How Does Medicaid Reimbursement Impact Nursing Home Quality? The Effects of Small Anticipatory Changes

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Objective. In 2006, Ohio changed its Medicaid reimbursement methodology for nursing homes (NHs) to promote more efficient staffing levels. This study examines the impacts of this policy change on quality.

Research Design and Subjects. Ohio NHs were categorized based on their anticipated change in reimbursement under a new reimbursement system initiated in 2006. Linear regressions were utilized to determine how quality changed from 2006 to 2010 relative to a group of NHs that were not anticipated to experience any significant change in reimbursement. We examine resident outcomes constructed from the Minimum Data Set, deficiency citations, staffing levels, and satisfaction scores for residents and families as measures of quality.

Principal Findings. Nursing homes in the group receiving increased reimbursement showed an increase in nursing and nursing aide staffing levels. NHs in the group receiving a reduction in reimbursement did lower staffing levels. None of the nonstaffing quality outcomes were impacted by changes in Medicaid reimbursement.

Conclusion. Increased Medicaid reimbursement was found to increase staffing levels, but it had a limited effect, at least in the short run, on an array of nonstaffing quality outcomes.

Key Words. Medicaid reimbursement, quality of care, nursing homes, linkage of payment and quality

The recent recession demonstrated that state budgets are highly vulnerable to fluctuations in the business cycle and that no program is safe from budget cuts. In the case of Medicaid, often the largest item in state budgets, recessions lead to state governments attempting to constrain Medicaid spending, including making cuts to Medicaid reimbursement for nursing home (NH) care. State budget concerns will only grow more problematic in the future as a projected doubling of the older population by 2040 could increase the number of NH residents reliant on Medicaid for funding. This implies there is a need for state

policy makers to better understand how Medicaid reimbursement impacts the value of NH services, especially in terms of quality of care.

While there is an expansive literature that argues that higher reimbursement provides greater financial resources to facilities to improve quality, higher reimbursement can also incentivize some NHs to operate inefficiently or increase owner profits. Early work by Nyman (1985, 1988) examined Medicaid reimbursement and quality during a period when demand for NH care was greater than the supply of beds, a situation called excess demand. His work showed that NHs in geographic areas with excess demand receiving higher Medicaid reimbursement rates actually had lower quality, as measured by severity-weighted deficiency citations. In areas without excess demand, the studies did not find a linkage between reimbursement and quality.

More recent studies have been done in an era of little excess demand and in some instances, utilize longitudinal data. These works generally find that higher Medicaid reimbursement rates lead to higher nurse staffing levels (Cohen and Spector 1996; Grabowski 2001a,b, 2004; Harrington, Swan, and Carrillo 2007), but findings on resident outcomes are ambiguous. Some studies find higher reimbursement does not statistically affect resident outcomes (Cohen and Spector 1996; Grabowski 2001a,b), while others find small improvements (Grabowski 2004; Intrator and Mor 2004; Teno et al. 2008; Mor et al. 2011; Bowblis et al. 2012). One reason for these mixed results may be that more recent literature measures Medicaid reimbursement as the average rate in the state, looks at variation in rates that are not caused by significant changes in how Medicaid rates are determined, or do not account for other policy changes, such as increases in nurse staffing requirements (Harrington, Swan, and Carrillo 2007; Hyer, Temple, and Johnson 2009).

As the nation grapples with large Medicaid NH expenditures, many states may decide to change how they reimburse for care. When these changes are enacted slowly over time, NHs have the ability to adjust costs to align with anticipated cuts in Medicaid reimbursement. However, the existing literature does not address how anticipatory changes in reimbursement impact quality. In this paper, we address this issue by examining a 2006 change in how Ohio determined Medicaid reimbursement rates for NHs. Under Ohio's new reimbursement system, some NHs were anticipated to experience large increases/decreases in Medicaid reimbursement rates. To allow NHs time to respond,

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reimbursement rates were capped and could change by no more than 2 percent each year. In this study, we group facilities by “anticipated” changes in Medicaid reimbursement, which correspond to actual changes in reimbursement if a NH’s case mix did not change, and then examine how reimbursement affects NH quality as rates adjust.

BACKGROUND ON MEDICAID REIMBURSEMENT IN OHIO

Prior to 2006, Ohio’s per diem Medicaid reimbursement rate was based on each NH’s “own” cost of providing care, subject to some restrictions.¹ NHs were paid the same amount per resident. Rates were updated on an annual basis, and NHs with higher costs received higher reimbursement rates. While caps on reimbursement constrained NHs that were cost outliers, the system led to Ohio having the 6th highest average Medicaid reimbursement rate in the United States in 2003. Furthermore, it led to significant variation in reimbursement rates across the state.

