patients. All States but Maryland met the target for total number of facilities (15 facilities participated in Maryland), and all States yielded the target number of urban-profit facilities. The subsample of urban-profit nursing homes included 91 facilities with 2,376 patients, of which 1,603 (67 percent) were Medicaid patients. Descriptive characteristics for both samples are presented in Table 2. Although the samples were not selected to be representative of the entire Nation, the sample facilities were broadly similar to national averages in terms of percent Medicaid patients, facility size (number of beds), and occupancy rate. For example, nationally in the mid-1980s, the percent of Medicaid patients was typically in the 60-70 percent range, occupancy rates were over 90 percent, and facility size averaged around 100 beds (National Center for Health Statistics, 1988; Sirrocco, 1988; Hawes and Phillips, 1986). Most sample values shown in Table 2 are similar to those national averages.

Statistical methods

Both patient- and facility-level analyses were used in this study. Two-sample tests of mean differences were the main technique for patient-level comparisons of case mix and quality across payment systems. These were two-tailed *t*-tests (with $p < 0.10$ used as the significance criterion), unless the Kolmogorov-Smirnov test indicated a significant ($p < 0.10$) departure from a normal distribution. In that case, a Wilcoxon test was used. Multivariate regression analyses (full model and stepwise approaches) also were used with both the patient and the

Table 2
Selected characteristics of the basic and urban-profit samples, by State: 1985

Characteristic	Case-mix systems			Facility-specific systems		Class-rate systems	
	Maryland	Ohio	West Virginia	Colorado	Florida	Texas	Utah
Basic sample							
Number of facilities	15	23	13	23	20	22	19
Number of sample patients:							
All payers	380	600	332	630	520	576	470
Medicaid	245	388	224	439	319	315	390
Ownership:							
Percent profit	87	87	85	83	80	73	95
Number of profit	13	20	11	19	16	16	18
Number of non-profit	2	3	2	4	4	6	1
Location:							
Percent urban	80	74	62	74	75	68	84
Number of urban	12	17	8	17	15	15	16
Number of rural	3	6	5	6	5	7	3
Average percent Medicaid ¹	64	65	65	67	61	66	64
Average bed size (number of beds)	123	101	89	119	122	104	89
Average percent occupancy rate	98	92	97	91	93	83	86
Urban-profit sample²							
Number of facilities	12	16	7	15	13	13	15
Number of sample patients:							
All payers	306	411	181	421	340	348	369
Medicaid	190	282	140	295	194	246	256
Average percent Medicaid ¹	62	68	71	82	57	67	67
Average bed size (number of beds)	128	99	99	135	131	115	87
Average percent occupancy rate	98	93	97	92	93	85	87

¹Percent Medicaid patient days in each facility, based on cost report data, averaged across the facility sample in each State.

²The urban-profit sample is a subsample of the basic sample.

SOURCE: (Schlenker, R.E., Stiles, J.D., Carlough, T., and DeVore, P.A., 1988.)

facility as the unit of analysis to take into account as many covariates as possible. At the patient level, regression analysis was used to include facility and State factors hypothesized to affect case mix and quality. Because the patient-level regressions yielded essentially the same results as the two-sample tests, only the latter are presented here. At the facility level, regression analysis was used to assess the associations between case mix and nursing home costs, Medicaid rates, and profits.

In several analyses, the case-mix rate simulation model mentioned earlier was also applied. For example, the model yielded a useful resource-use index based on case-mix measures. That index was used in the patient-level two-group case-mix analyses and in the facility-level regression analyses. The model was also employed to simulate the adoption of a case-mix system in the study's facility-specific and class-rate States.

Comparative analyses

Case mix

In theory, the financial attractiveness of a patient to a nursing home depends on the difference between the marginal revenue and the marginal cost associated with that patient. For most nursing homes, both private-pay and Medicaid patients are available and enter into the theoretical profit calculation. Scanlon (1980) showed the profit maximization mix of Medicaid and private-pay patient days assuming a fixed payment rate for all Medicaid patients (essentially a class-rate system with a single class) and a downward sloping demand curve for private-pay patients. Cotterill (1983) extended the analysis to include case mix. Based on such work, the main assumption in this study was that a case-mix system would make high-cost Medicaid patients relatively more attractive than they would be under facility-specific or class-rate systems. In the facility-specific system, the nursing home in essence receives only the past average cost of its patients; and under a prospective-rate approach, it is discouraged from admitting patients with costs above the average. Under a class-rate system, the nursing home receives only the fixed class-rate payment, which is likely to be less than the cost for the heavier care patients within each class. The assumption for this study therefore was that in most cases, the payment amount the nursing home would receive for a heavy-care Medicaid patient would be relatively greater (controlling for other factors) under a case-mix system than under the other two systems, particularly class-rate systems. The hypothesis, therefore, was that case-mix systems would have the most intense case mix, followed by facility-specific and then class-rate systems.

There also was interest in access differences across payment systems, particularly for high-cost Medicaid patients. Unfortunately, direct measures of access, such as the number of Medicaid patients awaiting nursing home admission, were either unavailable or unreliable. Therefore, the case-mix findings were used as suggestive of possible access differences across payment systems.

The original analysis plan was to pool the patients for each payment system. Case mix was generally similar for the three case-mix States and for the two class-rate

States, but it differed significantly between the two facility-specific States. Although the results using pooled samples were consistent with the above hypothesis, pooling was considered inappropriate, because the averages for facility-specific systems did not reflect the case mix pertaining to either facility-specific State. Thus, pairs of States were compared: each case-mix State with each of four other States (12 comparisons).

Many patient-level case-mix variables were analyzed in order to identify broad patterns rather than to concentrate on single-variable differences. These included activities of daily living (ADLs), several categories of long-term care problems (e.g., incontinence, shortness of breath, ulcerations, depression, confusion), and several indicators of patient-level resource use.

For these analyses, the resource-use measures were of greatest interest, because they translated case mix into expected care costs. The final resource-use measures were the RUG-I index, the three simulated case-mix payment rates, and the "average-rate ratio." The RUG-I index is based on the early work of Fries and Cooney (1985) and represents a rough indicator of resource use based primarily on ADLs. The Maryland, Ohio, and West Virginia simulated rates were derived from the study's simulation model. Although the three State rate amounts differed considerably from one another (primarily because each system translates case mix into payment rates somewhat differently), they were highly correlated, with pairwise correlation coefficients of .744 to .831 for the entire patient sample.

