Effect of Medicaid Payment on Rehabilitation Care for Nursing Home Residents

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There is considerable interest in examining how Medicaid payment affects nursing home care. This study examines the effect of Medicaid payment methods and reimbursement rates on the delivery of rehabilitation therapy to Medicaid nursing home residents in six States from 1992-1995. In States that changed payment from prospective facility-specific to prospective case-mix adjusted payment methods, Medicaid residents received more rehabilitation therapy after the change. While residents in States using case-mix adjusted payment rates for Medicaid payment were more likely to receive rehabilitation than residents in States using prospective facility-specific Medicaid payment, the differences were general and not specific to Medicaid residents. Retrospective payment for Medicaid resident care was associated with greater use of therapy for Medicaid residents.

INTRODUCTION

Through payment and regulation, governments play an important role in the nursing home market. Public payers have substantial influence, accounting for the majority of nursing home revenues, with State-funded Medicaid Programs accounting for more than 70 percent of government nursing home expenditures (Centers for Medicare & Medicaid Services, 2004). Between 1990 and 1999, Medicaid expenditures for nursing home care rise from $24.1 to $38.9 billion (Centers for Medicare & Medicaid Services, 2004). During the same period, Medicaid Programs implemented new payment methods to slow the escalation of expenditures and improve incentives for delivery of appropriate services to residents with extensive care needs.

This study examines how the method by which Medicaid payment is determined affects the delivery of physical rehabilitation therapy. The high cost and prevalence of rehabilitation therapy, with its importance in facilitating residents' return to the community or at least to higher levels of functioning, make this an important treatment to examine. Between one-third and one-half of nursing home residents are admitted to nursing homes for rehabilitation therapy and it accounts for a substantial proportion of government expenditures (Liu and Manton, 1984; Murray et al., 1999). While resident need is certainly an important determinant of rehabilitation therapy, payment may also have considerable influence.

The present study uses longitudinal data to examine the effect of Medicaid payment systems on receipt of rehabilitation care for Medicaid residents. Different payment methods employed by Medicaid Programs in six States and changes in payment methods over time are used to distinguish within- and between-State differences in treatment

patterns with private-pay residents serving as a control group.

MEDICAID NURSING HOME REIMBURSEMENT

Medicaid Programs reimburse nursing homes for all required resident care, generally under a per-diem rate that is usually lower than rates paid by other payers. There exists a fourfold variation in Medicaid rates between the highest and lowest paying States (Harrington et al., 2000; Swan et al., 2001). With all else constant, higher reimbursement enables nursing homes to provide additional services. Whether facilities have a direct economic incentive to use additional reimbursements to provide rehabilitation therapy depends on the link between rehabilitation costs and the reimbursement rate as determined by the payment method.

State Medicaid Programs use one of four methods to set reimbursement rates: (1) retrospective cost-based (RCB), (2) prospective class or flat rate (PCL), (3) prospective facility-specific (PFS), and (4) prospective case-mix (PCM) adjusted payment. Each of these methods generates different incentives.

RCB payment pays for all reasonable costs. Under RCB, higher incurred costs are fully recouped by the facility and there are no payment restrictions for the delivery of rehabilitation to residents. Due to the relative generosity and lack of cost control associated with RCB, only Nebraska and Pennsylvania continued to pay retrospectively in the 1990s.

PCL fixes reimbursement rates for all Medicaid residents as the State average cost or the average cost within a class of facilities (e.g., hospital based and freestanding). Costs are calculated from a base year and adjusted for inflation. PCL payment provides an incentive to avoid residents requiring complex or rehabilitative care and to reduce high-intensity care for admitted residents (Reschovsky, 1996). By 1992, only California, Louisiana, and Oklahoma continued to use PCL payment. This study does not include data from these States.

PFS payment is a common method of payment for nursing homes. The number of Medicaid Programs using PFS increased from 15 in 1990 to 21 in 1998. Under PFS, reimbursement is equal to the facility's average costs from a prior year, adjusted for inflation in input prices. The cost year used to calculate the reimbursement rate (the cost rebase year) is typically between 1 and 3 years prior, though some States have rebase years up to 12 years prior. Under PFS, facilities may restrict access to costly treatments, such as rehabilitation, to keep average facility costs below the level used to calculate reimbursement.