Ohio lawmakers grew concerned that the system paid rates that were not aligned with other states and rewarded NHs that were overstaffed or overinvested in capital expenditures. To support more efficient investment patterns, the state legislature passed a law in April of 2005 revising the reimbursement system beginning July 1, 2006. This law required all NHs to be classified into one of six peer groups, where peer groups were determined by the size of the NH (± 100 beds) and geographic location (three areas in the state).² NHs within a peer group received the same per diem reimbursement rate, though the rate could vary depending on a NH’s case mix.³

The implementation of the new system did not alter overall system reimbursement expenditures, but it did impact the specific rates a NH could receive. For some NHs—those with low staffing levels and capital costs—the reimbursement rate calculated under the new system was higher than the amount they received under the old system. For NHs with high staffing levels and capital costs, the new reimbursement rates were lower. Effectively, this created “winners” and “losers.” To reduce the immediate impact on NHs, the state also implemented a stop-loss/gain provision to allow reimbursement to transition slowly to the new rates. By statute, reimbursement rates could not be increased or cut by more than 2 percent per fiscal year. This provision was in effect from July 1, 2006 to June 30, 2010.

As reimbursement rates were determined using the 2003 Medicaid Cost Report data and NHs could not have anticipated a change at that time, the rate a NH received under the new Medicaid reimbursement policy is exogenous and allows us to explore how changes in the level of reimbursement affect quality of care. Furthermore, the stop-loss/gain provision allows NHs to be able to anticipate future reimbursement rates. By comparing winners and losers under the new system, we can identify how changes in Medicaid reimbursement rates impact the quality of NH care.

DATA AND METHODS

This study employs a retrospective design that examines changes in quality in response to the implementation of the new Medicaid reimbursement system for NHs in Ohio. To examine this issue, data on Medicaid-reimbursed NHs in the state of Ohio were obtained from multiple sources. Facility-specific Medicaid reimbursement rates were provided by the Ohio Department of Medicaid. The reimbursement data include the rates that would have been in place had the new reimbursement system been fully enacted and the actual rates NHs were reimbursed. Reimbursement data were merged with facility-level data from the Ohio Medicaid Cost Reports, Online Survey Certification and Reporting System (OSCAR), and the Ohio resident and family satisfaction surveys. To obtain resident-level quality information, we used the Minimum Data Set (MDS).

The analysis included all Ohio Medicaid-certified NHs with data from all sources in 2006 and 2010, with a resulting sample of 855 unique NH facilities.⁴ When we examine resident-level outcomes, sample sizes range from 18,634 to 50,658 observations depending on the inclusion criteria used for each quality measure. This period is utilized because it includes the first year in which the new reimbursement system was in effect, includes all years in which reimbursement rates slowly changed to the new reimbursement rates, and there were no other policy changes that would impact reimbursement or NH quality.⁵

We implement an estimation strategy that compares an array of quality measures between 2006 and 2010. We categorize NHs based on whether the NH anticipated no change, an increase, or a decrease in Medicaid reimbursement under the new system. By interacting a dummy variable for year (2010) with the categories of anticipated reimbursement changes, we examined how NHs responded to increases and decreases in Medicaid reimbursement. We

identify NHs that anticipate no change in reimbursement under the new system as a reference group. Therefore, the regression model estimated is:

$$Q_{ift} = \alpha(R_f^c * D_{ift}^{2010}) + \beta Z_{ft} + \theta X_{ift} + \delta_f + \varepsilon_{ift}$$

where Q_{ift} is a measure of quality for individual resident i in NH f in year t , and $(R_f^c * D_{ift}^{2010})$ is the interaction of a dummy variable indicating the observation is in year 2010 (D_{ift}^{2010}) and one of the anticipated Medicaid reimbursement changes categories (R_f^c) indicated by superscript c . Also included in the equation is a set of resident (X_{ift}) and facility-level (Z_{ft}) control variables, facility fixed effects (δ_f), and an error term (ε_{ift}). It should be noted that in some regressions we examine facility-level measures of quality. In these regressions, the subscript i is suppressed in the above equation and there are no resident-level controls.

In order to categorize NHs based on their anticipated change in Medicaid reimbursement, we used reimbursement data from 2006 to determine how much per diem Medicaid reimbursement rates would change should the new reimbursement system be fully enacted. This change is calculated as the difference in the rate the NH would receive under the new system without a stop-loss/gain provision and the actual rate a NH received in 2006.⁶ The anticipated change in reimbursement is positive for NH that would expect increases in reimbursement rates and negative for facilities that would see decreases in reimbursement rates.

In our primary model specification, NHs are categorized into three groups based on the percentage difference in the anticipated reimbursement change and actual reimbursement in 2006. The first group includes NHs for whom no change in reimbursement was anticipated. These NHs are defined as having an actual reimbursement rate that is within 5 percent of the reimbursement rate under the new system. The second group of NHs anticipates increases in Medicaid reimbursement. These NHs are defined as having an actual reimbursement rate that is at least 5 percent below the new rate. Finally, we identify NHs that anticipate a decrease in Medicaid reimbursement, which have actual reimbursement rates at least 5 percent or greater than the rate under the new system. In tables, we refer to the NHs that do not anticipate a change as “no change” and refer to those that anticipate a change by the direction and the size of the anticipated change (i.e., “increase 5%+” or “decrease 5%+”).