Because of the high correlations, a single consolidated rate variable was developed to measure the relative resource use for a patient compared with the average for the entire sample. Termed the "average-rate ratio," it was constructed by first dividing a patient's simulated case-mix rate under each system by the average rate for that system. The result was three ratios for each patient, which were averaged to obtain the average-rate ratio.

Table 3 presents ADL and resource-use averages for each State's Medicaid urban-profit patient sample and presents the results of the pairwise comparisons between each case-mix State and the four non-case-mix States. (Results for the entire facility sample were similar, but the urban-profit facilities were expected to be most responsive to payment system incentives.) As measured by the ADLs and resource-use measures, the three case-mix States had a more intense case mix than Colorado, Utah, and (usually) Texas. In contrast, case-mix intensity was usually significantly lower for Maryland and Ohio than for Florida and showed no significant difference for West Virginia compared with Florida. Although not definitive, the results suggest that the case-mix States had greater case-mix intensity than the class-rate States. The results were mixed for the case-mix compared with the facility-specific States.

Patient-level regression analyses (not shown) incorporated other factors that might affect case-mix differences among States and nursing homes, such as nursing home bed supply. Although such variables increased the explanatory power of the regressions, the results suggested the same case-mix pattern among States as did the two-sample tests.

In assessing these results, two questions that arise are whether case mix was already higher in the case-mix

Table 3
Comparison of case-mix systems with facility-specific and class-rate systems, by case-mix and resource-use measures: 1985

Case-mix and resource-use measures	Case-mix			Facility-specific		Class-rate	
	Maryland	Ohio	West Virginia	Colorado	Florida	Texas	Utah
Sample sizes¹							
Number of Medicaid patients	190	282	140	295	194	246	256
Activities of daily living (ADL) score (0-6) ²	4.82	4.61	5.12	4.10	5.08	4.39	4.16
H - Significance ³	CTU	CTU	CTU	—	—	—	—
L - Significance ³	F	F	—	—	—	—	—
Resources-use measures⁴							
RUG-I resource-use index	3.21	3.06	3.27	2.91	3.28	3.10	3.01
H - Significance	CU	CU	CTU	—	—	—	—
L - Significance	—	F	—	—	—	—	—
Maryland case-mix rate	\$15.62	\$15.38	\$16.12	\$14.43	\$17.34	\$16.27	\$14.55
H - Significance	CU	CU	CU	—	—	—	—
L - Significance	F	F	T	—	—	—	—
Ohio case-mix rate	\$25.56	\$24.35	\$25.09	\$22.66	\$26.12	\$22.98	\$23.46
H - Significance	CTU	CTU	CTU	—	—	—	—
L - Significance	—	—	—	—	—	—	—
West Virginia case-mix rate	13.23	13.22	13.91	12.46	14.32	12.77	12.52
H - Significance	CU	TU	CTU	—	—	—	—
L - Significance	F	F	—	—	—	—	—
Average-rate ratio	1.01	0.99	1.03	0.92	1.08	0.97	0.94
H - Significance	CU	CTU	CTU	—	—	—	—
L - Significance	F	F	—	—	—	—	—

¹The total sample included 1,603 Medicaid patients in 91 urban-profit nursing homes.

²The 6 ADLs are bathing, dressing, feeding, toileting, transferring, and mobility.

³The significance rows indicate for each case-mix State whether its mean value is higher (H) than or lower (L) than each non-case-mix State's mean, at a significance level of $p < 0.10$. Each State is represented by its first letter.

⁴The resource-utilization group, version 1 (RUG-I) index is from Fries and Cooney (1985); the Maryland, Ohio, and West Virginia case-mix rates are from the study's simulation model; and the average-rate ratio indicates each patient's resource use (relative to all sample patients) implied by simulated payment rates of the 3 case-mix systems combined. See text for details.

NOTES: CTU is Colorado, Texas, and Utah. TU is Texas and Utah. F is Florida. T is Texas. CU is Colorado and Utah.

SOURCE: (Schlenker, R.E., Stiles, J.D., Carlough, T., and DeVore, P.A., 1988.)

States than in the other States prior to their adoption of case-mix payment, and whether higher case mix is observed in case-mix States because payment is based on reported case mix and thus creates incentives for case-mix "inflation."

Prior data were unavailable to address the first question, but State officials and providers felt that case mix had increased because of the case-mix systems (Butler and Schlenker, 1989). To address the second question, the study design attempted to counteract possibly inflated case-mix reporting by using an assessment instrument developed specifically for the study and not one that determined payment in the case-mix States. Further, during data collection, it was emphasized that no comparison would be made of our data with the data used for payment determination.

The generally higher case mix in case-mix States, compared with most of the other study States, suggests better access in case-mix States for Medicaid patients with higher cost care needs. Those interviewed in the case studies also indicated that improved access was one of the goals of the case-mix systems, and most felt that the systems had succeeded (Butler and Schlenker, 1989). Improved access also was suggested as an outcome of Maryland's system by a recent before-and-after study (Feder and Scanlon, 1989).

In summary, the case-mix results point toward a greater responsiveness to intense case-mix patients under

case mix compared with class-rate systems, which may also signify better Medicaid access under case-mix systems. However, the Florida results suggest that facility-specific systems also can accommodate high case mix. Much therefore depends on the unique situation and policy objectives of each State. Case mix and access are thus important topics for further research, particularly as the newer case-mix systems evolve.

Quality

The study hypothesis was that quality among systems would decline from case-mix (highest) to facility-specific to class-rate systems. The clearest financial incentives pertain to the class-rate systems, where lower costs lead to higher profits, and one consequence of lower costs can be lower quality (for instance, if lower costs are achieved by reducing nursing staff hours per patient). However, this incentive may be mitigated by regulatory quality requirements or by a desire to attract private-pay patients.

For case-mix systems, it was hypothesized that the ongoing patient-assessment activities and emphasis on patient service needs for payment determination would encourage higher quality care. However, concerns also have been raised that by paying more for sicker patients and for the provision of costly services, case-mix systems may motivate nursing homes either to provide

unnecessary services (such as catheterization or ADL assistance, if the increased payment would exceed the increased costs) or to minimize rehabilitation and restorative efforts. Thus, lower quality in case-mix systems was also considered a possibility.