To provide incentives for facilities to admit and provide care to more resource-intensive residents, Medicaid Programs introduced patient-based case-mix adjustment to prospective payment. The number of States with PCM payment increased from 14 in 1990 to 25 in 1996. PCM requires that residents be categorized based on their need for resources (primarily direct nursing care and other treatments). A resource-intensity index is associated with each category, representing the relative resources used caring for this type of resident. Typically, the reimbursement for a category of residents is calculated by multiplying the average reimbursement rate by this index. Under PCM, facilities whose residents have higher care needs receive higher reimbursement.

The effect of PCM on rehabilitation therapy depends on the extent to which rehabilitation costs are accounted for in the case-mix categorization algorithm. The resource utilization groups (RUG) case-mix measurement system (Fries et al.,

1994) is the most common case-mix adjustment method in Medicaid Programs and is used by all PCM States in this study. The RUG algorithm specifies reimbursement based on several criteria, including the degree of dependence in eating, toileting transferring, and moving on a bed; and the number of rehabilitation therapy types, the number of days of therapy, and the total weekly minutes of therapy. The algorithms used by most Medicaid Programs are prior versions of the RUG-III algorithm introduced for Medicare Part A skilled nursing facility care. RUG-based case-mix adjustment specifically provides additional payments for rehabilitation. Thus, RUG-based PCM payment is more restrictive than RCB, but less restrictive than PFS for reimbursing rehabilitation costs, and treatment under PCM should fall between RCB and PFS levels of care.

EMPIRICAL ANALYSIS

Previous studies of Medicaid payment methods found that nursing homes respond to different payment methods by adjusting admission patterns, staffing levels, and care costs (Cohen and Dubay, 1990; Grabowski, 2001; Norton, 1992; Reschovsky, 1996). However, these studies are limited to facility level analyses or small resident samples. We employ assessment data from all residents in six States over a 4-year period. We also compare the care provided to Medicaid and private-pay residents. Private-pay residents are a useful comparison group because access and treatment decisions are individually determined for each resident, based on resident need and market price while for Medicaid residents they are determined by resident need and payment policies for treatment. Wodchis (2004) employed a similar strategy to examine the effect of Medicare's prospective payment system (PPS)

payment on rehabilitation therapy. This approach assumes that nursing homes tailor their care to fit the payer type of residents; a hypothesis that we test.

The present research focuses on a particular component of direct care costs, namely physical rehabilitation therapy services. Therapies are high cost treatments, which should be provided differentially according to residents' diagnoses and functional status. However, little is known about the non-clinical determinants of rehabilitation treatment in nursing homes (Berg et al., 1997; Kosasih et al., 1998). Rehabilitation is sometimes considered an ancillary service. As such, not all States include rehabilitation services in the calculation of Medicaid reimbursement rates. To control for these differences, this study only examines residents in States that include ancillary therapy in the Medicaid reimbursement rates.

Data

The data represent all nursing home residents between 1992 and 1995 in Kansas, Missouri (1992 not available), New York, Pennsylvania, South Dakota, and Vermont. The choice of years and States for the current study was determined by the availability of nursing home resident assessments and the inclusion of ancillary therapy in State Medicaid reimbursement rates. Resident level data were obtained from the minimum data set (MDS)—resident assessment instrument for nursing homes. The MDS was mandated since 1990 for use as a resident assessment and care planning tool for all residents in U.S. nursing homes. The MDS contains more than 400 items related to resident functioning and treatments. Evaluations of the MDS provide evidence of its validity and reliability for research purposes (Hawes et al., 1995; Morris et al., 1997; Sgadari et al.,

1997). State-level Medicaid payment variables were obtained from a database that includes Medicaid reimbursement rates and payment methods. The latter data have been used to describe the U.S. nursing home industry (Harrington et al., 1997; Swan et al., 1993), to examine reimbursement rates and ancillary therapy (Swan et al., 2001), and to examine the effect of Medicaid reimbursement rates and methods on nursing home quality (Grabowski, 2001). Wage indices for metropolitan statistical and non-urban areas were obtained from CMS hospital wage index file and used to adjust for local price levels.

Facility characteristics were extracted from the online survey certification and reporting (OSCAR) file. The OSCAR database includes all nursing homes in the U.S. and is often used to measure provider and market characteristics (Harrington and Carrillo, 1999). Facility information was linked to MDS data assessments based on the Federal identification number.

Sample Selection

Residents in this study were admitted to nursing homes between January 1, 1992, and December 31, 1995. Residents were excluded if they were under age 65 (9 percent), if no payment source was specified on the assessment (3 percent), if key data items were missing (i.e., RUG-III case-mix variables, physical functioning, or cognitive ability) (3 percent), or if resident assessments could not be matched to OSCAR facility data (8 percent).

