

Effect of Prospective Reimbursement on Nursing Home Costs

Andrew F. Coburn, Richard Fortinsky, Catherine McGuire, and Thomas P. McDonald

Objective. This study evaluates the effect of Maine's Medicaid nursing home prospective payment system on nursing home costs and access to care for public patients.

Data Sources/Study Setting. The implementation of a facility-specific prospective payment system for nursing homes provided the opportunity for longitudinal study of the effect of that system. Data sources included audited Medicaid nursing home cost reports, quality-of-care data from state facility survey and licensure files, and facility case-mix information from random, stratified samples of homes and residents. Data were obtained for six years (1979-1985) covering the three-year period before and after implementation of the prospective payment system.

Study Design. This study used a pre-post, longitudinal analytical design in which interrupted, time-series regression models were estimated to test the effects of prospective payment and other factors, e.g., facility characteristics, nursing home market factors, facility case mix, and quality of care, on nursing home costs.

Principal Findings. Prospective payment contributed to an estimated \$3.03 decrease in total variable costs in the third year from what would have been expected under the previous retrospective cost-based payment system. Responsiveness to payment system efficiency incentives declined over the study period, however, indicating a growing problem in achieving further cost reductions. Some evidence suggested that cost reductions might have reduced access for public patients.

Conclusions. Study findings are consistent with the results of other studies that have demonstrated the effectiveness of prospective payment systems in restraining nursing home costs. Potential policy trade-offs among cost containment, access, and quality assurance deserve further consideration, particularly by researchers and policymakers designing the new generation of case mix-based and other nursing home payment systems.

Keywords. Nursing home costs, Medicaid, cost containment

Prospective payment has been at the center of state efforts to control rapidly growing Medicaid nursing home expenditures. Between 1960 and 1982, nursing home expenditures grew faster than any other component of health care costs, with annual increases averaging 18 percent. Concern with rising nursing home expenditures reached critical proportions in the early 1980s as states faced serious budgetary constraints resulting from slow economic growth and reductions in federal support of Medicaid and other social programs. To reduce the rate of growth in Medicaid expenditures for nursing home care, states began modifying their nursing home payment systems and limiting nursing home bed supply. As modifications in federal law in 1980 gave them greater flexibility in designing Medicaid reimbursement policies, many states embarked on the development of prospective and other incentive-based nursing home payment systems. Although recent data suggest that the growth rate in nursing home expenditures has moderated (Cohen and Dubay 1990), important policy questions remain regarding the role of prospective payment in containing costs and its impact on equally important considerations of access to nursing home care and quality of care.

Before 1980, many states paid for nursing home care using retrospective, cost-based reimbursement systems. These systems were generally viewed as inflationary since homes that exceeded their interim target rate at the end of the year (usually set using the prior year as a base, adjusted for anticipated inflation) were paid the difference between their target rate and actual costs (usually up to a ceiling). Under such systems, homes had no incentives to limit their costs.

Prospective payment systems, in contrast, limit payment to nursing homes to rates set in advance, regardless of the actual costs incurred. Prospective rates are usually established by setting a base-

Support for this research was provided by the Health Care Financing Administration, Office of Research and Demonstrations. The views expressed are those of the authors and no official endorsement by the Health Care Financing Administration or the University of Southern Maine should be inferred.

Address correspondence and requests for reprints to Andrew F. Coburn, Ph.D., Associate Director for Research Programs and Associate Professor, Edmund S. Muskie Institute of Public Affairs, University of Southern Maine, 96 Falmouth Street, Portland, ME 04103. Richard Fortinsky, Ph.D. is Director, Center for Aging and Rehabilitation, and Catherine McGuire is Research Associate, both at the Edmund S. Muskie Institute of Public Affairs, University of Southern Maine; Thomas P. McDonald, Ph.D. is Associate Professor, School of Social Welfare, University of Kansas, Lawrence. This article, submitted to *Health Services Research* on May 3, 1990, was revised and accepted for publication on July 13, 1992.

year cost projected forward using an inflation index. Homes with year-end costs below their prospective rate are typically entitled to keep some or all of their "savings." Homes whose costs exceed their prospective rates are not entitled to any additional payment.

Prospective payment systems provide explicit financial incentives for nursing home owners and managers to operate in an efficient manner. The stringency of these incentives varies with the design of the system. For example, systems that adjust the cost base used to set rates to reflect facilities' actual costs are far less stringent than systems that do not provide for a rebasing of facility costs. Indeed, the former approximate the incentive structure of retrospective, cost-based systems.

Much of the research on nursing home costs has focused broadly on the determinants of nursing home costs and, more specifically, on the impact of reimbursement policies (Bishop 1980; Birnbaum et al. 1981; Cotterill 1982; Schlenker and Shaughnessy 1984; Holahan and Cohen 1987). Most studies have used national data to compare nursing home costs cross-sectionally under different reimbursement systems. These are most often categorized as retrospective, cost-based, flat-rate, or prospective reimbursement systems.

In general, the studies just mentioned have shown that different payment systems do affect nursing home costs, with the flat-rate and prospective systems associated with lower costs than the retrospective, cost-based systems. Cohen and Dubay (1990) recently examined the effects of nursing home ownership and Medicaid payment systems on costs, payer mix, and staffing using 1981 data on a sample of Medicare-certified facilities. They found that although facilities reimbursed under both prospective and flat-rate systems had lower costs than those reimbursed retrospectively, it appeared that those lower costs were achieved by decreasing case mix or lowering staffing levels, or both.