While the results are found to be robust to a number of different cut-offs,⁷ for some quality measures, NHs that anticipated increases/decreases

in reimbursement of greater than 10 percent behaved differently than those anticipating smaller increases/decreases in reimbursement. To allow for a nonlinear effect in how NHs respond to changes in reimbursement, we also report results using five groups. When five groups are utilized, NHs with increases/decreases are broken into smaller (5–10 percent) and larger (10 percent+) groups.

Quality Measures

As NH quality is multidimensional and there is a lack of consensus on how to define and measure quality, we examine a number of quality measures. Quality is measured using a set of resident-level measures and four sets of facility-level measures. Summary statistics for these quality measures are reported in Table 1.

Using individual MDS assessments, we construct a set of resident-level quality measures. These measures are defined and constructed for each individual resident based on the technical instructions used for long-stay resident quality measures reported on the Nursing Home Compare website for MDS version 2.0. The only difference between our measures and those reported on the website is we do not aggregate the measures to the facility level, but instead run regressions at the individual level. For almost all resident-level quality measures, there is significant variation in quality within each anticipated reimbursement group. Additionally, most conditions are highly prevalent in NHs, with all but one measure having a prevalence rate of greater than 5 percent.

The first set of facility-level quality measures is the number of deficiencies. Deficiencies are given when a NH does not meet a regulatory standard in various dimensions of quality. Our deficiency outcome measures are the number of deficiencies the NH received in their most recent state survey inspection. The average NH had five deficiencies and generally the number of deficiencies is lower in NHs that are in the group anticipating larger decreases in reimbursement.

The second and third sets of facility-level measures are the number of direct care staff and other support staff employed at the facility. Direct care staff includes registered nurses (RNs), licensed practiced nurses (LPNs), and certified nurse aides (CNAs). Other support staff includes social services, housekeeping, food service, dietitians, and activities staff. All staffing variables are measured in terms of hours per resident day (HPRD) and for each staff variable, improbable observations were eliminated from the analysis using a method found in Bowblis (2011). As applied in this context, this method

Table 1: Summary Statistics of Quality Measures for Ohio Nursing Homes by Anticipated Change in Medicaid Reimbursement

	Anticipated Change in Reimbursement			
	Entire Sample	No Change	Increase 5%+	Decrease 5%+
Resident-level quality measures (binary outcomes)				
Catheter use	0.056 (0.230)	0.055 (0.228)	0.059 (0.235)	0.055 (0.228)
Moderate-severe pain	0.083 (0.276)	0.080 (0.271)	0.083 (0.276)	0.088 (0.284)
Decline in physical functioning	0.108 (0.310)	0.109 (0.311)	0.117 (0.322)	0.100 (0.300)
Bowel/bladder incontinence	0.469 (0.499)	0.462 (0.499)	0.462 (0.499)	0.483 (0.500)
Physically restrained	0.050 (0.218)	0.052 (0.221)	0.054 (0.226)	0.045 (0.207)
Urinary tract infection	0.083 (0.276)	0.080 (0.272)	0.085 (0.278)	0.085 (0.279)
Pressure ulcers (low-risk resident)	0.075 (0.264)	0.074 (0.262)	0.071 (0.256)	0.080 (0.271)
Pressure ulcers (high-risk resident)	0.012 (0.109)	0.012 (0.109)	0.012 (0.109)	0.012 (0.111)
Falls with major injury	0.104 (0.305)	0.104 (0.305)	0.102 (0.303)	0.105 (0.307)
Antipsychotic medication	0.247 (0.432)	0.248 (0.432)	0.255 (0.436)	0.242 (0.428)
Facility-level quality measures (continuous outcomes)				
Total number of deficiencies	5.026 (4.438)	5.193 (4.541)	5.239 (4.417)	4.611 (4.275)
Number of quality of care deficiencies	3.431 (2.974)	3.365 (2.983)	3.586 (3.096)	3.096 (2.891)
Number of quality of life deficiencies	1.437 (1.799)	1.519 (1.891)	1.429 (1.711)	1.320 (1.719)
Number of administrative/other deficiencies	0.224 (0.514)	0.243 (0.545)	0.224 (0.523)	0.195 (0.455)
Total nurse staffing (HPRD)	3.533 (0.728)	3.503 (0.665)	3.240 (0.682)	3.802 (0.756)
Registered nurse staffing (HPRD)	0.348 (0.248)	0.327 (0.175)	0.308 (0.148)	0.410 (0.365)
Licensed practical nurse staffing (HPRD)	0.891 (0.300)	0.869 (0.263)	0.835 (0.339)	0.967 (0.306)
Certified nurse aides staffing (HPRD)	2.301 (0.525)	2.316 (0.511)	2.110 (0.481)	2.424 (0.538)
Social services staffing (HPRD)	0.108 (0.320)	0.115 (0.466)	0.090 (0.054)	0.111 (0.081)
Housekeeping staffing (HPRD)	0.522 (0.266)	0.515 (0.244)	0.455 (0.205)	0.585 (0.319)