The admission assessment for each Medicaid or private-pay resident was selected. Residents with Medicare and other payment sources typically receive short-term post-acute rehabilitation care with limited duration of benefits. Thus, with the focus for the present study on Medicaid payment, private-pay residents are a better comparison group. On admission, the primary difference in Medicaid and private-pay residents is ability to pay for one's own care. The analyses also included variables to control for additional sources of resident heterogeneity. The final sample population of nursing home residents was 119,658.

Statistical Analyses

The empirical analyses were designed to determine the effect of Medicaid payment methods on the delivery of rehabilitation therapy to Medicaid residents in nursing homes. The basic empirical strategy was to examine the differences in use of rehabilitation therapy for Medicaid residents with each payment type (PCM, RCB, using PFS as a reference category). Two sets of empirical analyses were conducted. First, differences in rehabilitation therapy for Medicaid residents across payment systems were examined. Second, a differences-in-differences identification strategy was used to control for unobserved variables associated with State variation in rehabilitation use. In the latter analyses, private-pay residents were used as a within-State control group. Medicaid payment source (versus private pay) was identified with a dummy variable, as was the payment method used in each State. An interaction between Medicaid payment and the payment method identified differential treatment given to Medicaid residents under each payment method.

For each set of analyses, multivariate models were estimated for two dependent variables. First, a logistic regression explained the receipt of any rehabilitation therapy (versus none). Second, an ordinary least squares (OLS) regression estimated the number of minutes of weekly therapy (conditional on receipt of some therapy). Huber-White (Greene, 1999) robust standard errors were used to ensure that the

standard errors were not biased downward due to clustering of residents within facilities and States. The results of the regression analyses were used to predict the probability of rehabilitation therapy for residents under each payment method.

Dependent Variables

As previously described, this study examined physical and occupational rehabilitation therapy delivered to each resident. The MDS records the total number of days that the resident received each in the week preceding the assessment. With the exceptions of Missouri and Vermont (who used slightly abbreviated versions of the MDS) total weekly therapy time (in minutes) in the week preceding the assessment was also recorded. Two dependent variables were created. First, a dichotomous variable was created to indicate receipt of either physical or occupational therapy. Second, for those residents receiving therapy, a continuous variable was created as the sum of weekly occupational and physical therapy time. This sum was log-transformed to correct for skew.

Independent Variables

Payment source was identified from MDS admission assessments. Medicaid reimbursement rates and payment methods were identified for each State and year of the study. Medicaid payment methods were as shown in Table 1. There were 4, 7, and 12 State-year observations for RCB, PFS, and PCM payment systems, respectively. As some States changed payment method over time, we isolated these time-series effects from the cross-sectional effect arising from differences across States in payment methods.

Besides payment methods, State payment policies have other minor variations.

Table 1

Payment Methods Used by State Medicaid Programs: 1992-1995

State	1992	1993	1994	1995
Pennsylvania	RCB	RCB	RCB	RCB
Missouri	NA	PFS	PFS	PFS
Kansas	PFS	PFS	PCM[1]	PCM
South Dakota	PFS	PFS	PCM[1]	PCM
New York	PCM	PCM	PCM	PCM
Vermont	PCM	PCM	PCM	PCM

[1] Effective July 1, 1994.

NOTES: RCB is retrospective cost-based. PFS is prospective facility-specific. PCM is prospective case-mix. NA is not available.

SOURCE: Swan, J., Wichita State University and Harrington, C., University of California, San Francisco, 2002.

All States except South Dakota allowed adjustments to facility payment rates throughout the year. All States except Pennsylvania used ceilings[1]. There was some range in the lag in rebase years and State average Medicaid payment rates. All States used a medical-specific, market-level price index to adjust reimbursement rates from the rebase year. Such State-level characteristics were addressed in multivariate analyses by including State-level fixed effects (dummy variables).

Annual State average Medicaid reimbursement rates were used to identify the generosity of the Medicaid Programs. This is not the same as identifying the effect of a reimbursement rate on rehabilitation therapy. Because facility-specific reimbursement levels for rehabilitation therapy are related to facility-specific costs, facility-specific reimbursement would be endogenous to facility rehabilitation costs. Other researchers have used State average Medicaid rates (Grabowski, 2001), or two-stage approaches (Cohen and Spector, 1996) to develop instruments for exogenous reimbursement rates. Grabowski (2001) compared these two approaches and found that the effect of reimbursement on facility staffing was similar for both approaches.