Expectations for quality under facility-specific systems also were mixed. The responsiveness of payment rates to average facility cost could facilitate the provision of more costly, higher quality care (particularly in order to attract private-pay patients). However, rate ceilings and the time lags associated with translating higher costs into higher rates under prospective payment are likely to dampen this incentive and discourage efforts to improve quality.

In this study, only limited aspects of quality could be examined. In particular, patient condition over time could not be assessed. The main quality analyses employed cross-sectional, patient-level measures obtained from the primary data, and several variables were modeled after key indicators of quality suggested by the Institute of Medicine Committee on Nursing Home Regulation (1986). The resulting variables pertained to incontinence, decubitus ulcers, psychotropic drugs, and physical restraints.

The two incontinence variables were the use of indwelling (urethral) catheters and symptomatic urinary tract infections (UTIs), both measured as proportions of incontinent patients (this was the assumed risk group for overcatheterization). Although some infections are unavoidable with catheter use, UTIs can result from poor catheter care; and a high UTI rate also may reflect catheter overuse (Smits, 1984).

Three ulceration variables were included. The first was the ulceration (decubitus ulcer) rate in the total patient sample (i.e., ulcer prevalence). To focus more directly on the population at risk, the second variable was the ulcer prevalence among chairfast or bedfast patients. Finally, as an indicator of preventive efforts, the third variable measured the proportion of non-ulcerated chairfast or bedfast patients receiving turning and positioning on a daily basis for more than half the prior month.

The two remaining quality variables were use of daily psychotropic drugs and daily physical restraints, both measured as proportions of all sample patients. The psychotropic drugs included hypnotics, sedatives, and tranquilizers. Restraints were defined as the application of physical restraints or protective devices ordered by a physician. Both variables should be interpreted cautiously as quality indicators. Psychotropic drugs can include nightly sleeping pills as well as neuroleptic drugs, and the use of such drugs is often appropriate. Also, physical restraints are sometimes considered necessary to reduce the danger of falls.

Table 4 presents the quality-related measures for the Medicaid patients in the urban-profit sample. For each quality variable, the table presents the rank, mean, and sample size (with non-missing data) for each State. The ranks range from 1 to 7, with 1 indicating the presumed highest quality. The mean values measure the proportion of each study State's patient sample (or specified at-risk subsample) with the indicated condition or receiving the indicated service. For all variables but turning and positioning, a lower mean value is assumed to reflect higher quality. The table also indicates the statistically

significant differences between each case-mix State and the four non-case-mix States. Because accepted standards of high- or low-quality values for the variables were unavailable, the analysis focused on relative differences across States as indicative of potentially higher or lower quality, without reference to absolute quality standards.

In general, relatively few statistically significant differences were found. The incontinence and ulceration comparisons indicate that Maryland and Ohio often had better quality values than the four non-case-mix States, and several of the differences were statistically significant. For the ulceration variables, Maryland's quality rankings were the highest of all study States. In contrast, West Virginia's catheter and ulceration rankings were lower than those of most other study States. Virtually no significant differences emerged for psychotropic drugs or restraints. Thus, no definitive quality patterns emerged across payment systems. However, only a few quality-related measures could be examined, and considerably more work on quality is needed, particularly on patient-specific outcomes and conditions over time.

Costs, rates, and profits

The levels of nursing home costs, Medicaid payment rates, and profits vary among States and facilities because of many factors. The main interest was in the association of case mix with costs, rates, and profits. The facility was the unit of analysis for these analyses. The main cost per day variable covered patient care costs—i.e., the costs associated most directly with patient care, primarily nursing staff (including aide) costs. (These costs typically represent 40 to 50 percent of total costs.) The data were obtained from Medicaid cost reports and adjusted to represent comparable cost items across States. The Medicaid rate and profit data could not be disaggregated to relate only to direct patient care. The Medicaid rate per day variable was thus the entire payment rate, covering all cost components. Profit was measured as the ratio of revenues to expenses, excluding both non-patient revenues (such as from cafeteria operations) and expenses that were classified as non-allowable for Medicaid reimbursement. In this way, an attempt was made to construct a uniform profit measure that would be reasonably consistent across States. It was not possible, however, to remove all sources of hidden profit, such as items that might be inappropriately "buried" in cost categories such as administration. Nevertheless, it is believed that the profit variable reflects relative differences among States and payment systems reasonably well.

Descriptive data on cost, rate, profit, and case mix for the sample facilities are presented in Table 5, with all financial variables adjusted for geographic input price differences. The cost and rate variables exhibit the same general pattern as shown earlier for the case-mix index (i.e., the average-rate ratio defined earlier), with higher average values for the case-mix States than for the class-rate States and mixed results for the facility-specific States. The descriptive data thus suggest an association of cost, rate, and profit with case mix.

Table 4
Comparison of case-mix systems with facility-specific and class-rate systems, by quality-related measures: 1985

Quality-related measures ¹	Case-mix ²			Facility-specific		Class-rate	
	Maryland	Ohio	West Virginia	Colorado	Florida	Texas	Utah
Incontinence							
Indwelling urinary catheter, incontinent (including catheterized) patients:							
Rank	2	1	5-6	3	4	7	5-6
Mean	0.08 H	0.05 H	0.20	0.09	0.18	0.30	0.20
Number	119	154	82	159	136	136	135
Symptomatic urinary tract infection, incontinent (including catheterized) patients:							
Rank	4-6	1	3	2	4-6	7	4-6
Mean	0.07	0.02 H	0.05	0.04	0.07	0.10	0.07
Number	119	154	82	159	136	136	135
Ulcerations							
Ulcerations, all patients:							
Rank	1	3	7	4-6	4-6	2	4-6
Mean	0.06 H	0.10	0.14	0.13	0.13	0.08	0.13
Number	190	282	140	295	193	246	256
Ulcerations, chairfast and bedfast patients:							
Rank	1	3	6	7	4	2	5
Mean	0.09 H	0.17	0.24	0.27	0.21	0.13	0.23
Number	93	98	67	102	107	130	107
Turning and positioning, non-ulcerated chairfast and bedfast patients:							
Rank	1	2	7	5	6	3-4	3-4
Mean	0.66 H	0.56	0.29 L	0.48	0.46	0.50	0.50
Number	85	81	51	73	84	113	82
Psychotropic drugs							
Daily psychotropic drugs, all patients:							
Rank	1-2	7	1-2	3	4-6	4-6	4-6
Mean	0.31	0.40	0.31	0.33	0.34	0.34	0.34
Number	190	282	140	295	194	246	256
Restraints							
Daily restraints, all patients:							
Rank	5	3	6	2	7	4	1
Mean	0.41	0.36	0.47 L	0.35	0.51	0.40	0.29
Number	190	282	140	295	194	246	256

¹For all variables except turning and positioning, lower means are presumed to reflect higher quality. Means are proportions of each State's Medicaid urban-profit sample or subsamples of "at-risk" patients.
²For each case-mix State, significance ($p < 0.10$) higher quality or lower quality mean values than at least two of the non-case-mix States are indicated by H or L, respectively.