Continued

Table 1. *Continued*

	Entire Sample	Anticipated Change in Reimbursement		
		No Change	Increase 5%+	Decrease 5%+
Food service staffing (HPRD)	0.743 (0.378)	0.714 (0.341)	0.661 (0.248)	0.848 (0.479)
Dietitians (HPRD)	0.033 (0.053)	0.031 (0.057)	0.026 (0.038)	0.040 (0.056)
Activities staffing (HPRD)	0.211 (0.121)	0.211 (0.115)	0.199 (0.130)	0.220 (0.122)
Resident satisfaction score (0–100)	86.428 (8.856)	86.094 (8.734)	85.657 (8.890)	87.528 (8.926)
Family satisfaction score (0–100)	86.357 (5.167)	86.417 (5.197)	86.243 (5.198)	86.355 (5.107)
No. of resident observations (range)	18,634–50,658	8,856–23,515	3,874–10,829	5,904–16,314
No. of facility observations	1,710	782	406	522
No. of unique facilities	855	391	203	261

Notes: The table reports the calculated means and standard deviation for the entire sample and by anticipated change in Medicaid reimbursement. The resident-level quality measures are binary indicators for presence of the condition as per CMS definitions. As the inclusion criteria for each CMS quality can vary, the number of resident observations is reported in ranges.
HPRD, hours per resident day.

identifies staffing levels that are three standard deviations from the mean in the state as improbable values. Generally, NHs anticipating decreases in reimbursement tended to have the highest average staffing levels (Table 1).

The final set of facility-level quality data comes from resident and family satisfaction scores collected by Ohio for the Long-Term Care Consumer Guide. For both satisfaction scores, individual respondents are asked to rate their overall satisfaction with the NH. These individual respondent ratings were aggregated to represent the average satisfaction score of the NH, ranging from 0 to 100, with higher numbers implying higher satisfaction.⁸ Average resident and family satisfaction scores in the entire sample were 86 percent, with resident satisfaction scores being slightly higher for NHs in the group anticipating decreases in reimbursement (Table 1).

Control Variables

Included in all regressions were a set of control variables to capture factors that could influence NH quality. When resident-level quality measures were analyzed, we included a set of controls specific to the resident. These included resident's age, gender, race, education, physical functioning (ADL index score), diabetes, cardiac dysrhythmia, heart failure, stroke, hip fracture, dementia, schizophrenia, COPD, and cancer. Because the number of residents utilized in each resident-level quality regression varied with the measure, we did not report summary statistics for these variables.

Facility-level control variables were included in all regressions. Summary statistics for these variables are reported in Table 2 and include profit status, number of beds, chain membership, hospital-based facility, presence of Alzheimer's and other special care units, payer-mix, occupancy rates, and case mix measures. Case mix is measured by the Acuiindex—a measure of physical acuity level that is the sum of the activities of daily living index and the proportion of residents that require special treatment (Cowles 2002)—and the percent of residents with dementia, psychiatric illness, depression, and intellectual disability. Considering the study period was from 2006 to 2010, a period that encompasses the Great Recession, we included the county-level unemployment rate to proxy for economic conditions in the local area.

There were some differences in facility characteristics based on anticipated change in reimbursement. NHs in the group that anticipated an increase in reimbursement were more likely to be owned by for-profit organization, were smaller in terms of number of beds, and were less likely to have special care units. Additionally, they had slightly lower occupancy rates. In contrast,

Table 2: Summary Statistics of Facility-Level Control Variables for Ohio Nursing Homes by Anticipated Change in Medicaid Reimbursement

	<i>Entire Sample</i>	<i>Anticipated Change in Reimbursement</i>		
		<i>No Change</i>	<i>Increase 5%+</i>	<i>Decrease 5%+</i>
Not-for-profit ownership	0.198 (0.399)	0.152 (0.359)	0.071 (0.258)	0.366 (0.482)
Government ownership	0.026 (0.158)	0.028 (0.165)	0.002 (0.050)	0.040 (0.197)
Facility size (number of beds)	100.363 (45.770)	102.001 (45.752)	92.953 (37.814)	103.670 (50.642)
Part of multifacility chain	0.312 (0.463)	0.320 (0.467)	0.340 (0.474)	0.278 (0.448)
Hospital-based facility	0.013 (0.115)	0.003 (0.051)	0.000 (0.000)	0.040 (0.197)
Alzheimer's special care unit	0.208 (0.406)	0.223 (0.416)	0.170 (0.376)	0.216 (0.412)
Other special care unit	0.064 (0.244)	0.061 (0.240)	0.022 (0.147)	0.100 (0.300)
% Medicaid residents	64.535 (15.983)	65.606 (15.267)	65.690 (13.927)	62.033 (18.131)
% Medicare residents	12.617 (8.828)	11.843 (7.273)	13.244 (7.646)	13.289 (11.369)
Occupancy rate	87.330 (11.395)	87.185 (11.644)	85.881 (12.203)	88.676 (10.171)
% Residents with dementia	47.789 (17.306)	48.131 (17.895)	46.218 (15.925)	48.497 (17.395)
% Residents with psychiatric illness	30.108 (18.214)	30.116 (17.843)	31.062 (17.926)	29.354 (18.970)
% Residents depressed	69.935 (20.382)	69.779 (20.358)	71.994 (19.154)	68.569 (21.237)
% Residents intellectual disability	3.065 (3.748)	3.177 (3.820)	3.415 (3.440)	2.626 (3.835)
Acuindex	10.165 (1.149)	10.128 (1.198)	10.118 (1.086)	10.257 (1.118)
County unemployment rate	7.963 (2.686)	7.964 (2.690)	8.056 (2.739)	7.890 (2.640)
No. of facility observations	1,710	782	406	522
No. of unique facilities	855	391	203	261