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[1] All prospective payment States had ceilings: Kansas and South Dakota used 125 percent of the median; New York used 110 percent of the mean; Missouri used 120 percent of the median; and Vermont used 115 percent of the median.

Resident, Facility, and Market Level Controls

Facilities differ in their cost structures and capacities to provide rehabilitation therapy. Hence, measures of facility size, for-profit ownership, hospital-based (versus freestanding), and the proportion of Medicaid residents served were included in the analyses. Market level competition was measured by a transformed Herfindahl Index. (computed as one minus the sum of the market shares squared). With the transformed Herfindahl Index, the most competitive markets have values near one, while the least have values near zero. Consistent with prior research, we used the county as the market area and the number of beds to calculate the market share. The CMS market level wage index was used to measure area wage costs.

As rehabilitation therapy should be individually prescribed, we included a range of resident characteristics that have been identified with physical and/or occupational therapy in past research, including age, cardiac conditions (atherosclerotic heart disease, congestive heart failure, or other cardiac conditions), peripheral vascular disease, stroke, respiratory conditions, depression, terminal diagnosis, recent fall, hip fractures, resident resistance to care, and resident has a discharge plan. Functional impairment was measured using the MDS activities of daily living (ADLs) scale (Morris, Fries, and Morris, 1999), and cognitive impairment using the MDS cognitive performance scale (CPS) (Morris et al., 1994). Additional resident heterogeneity was identified with the RUG-III nursing case-mix index, which is based on resident need for care from nursing and aide staff. Unlike the overall case-mix index, it does not include adjustments for rehabilitation therapy (which would introduce endogeneity).

RESULTS

Table 2 summarizes receipt of therapy and therapy time for the study sample of nursing home admissions, grouped by payment method. The average Medicaid State reimbursement rates and rebase lag periods are also shown. As hypothesized, among Medicaid residents, RCB payment was associated with the highest prevalence and highest intensity of rehabilitation therapy, while PFS payment was associated with the lowest prevalence and the lowest intensity of rehabilitation therapy. The average Medicaid payment rate was also lowest under PFS. The average Medicaid payment rate was highest in PCM States, but so too was the rebase lag. Private pay residents were less likely to receive therapy than

Table 2

Rehabilitation Utilization and State Payment Statistics, by Payment Method: 1992-1995

Payment Source	N	Percent Receiving Therapy	Average Weekly Therapy Minutes[1]	Average Medicaid Rate	Average Rebase Lag (Years)
Medicaid					
RCB	15,342	47	252	$55.77	0.3
PFS	14,235	30	171	39.50	4.6
PCM	34,104	43	201	67.10	6.9
All Medicaid	63,681	41	216	58.20	4.8
Private-Pay	55,977	37	159	NA	NA

[1] Rehabilitation therapy minutes are based on residents who do receive therapy.

NOTES: NA is not applicable to non-Medicaid residents. RCB is retrospective cost-based. PFS is prospective facility-specific. PCM is prospective case-mix.

SOURCE: Wodchis, W.P., University of Toronto, 2006.

Medicaid residents except for Medicaid residents paid for by PFS (the most restrictive) payment. Of those receiving therapy, private pay residents received less therapy time than Medicaid residents under all payment methods.

Descriptive statistics for the study population are shown in Table 3. The prevalence of characteristics were as expected, with high prevalence of females, older residents, cardiac comorbidity, recent falls, and cognitive and physical impairment.

The large sample led to significant differences ($p<0.05$) between private and Medicaid residents for all characteristics except diagnosed depression. However, few of these differences were large. Notably, private-pay residents were slightly older than Medicaid residents and were nearly twice as likely to have a discharge planned. Given the observed differences in expected discharge, we further compared the prevalence of an expected discharge according to each Medicaid payment method and

Table 3
Prevalence of Payment, Facility, Market, and Resident Characteristics: 1992-1995