NOTE: The total sample included 1,603 Medicaid patients in 91 urban-profit nursing homes.

SOURCE: (Schlenker, R.E., Stiles, J.D., Carlough, T., and DeVore, P.A., 1988.)

Table 5
Cost, rate, profit, and case-mix averages, by type of payment system: 1985

Cost, rate, profit, and case-mix averages ¹	Case-mix			Facility-specific		Class-rate	
	Maryland	Ohio	West Virginia	Colorado	Florida	Texas	Utah
Cost per patient day							
Patient care cost	\$20.41	\$21.59	\$20.70	\$17.89	\$22.00	\$15.64	\$15.66
Total cost	47.22	45.01	48.84	39.08	47.82	37.37	41.58
Medicaid rate per day	46.88	41.63	46.85	38.09	54.02	33.02	38.27
Profit (revenue-expense ratio)	1.08	1.07	1.03	1.06	1.04	0.95	0.86
Case-mix index (average-rate ratio)	1.00	1.01	1.09	0.94	1.06	0.97	0.93

¹All cost, rate, and profit variables were adjusted for geographic wage-rate differences.

NOTE: Data are based on Medicaid cost reports and State Medicaid rate data.

SOURCE: (Schlenker, R.E., Stiles, J.D., Carlough, T., and DeVore, P.A., 1988.)

Regression analysis was used to examine these relationships further.

The regression equations related each dependent variable (cost, rate, and profit) to case mix, quality, States and payment systems, area and market factors, and facility characteristics. Different associations between case mix and the dependent variables under each payment system were hypothesized. For the cost equation, case mix was hypothesized to relate positively to patient care cost per day under all payment systems. However, a stronger association was expected for the case-mix and facility-specific systems, because payment is closely linked to cost in such systems. The weakest association was expected for class-rate systems. In such systems, facilities with different cost structures are paid the same rates for the same proportions of skilled and intermediate patients. Although facilities then have a strong incentive to minimize costs, cost differences among facilities with the same case mix are still likely to emerge, because of differences in input prices, efficiency, emphasis on quality (perhaps to attract private-pay patients), and other factors.

For the Medicaid payment rate equation, it was recognized that many factors other than case mix affected each facility's total rate. The expectation was that the case-mix rate association would be strongest under case-mix systems, because of the direct link between case mix and a major portion of the rate. A weaker but still positive association was hypothesized for facility-specific systems (because case mix affects costs, which in turn affect future rates). The weakest association was expected for class-rate systems, although a facility's average payment rate would depend on its proportions of skilled and intermediate Medicaid patients and therefore should be positively related to case mix.

For the profit equation, weak case-mix associations were expected, because the number of factors affecting profit is even greater than the number affecting the Medicaid rate (for instance, factors characterizing the private-pay market are critical to a nursing home's profit). Therefore, this equation was specified only to detect broad underlying trends rather than to fully explain profitability. The hypothesis was that case mix and profit

would be negatively associated under class-rate systems because higher case mix within each patient-rate class implies higher costs but does not change revenues. For case-mix and facility-specific systems, no such association was expected, because rates are designed to vary with case mix (although less directly for the facility-specific systems).

Each regression equation was thus designed to allow for a different case-mix association with the dependent variable under each payment system, through the use of interaction terms between case-mix and payment system. The details of this analysis are presented in another article (Schlenker, to be published). Summary results are presented in Table 6 for the associations of the case-mix index and payment system interaction terms with the three dependent variables.

The cost equation accounted for about two-thirds of the variation in patient care cost per day ($R^2 = 0.661$). The regression showed a positive association between case mix and patient care cost per day under all payment systems (indicated by the positive case-mix index coefficient), with a weaker association for the class-rate system (indicated by its negative interaction coefficient) than for the other systems. The explanatory power of the Medicaid rate equation was, surprisingly, somewhat higher, with an R^2 of 0.760. The case-mix index coefficient was positive and marginally significant ($p=0.051$). However, the positive case-mix system interaction coefficient indicates a stronger positive association for the case-mix system than for the other systems. The profit regression equation had considerably lower explanatory power than the cost and rate equations, with an R^2 of only 0.358. The only significant case-mix variable was the class-rate interaction term, with a negative coefficient. This implies that case mix and profits were negatively associated under class-rate systems but were not associated under the other two systems.

Because the case-mix index in these regressions is derived from a sample of patients in each nursing home, additional measurement error is introduced. This situation tends to result in biased and inconsistent coefficient

Table 6
Case-mix and payment system regression results: 1985

Item	Patient care cost per day		Medicaid payment rate		Profit (revenue-expense ratio)	
	Coefficient	Significance	Coefficient	Significance	Coefficient	Significance
Dependent variable mean	19.000		42.071		1.016	
R^2	0.661		0.760		0.358	
Case-mix-related independent variables ¹						
Case-mix index (CMI) ²	12.307	< 0.001	4.913	0.051	—	—
Interaction of CMI with payment system						
Case-mix	—	—	6.977	< 0.001	—	—
Facility-specific	—	—	—	—	—	—
Class-rate	-4.482	< 0.001	—	—	-0.205	< 0.001

¹The results for only the case-mix-related variables are presented. For the complete equations, see Schlenker (to be published).

²The CMI is the average-rate ratio variable defined in the text.

NOTES: The sample included all 135 nursing homes. The regressions were estimated both as full models and using stepwise procedures, with essentially the same results. The stepwise results are presented here. All 3 interaction terms are listed, but in each case only 1 entered the final equation. (If all 3 were included in a full-model regression, the coefficients could not be estimated.)

SOURCE: (Schlenker, R.E., Stiles, J.D., Carlough, T., and DeVore, P.A., 1988.)

estimators, with asymptotic bias toward zero (Johnston, 1972). This suggests that the coefficient estimators in Table 6 may be understated (both positively and negatively), so that the true coefficients may actually be greater in absolute value than indicated in Table 6, which would strengthen the results just noted. However, the measurement error problem also argues for larger patient samples in future studies; in particular, it suggests obtaining a complete census of each nursing home for case-mix measurement.

