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The Impact of Chain Standardization on Nursing Home Staffing

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Abstract

Background: Standardization in production is common in multi-entity chain organizations. Although chains are prominent in the nursing home sector, standardization in care has not been studied. One way nursing home chains may standardize is by controlling the level and mix of staffing in member homes.

Objectives: To examine the extent to which standardization occurred in staffing, its relative presence across different types of chains, and whether facilities became more standardized following acquisition by a chain.

Research Design: We estimated predictors of the difference between facility and chain staffing using Generalized Estimating Equations with 2000-2010 data.

Subjects: This study included nursing homes nationally, excluding hospital-based homes and homes in Alaska, Hawaii, and District of Columbia.

Measures: Chain ownership was coded from text identifying chain names. Two nurse staffing measures were used: staff hours per resident day and staff mix.

Results: Very large for-profit chain nursing homes and large nonprofits had less variation in staff hours per resident day ($p < .001$) but greater variation in staffing mix ($p < .001$) compared to the chain average nationally. Large for-profit chains and medium nonprofit chains had greater dispersion on staff hours per resident day ($p < .001$), while large nonprofit chains had greater

dispersion in staffing mix ($p<.001$). The difference between facility and chain staffing decreased over time.

Conclusions: The largest chains (for profit and nonprofit) had less staffing variation compared to national standards, suggesting they were best at implementing corporate practices. Following ownership changes, staffing converged towards chain averages over time, suggesting standardization takes time to implement.

Keywords

nursing homes; organizational change; staffing measures

INTRODUCTION

Staffing is an important component of nursing home care and an explicit domain of quality ratings for nursing.¹ Approximately two-thirds of all nursing home expenditures are spent on staffing.^{2–4} Despite public reporting of staffing levels and efforts to impose minimum standards for staffing, there has been and continues to be substantial variation in nursing home staffing.^{5,6} Staffing impacts resident care directly, as a critical component of service⁷ and indirectly through staff satisfaction and turnover.⁸ Furthermore, quality of care is impacted by both a nursing home's availability of staff hours and by the relative mix of staff, with greater dependence on registered nursing (RN) staff leading to better resident outcomes.^{9,10}

Our study examined the relationship between chain ownership and nursing home staffing, focusing specifically on whether standardization occurred across chain-owned facilities. Past research on chain ownership has shown that corporate ownership was associated with lower overall staffing,^{9,11–12} and a number of rationales have been given for chain effects on staffing. Some studies have found a correlation between operational efficiency and ownership and argued that chains minimize staffing when possible.^{13–15} In line with this research, Harrington et al.^{9,16} used longitudinal data to show that the largest for-profit chains in particular had lower staffing than other types of nursing homes. Others have shown that chains were more likely to provide some types of specialty care service, impacting the skill mix of staffing in the process.¹⁵ In summary, past studies have identified the importance of chain ownership, with mixed results on the impact of chain ownership. This raises the question of how chains accomplish operational changes in nursing homes.

For the most part, past research has lacked details on nursing home chain characteristics, and only a handful of studies have explored the management processes impacting staffing within chain-owned homes. Research has shown that nursing home chains used communication systems, which may include intranet systems or managerial accounting reporting, to impact care provision.^{12,17} Harrington et al.¹⁶ also found that within a single regional for-profit chain in California, nurse staffing was lower than in surrounding non-chain nursing homes. Among kidney dialysis centers, Hirth et al.¹⁸ found for-profit chains provided more intensive anemia management within facilities (under a payment policy that made doing so profitable), although chains only slightly reduced local variation across facilities in use of

these practices. This last study, while not on nursing homes, provides evidence that chains shift care to be in line with chain norms.