Notes. The table reports the calculated means and standard deviation for the entire sample and by anticipated change in Medicaid reimbursement. The reference group for ownership is for-profit ownership.

NHs in the group that anticipated a decrease in reimbursement were more likely to be owned by a not-for-profit or government organization, were more likely to be hospital-based, and less likely to be part of a multifacility chain. These NHs were also less reliant on Medicaid for funding, having 62 percent of residents paid for by Medicaid compared to 66 percent for the other two groups.

RESULTS

Overall, the average Medicaid reimbursement rate under the new system was expected to be \$159.39/day, whereas the actual reimbursement rate paid in 2006 was \$161.16 (Table 3). Although the average reimbursement was relatively stable, declining by just \$1.77/day, there was considerable variation across NHs. Nearly half (45.7 percent) anticipated no change in Medicaid reimbursement under the new system. Slightly under one-quarter of NHs anticipated an increase in reimbursement of 5 percent or greater, with an anticipated increase of \$18.16/day. In contrast, three in ten NHs anticipated rates to decrease by more than 5 percent, with an average anticipated decrease of \$20.11/day.

Table 4 reports the change in quality for the three groups of NHs by anticipated change in Medicaid reimbursement. The first column reports the change in quality from 2006 to 2010 for NHs that anticipated no change in

Table 3: Anticipated Change in Medicaid Reimbursement for Ohio Nursing Homes

	<i>No. of Unique Facilities</i>	<i>% of Sample</i>	<i>Average per Diem Medicaid Reimbursement in 2006</i>		
			<i>Anticipated Rate</i>	<i>Rate Paid</i>	<i>Anticipated Change</i>
Entire sample	855	100.00%	\$159.39	\$161.16	−\$1.77
Anticipated change					
No change	391	45.73%	\$158.87	\$158.73	\$0.13
Increase 5%+	203	23.74%	\$161.59	\$143.43	\$18.16
Decrease 5%+	261	30.53%	\$158.46	\$178.57	−\$20.11

Notes. The table reports the average per diem Medicaid reimbursement rate anticipated if Ohio's new Medicaid reimbursement system was fully enacted in 2006 without a stop-loss/gain provision. The rate paid reflects the actual rate paid in 2006. The final column is the anticipated change in the reimbursement rate.

Table 4: Change in Quality from 2006 to 2010 by Anticipated Change in Medicaid Reimbursement

		<i>Difference Relative to No Change in Reimbursement</i>	
	<i>No Change</i>	<i>Increase 5%+</i>	<i>Decrease 5%+</i>
Resident-level quality measures (binary outcomes)			
Catheter use	−0.015	0.004	0.013***
Moderate–severe pain	−0.009	−0.004	0.001
Decline in physical functioning	0.001	−0.006	−0.002
Bowel/bladder incontinence	0.046*	−0.024*	−0.008
Physically restrained	−0.001	0.001	0.002
Urinary tract infection	−0.032***	−0.001	0.003
Pressure ulcers (low-risk resident)	−0.005	0.009	0.004
Pressure ulcers (high-risk resident)	0.006	−0.003	0.002
Falls with major injury	−0.009	0.005	0.007
Antipsychotic medication	−0.003	0.001	−0.022**
Facility-level quality measures (continuous outcomes)			
Total number of deficiencies	0.809	−0.545	−0.045
Number of quality of care deficiencies	0.926	−0.260	−0.134
Number of quality of life deficiencies	−0.055	−0.271	0.039
Number of administrative/other deficiencies	−0.062	−0.014	0.051
Total nurse staffing (HPRD)	0.286**	0.062	−0.058
Registered nurse staffing (HPRD)	0.012	0.018	0.009
Licensed practical nurse staffing (HPRD)	0.136**	−0.006	−0.034
Certified nurse aides staffing (HPRD)	0.117	0.034	−0.043
Social services staffing (HPRD)	−0.067	−0.033	−0.031
Housekeeping staffing (HPRD)	−0.063	0.048***	−0.026
Food service staffing (HPRD)	−0.012	−0.001	−0.073**
Dietitians (HPRD)	0.001	0.010*	0.007
Activities staffing (HPRD)	0.027	−0.003	−0.017
Resident satisfaction score (0–100)	−3.837***	0.947	0.494
Family satisfaction score (0–100)	1.283	0.107	−0.330
Number of facilities	391	203	261

Notes. The first column reports the average change in quality for Ohio nursing homes anticipating no change in per diem Medicaid reimbursement. The last two columns report the difference in the change in quality from 2006 to 2010 for the other nursing homes relative to those anticipating no change. All regressions include facility fixed effects and control variables reported in Table 2.