Although Cohen and Dubay's findings regarding the cost-containment effects of different Medicaid payment systems are consistent with the results of most other studies, the research to date is not entirely conclusive. For example, Holahan (1985) was unable to discern any consistent differences between costs in prospective and retrospective payment systems. Birnbaum et al. (1981) concluded that facilities operating under retrospective systems actually had lower costs than those under prospective systems. Meiners (1982) and Frech and Ginsburg (1981), on the other hand, found that flat-rate systems tended to produce the lowest costs and retrospective systems the highest. Harrington and Swan (1984) also found that facilities in states with

prospective payment systems generally had lower rates than those in states with retrospective payment methodologies.

The importance of ways in which facilities contain costs has become increasingly clear as concerns focus on the fact that homes may cut costs by admitting less debilitated patients, reducing staff, cutting other patient services, or otherwise reducing the quality of care. Work by Holahan and Cohen (1987) and Cohen and Dubay (1990) suggests that, faced with strong cost-containment incentives, homes are more likely to try to control patient-related costs over non-patient care expenses. This is not surprising, of course, given the fact that patient care costs usually represent over half of all noncapital nursing home costs.

MAINE'S NURSING HOME INDUSTRY

In July 1982, Maine implemented a Medicaid prospective nursing home payment system that replaced a retrospective, cost-based system in place since 1972. This prospective payment system was developed principally to control Medicaid nursing home expenditures, which had increased between 10 and 15 percent annually since 1978. Maine's new payment system was implemented shortly after a moratorium on new nursing home bed construction was enacted in response to a 50 percent expansion in beds between 1971 and 1978. By 1982, Maine ranked in the top one-third of states having the largest supply of nursing home beds, with 58 nursing home beds per 1,000 patients aged over 65. The state had 132 nursing homes representing approximately 8,900 beds.

Nursing home care in Maine is provided primarily in intermediate care facilities with over 95 percent of homes in Maine licensed as ICFs. The ratio of intermediate to skilled care beds (25:1) is among the highest in the nation. Over 90 percent of the nursing homes in Maine are for-profit facilities (which care for 80 percent of patients), with relatively few multilevel, hospital-based, and chain-affiliated homes operating in the state. Nursing homes in Maine have high occupancy rates (averaging 97 percent in 1982), with Medicaid as the predominant payer covering 80 percent of all patient days. In 1983, Maine's average per diem reimbursement rates for ICFs and SNFs (skilled nursing facilities) were among the highest in the country, exceeded by the rates of only seven other states (Health Care Financing Administration 1984).

MAINE'S PAYMENT SYSTEM

Maine's prospective reimbursement system contains both implicit and explicit incentives for nursing homes to contain costs. For an industry that is predominantly for-profit and derives a major source of its revenue from the Medicaid program (80 percent), the opportunity to earn a profit and the corresponding risk of incurring a loss constitute the major cost control incentive features of the prospective system (Coburn and Fralich 1984). Under the payment system, each intermediate care facility in the state is assigned a prospectively determined per diem rate based on its historical costs, for each day of care provided a Medicaid beneficiary. This rate consists of a fixed and variable rate component. Fixed costs (e.g., interest, depreciation) are a "pass-through" under the system. Variable costs include non-capital-related items such as salaries, food, supplies, fuel, and plant operation and maintenance.

Under the prospective payment system, each facility's variable costs are determined in a base year and trended forward using the skilled nursing facility market basket inflation forecast published by Data Resources, Inc. (DRI). If at the end of a facility's prospective year it has incurred costs that are less than its prospectively determined rate, it shares a portion of the savings with the Medicaid program. No retrospective adjustments are made for costs in excess of the prospectively determined rate. The prospective rate for the following year is obtained by applying the inflation factor to the previous year's rate minus the state's share of savings.

The proportion of the incentive payment that a facility retains is determined by the facility's cost per day relative to that of its peers; facilities with the lowest variable cost per day are entitled to receive the largest share of the savings, and facilities with the highest variable cost per day receive the smallest share of savings. To encourage facilities to accept Medicaid patients, a facility can increase its share of savings by an additional 10 percent by maintaining or increasing its percentage of Medicaid beneficiaries or by obtaining high occupancy and not decreasing its proportion of heavy care Medicaid beneficiaries.

The characteristics of Maine's nursing home industry and its Medicaid prospective payment system have potentially significant implications for our understanding of the payment system's impact on nursing home behavior and costs. On the one hand, the dominant position of the Medicaid program as a purchaser of nursing home care, combined with the predominantly proprietary nature of the industry, would lead us to expect that facilities would respond to the system's cost control and other features by reducing the rate of growth in their costs

over time. Exactly how cost savings would be achieved is not clear. In the absence of any specific prohibitions against reductions in patient care categories such as nurse staffing, the greatest concern is, of course, that cost savings might be achieved at the expense of quality of care.

Although Medicaid is the dominant purchaser of care, restrictions on the supply of nursing home beds combined with the effects of the new payment system would tend to counter the state's market dominance. As the supply of beds declines relative to demand, we would expect the market to become more of a sellers' market, with a potentially negative effect on access for Medicaid patients. A key question addressed in this article is whether the payment system's incentive features are sufficient to overcome these other, potentially competing market forces.

STUDY METHODS

The implementation of Maine's prospective payment system in July 1982 provided the opportunity to evaluate the impact of the system on costs, quality of care, and access to care for Medicaid patients. This article examines three questions addressed in this larger study: (1) How effective has Maine's nursing home payment system been in reducing the rate of growth in Medicaid nursing home costs? (2) What impact has prospective payment had on the cost structure of Maine's nursing homes? and (3) How do nursing homes perform under prospective payment?