Independent Variable	Column Prevalence or Mean (S.D.)	
	Private Pay (N = 55,977)	Medicaid (N = 63,681)
Payment Method Percent		
Retrospective Payment State (RCB)	18	24
Prospective Facility-Specific (PFS)	43	22
Prospective Case-Mix (PCM)	39	54
State Percent		
Kansas	9	29
Missouri	29	16
New York	31	28
Pennsylvania	18	24
South Dakota	10	1
Vermont	2	2
Facility and Market Characteristics		
Total Beds	141 (114)	166 (164)
Percent For-Profit	46	47
Percent Hospital-Based	7	10
Percent Medicaid Residents	62	64
Market Competition	0.80 (0.22)	0.82 (0.19)
CMS Market Wage Index	0.96 (0.16)	0.99 (0.19)
Resident Characteristics Percent		
Male	31	28
Age 85 or Over	42	35
Cardiac Conditions	61	63
Stroke	16	18
Respiratory Conditions	12	14
Diagnosed Depression	11	11
Terminal or Cancer	11	10
Recent Fall	35	30
Hip Fracture	5	4
Cognitively Impaired (CPS=2,3,4)	47	45
Cognitively Dependent (CPS=5,6)	14	15
Physically Impaired (ADL=2,3,4)	60	59
Physically Dependent (ADL=5,6)	11	12
Resists Care	8	8
Discharge Planned Within 90 Days	28	15
Nursing Intensity (RUG-III Nurse CMI)	93	97
Length of Stay on Assessment (Days)	8.4 (5.1)	8.2 (4.6)

NOTES: CMS is Centers for Medicare & Medicaid Services. CPS is cognitive performance scale. ADL is activity of daily living. RUGs are resource utililization groups. CMI is cardiac mycardial infarction. S.D. is standard deviation.

SOURCE: Wodchis, W.P., University of Toronto, 2006.

found that discharge was planned for 16 percent of Pennsylvania residents (RCB), 26 percent of residents in PFS States, and just 10 percent of residents in PCM States.

Table 4 contains multivariate results for the Medicaid sample. Medicaid residents in States that changed to PCM payment from PFM payment were 1.44 times as likely to receive therapy and they received, on average, 41 percent more therapy time than Medicaid residents in States with PFS payment. Medicaid residents in States that used PCM payment throughout the study period also had higher likelihood of receiving therapy and received more therapy time compared with residents in States that used PFS payment, though only the therapy time result was significant. RCB was also significantly associated with more therapy time. The State average reimbursement rate had no significant association with receipt of therapy. A higher rebase lag time period (time since the base-year used in setting rates) was associated with lower use of therapy. For-profit facilities provided more therapy to more residents, and the proportion of Medicaid residents in the facility was negatively associated with the likelihood of receiving therapy. Greater competition was significantly associated with greater use of rehabilitation therapy. Resident clinical characteristics had the expected associations with therapy: strokes, falls, fractures, and discharge home were associated with greater use of therapy while terminal conditions and increased cognitive impairment were negatively associated with therapy.

Private-pay residents were then added to the sample, along with a dummy variable that identified a Medicaid payment source. The effect of Medicaid payment methods on the use of therapy was identified using an interaction between Medicaid payment source and the payment method used for residents in each State. The interaction terms are interpreted as the effect of the payment method on the difference in rehabilitation therapy between Medicaid and private-pay residents. The change in payment from PFS to PCM payment was associated with increased odds of therapy and greater therapy time for Medicaid residents, though only the therapy time result was significant. Compared with PFS States (reference group), Medicaid residents in States that used PCM throughout the study period had lower relative therapy use (relative to private-pay residents in the same State). In PCM payment systems (both in States that changed to PCM and in States that employed PCM throughout the study period), the overall use of therapy was greater than in States that used PFS payment. RCB payment for Medicaid residents in Pennsylvania was not associated with higher odds of receiving therapy compared with PFS States, but was associated with more therapy time. Medicaid payment source was not significantly associated with the use of therapy on admission to a nursing home.

Parameters for market, facility, and resident characteristics were similar in Tables 4 and 5, suggesting that these characteristics do not have a differential effect on Medicaid versus private-pay residents' use of rehabilitation.

The results of the regression model were used to predict the probability of rehabilitation therapy and times, by payment methods. The predictions were computed using the population mean (Table 3) for all other market, facility, and patient-level characteristics. Predictions shown in Table 6 indicate that overall, Medicaid payment led to a slightly increased probability of rehabilitation and approximately 10 percent more therapy time, compared with private payment. Among Medicaid Programs, PFS was associated with the lowest probability of therapy and the lowest predicted therapy

time while PCM payment was associated with higher probability of therapy and higher therapy times than PFS payment. The regression model divided the PCM effect into a difference and change effect, reproduced in Table 6. The States that used PCM throughout the study period (New York and Vermont) had about the same predicted probability of therapy use and therapy time as private-pay residents, while the