*** $p < .01$, ** $p < .05$, * $p < .1$.

reimbursement. The next two columns report the change in quality for those NHs that anticipated increases or decrease in reimbursement relative to NHs that anticipated no change. For the 10 resident quality measures examined, eight of the measures in the no anticipated change group have negative coefficient estimates consistent with general improvements in quality. However, only two of the measures are statistically significant. The no change group is

found to have more residents with bowel and bladder incontinence issues (4.6 percent points), but improvement is found in the prevalence of urinary tract infections (3.2 percent points).

Compared to the no change group, the quality measures in NHs anticipating changes in reimbursement are not significantly different in most cases. Even where there are statistically significant differences in trends, the results are mixed. Compared to the no change group, NHs anticipating increases in reimbursement saw statistically significant improvements in the incontinence measure (2.4 percentage point fewer residents). In contrast, NHs that anticipate decreases in reimbursement saw statistically significant quality changes for catheters and use of antipsychotics. The use of catheters increased by 1.3 percentage points and use of antipsychotics decreased by 2.2 percentage points.

Facility-level quality measures mirror the results for resident-level quality measures in terms of deficiencies and satisfaction scores. Deficiencies show no significant trends for any of the three groups. Resident satisfaction is found to decrease over the study period, but again, these trends are found to be statistically similar for all NHs. The only place where there is a discernible pattern is in staffing. From 2006 to 2010, NHs anticipating no change in reimbursement had a significant increase total nurse and licensed practical nurse staffing. Generally, NHs that anticipated increases in reimbursement increased nurse staffing levels, and those that anticipated decreases reduced nurse staffing levels—though none of the results are statistically significant. For support staff, NHs that anticipated increases in reimbursement significantly increased housekeeping (0.05 HPRD) and dietitian (0.01 HPRD) staffing levels. In contrast, NHs that anticipated decreases, reduced food service staffing levels by 0.07 HPRD.

As noted earlier, some NHs may behave differently if they experienced smaller or larger anticipated changes in reimbursement. Table 5 reports results that break NHs anticipated changes in reimbursement into two groups—those anticipating smaller (5–10 percent) and larger (10 percent+) changes. When broken into five reimbursement groups, the resident-level quality measures show results that are generally similar to the three-group specification. The only difference is the result for the incontinence measure is concentrated in NHs that anticipate a 5–10 percent increase in reimbursement, and NHs that anticipate a decrease of 5–10 percent in reimbursement saw a greater number of falls with major injury (1.9 percent point increase). For the facility-level measures of number of deficiencies and satisfaction, the results are similar to the three-group specification.

Table 5: Change in Quality from 2006 to 2010 by Anticipated Change in Medicaid Reimbursement

	<i>Difference Relative to No Change in Reimbursement</i>				
	<i>No Change</i>	<i>Increase 10%+</i>	<i>Increase 5 to 10%</i>	<i>Decrease 5 to 10%</i>	<i>Decrease 10%+</i>
Resident-level quality measures (binary outcomes)					
Catheter use	−0.015	0.003	0.005	0.011*	0.014**
Moderate–severe pain	−0.009	−0.007	−0.003	−0.004	0.003
Decline in physical functioning	0.001	−0.009	−0.005	−0.005	0.001
Bowel/bladder incontinence	0.048*	−0.002	−0.041**	−0.017	−0.001
Physically restrained	−0.001	0.010	−0.005	−0.005	0.007
Urinary tract infection	−0.032***	−0.005	0.002	0.002	0.004
Pressure ulcers (low-risk resident)	−0.006	0.005	0.012	0.009	−0.001
Pressure ulcers (high-risk resident)	0.007	0.001	−0.006	−0.003	0.006
Falls with major injury	−0.010	0.001	0.008	0.019**	−0.003
Antipsychotic medication	−0.005	−0.020	0.016	−0.015	−0.027**
Facility-level quality measures (continuous outcomes)					
Total number of deficiencies	0.789	−0.729	−0.365	0.775	−0.634
Number of quality of care deficiencies	0.925	−0.289	−0.227	0.328	−0.466
Number of quality of life deficiencies	−0.072	−0.415*	−0.136	0.321	−0.164
Number of administrative/ other deficiencies	−0.063	−0.025	−0.002	0.126	−0.003
Total nurse staffing (HPRD)	0.273**	−0.033	0.150*	0.145**	−0.205***
Registered nurse staffing (HPRD)	0.010	−0.003	0.037*	0.009	0.009
Licensed practical nurse staffing (HPRD)	0.133**	−0.024	0.012	−0.006	−0.054*
Certified nurse aides staffing (HPRD)	0.111	−0.019	0.085	0.127**	−0.167***
Social services staffing (HPRD)	−0.067	−0.034	−0.033	−0.038	−0.026
Housekeeping staffing (HPRD)	−0.062	0.046**	0.050**	0.013	−0.055*
Food service staffing (HPRD)	−0.010	0.011	−0.011	−0.032	−0.103**
Dietitians (HPRD)	0.001	0.013	0.007	0.001	0.011**
Activities staffing (HPRD)	0.030	0.014	−0.019	−0.007	−0.024*
Resident satisfaction score (0–100)	−3.926***	0.224	1.583	0.404	0.563
Family satisfaction score (0–100)	1.346	0.398	−0.136	−0.645	−0.111
Number of facilities	391	97	106	107	154