The healthcare literature has also explored whether ownership strategies motivate changes in operations post acquisition of facilities. In past research on nursing homes¹¹ and dialysis centers,¹⁹ the authors have argued that corporate owners used a mix of “turn-around” and “cream-skimming” strategies. With a turn-around strategy, chains acquired facilities with less favorable market positions and lower quality, which makes sense when chains strategically infuse managerial expertise to improve operations. In contrast, cream-skimming occurred when corporate owners acquired facilities with high demand specialty care beds (such as, for dementia, medically intensive services, or rehabilitation), possibly because these facilities operated in relatively unique market positions. In both the turn-around and cream-skimming models, the researchers have presumed that acquiring chains directly intervene in operations post-acquisition.

In this paper, we focused on standardization of staffing as a key mechanism for intervening in nursing home operations. Standardization is a managerial control process²⁰ and has been found to be relatively common across service industries, including the hotel industry, the financial sector, and across local restaurant markets.^{21–24} For nursing homes, it may be an important mechanism for both turn-around and cream-skimming strategies. Standardization implies that a chain owner induces member nursing homes to align with corporate norms and creates uniformity across units.^{21,24–25} From a transaction costs perspective, standardization reduces managerial costs and uncertainty.²⁶ By allowing an owner to operate member homes with similar managerial practices, standardization may ease external resource dependencies.²⁵ And, from an institutional perspective, standardization puts pressure on new facilities to comply with normative behavior and is a useful mechanism for assuring quality.^{24,27–28} In conclusion, standardization is a managerial process critical to development of chains that can be applied across various aspects of work production.²⁹

Theory suggests that chains will apply standardization to a variety of operational characteristics post-acquisition. We examine specifically whether standardization occurs in multiple aspects of nursing home staffing, including both the total staff hours per resident day and relative mix of nursing staff. We expect that standardization may be more common in larger and for-profit chains, which would be better able to achieve efficiencies in operations. By definition, smaller chains operate in a small number of markets^{20,26} and are less likely to focus on mechanisms, such as standardization, for operating across markets.²⁰ Nonprofits focus heavily on community mission to drive their strategy, which could also make them less likely to standardize. Standardization will not necessarily occur immediately when a nursing home is acquired by a chain but may occur over time. Acquisitions are disruptive processes, and corporate owners will need time to implement changes in newly acquired homes.¹⁵ These hypothesized relationships can be tested by comparing absolute differences between a nursing home’s staffing and the chain’s average staffing. Our arguments are summarized in the following hypotheses:

Hypothesis 1: Facilities in for-profit and large or very large chains will have less variation in staffing than facilities in other nursing home chains, because these types of chains are more likely to implement standardization.

Hypothesis 2: Following an ownership change, nursing homes are expected to become more like the chain average over time, as standardization occurs over time.

METHODS

We used data from 2000 through 2010 for all Medicare and Medicaid certified nursing homes in the United States, excluding hospital-owned homes, in which we expected different business strategies, and excluding homes in Alaska, Hawaii and the District of Columbia, for which data were not available across the full study period (years 2000 and 2001 were used to create lagged measures). Analyses are reported for chain-owned facilities during this period; for non-chain facilities acquired or merged into a chain during our study period, only years post-acquisition were included. Data come from three sources: (1) the On-Line Survey Certification and Reporting (OSCAR), with self-reports of chain ownership and other nursing home characteristics; (2) Brown University's [LTCFocus.org](https://ltafocus.org) data for residents' case mix acuity; and (3) the Area Resource File (ARF) county (market) data on availability of nursing resources.

The OSCAR data (now reported in the Certification and Survey Provider Enhanced Reporting system (CASPER)), are generally believed to be reliable for research and widely used for quality and policy analyses. OSCAR data include 1) a binary variable identifying whether a nursing home belonged to a chain and 2) a free-text field for the name of the organization to which they belonged. We identified chains based on these reported names using line-by-line inspection across multiple years and addressed inconsistencies by comparing name spelling and inter-temporal relationships of chain reports. For this study, we focus on chains owning five or more nursing homes, because processes of standardization would not be feasible for the smallest chains. Chains are only included in the years they owned 5 or more nursing homes.

Outcome Measures.