Table 4
Regression Results Predicting Therapy Receipt and Weekly Therapy Time (Medicaid Residents Only): 1992-1995

Independent Variable	Logistic Regression Receives Therapy AOR (95% C.I.)[1]		Ordinary Lease Squares Therapy Time Estimate (S.E)[1]	
Medicaid Change to PCM[2]	1.44 (1.18,1.75)	***	0.41 (0.06)	***
Medicaid PCM Constant[2]	2.29 (0.32,16.4)		2.85 (1.04)	**
Medicaid RCB System	1.18 (0.69,2.02)		1.48 (0.20)	***
Reimbursement Rate	1.01 (0.98,1.04)		-0.02 (0.02)	
Rebase Lag (Years)	0.90 (0.81,0.99)	*	-0.12 (0.04)	**
Facility Characteristics				
Total Beds	1.01 (1.00,1.01)		0.00 (0.00)	
For-Profit	1.14 (1.01,1.29)	*	0.18 (0.03)	***
Hospital-Based	1.40 (1.12,1.76)	**	0.09 (0.09)	
Percent Medicaid	0.66 (0.49,0.89)	**	-0.13 (0.08)	
Market Characteristics				
Market Competition	2.51 (1.81,3.50)	***	0.49 (0.15)	**
CMS Area Wage Index	1.12 (0.73,1.72)		0.37 (0.10)	***
Resident Characteristics				
Male	0.97 (0.92,1.02)		-0.01 (0.01)	
Log Length of Stay	1.09 (1.00,1.18)	*	0.09 (0.04)	*
Age 85 or Over	0.99 (0.94,1.03)		-0.02 (0.02)	
Cardiac Conditions	1.10 (1.05,1.16)	***	-0.03 (0.02)	
Stroke	1.30 (1.22,1.38)	***	0.06 (0.02)	***
Respiratory Conditions	0.90 (0.84,0.97)	**	-0.02 (0.02)	
Diagnosed Depression	0.98 (0.91,1.05)		0.00 (0.02)	
Terminal or Cancer	0.68 (0.62,0.74)	***	-0.05 (0.02)	*
Recent Fall	1.53 (1.45,1.62)	***	0.04 (0.01)	*
Hip Fracture	1.88 (1.67,2.11)	***	0.06 (0.02)	*
Cognitively Impaired	0.62 (0.58,0.65)	***	-0.08 (0.02)	***
Cognitively Dependent	0.38 (0.35,0.42)	***	-0.22 (0.03)	***
Physically Impaired	0.71 (0.65,0.78)	***	-0.28 (0.03)	***
Physically Dependent	0.23 (0.20,0.27)	***	-0.78 (0.03)	***
Resists Care	0.81 (0.74,0.89)	***	-0.14 (0.02)	***
Discharge planned	1.57 (1.42,1.72)	***	0.19 (0.02)	***
Nursing Intensity	25.9 (22.2,30.1)	***	1.27 (0.03)	***
Year (1992 Reference)				
1993	1.36 (1.17,1.58)	***	0.22 (0.07)	**
1994	1.58 (1.23,2.02)	***	0.39 (0.13)	**
1995	1.83 (1.27,2.63)	**	0.61 (0.18)	**
State (New York Reference)				
Kansas	0.79 (0.49,1.29)		0.83 (0.15)	***
Vermont	0.14 (0.03,0.61)	**	NA	
Missouri	1.81 (1.06,3.09)	*	NA	
c-Statistic/R^2	0.80		0.35	
Chi-Square/F-Value (Degrees of Freedom)	3664.74 (34)		113.46 (32, 1643)	

*$p<0.05$.
**$p<0.01$.
***$p<0.001$.

[1] Robust confidence intervals (C.I.) and standard errors (S.E.) adjusted for facility clustering.

[2] South Dakota and Kansas are included in change to prospective case-mix (PCM); New York and Vermont are captured in PCM constant. Vermont and Missouri minutes are NA (not available).

NOTES: CMS is Centers for Medicare & Medicaid Services. RCB is retrospective cost-based. AOR is adjusted odds ratio.

SOURCE: Wodchis, W.P., University of Toronto, 2006

States that changed to PCM payment had a much higher predicted probability of therapy use and therapy time after PCM payment introduction. Retrospective payment was associated with higher probability of therapy than PFS, about the same probability as PCM and the highest level of predicted therapy time by a substantial margin.