Notes. The first column reports the average change in quality for Ohio nursing homes anticipating no change in per diem Medicaid reimbursement. The last four columns report the difference in the change in quality from 2006 to 2010 for the other nursing homes relative to those anticipating no change. All regressions include facility fixed effects and control variables reported in Table 2.

*** $p < .01$, ** $p < .05$, * $p < .1$.

Where there is significant deviation between the three- and five-group breakdown is for the staffing level measures. While the three-group specification found no statistically significant effects for nurse staffing, the five-group specification has a number of statistically significant effects. NHs anticipating a 5–10 percent increase in reimbursement significantly increase total nurse staffing (0.15 HPRD) and RN staffing (0.04 HPRD), but those anticipating larger increases do not change nurse staffing levels. Among NHs anticipating decreases in reimbursement, NHs anticipating larger cuts reduce total nurse staffing levels (–0.21 HPRD), LPN staffing levels (–0.05 HPRD), and CNA staffing levels (–0.17 HPRD). Interestingly, NHs anticipating smaller decreases in reimbursement of 5 to 10 percent are found to increase total nurse staffing levels mostly through hiring more CNAs. This same general pattern is found for support staff. While all NHs anticipating increases in reimbursement increase housekeeping staffing levels, NHs anticipating larger decreases in reimbursement reduce staffing levels for housekeeping, food service, and activities.

DISCUSSION

In this study, we examine a policy change addressing how Ohio determined Medicaid reimbursement rates. The purpose of this policy change was to promote efficiency in staffing and capital expenditures. As Medicaid reimbursement rates changed slowly over time, we utilized reimbursement in 2006 to categorize NHs into groups based on how much NHs anticipated their Medicaid reimbursement to change. Therefore, our empirical strategy allows us to identify how NHs respond to changes in Medicaid reimbursement when these changes are known and anticipated by the facility.

Consistent with the existing literature, we find that Medicaid reimbursement is associated with staffing levels. Nurse and support staffing levels are higher in NHs with higher reimbursement rates in 2006. Our study did find that NHs receiving increased reimbursement hired additional staff. In contrast, NHs experiencing a decrease in reimbursement did not change staffing levels as a group. However, NHs with the largest reimbursement cuts did reduce staffing levels across a broad range of personnel. Because NHs in the group that anticipated larger decreases had higher reimbursement rates in 2006, this result is consistent with expectations that staffing levels would converge to more uniform levels as Medicaid reimbursement rates reached a more uniform rate.⁹

As we clearly find some NHs responding to changes in reimbursement through staffing decisions and staffing is a critical part of improving NH quality (Schnelle et al. 2004; Lin 2014), we would expect that other dimensions of quality could be affected by changes in reimbursement rates. Our results do not find any sizable effects on an array of nonstaffing quality measures. Among resident-level quality measures, NHs that had increases in reimbursement saw a statistically significant improvement for one indicator, incontinence, whereas NHs with decreases in reimbursement found degradation in catheter use and falls with major injury quality measures, but improvements in antipsychotic use. Although we also found that resident satisfaction dropped nearly 4 percentage points during the study period, there was no difference across the anticipated reimbursement groups.¹⁰

One explanation for these findings is NHs experienced only small reimbursement changes. During the study period, the reimbursement rate for any NH was not allowed to change more than 2 percent/year, resulting in a maximum cut in reimbursement of 8.24 percent. Some facilities may have attempted to maintain quality by using other financial resources, such as endowments, hoping that through lobbying they could restore higher rates in the future. A second explanation is the timing of quality changes and reimbursement. Reimbursement changes generate cash flow that can instantaneously impact staffing levels by hiring or laying off staff, but responses in other measures of quality by improving care practices or culture change take time to gain or lose traction within a NH and even more time to translate into resident outcomes. Another explanation is NHs that have excess capacity and are in markets that do not experience excess demand need to invest in quality to attract residents. We test this hypothesis by including an indicator variable for county demand and by interacting excess demand with the anticipated reimbursement category groups. These regressions found no evidence that supported the excess demand explanation.