Overall, these equations suggest that case-mix systems link the payment rate more directly to case mix than do the other systems and that both case-mix and facility-specific systems link cost more directly to case mix than do class-rate systems. Neither the case-mix nor the facility-specific systems associate profit with case mix; and profits appear to be negatively associated with case mix in class-rate systems, which may impede access for heavy-care patients.

Case-mix system analyses

As discussed earlier, a major component of this study involved a more detailed examination of case-mix systems. The growing interest in and adoption of such payment systems during the course of the study highlighted the importance of this topic.

Case-mix system comparisons

The objective of this analysis was to determine if several case-mix systems would assign similar relative payment amounts to a given patient population, despite differences in patient classification and payment methodologies. The Maryland, Ohio, and West Virginia "service-specific" approaches that were the focus of this study were compared with the newer "grouping" (i.e., RUG) methodologies implemented by Minnesota and New York while the study was in progress. The service-specific approaches were so denoted, because specific services (such as assistance with bathing, tube feeding, and skin care) form the basis of payment. The grouping approaches use broader categories of patient conditions and care needs (such as the need for special nursing care) as the payment basis. (Maryland actually uses elements of both approaches but is primarily a service-specific system.)

Under the service-specific approaches, a unique expected cost is associated with each patient, based on the patient's assessed service needs. In developing these systems, States used time studies and expert opinion methods to identify the amount of time required to perform each level of each service and the professional staff required to perform the service. This information was combined with wage-rate data to estimate the unit costs for each type and level of service. The unit costs are the basis of service-specific payment rates for

Table 7
Services used for case-mix reimbursement in Maryland, Ohio, and West Virginia

Maryland	Ohio	West Virginia
—	Personal hygiene ¹	Personal hygiene ¹
Bathing ²	—	—
Dressing ²	—	—
Eating ²	Eating or tube feeding	Eating or tube feeding
Tube feeding ³	—	—
Mobility ²	Mobility	Mobility
Incontinence or catheters ²	Incontinence or catheters	Incontinence Catheters
—	—	—
Turning and positioning ³	—	—
Decubitus care ³	Dressings and non-routine skin care	Dressings and non-routine skin care
—	Medications	Medications
Single injections	Injections	Injections
Multiple injections	—	—
—	Appliances or restraints	Appliances or restraints
Restraints	—	—
—	Enemas or douches	Enemas or douches
Suctioning or tracheostomy	Suctioning or tracheostomy	Suctioning or tracheostomy
Oxygen or aerosol (IPPB)	Oxygen or aerosol (IPPB)	Oxygen or aerosol (IPPB)
Colostomy, ileostomy, or ureterostomy	Colostomy, ileostomy, or ureterostomy	Colostomy, ileostomy, or ureterostomy
Intravenous and subcutaneous fluids	Intravenous and subcutaneous fluids	Intravenous and subcutaneous fluids
—	Behavioral or mental status	Behavioral or mental status
—	Habilitation ⁴	—
—	Specialized services	—
—	Physical therapy	—
—	Occupational therapy	—
—	Speech and/or audiology therapy	—
—	Psychological therapy	—

¹Personal hygiene in Ohio and West Virginia includes bathing, dressing, hair care, nail care, shaving, and dental care.

²All activities of daily living together are utilized in Maryland to categorize patients into light, moderate, or heavy-care classifications.

³These services are utilized to categorize patients into the Maryland heavy special-care classification.

⁴In Ohio, the habilitation service determines the patient's need for any of the 5 rehabilitation therapies listed next.

NOTE: IPPB is intermittent positive pressure breathing.

SOURCE: (Maryland, Ohio, and West Virginia regulations, as summarized in Foley et al. 1984.)

individual patients in Maryland and of facility average rate ceilings in Ohio and West Virginia.

Table 7 presents the different services covered by the Maryland, Ohio, and West Virginia systems in 1985. The three States' services are similar but not identical. For instance, the ADLs of bathing and dressing are separate services in Maryland but are included as part of personal hygiene in Ohio and West Virginia. In addition (not shown in the table), the individual levels of each service differ across systems. For example, mobility has two levels in Maryland (independent and dependent), three in West Virginia (independent, staff assistance, and completely dependent), and four in Ohio (no service, limited assistance, partial dependence, and total dependence).

Minnesota and New York implemented case-mix systems based on the grouping approach. To develop these systems, the States conducted studies of total patient care time (primarily nursing staff time), by patient, in a sample of nursing homes. The times were weighted by wage rates to derive an overall relative resource-use amount per day for each patient. Statistical and clinical procedures were then utilized to develop RUGs, which categorized patients into clinically meaningful groups that also had similar resource-use amounts within each group. (Schneider et al., 1988, developed the New York system; the Minnesota system is described in Grimaldi and Jazwiecki, 1987.)

The resulting Minnesota and New York RUG categories are broadly similar but also have several differences. For example, Minnesota has 11 groups and New York has 16. Also, although ADLs are important in both systems (as they are to the service-specific systems), the individual ADLs, their levels, and the cutoff points between groups vary. The clinical categories also differ. Minnesota utilizes functional, behavioral, special nursing, and neuromuscular categories; and New York uses rehabilitation, special care, clinically complex, behavioral, and reduced physical functioning. As a result of such differences, the resulting range of relative resource-use weights differs between the two systems. The highest Minnesota weight is 4.12 times the lowest weight, and the comparable New York ratio is 3.25.

The analytic question was whether, in view of all these differences, the resulting relative resource-use amounts would be at all similar for the same sample of patients. To compare the five systems, payment rates for Maryland, Ohio, and West Virginia and relative resource-use weights for New York and Minnesota were calculated for each patient in a subsample of 648 study patients in 23 urban-profit nursing homes in six study States (all but West Virginia), using data collected in 1986 (as a followup to the main study data collection of 1985). Although the absolute rates and weights differed among the five systems, they indicated the relative payment amounts among patients under each system.