To address these questions, we make use of six years of nursing home cost report data, as well as data on facility case-mix and quality of care to construct interrupted, time-series regression models estimating the effects of prospective payment and other factors on nursing home costs. The study uses a pre-post design with nursing homes operating under retrospective cost-based payment systems in the first three years (July 1979-June 1982) and under prospective payment systems in the final three study years (July 1982-June 1985). The intent of these analyses was to develop comprehensive analytic models to measure the effects of the change in reimbursement policy on nursing home costs, controlling for other known cost determinants, including facility characteristics, nursing home market factors, facility case mix, and quality of care.

MEASURES OF NURSING HOME COSTS

The cost and other variables employed in this study are summarized in Table 1. The principal dependent variable—total Medicaid allowable variable costs per patient day—represents the facility’s costs as defined and determined by Medicaid payment regulations and audit procedures. Component variable costs include nursing, other nursing (primarily nonsalaried patient care consultants), dietary, housekeeping, laundry, plant operation/maintenance, and administrative. Three aggregated cost components were also used, including patient care costs (nursing salaries, consultants, drugs); room and board costs (plant operation/maintenance, dietary, laundry, housekeeping); and administrative costs. All cost variables are expressed as cost per patient day and are based on audited data obtained from the Medicaid cost reports.

MEDICAID ACCESS

We use the variable “Medicaid share” representing Medicaid patient days as a percentage of total patient days to evaluate the effect of prospective payment on access to nursing home care for Medicaid patients.

INDEPENDENT VARIABLES

Three variables were used to estimate the effects of prospective reimbursement. The first, *STUDYR*, captures the time trend, including the effects of economic inflation and other potential factors not included in our model. A second dichotomous variable, *PR*, was constructed with a value of 0 representing the years when facilities were cost reimbursed and 1 for the years under prospective reimbursement. As used in our regression models, the *PR* variable measures the one-time intercept or constant effect of prospective reimbursement. That is, the coefficient for the variable *PR* represents the average decrease in costs under prospective reimbursement (in years 4, 5, and 6) compared to the costs projected from the first three years without prospective reimbursement. The addition of this variable alone to the equation indicates a one-time reduction in costs with no change in the rate of increase (slope) in subsequent years. An interaction or cross-product variable (*STUDYR * PR*) is used to capture changes in the rate of increase in costs over the study period resulting from the implementation of prospective reimbursement. The total impact of the payment system is calculated, therefore, using the following equation:

$$\text{Cost Impact} = PR + [PRYR * STUDYR]$$

Table 1: Study Variables

<i>Variable</i>	<i>Definition</i>
<i>Cost Variables</i>	
Total Medicaid allowable variable cost per patient day	Variable costs as defined by Medicaid regulations and audit procedures
Patient care cost per patient day	Aggregated patient care costs including nursing salaries, consultants, and drugs
Room and board cost per day	Aggregated room and board-related costs including maintenance, housekeeping, and dietary
Administrative costs per patient day	Aggregated administrative costs
Savings/Losses	Categorical variable (1 = savings; 2 = broke even; 3 = losses)
<i>Policy Variables</i>	
Study year (STUDYR)	Study year (1-6)
Reimbursement type (PR)	Dichotomous variable indicating type of reimbursement: equals 0.0 for years under retrospective, cost-based reimbursement (1-3) and 1.0 for years under prospective reimbursement (4-6)
Interaction term (PRYR)	Interaction variable: equals PR * STUDYR (1-6)
<i>Facility Characteristics Variables</i>	
Nursing home size (BEDSIZE)	Average number of ICF* beds per year
Type of ownership (OWNERSHIP)	Dichotomous variable: equals 0.0 if nonprofit; 1.0 if for-profit
Facility type (FACTYPE)	Dichotomous variable: equals 0.0 if ICF only; 1.0 if multilevel (i.e., SNF [†] and ICF)
Chain ownership (CHAIN)	Dichotomous variable: equals 0.0 if nonchain; 1.0 if chain owned/operated
Facility occupancy rate (OCC)	Total ICF patient days divided by total available ICF patient days (ICF beds × total number of days in cost report period) times 100
Medicaid share (MEDSHARE)	Medicaid ICF patient days divided by total ICF patient days
Facility case mix	Includes three measures: resource utilization group (RUG) score and two derived factors representing disorientation (behavior factor 1) and delusional behavior (behavior factor 2)

Continued

Table 1: Continued

<i>Variable</i>	<i>Definition</i>
Nursing intensity (NURSE) Quality of care	Total nursing hours per patient day Includes three variables: deficiency score based on survey deficiencies and two derived factors representing changes in ADL [†] and behavioral outcomes (quality factor 1) and use of restraints/presence of bedfast patients (quality factor 2)
Nursing home bed supply (BEDSUPPLY)	Nursing home (ICF) beds per 1,000 population 65 and over in market area

*Intermediate care facility.

†Skilled nursing facility.

‡Activities of daily living.

Other covariates included in the estimation models are described in Table 1.

Disentangling the effects of inflation from those of the payment system represented a serious challenge in this study. Our analyses are based on actual costs, unadjusted for inflation. As in similar studies (Coelen and Sullivan 1981), we decided that removing inflation would be inappropriate, particularly in our multivariate analyses, as this might actually limit the potential for detecting the effects of the payment system. By adjusting cost data for inflation, we introduce the possibility that we incorrectly attributed changes in the rate of growth in nursing costs to inflation when, in fact, they might have been due to the responses of nursing homes to the efficiency incentives provided by the prospective payment system. As indicated above, our time trend variable was designed to capture the effects of inflation and other unmeasured factors over the six years of the study.