These results suggest that, in the short run, small changes to Medicaid reimbursement have little effect on nonstaffing quality measures, and cutting reimbursement rates may be an effective policy tool to reduce Medicaid costs without harming quality. While we agree with this interpretation, in the short run, there are many caveats. First, at the start of the study period, Ohio had one of the highest Medicaid reimbursement rates in the nation and may have had the ability to reduce rates without impacting the profitability of the industry. However, other states which have significantly lower rates may not have the same experience. Second, Ohio changed rates by no more than 2 percent/

year and results are only relevant for small changes in reimbursement. Larger changes in reimbursement, especially during times of recession, may have large effects on quality that our study design cannot address. Third, we only examine quality in the short run. Many NHs may have maintained quality by cutting administrative staff, sustaining losses, and focusing on more profitable Medicare and private pay residents. In the short run, this may be manageable, but it may have detrimental impacts on quality in the long run or limit the ability of NHs to improve quality over time. And finally, we have not examined other important policy considerations such as access to care for Medicaid residents. Cutting Medicaid or failing to keep reimbursement rates competitive with private pay and Medicare postacute care rates will reduce the incentive for some NHs to accept new Medicaid patients, particularly harming individuals in areas with little excess bed capacity.

In conclusion, this paper reiterates the importance of revisiting the issue of Medicaid reimbursement by focusing on how reimbursement affects NHs at the microlevel through the use of facility-specific reimbursement rates. This study highlights that small changes in reimbursement may impact some dimensions of quality (i.e., staffing), but have little impact on others. While our results may be generalizable to other states with more generous Medicaid reimbursement rates, additional research is needed to better understand the relationship between reimbursement and quality. Areas where further research is needed is in understanding the long run effects of small reimbursement changes and how NHs react to large changes. As pressure on state budgets and Medicaid spending continues, the importance of getting reimbursement right will only increase. This study represents the continued effort to understand the critical linkage between quality and reimbursement.

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Disclaimers: None.

NOTES

1. The per diem Medicaid reimbursement rate in Ohio is calculated by summing together five cost components and a quality incentive (<2 percent of reimbursement). The five cost components include the cost of direct care, capital, ancillary and support services, taxes, and franchise costs. Direct care costs are calculated by applying the NH's own cost of providing direct care per case mix unit and multiplying it by the NH's own case mix score. All other costs components are calculated based on the NH's own cost and did not vary with case mix.
2. The legislation divided the state into three geographic areas—the six counties in southwest Ohio near Cincinnati, the 34 counties that include or are near urban centers (e.g., Akron, Cleveland, Columbus, Dayton, and Toledo), and all other rural counties.
3. The old and new Medicaid reimbursement system used the same five cost components and quality incentive. The major difference was in how each cost component was calculated. Under the old system, NHs were reimbursed for each cost component based on their own cost. Under the new system, NHs were reimbursed for each cost component based on the cost for the peer group. The cost for the peer group was calculated as the cost for the median NH in the peer group using data from the 2003 Medicaid Cost Reports.
4. There were 962 NHs in Ohio in 2010. Our empirical strategy requires NHs to have data in both 2006 and 2010. Because data from OSCAR are collected every 9–15 months, some NHs may not have OSCAR data for a particular year. As OSCAR is collected by state survey inspection teams and the timing of an inspection in any given year is quasi-random, the sample of 855 NHs is representative of all NHs in Ohio. This was verified by finding little difference in NHs that were included and excluded from the sample due to missing 1 year of data.
5. For example, our study period ends in Ohio Fiscal Year 2010. Shortly after this, there were multiple policy changes that can confound the analysis. Ohio revised the Medicaid reimbursement system by utilizing the 25th percentile to determine costs for each peer group and eliminated the stop-loss/gain provision. At the federal level, the Centers for Medicare and Medicaid Services (CMS) revised how NHs are reimbursed by Medicare for postacute care and moved from MDS version 2.0 to version 3.0.
6. NHs that anticipated increases/decreases in reimbursement saw actual increases/decreases in reimbursement over the study period, but an NH's actual reimbursement could not change more than 8.24 percent because of the stop-loss/gain provision. Therefore, assuming facility case mix did not change, all NHs could have changes in actual Medicaid reimbursement rates that were equal to or smaller than the anticipated change.
7. Our robustness checks utilized cut-offs of 2.5, 5, and 10 percent to define NHs that did not anticipate a change in reimbursement.
8. For more information on the satisfaction survey processes, see Straker et al. (2007, 2013).
9. We also determined if NHs that are less likely to adhere to Ohio's 2.75 HPRD minimum nurse staffing level requirement in response to the new policy. Among all

reimbursement groups, the proportion of NHs not meeting the requirement decreased about half and there was no discernable difference by anticipated reimbursement.

10. These changes were state-wide and may have been due to other trends in the state that impacted all NHs, such as changes in how the survey was administered.

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SUPPORTING INFORMATION

Additional supporting information may be found in the online version of this article:

Appendix SA1: Author Matrix.