Table 8 presents the resulting rate and weight correlations for the resource-use amounts of the five systems. The correlation coefficients were quite high (and significant at $p < 0.001$). As noted earlier for the 1985 patient sample, the payment rates for the three service-specific systems were highly correlated ($r = 0.763$ to 0.825 in the 1986 sample), as shown in

the first two columns of the table. The correlation coefficients of all three with each grouping system also were high ($r = 0.688$ to 0.747 with New York, and $r = 0.743$ to 0.800 with Minnesota), as shown in the last two columns of the table. (The New York and Minnesota weights also were highly correlated, with $r = 0.753$.) These correlations suggest general similarities in the estimated relative resource-use amounts under the five case-mix systems, despite their differences in classification categories. A similar finding for a comparison including the Maryland, Minnesota, and New York systems was obtained by Fries (1990) using a somewhat different approach.

The correlations in Table 8 suggest that despite the differences among the case-mix methodologies, the systems are broadly similar in terms of the relative resource amounts they assign. This suggests that States have significant flexibility in the design of classification systems for case-mix payment.

Specific service incentives

One concern with service-specific case-mix systems is that they may distort care by encouraging or discouraging the provision of specific services according to their profitability. Although this question could not be addressed definitively, some information on specific services was examined. First, differences in payment amounts were identified for specific services among the Maryland, Ohio, and West Virginia systems; and then it was determined whether actual service provision corresponded with the implied payment differences. (Although the financial incentives hinge on expected profitability rather than on payment amounts, our information suggested that the costs of service provision were similar across States, so that the payment amounts could be considered as reasonable indicators of relative profitability.) The analysis was exploratory and did not control for other factors affecting service use, such as regulatory constraints and patient conditions. The intent was to determine if major differences in the use of specific services could be found that might be directly linked to financial incentives. Such information could be of value to States considering case-mix systems, particularly for the design of quality assurance programs.

The results for two service areas are presented here, covering catheters and decubitus ulcer prevention and

Table 8
Correlation coefficients of resource-use amounts derived under 5 case-mix systems, by State system: 1986

State system	Ohio	West Virginia	New York	Minnesota
Maryland	0.763	0.825	0.688	0.800
Ohio	—	0.773	0.725	0.743
West Virginia	—	—	0.747	0.797
New York	—	—	—	0.753

NOTE: The sample was comprised of 648 patients in 23 urban-profit nursing homes in 6 States (all study States but West Virginia).

SOURCE: (Schlenker, R.E., Stiles, J.D., Carlough, T., and DeVore, P.A., 1988.)

Table 9
Per diem payment amounts¹ and use of selected services in 3 case-mix systems,
by State and type of service: 1985

Service	Maryland	Ohio	West Virginia		
Catheters	No separate service.	Included with incontinence. Bladder—catheter 5 or more days per month, payment of \$1.55. Bowel or bladder, no catheters, payment of \$1.74. Bowel or bladder, advance of need, payment of \$2.98.	Separate service. 15 days or less per month, payment of \$1.29. More than 15 days per month, payment of \$2.59.		
Ulcerations: Decubitus ulcer care	Separate service, payment of \$7.61 (for unavoidable ulcers).	Included with dressings. Ulcers, payment of \$3.88. Necrotic ulcers, payment of \$7.63.	Included with dressings, payment of \$2.59.		
Turning and positioning	Separate service, payment of \$1.91.	No separate service.	No separate service.		
		Statistically significant differences ³	Service use and problem prevalence ²		
			Maryland	Ohio	West Virginia
Catheters, incontinent patients		WV	0.08	0.05	0.20
Ulcerations: Turning and positioning in non-ulcerated chairfast or bedfast patients		WV	0.66	0.56	0.29
Ulcerations, all patients		MD-WV	0.06	0.10	0.14

¹All payment amounts were standardized for geographic wage-rate differences across States. In Maryland, the amounts are actual patient-specific payments; in Ohio and West Virginia, they are used in the calculation of facility average per diem ceilings.

²These data are repeated from Table 4 and represent sample proportions. The total sample included 1,603 Medicaid patients in 91 urban-profit nursing homes.

³Two-sample tests of mean differences were conducted; differences were considered significant if $p < 0.05$. If 1 State is listed, its mean was significantly different from both of the other States' means. If 1 State pair is listed, only that difference was significant.

NOTE: WV is West Virginia, and MD-WV is Maryland and West Virginia.

SOURCE: State regulations (Foley et al., 1984); (Schlenker, R.E., Stiles, J.D., Carlough, T., and DeVore, P.A., 1988).

care; additional service areas are included in the study report (Schlenker et al., 1988). As noted earlier, catheterization, while necessary in some instances (such as for a patient with outlet obstruction), can be overused to deal with chronic incontinence (Smits, 1984). At the same time, catheterization requires resources. The issue is whether additional payment to cover the cost of catheterization encourages catheter overuse. A similar dynamic pertains to decubitus ulcer care. It is costly, but ulcers can result from poor care, such as not turning and positioning immobile patients. High payment for ulcer care may thus become a "reward" for poor care.

Table 9 summarizes the payment structures for these services in the three case-mix States. Maryland did not pay separately for catheterization, but Ohio included catheterization in the incontinence service area and West Virginia treated it as a totally separate service. With regard to relative payment amounts, catheterization represented a potential increased payment in West Virginia. In Ohio, however, facilities actually received less for catheterized patients than for incontinent, non-catheterized patients, particularly those who were toileted in advance of need. Thus, Ohio attempted to shift incentives away from catheterization by explicitly recognizing the greater cost of incontinent patients who were not catheterized and who received toileting assistance.

As for ulcerations, Ohio and West Virginia recognized the extra cost of ulcer care but did not include turning and positioning as an extra cost service. Maryland encouraged turning and positioning by identifying it as a

separate service for payment. Maryland further encouraged preventive efforts by not paying for the care of ulcers that were judged by the quality-assurance agency to have been avoidable.

Considering these financial incentives independently of other factors, the highest catheter use was expected in West Virginia and the most turning and positioning in Maryland (which, if effective, should also lead to the lowest decubitus ulcer prevalence in Maryland).

The actual service distributions (Table 9) were consistent with these hypotheses. West Virginia had the highest catheterization rate, and the differences with both other States were statistically significant. Also as hypothesized, Maryland had the highest proportion of turning and positioning for non-ulcerated chairfast and bedfast patients. (Both Maryland and Ohio had significantly greater proportions than West Virginia, and the Maryland-Ohio difference was not statistically significant.) Maryland also had the lowest ulcer prevalence rate (the Maryland-West Virginia difference was statistically significant, and the other two differences were not).