ANALYSES

Analyses include both descriptive statistics by study year and multivariate regression analyses of the pooled, time-series/cross-sectional data. Regression analyses were performed on a final sample of 446 out of 762 observations.¹ Sample attribution is due to the fact that case-mix data were obtained only on a random sample of facilities.

Both ordinary least squares (OLS) and variance component estimation techniques were used to estimate the equations (Fuller and Battese 1974). OLS estimation of panel data yields unbiased, although

inefficient, coefficient estimates and, more importantly, the variance of the disturbance will be incorrect (Markus 1979). However, OLS estimation is both cheaper and more capable of using data for facilities that do not have cost reports for all study years. Because our variance component estimates did not differ from those generated by the OLS procedure, only the OLS results are reported here.

PROSPECTIVE PAYMENT AND NURSING HOME COSTS

Cost Trends

Descriptive analyses indicate a decline in the rate of growth in nursing home costs following the introduction of prospective payment. As indicated in Table 2, total variable costs grew by slightly more than 12 percent annually before the introduction of prospective payment. In the first year following implementation of the system, the rate of growth in total variable costs declined to 11 percent. Cost increases in the second and third year of the payment system were substantially lower, averaging 3.2 percent in year 5 and 4.7 percent in year 6. Similar patterns over the six-year period can be seen in patient care

Table 2: Average Costs per Patient Day and Annual Percentage Change by Study Year (All Facilities, Maine, 1979-1985)

<i>Cost Component</i>	<i>Study Year</i>					
	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>
Total Variable Costs*						
Mean	26.32	29.54	33.17	36.83	38.01	39.79
Percent change		(12.2)	(12.3)	(11.0)	(3.2)	(4.7)
Patient care costs						
Mean	13.52	15.49	17.61	19.57	20.44	21.85
Percent change		(14.6)	(13.7)	(11.1)	(4.4)	(6.9)
Room and board costs						
Mean change	9.60	10.89	12.21	13.17	13.31	13.60
Percent change		(13.4)	(12.1)	(7.9)	(1.1)	(2.2)
Administrative costs						
Mean change	2.44	2.45	3.00	4.16	3.93	4.15
Percent change		(0.4)	(22.4)	(38.7)	(-5.5)	(5.6)

*Component costs do not add to total variable costs due to exclusion of gift shop, personal purchases, and other miscellaneous expenses unrelated to the cost components.

and room and board costs with slightly lower increases in cost in year 4 and substantially smaller increases in years 5 and 6.

As indicated in Table 3, increases in total variable nursing home costs in the two years preceding implementation of the prospective payment system exceeded the rate of growth in the DRI index by 29.8 percent and 35.8 percent, respectively. The difference between the increases in total variable costs and the DRI index grew to 46.4 percent in the first year under prospective payment. In subsequent years, however, this trend is reversed, with total variable costs growing more slowly than the DRI index in year 5 and exceeding the index by only 14 percent in year 6. These data suggest a slowing of nursing homes costs, particularly in years 5 and 6 beyond what can be attributed to reductions in underlying inflation.

Regression Analyses

The effects of prospective payment on nursing home costs were tested in two separate sets of regression analyses. We first estimated restricted regression models consisting of the time variable (STUDYR), the prospective payment variable (PR), and the interaction term (PRYR). Because several of the covariates are hypothesized to be affected by prospective reimbursement, the restricted regression models (Table 4) are used to test the total (direct and indirect) effects of the prospective payment system on nursing home costs. We then run full regression models (Table 5), including the covariates described in Table 1.

Total Variable Costs. As indicated in Tables 4 and 5, the coefficients for the variables representing the effect of the prospective payment system are statistically significant in both the restricted- and full-model equations. Utilizing the coefficients for our PR, STUDYR, and PRYR variables in the manner described earlier, we estimated the dollar effect of the payment system. The results of the equations in Table 4 indicate an increased cost of \$0.23 per patient day in total variable cost per patient day in the

Table 3: Annual Percentage Change in Total Variable Costs Compared with Data Resources, Inc., Skilled Nursing Facility Market Basket Index (All Facilities, Maine, 1979-1985)

Category	Study Year (% Change)					
	1	2	3	4	5	6
Total variable costs (TVC)	-	12.2	12.3	11.0	3.2	4.7
DRI (Data Resources, Inc.) Index	-	9.4	7.9	5.9	4.5	4.0
Percent difference between TVC and DRI	-	(29.8)	(35.8)	(46.4)	(-40.0)	(14.0)

Table 4: Regression Results Relating Nursing Home Costs to Prospective Reimbursement, Restricted-Model Equation

Equation	Total Variable Costs		Patient Care Costs		Room and Board Costs		Administrative Costs	
	Coefficient	t-ratio	Coefficient	t-ratio	Coefficient	t-ratio	Coefficient	t-ratio
STUDYR	3.42	10.03****	2.04	10.29****	1.30	8.71****	0.28	3.38****
PR	8.07	4.10****	3.52	3.07****	3.99	4.64****	2.08	4.30****
PRYR	-1.96	-3.92****	-0.91	-3.14****	-1.09	-4.97****	-0.30	-2.42**
Intercept	22.82		11.45		8.30		2.06	
R ²	.42		.43		.26		.22	
F	181.34		192.57		88.42		73.57	
d.f.	3,762		3,762		3,762		3,762	

*p < .10; **p < .05; ***p < .01; ****p < .001.