Table 5

**Regression Results Predicting Therapy Receipt and Weekly Therapy Time
(Medicaid and Private-Pay Residents): 1992-1995**

Independent Variable	Logistic Regression Receives Therapy		Ordinary Lease Squares Therapy Time	
	AOR (95% C.I.)[1]		Estimate (S.E)[1]	
Medicaid * PCM Change	1.24 (0.95,1.61)		0.32 (0.09)	***
Medicaid * PCM Constant	0.83 (0.72,0.95)	**	-0.06 (0.06)	
Medicaid * RCB System	1.40 (1.20,1.64)	***	0.01 (0.06)	
Medicaid Payment Source	1.03 (0.94,1.13)		0.06 (0.05)	
PCM Change States	1.21 (0.93,1.57)		0.08 (0.08)	
PCM Constant States	1.36 (0.98,1.88)		0.91 (0.10)	***
RCB Payment System	0.98 (0.72,1.33)		1.41 (0.11)	***
Facility Characteristics				
Total Beds	1.00 (1.00,1.01)		0.00 (0.00)	
For-Profit	1.04 (0.94,1.15)		0.14 (0.03)	***
Hospital-Based	1.40 (1.16,1.70)	**	0.07 (0.06)	
Percent Medicaid	0.79 (0.62,1.01)		-0.09 (0.07)	
Market Characteristics				
Market Competition	2.15 (1.63,2.82)	***	0.42 (0.11)	***
CMS Area Wage Index	1.15 (0.80,1.66)		0.37 (0.08)	***
Resident Characteristics				
Male	0.98 (0.95,1.02)		-0.03 (0.01)	*
Log Length of Stay	1.16 (1.09,1.24)	***	0.10 (0.03)	***
Age 85 or Over	0.98 (0.95,1.02)		-0.03 (0.01)	*
Cardiac Conditions	1.08 (1.04,1.12)	***	-0.02 (0.02)	
Stroke	1.30 (1.24,1.36)	***	0.04 (0.01)	***
Respiratory Conditions	0.90 (0.86,0.95)	***	-0.03 (0.01)	*
Diagnosed Depression	1.03 (0.98,1.08)		-0.02 (0.01)	
Terminal or Cancer	0.68 (0.64,0.72)	***	-0.06 (0.02)	***
Recent Fall	1.52 (1.46,1.58)	***	0.04 (0.01)	***
Hip Fracture	1.81 (1.66,1.97)	***	0.06 (0.02)	**
Cognitively Impaired	0.64 (0.61,0.67)	***	-0.09 (0.01)	***
Cognitively Dependent	0.39 (0.36,0.42)	***	-0.24 (0.02)	***
Physically Impaired	0.73 (0.68,0.78)	***	-0.30 (0.02)	***
Physically Dependent	0.30 (0.26,0.33)	***	-0.77 (0.03)	***
Resists Care	0.81 (0.75,0.86)	***	-0.11 (0.02)	***
Discharge Planned	1.57 (1.46,1.68)	***	0.18 (0.02)	***
Nursing Intensity	21.2 (18.6,24.0)	***	1.28 (0.03)	***
Year (1992 Reference)				
1993	1.46 (1.32,1.60)	***	0.15 (0.03)	***
1994	1.62 (1.44,1.81)	***	0.20 (0.04)	***
1995	1.70 (1.52,1.92)	***	0.28 (0.04)	***
State (New York Reference)				
Kansas	0.68 (0.50,0.92)	*	0.99 (0.10)	***
Vermont	0.22 (0.15,0.33)	***	NA	
Missouri	1.03 (0.76,1.39)		NA	
c-Statistic/R2	0.79		0.42	
Chi-Square/F-Value (Degrees of Freedom)	4757.94 (35)		166.2 (33,1997)	

*$p<0.05$.
**$p<0.01$.
***$p<0.001$.

[1] Robust confidence intervals (C.I.) and standard errors (S.E.) adjusted for facility clustering.

NOTES: Vermont and Missouri minutes are NA (not available). CMS is Centers for Medicare & Medicaid Services. RCB is retrospective cost-based. PCM is prospective case-mix. AOR is adjusted odds ratio.

SOURCE: Wodchis, W.P., University of Toronto, 2006.

Discussion

This study used a resident-level longitudinal database to examine the delivery of rehabilitation therapy in U.S. nursing homes. Data from all nursing home admissions over 4 years in six States provided results whether Medicaid payment methods and the generosity of Medicaid reimbursement affected resident receipt of physical and occupational therapy. The present study is the first to examine care at the resident level within the nursing home.