These results are not conclusive regarding either the role of financial incentives in affecting service use or whether the high catheter or decubitus ulcer rates reflect poor quality. Nevertheless, the results suggest that financial incentives can affect service delivery, with both positive and negative quality implications. Such possibilities are important for policymakers to consider in the design of payment systems, particularly with regard to the linkages between quality assurance and payment.

Table 10

Mean rate changes generated by the case-mix simulation model, by State and case-mix level: 1985

State and case-mix level	Facility sample size	Mean non-case-mix rate	Mean case-mix rate	Mean change (to case-mix rate) ¹
Colorado				
Low case-mix ²	11	\$38.30	\$35.95	-\$2.35
High case-mix	12	37.90	40.06	2.16
Florida				
Low case-mix	10	53.59	51.24	-2.35
High case-mix	10	54.46	56.81	2.35
Texas				
Low case-mix	11	32.71	30.64	-2.07
High case-mix	11	33.33	35.39	2.06
Utah				
Low case-mix	9	38.30	36.08	-2.22
High case-mix	10	38.23	40.23	2.00

¹Within each State sample, the average changes were approximately budget neutral in that the average rate change for all facilities (not weighted by Medicaid patient days) was approximately zero.

²Low case-mix and high case-mix facility groups were derived for each State based on whether the facility was below or above the median case-mix index (average-rate ratio) for the State sample.

SOURCE: (Schlenker, R.E., Stiles, J.D., Carlough, T., and DeVore, P.A., 1988.)

Case-mix payment simulations

To examine whether the application of case-mix methodologies would alter the distribution of Medicaid payments among nursing homes, a consolidated version of the three service-specific case-mix methodologies was applied to the four non-case-mix States using the study's simulation model.

The average rate ratio variable (defined earlier) was used as the case-mix index, and the estimated patient care portion of each facility's rate was adjusted in accord with the ratio of the facility's index to the average index for the facility's State sample. The methodology was designed to be approximately budget neutral, so that the average simulated rate change for all facilities in each State's sample was zero. The model was not designed to precisely reflect any State's payment system or the exact changes that would occur if a case-mix approach were implemented. Rather, its objective was to illustrate the general direction of change that a generic case-mix approach would yield.

Table 10 presents the simulation results for the four non-case-mix study States. Each State's facility sample was divided into low and high case-mix groups, using the median case-mix index value for each State. In all four States, low case-mix facilities on average received rate reductions and high case-mix facilities received rate increases. Thus, it appears that case-mix payment would achieve a closer association between case mix and payment rates than the current systems. Similar results were obtained in the application of an earlier version of the simulation model to Connecticut (Adams and Schlenker, 1986).

Discussion

The following discussion draws on the study results presented here as well as on other information that has become available since the study's completion.

Payment system comparisons

Payment systems are complex, and each State is unique. It is therefore difficult to categorize payment systems on the basis of a few characteristics and to draw conclusions on the basis of a relatively few States. Nevertheless, the results of this study suggest the following summary observations.

The case-mix systems in this study tended to exhibit a more intense case mix than the class-rate systems. In case-mix systems, Medicaid payment rates and facility patient care costs also were more closely associated with case mix than in the other systems. These findings suggest that case-mix systems result in closer linkages between case mix, payment, and costs than do other systems. Case-mix systems thus also may remove some nursing home access barriers for heavy-care Medicaid patients. Although it is possible that the case-mix States in this study had a more intense case mix than the other States prior to their adoption of a case-mix approach, the site visit information suggests that improved access was a major objective of case-mix adoption and that the new systems generally resulted in increased nursing home case-mix intensity.

The two facility-specific States were quite different from one another, and this payment system category warrants further study with larger State samples. The high case mix for Florida suggests that heavy-care Medicaid

patients can be accommodated under a facility-specific system. Also, payment rate and facility cost were positively associated with case mix in the facility-specific States, although not as strongly as in the case-mix States.

The class-rate States had the lightest case mix, possibly indicating access barriers for Medicaid patients with high-cost care needs. This possibility of access barriers is increased by the finding of a negative association between profits and case mix for the class-rate systems, a relationship that was absent for the other systems. At the same time, however, the class-rate approaches have the advantages of administrative simplicity and generally lower payment rates.

The results for quality, although limited by the small number of available quality-related measures, indicated few differences among the three payment systems. The quality area, however, deserves extensive additional study, particularly as the nursing home reform provisions of OBRA 1987 are implemented. A more complete analysis of quality, for example, should include longitudinal data on nursing home patient cohorts under the different payment systems.

Although this study focused on the structure of payment systems rather than on determinants of rate levels, rate levels and payment system structures tend to be related and are likely to be jointly determined by State conditions and policy objectives. For example, class-rate systems tend to have low payment rates. Typically, the low-payment levels result from policy decisions, and the class-rate methodology is an administratively efficient way to implement such a policy. Analogously, a policy objective to pay rates more in accord with costs as reported by facilities tends to be associated with higher rates and a facility-specific approach. (However, in Colorado, a facility-specific State, rate and cost levels were not much different from those in the two class-rate States.) Finally, a policy objective to link payment to externally determined (rather than facility-determined) expected costs can lead to a case-mix approach. Payment rates for case-mix systems tend to be higher than those for class-rate systems, but they may be higher or lower than those for facility-specific systems (as illustrated by this study). Thus, although payment system structures and payment rate levels appear to be intertwined, States have considerable flexibility with regard to how they design payment systems to meet their objectives.

Program administration considerations also are important in comparing payment systems and were examined in the case studies. Case-mix systems tend to be the most complex and costly to administer, at least when first implemented, and class-rate systems are the least costly. However, the uniform resident assessment process mandated by OBRA 1987 will lessen the administrative cost differences among systems and will generate the type of data that can be used as the basis for a case-mix approach. Nevertheless, case-mix systems will still be more complex and costly than other payment systems. For example, more frequent resident assessments tend to be necessary for case-mix payment determination than to meet the OBRA requirements. Further, linking assessment information to ratesetting requires additional administrative mechanisms and resources.

Overall, the case-mix and facility-specific systems appeared to perform better than the class-rate systems in terms of most of the variables examined. The case-mix systems have additional advantages, such as tying rates more closely to case mix, but they also entail greater administrative cost than do the facility-specific systems. Thus, policymakers must carefully evaluate the strengths and weaknesses of alternative systems in light of State conditions and policy objectives. In such evaluations, the entire ratesetting methodology is important, including how non-patient-care rate components such as those covering administration and capital are determined (e.g., see the recent discussion by Holahan and Cohen, 1987). The results reported here concentrated on the direct patient care components of Medicaid nursing home payment.