Table 5: Full-Model Regression Results Relating Nursing Home Costs to Prospective Reimbursement

Explanatory Variables	Dependent Variables							
	Total Variable Costs		Patient Care Costs		Room and Board Costs		Administrative Costs	
	Coefficient	t-ratio	Coefficient	t-ratio	Coefficient	t-ratio	Coefficient	t-ratio
STUDYR	3.40	8.33***	1.96	7.33***	1.31	6.59***	0.43	3.24***
PR	5.57	2.53***	3.26	2.26**	2.93	2.73***	1.30	1.83*
PRYR	-1.48	-2.60***	-0.81	-2.16**	-0.89	-3.19***	0.24	-1.28
MEDSHARE	0.07	4.48***	0.03	3.13**	0.02	1.94**	0.02	3.15***
OCC	0.02	0.47	0.06	1.16*	0.00	0.00	-0.03	-1.77*
BEDSIZE	0.00	0.91	0.01	4.24***	0.00	-0.34	-0.01	-5.32***
OWNERSHIP	-6.64	-9.82***	-2.00	-4.53***	3.39	-10.29***	-0.77	-3.50***
CHAIN	-0.70	-1.43	-0.41	-1.28	-0.06	-0.27	-0.09	-0.56
FACTYPE	-0.44	-0.63	0.12	0.26	0.07	0.21	0.07	0.31
BEDSUPPLY	-0.05	-4.91***	-0.02	-2.79***	-0.02	-3.07***	-0.01	-4.09***
Case Mix								
RUG	1.80	0.65	1.50	0.83	1.18	0.88	-1.81	-2.02**
Behavior factor 1	1.51	1.55	0.98	1.54	0.52	1.09	-0.04	-0.14
Behavior factor 2	-0.20	-0.33	-0.61	-1.56	-0.14	-0.49	0.47	2.42***
Quality								
Quality factor 1	-0.12	-0.50	-0.13	-0.87	-0.07	-0.65	0.11	1.39
Quality factor 2	0.01	0.05	-0.04	-0.26	0.09	0.83	-0.03	-0.41
Deficiency	0.07	1.11	0.03	0.84	0.03	1.00	0.03	1.32
Intercept	15.93		1.16		7.08		4.77	
R ²	.68		.62		.54		.39	
F	37.33		28.27		20.41		11.28	
d.f.	16,280		16,280		16,280		16,280	

* $p < .10$; ** $p < .05$; *** $p < .01$; **** $p < .001$.

first year following implementation of the prospective payment system [$\$8.07 + (-1.96 * 4) = \0.23]. However, the model shows substantial declines in total variable costs per patient day of \$1.73 [$\$8.07 + (-1.96 * 5)$] in year 5 and \$3.69 [$\$8.07 + (-1.96 * 6)$] in year 6.

The inclusion of other explanatory variables in our full-model equations (Table 5) increases the effects of the prospective payment system variables in the first two years from \$0.23 to $-\$0.35$ [$\$5.57 + (-1.48 * 4)$] in year 4 and from $-\$1.73$ to $-\$1.83$ [$\$5.57 + (-1.48 * 5)$] in year 5. The full model decreases the effect of the payment variables in year 6 from $-\$3.69$ to $-\$3.31$. Overall, this model shows that, controlling for other factors, the prospective payment system reduced the rate of growth in nursing home costs by 5–10 percent in years 5 and 6. Both the PR and PRYR variables remain statistically significant in the full model.

The full-model equations predicting total variable costs improve our R^2 value to .68 from .42 in the restricted model.

Component Costs. The prospective payment variables are significant in both the restricted- and full-model equations predicting patient care and room and board costs. In the restricted-model equation (Table 4), the prospective payment variables are associated with a reduction in patient care costs in year 4 of \$0.12 [$\$3.52 + (-0.91 * 4)$]. This effect increases in years 5 and 6 with cost reductions of \$1.03 [$\$3.52 + (-0.91 * 5)$] and \$1.94 [$\$3.52 + (-0.91 * 6)$], respectively.

The effects of the PR and PRYR variables in the full-model equation (Table 5) are reduced, although they remain statistically significant. In year 4, we see only a negligible effect of the payment system variables with patient care costs increasing by \$0.02 [$\$3.26 + (-0.81 * 4)$]. The effects in years 5 and 6 are to reduce costs by \$0.79 [$\$3.26 + (-0.81 * 5)$] and \$1.60 [$\$3.26 + (-0.81 * 6)$].

The prospective reimbursement variables are also significant in predicting room and board costs in both the restricted- and full-model equations. The effects of the prospective reimbursement variables on room and board costs in the restricted-model equation ranged from $-\$0.37$ [$\$3.99 + (-1.09 * 4)$] in year 4 to $-\$2.55$ [$\$3.99 + (-1.09 * 6)$] in year 6. The effects in the full-model equation are somewhat larger than in the restricted equation in year 4 ($-\$0.63$ versus $-\$0.37$) and year 5 ($-\1.52 versus $-\$1.46$), and somewhat smaller in year 6 ($-\$2.41$ versus $-\$2.55$).

The coefficients for the PR and PRYR variables in equations predicting administrative costs are significant in the restricted-model equation but do not achieve significance in the full-model equations. In the restricted-model equation, the coefficients and the prospective pay-

ment variables indicate a significant relationship between the implementation of prospective payment and increased administrative costs in year 4 (\$0.88), year 5 (\$0.58), and year 6 (\$0.28). These effects are not significant, however, when controlling for other variables in the full-model equations.