Some support was found for the hypothesized relationships. The results based on the change in payment system from PFS to PCM payment are considered more robust statistically because they naturally control for within-State factors not measured by other variables in the model. The predictions of therapy standardized for patient, facility and market characteristics demonstrate that PFS payment was associated with the lowest levels rehabilitation therapy, RCB was associated with the highest levels of rehabilitation therapy and PCM lay between these two. The prediction model demonstrates clearly that the change in Medicaid payment from a PFS to a PCM payment system was strongly associated with increased therapy.

Medicaid-only results that accounted for State average reimbursement rates indicated 44 percent higher odds of receiving therapy, and 41 percent more weekly therapy time following a change from PFS to PCM payment. While, on average, PCM payment was associated with higher levels of therapy than PFS, the expected differential between Medicaid residents and private-pay residents (Table 5) was only observed for the within-State changes. One potential explanation for the latter finding is that additional reimbursement in New York and Vermont was small relative to the cost of rehabilitation and while private payment rates were sufficient to cover costs, Medicaid payment rates were not. Average reimbursement rates included in the Medicaid-only analyses suggest no relationship to rehabilitation therapy. This result does not preclude the possibility that facilities will provide more therapy, if given more money. However, it does indicate that a higher average reimbursement rate in a State does not necessarily mean facilities will provide more rehabilitation. With the caveat that RCB payment was identified by residents in Pennsylvania only, in agreement with our study hypothesis, this payment system did lead to the expected finding of higher

Table 6
Predicted Rehabilitation Therapy, by Population Mean Characteristics: 1992-1995

Payer Group	Predicted Probability of Rehabilitation	Predicted Rehabilitation Time (Minutes)	Expected Value of Rehabilitation Time (Minutes) (Probability x Duration)
	Percent		
Overall	37	125	46
Private Pay	36	114	41
Medicaid (All Medicaid)	38	127	48
PFS	34	79	27
PCM			
PCM Difference	37	106	39
PCM Change	44	143	63
RCB	41	228	94

NOTES: RCB is retrospective cost-based. PFS is prospective facility-specific. PCM is prospective case-mix.

SOURCE: Wodchis, W.P., University of Toronto, 2006.

therapy time for Medicaid residents in both Medicaid and full-sample analyses.

Splitting the effect of PCM payment into time-series (within State) and cross-sectional (between State) results reduced the power of the estimates. Although we have a large sample of nursing home residents, there are few State-level observations on which to base our conclusions. While the within-State comparisons (change to PCM) were consistent with our hypotheses, there was insufficient power to provide statistical significance in the full sample difference-in-difference analyses. Although RCB results consistently indicated both higher likelihood of therapy and greater therapy time in both regression analyses, statistical significance was found either for receipt of therapy or for total therapy time but not both in any given model. Again this is likely attributable to the presence of just one State using this payment method.

With these caveats in mind, we conclude that changing from PFS to PCM payment resulted in increased use of rehabilitation therapy on the part of Medicaid residents and the use of RCB was associated with higher utilization of rehabilitation therapy compared with States with PFS payment.

The identification of payment methods was based on 4 years of data from six States. Clearly caution must be exercised in generalizing from these results. However, the present study represents a first attempt employing an entire State's resident population to examine the effect of payment methods. Past studies that included resident level data have either used small resident samples from many different facilities and States (Cohen and Spector, 1996), single nursing home chains (Murtaugh et al., 1988), or statewide results for single States (Coburn et al., 1993; Davis, Freeman, and Kirby, 1998). This analysis exemplifies both the power and hazards of population-based nursing home research.

POLICY IMPLICATIONS

Although this study indicates that case-mix payment can increase resident receipt of therapy, the policy implications of this research may be more difficult to implement. As Swan and colleagues (1993) suggest, "…although complex in their specification, these [payment] systems may be less rational in their determination." Moreover, the present results do not provide evidence on whether or not differences in rehabilitation therapy are associated with improved outcomes. Though prior research suggests that rehabilitation generally has positive effects, the benefits accruing to Medicaid residents have not been a particular area of focus. Recent evidence examining the Medicare Program's change to prospective case-mix payment suggests that case-mix payment provided increased odds of rehabilitation therapy but without clear improvement in resident discharge outcomes (Wodchis, 2004; Wodchis, Fries, and Hirth, 2004/2005). Further research examining resident functional and quality of life outcomes are particularly important areas that might be affected by facility responses to different reimbursement rates and payment methods used by both Medicare and Medicaid Programs.

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