Alternative case-mix methodologies

Case-mix systems vary considerably in both patient classification and ratesetting approaches. The two major patient classification approaches used to date are the "service-specific" approach and the RUG or "grouping" approach. The earlier case-mix systems use the service-specific approach, and the more recent systems use the grouping method. This study analyzed primarily the earlier, service-specific methodologies.

A major advantage of the service-specific systems is that they generate, in effect, a unique payment amount for each patient, based on the patient's assessed specific service needs. However, a major concern with the service-specific approaches is that they create incentives to allow patients to deteriorate or to overprovide services that yield higher profits. The RUG approaches attempt to reduce such potential incentives by minimizing the extent to which specific services are used as criteria for patient categorization. For example, higher payments for catheterized patients create incentives for possible catheter overuse; therefore, the RUG systems do not use catheterization as a grouping variable. Also, by using a relatively small number of clinically meaningful patient categories, RUG systems can facilitate program administration, care planning, and quality assurance. However, all systems rely heavily on determining residents' functional abilities and needs (ADLs), and these are subject to the negative incentives just noted. Both the service-specific and the RUG systems therefore require careful attention to the quality-of-care implications of their financial incentives (discussed in the next section).

Thus, both major case-mix classification methodologies have relative advantages. Although the current trend is toward the grouping approach, aspects of the service-specific methodology may warrant consideration, such as the ability to tailor payments to patients' individual service needs and the use of incentives to encourage or discourage the provision of specific services.

The manner in which case-mix information is incorporated into ratesetting differs significantly among the case-mix States, and States considering such systems thus have considerable flexibility in this regard. Rates can be prospective or retrospective, as well as patient-specific or facility average. The frequencies of patient assessments

and rate changes also provide a range of options. These and other ratesetting features strongly influence the actual outcomes of a payment system. Discussions of case-mix classification and payment methods that address some of these points in greater detail are provided by Rosko, Broyles, and Aaronson (1987) and by Hornbrook (1989).

Quality assurance

Quality assurance is critical to all nursing home payment systems. Many of the reform provisions of OBRA 1987 are designed to improve the quality of nursing home care, and the evolution of these changes should be carefully monitored. For instance, the law's requirements for resident assessments based on a uniform minimum data set can lead to the generation of longitudinal data systems useful for quality assurance.

From the perspective of this study, it is important that quality assurance be tailored to the specific incentives created by the payment system. For example, in class-rate systems, the incentive for nursing homes to minimize costs may lead to general underservice. In facility-specific systems, such incentives may pertain primarily to facilities at or near a cost ceiling or to heavy-care patients whose costs exceed the facility's payment rate. In case-mix systems, the incentives are to classify patients in those categories for which the difference between marginal revenue and marginal cost are greatest. These may be the heavy-care categories if the State has structured payment to encourage the placement of such patients, or other categories of patients and services may be the most attractive. To be optimally effective, quality-assurance programs should target those areas (patient types, facilities, and services) with the strongest financial incentives for poor quality care.

The site visits to all six case-mix States conducted as part of this study examined quality-assurance procedures and the linkages between quality assurance and payment systems. It was found that the States generally were aware of the adverse quality incentives created by case-mix payment and made efforts to counteract them (Butler and Schlenker, 1989). However, quality assurance and payment functions typically were not closely integrated, and more communication and coordination between State ratesetting and quality-assurance agencies appeared to be warranted.

In case-mix payment systems, the longitudinal data base resulting from the periodic resident assessments needed for case-mix payment can provide valuable quality-assurance information. For instance, patient cohorts can be followed over time to identify improvement or deterioration. Patient profiles by facility can be used as screens for possible further review by quality-assurance agencies. Also, if certain services are likely to be overused in response to payment system incentives, such services can be more closely monitored. New York, for example, has developed a quality-assurance approach along these lines termed the "New York Quality Assurance System" (Schneider et al., 1987).

Research suggestions

Important questions remain concerning nursing home payment systems, and new ones arise in the context of continuously evolving Federal and State policies. The trend toward case-mix payment, for example, is of major importance. Most of the new case-mix systems are based on RUG-type patient classification methodologies, but the incorporation of case-mix information in the ratesetting process varies considerably. The Multistate Demonstration, involving Kansas, Maine, Mississippi, and South Dakota (with additional components involving New York, Texas, and Nebraska) provides a major opportunity to assess several case-mix payment approaches in depth, including alternative linkages between payment and quality assurance.

To illustrate some case-mix system issues requiring attention, recent studies suggest that the relative absence of competition for nursing home patients in most markets (because of nursing home bed shortages) can adversely affect access and quality under case-mix as well as other payment systems (Nyman, Levey and Rohrer, 1987; Nyman, 1988). Questions also exist regarding the ability of case-mix systems to adequately adjust payment to changes in patient conditions (Rohrer et al., 1988) and at the same time to appropriately encourage rehabilitation therapy provision (Murtaugh et al., 1988).

Even with the increased interest in case-mix systems, facility-specific systems are still the predominant type. States are modifying and refining such systems, and the implementation of the OBRA 1987 requirements will affect all States. The access, quality, and cost-containment performance of evolving facility-specific systems thus deserves ongoing evaluation, as illustrated by the recent studies of Swan, Harrington, and Grant (1988) and Gohmann and Ohsfeldt (1990).

These and related issues call for the continued evaluation of payment systems. The many State approaches to Medicaid nursing home payment, quality assurance, and related issues provide a "natural laboratory" of alternative approaches and thereby provide important opportunities for fruitful future policy-relevant research. Larger samples are needed for such evaluations than were possible in this study. Although studies with larger State samples, such as those just cited, have relied on State-level data, facility-level and patient-level studies should become more feasible at reasonable cost as uniform national, computerized data become more available. For example, the minimum data set of resident assessment information mandated by OBRA 1987 potentially can become a valuable source of patient-level data for such studies.

In addition to larger samples, future evaluations will require longitudinal State, facility, and patient data. In particular, before-and-after studies of States changing their payment systems will be important. In such studies, facility behavior over time (e.g., with regard to admissions, staffing, payer mix, and related factors) can provide vital information on payment policy impacts.

Finally, longitudinal data on cohorts of patients can be used to assess the strengths or weaknesses of various systems in encouraging rehabilitation and improving the quality of life in nursing homes.

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