The results of these models indicate a significant association between the implementation of Maine's prospective payment system and decreased growth in nursing home costs. Not completely clear, however, is the extent to which cost reductions were due to increased nursing home efficiency generated in response to payment system incentives or to reduced inflation. Although the time trend variable, *STUDYR*, removes some of the effects of inflation in this model, we cannot necessarily attribute all of the cost reductions to the effectiveness of the prospective payment system. Nevertheless, the findings strongly suggest that the prospective payment system contributed significantly to reducing the rate of growth in nursing home costs when compared with what they would have been under the previous retrospective cost-based payment system.

NURSING HOME PERFORMANCE UNDER PROSPECTIVE REIMBURSEMENT

One of the important objectives of this study was to examine how nursing homes have responded to the efficiency incentives in Maine's nursing home payment system and how those incentive features have affected facilities' financial performance. Facility performance in relation to the prospective payment system was measured by examining each facility's actual costs in relation to Medicaid reimbursed costs. A variable was created, "Savings/Losses," which categorized facilities according to whether they (1) earned savings (incentive payments) under the payment system; (2) "broke even" (payment \pm \$0.10 of cost per day); or (3) had allowable variable costs that exceeded their prospective rates (i.e., lost money). It is important to note that these are not measures of accounting profit and, therefore, that they cannot be used to determine the profitability of the industry. Rather, they are intended to indicate the responsiveness of facilities to the reimbursement incentives or the adequacy of Medicaid payments relative to facilities' actual costs, or both.

As indicated in Table 6, the majority of facilities either earned savings or broke even in the first three years of Maine's prospective payment system. The percentage of facilities with savings increased from 38.2 percent in year 4 to 63.9 percent in year 5. It declined somewhat in year 6, however, with half of all homes earning savings. Overall, half of all homes in the study earned savings over one or more of the first three years of the payment system.

Between one-quarter and one-third of all homes incurred losses under the prospective payment system over the first three years. Although the percentage of homes with losses declined somewhat in year 5 (from 38.9 percent to 28.7 percent), the percentage increased again in year 6 to 36.9 percent. Overall, slightly over one-third of all homes had variable costs in excess of their prospectively determined rates in the first three years. Analysis of the characteristics of facilities incurring losses (e.g., Medicaid share, size, occupancy rate, per diem cost in base period) yielded no significant findings. The percentage of facilities breaking even under the payment system declined over the three years from 22.9 percent in year 4 to 12.6 percent in year 6.

The magnitude of savings and losses during the first three years of the payment system is shown in Table 7. Over the three-year period, average facility savings per patient day (among those facilities that earned savings) declined from \$1.31 in year 4 to \$1.12 in year 6. Similarly, among facilities with losses, average losses declined during this period from \$2.33 to \$1.81 per patient day. Savings as a percentage of total variable costs declined during the three years from 3.6 percent in year 4 to 2.8 percent in year 6. Losses also declined as a percentage of variable costs from 6.3 percent in year 4 to 4.5 percent in year 6.

Table 6: Financial Performance of Nursing Homes under Prospective Reimbursement by Study Year (Maine, 1979-1985)

<i>Financial Performance*</i>	<i>Study Year</i>							
	<i>4</i>		<i>5</i>		<i>6</i>		<i>Total</i>	
	<i>N</i>	<i>%</i>	<i>N</i>	<i>%</i>	<i>N</i>	<i>%</i>	<i>N</i>	<i>%</i>
Achieved savings	50	38.2	78	63.9	52	50.5	180	50.6
Broke even	30	22.9	9	7.4	13	12.6	52	14.6
Incurred losses	51	38.9	35	28.7	38	36.9	124	34.8
Total	131	100.0	122	100.0	103	100.0	356	100.0

Chi-squared = 21.19; d.f. = -4; $p = .0001$

*See text for definitions of categories.

Table 7: Nursing Home Costs, Savings, and Disallowances per Patient Day under Maine's Prospective Payment System (Maine, 1979-1985)

<i>Cost Category*</i>	<i>First Prospective Year</i>	<i>Second Prospective Year</i>	<i>Third Prospective Year</i>
Variable costs per day			
Mean	\$36.83	\$38.01	\$39.79
Percent change	(11.0)	(3.2)	(4.7)
<i>N</i>	133	122	103
Medicaid reimbursement costs per day			
Mean	\$36.54	\$38.10	\$39.47
Percent change	(10.2)	(4.3)	(3.6)
<i>N</i>	133	122	103
Disallowance per day			
Mean	\$2.33	\$1.29	\$1.81
Percent change	—	(-44.6)	(40.3)
<i>N</i>	51	35	38
Disallowance as a percent of variable costs			
Mean	6.3	3.4	4.5
Percent change	—	(-46.0)	(32.4)
Savings per day			
Mean	\$1.31	\$1.39	\$1.12
Percent change	—	(6.1)	(-19.4)
<i>N</i>	50	78	52
Savings as a percent of variable costs			
Mean	3.6	3.7	2.8
Percent change	—	(2.8)	(-24.3)

*See text for definitions of categories.

The increases in financial losses in the third year raises important questions regarding the potential long-term effect of prospective payment. Clearly, facilities have had an increasingly difficult time earning savings in the first three years of the payment system. While losses under the system declined from the first to the second year, they increased rather dramatically in the third year. This suggests that facilities will have a diminished ability to earn savings in future years and, depending of the economic environment, may be more likely to incur losses. A continuing trend of greater losses, of course, would raise significant concerns about the impact of the system on the quality of care. Declining inflation adjustments during these three years, resulting from significant declines in the DRI SNF inflation projections used to set payment rates, was undoubtedly a contributing factor to the

losses in many homes that probably budgeted staff and other expenses using higher projections. In the third year of the payment system, for example, the average DRI index was 4.7 percent as compared with 6.5 percent the first year. We are unable to determine from these data whether these changes produced changes in nursing home operations that resulted in greater efficiencies, on the one hand, or in diminished quality, on the other. This issue is addressed further in the next section, which examines the response of facilities to changes in the payment system.

NURSING HOME RESOURCE ALLOCATION

Among the important issues addressed in this study is the response of nursing homes to changes in Medicaid payment policies and, specifically, to the efficiency incentives embodied in those systems, and the possible effects of changes in the cost structure on quality of care. Based on study findings that indicated a significant decline in the rate of growth in nursing home costs after the implementation of Maine's prospective payment system, we sought to determine how nursing homes controlled their costs to achieve such declines. In particular, we were interested in whether or not homes sought to control costs through reductions in patient care or non-patient care areas. This question is particularly important given concerns that cost reductions under prospective payment systems may come at the expense of quality of care.

To assess the decisions of nursing home owners and administrators in choosing to restructure their operations in response to prospective payment, we examined trends in the proportion of total costs represented by each cost category. As indicated in Table 8, patient care costs increased during the study period from 51.4 percent of variable costs in year 1 to 54.9 percent in year 6. Nursing costs, as a share of total costs, remained unchanged over the study period. Analyses of trends in nursing hours per patient day (not shown) indicate no change over the study period.

In contrast, the figures for room and board costs indicate that nursing homes attempted to achieve efficiencies in this area, with costs during the study period generally decreasing as a percentage of total variable costs. This is the only cost category in which a trend appears to have followed implementation of the prospective payment system. This trend is specifically reflected in a decline in dietary costs, laundry

Table 8: Component Costs as Percentage of Variable Costs by Study Year (All Facilities, Maine, 1979-1985)

Cost Category	Study Year					
	1	2	3	4	5	6
	Percent of Variable Costs Per Patient Day					
<i>Patient Care</i>						
Mean	51.4	52.4	53.1	53.1	53.8	54.9
Percent change	—	(1.9)	(1.3)	(0.0)	(1.3)	(2.0)
<i>Nursing</i>						
Mean	46.5	47.0	47.2	46.9	47.8	47.9
Percent change	—	(1.1)	(0.42)	(-0.64)	(1.9)	(0.21)
<i>Room and Board</i>						
Mean	36.5	39.9	36.8	35.8	35.0	34.2
Percent change	—	(1.1)	(-0.27)	(-2.7)	(-2.2)	(-2.3)
<i>Dietary</i>						
Mean	18.8	18.8	18.6	18.4	18.2	17.5
Percent change	—	(0.0)	(-1.1)	(-1.1)	(-1.1)	(-3.8)
<i>Laundry</i>						
Mean	3.8	3.9	4.1	4.1	3.9	3.8
Percent change	—	(2.6)	(5.1)	(0.0)	(-4.9)	(-2.6)
<i>Housekeeping</i>						
Mean	5.2	5.3	5.1	5.2	5.3	5.2
Percent change	—	(1.9)	(-3.8)	(2.0)	(1.9)	(-1.9)
<i>Plant/Maintenance</i>						
Mean	9.7	9.7	9.5	8.6	8.2	8.0
Percent change	—	(0.0)	(-2.1)	(-9.5)	(-4.6)	(-2.4)
<i>Administration</i>						
Mean	9.3	8.3	9.0	11.3	10.3	10.4
Percent change	—	(-10.8)	(8.4)	(25.6)	(-8.8)	(0.97)

costs, and plant operation and maintenance costs over the study period. In the case of plant operation and maintenance, for example, costs remained relatively stable during the first three years of the study but declined as a percentage of variable costs in all three years following implementation of the prospective payment system. Similar, though less dramatic, changes are evident in the dietary cost category where dietary costs decreased from 18.6 percent of variable costs in year 3 to 17.5 percent in year 6. The large one-time increase in administrative costs as a percentage of variable costs in year 4 (25.6 percent) was the result of the elimination under prospective payment of an administrative cost ceiling that had been in place under the state's retrospective cost-based system. Restricted- and full-model equations predicting patient care, room and board, and administrative costs as a percentage of total variable costs indicated no significant trend over the

six-year period in the distribution of costs across cost categories and, consequently, no significant payment system effect.

Maine's prospective reimbursement system does not limit the ability of nursing home operators to earn savings in areas related to patient care, and this raises concerns that homes may attempt to cut costs at the expense of patient care. On the one hand, our findings indicate no significant changes in patient care or nursing costs as a percentage of total variable costs, suggesting that facilities have not attempted to achieve efficiencies and cost savings in these areas. On the other hand, the decline in dietary costs as a percentage of total variable costs in year 6 is potentially disturbing given the importance of food services for the overall quality of patient care. It is important to note, however, that while a decline in dietary costs and services could jeopardize quality of care, it could also indicate efficiencies gained through bulk/joint purchasing arrangements that would not be expected to affect quality. Distinguishing between efficiency and quality changes—something we could not do in this study—represents a critical problem warranting further study.

ACCESS TO CARE FOR MEDICAID PATIENTS

To assess the effectiveness of the payment system's access incentives in counterbalancing the system's cost-containment effects, we examined trends in Medicaid patient days as a percentage of total patient days (Medicaid share). As shown in Table 9, descriptive trends indicated a decline in the Medicaid share of patient days following the introduction of prospective payment—from 80.2 percent in year 3 to 75.9 percent in year 6.

To test the significance of this decline and the effect of our prospective payment variables, we estimated both restricted- and full-model equations predicting Medicaid share (Table 10). The results indicated only a weak relationship between prospective reimbursement and Medicaid share. None of the reimbursement variables was significant in the restricted model.

Nevertheless, the large decline in Medicaid share in year 6 is provocative, suggesting a trend of declining Medicaid access as the nursing home market adjusts and responds to Medicaid's new cost constraints. On a more conclusive note, these findings demonstrate the ineffectiveness of the payment system's special bonus incentives for increasing Medicaid share. Although a small number of individual

Table 9: Percent Medicaid Patient Days, by Study Year
(All Facilities, Maine, 1979–1985)

<i>Medicaid Patient Days</i>	<i>Study Year</i>					
	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>
Mean (percent)	79.8	80.4	80.2	78.8	78.1	75.9
Percent change		0.8	-0.2	-1.7	-0.9	-2.8
<i>N</i>	133	139	136	133	122	103

Table 10: Regression Results Relating Medicaid Share to
Prospective Reimbursement (All Facilities, Maine, 1979–1985)

	<i>Coefficient</i>	<i>t-Ratio</i>
Restricted-Model Equation		
STUDYR	0.20	0.21
PR	4.85	0.90
PRYR	-1.59	-1.16
Intercept	79.77	—
$R^2 = .004$		
$F(3,762) = 2.207$		
$N = 766$		
Full-Model Equation		
STUDYR	0.46	0.53
PR	7.12	1.41
PRYR	-2.11	-1.64*
Intercept	40.55	—
$R^2 = .15$		
$F(9,756) = 15.482$		
$N = 762$		

* $p < .10$.

homes that earned savings also received bonuses for increasing their Medicaid share, these increases appear to have been outweighed by declines in Medicaid patient days in other facilities.

DISCUSSION AND CONCLUSIONS

This study has examined the effectiveness of reimbursement policy in general, and prospective payment in particular, in achieving the increasingly important objective of reducing the rate of growth in Medicaid expenditures for nursing home care. Findings indicate a decline in the rate of growth in nursing homes in costs following the

implementation of the Medicaid program's nursing home prospective payment system. Although, as mentioned before, changes in inflation during this same period no doubt had an effect that is difficult to separate out, comparisons of the annual per diem cost increases and growth in the DRI SNF market basket index following the implementation of the prospective payment system, suggest that the new payment system contributed to a decline in the growth in nursing home costs in Maine.

While it is important to know whether or not the rate of increase in average costs was slowed, it is equally significant to understand how cost constraints were achieved and the effect of those constraints on the financial stability of nursing homes. Were the incentives in Maine's prospective payment effective in producing operating efficiencies?

The results of this study suggest that in the initial years of the prospective payment system, immediate management responses produced significant changes in operating expenses. This is evidenced by the fact that in the first year of the payment system over half of all nursing homes in Maine experienced significant savings. In addition, there is evidence that nursing homes responded to the payment system by changing their management practices, particularly in the area of room and board where significant cost efficiencies appear to have been achieved.

By the third year of the payment system, however, the responsiveness to the system's incentives appears to have declined significantly, with fewer facilities achieving savings and more homes just breaking even or even incurring losses (as defined by a shortfall between facility costs and Medicaid payment rates). One potential explanation for this trend is the payment system's incentive and rate-setting provisions, which exclude from the future rate base that portion of a home's savings shared with the Medicaid program. This feature creates significant disincentives for facilities to attempt to seek efficiencies and earn incentive payments. The magnitude of the potential incentive payments that can be earned may also be significant in the decisions that nursing home administrators make in managing their facilities. The potential for earning significant dollar savings declined under Maine's prospective payment system as facilities experienced progressive declines in their inflation adjustments due to significant drops over the study period in the DRI index.

While the findings reported in this article demonstrate that reimbursement, and prospective payment systems in particular, can be effective in reducing nursing home costs, there is increasing concern that cost constraints may negatively affect the quality of patient care or

reduce access to nursing home care for Medicaid patients, or both. In Maine and other states where Medicaid is the dominant payer for nursing home care, both concerns are especially critical. Although a decline in dietary costs was the only potentially worrisome finding with respect to patient care quality, we are not sufficiently confident in our ability to measure quality of care in this study to conclude that quality has not been affected by the implementation of prospective payment.

Nor is it clear whether or not a decline in the percentage of Medicaid patient days is indicative of a definite trend of declining Medicaid market share and patient access. These results strongly suggest, however, that as Medicaid programs constrain nursing home payment rates over time, homes will seek to increase their private pay census at the expense of access for Medicaid patients. This is particularly true in markets with an artificially constrained bed supply – as is the case in Maine and many other states.

Recognizing that designing a nursing home payment system carries with it important trade-offs between the achievement of cost-containment objectives and the goal of assuring that Medicaid patients have access to quality nursing home care, many states have sought to develop case-based payment systems. These systems are intended to provide better integration of cost-containment and access, particularly for patients with heavy care needs, and quality incentives (Schlenker 1991). The results of this study suggest that these more explicit incentive features, which attempt to balance the potentially competing objectives of cost control, access, and quality, may be particularly important over time to ensure that Medicaid patients compete successfully with private patients for access to quality nursing home care.

ACKNOWLEDGMENTS

The authors acknowledge and appreciate the support and advice of Judy Sangl and Philip Cotterill, our project officers, and two anonymous reviewers. We are also grateful for the cooperation and assistance of the Maine Medicaid staff. We also wish to note the contribution of Julie Fralich of the Muskie Institute, University of Southern Maine, in the original design of this study. Karen Williams provided invaluable administrative support throughout the study.

NOTE

1. Total observations based on the following facilities in each study year are: 1 = 133; 2 = 139; 3 = 134; 4 = 131; 5 = 122; 6 = 103.

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