We used two measures of nursing home staffing, the Direct Care Hours per Resident Day (DCHPRD, referred to as "hours per resident day") and the ratio of RN to total nurse staffing (RN2NRS, referred to as "staffing mix"). The validity of both measures has been demonstrated in previous research on staffing changes (including description of how outliers were treated).^{30–31} For both measures, staffing was measured in Full-Time Equivalents (FTEs), as reported in OSCAR. Hours per resident day was measured as the cumulative FTEs for RNs, LPNs, and CNAs relative to the number of residents in the nursing home (this measure is used as a Nursing Home Compare (NHC) quality indicator).¹ Staff mix was measured as the proportion of total nurse staff hours that were RN FTEs. Annual chain average staffing measures for both hours per resident day and staffing mix were computed in two ways in order to evaluate standardization as possibly a national or a state-level phenomena. The national standardization measure was calculated by taking the three-year running average among all facilities in the chain and the state standardization measure was

calculated by taking the three-year running average among all facilities in the chain that operated in the same state. Three year averages of chain staffing measures were used to minimize the impact of sudden or dramatic shifts in staffing on our standardization measures and to more accurately reflect how corporate managers view staffing over time. Our dependent measures were then calculated as the absolute difference between a home's staffing and the chain's staffing standards.

Predictor Measures.

Two chain characteristics were measured: size and profit status. Chain size was classified as small (5-6 facilities), medium (7-11 facilities), large (12-30 among for-profits and 12+ among nonprofits) or very large (with greater than 30 facilities, this category was used only among for-profits). Chain size categories were roughly based on Grabowski et al.³² but modified slightly to more evenly distribute facilities across categories. Chain profit status was identified as the profit status of the majority of nursing homes belonging to the chain. In some chains, ownership was mixed, which reflects the fact that chains can acquire facilities with mixed ownership (this is under-recognized and understudied). We found that across the study years, between 10-15% of chains per year owned at least one for-profit and one nonprofit facility. For most chains with mixed ownership, homes that did not match the chain's ownership status often reflected intended ownership conversions (conversions have been studied previously³³) that took time to finalize after acquisition; and this study does not focus on conversions but they merit further examination.

Several types of chain ownership changes were identified by yearly reports of chain names. An acquisition occurred when an independent facility reported ownership by a chain in the following year, and a chain switch occurred when a chain-owned facility was acquired by a different chain in the following year. We also defined divestitures as when a chain-owned nursing home reported no owner the following year. Because coding was done from self reports of chain names, we did not have information on competing risks such as facility closures that could not be identified through name changes and which we did not otherwise track. Chain switches could include multiple homes being acquired by a chain, and we expected the effects of standardization to differ following acquisitions and following chain switches.

Our models controlled for a number of factors expected to impact changes in nursing home staffing but not central to the standardization model. Secular time trends were measured by calendar year dummy variables and provide a basic control for a range of policy and economic trends during this study period. At the nursing home level, we also included the number of beds in the home (scaled to 10 beds), a nursing home case-mix acuity scale, and scaled measures for the percent Medicare and percent Medicaid residents. The case-mix acuity scale, previously used by Feng et al.,³¹ measured the range of activities of daily living (ADLs) and specialty treatments provided to nursing home residents. Finally, analyses included a measure indicating whether the acquired nursing home had staffing higher or lower than the chain average, because chains may react differently to lower staffing in homes.

Methodological Approach.

For facility i entering chain j at year t , we modeled the absolute difference between the nursing home's staffing and an estimate of the chain standard. The chain standardization measures were estimated using a 3-year moving average of the staffing measure average within the chain owner across the set of years: $t-1$, $t-2$, $t-3$ [set referred to as AT]. Standardization was estimated nationally as the average for all nursing homes in the chain in a particular year, and at the state level as the average for all facilities from that chain that operated in that state. Covariates $X_1, \dots, X_k$ captured chain and facility characteristics and the time trend. As an example, the estimated model for hours per resident day (DCHPRD) was of the form:

$$\text{Log}(|\text{DCHPRD}_{ijt} - \text{Avg DCHPRD}_{j,AT}|) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \dots + \beta_k X_k + \varepsilon_{ijt} \text{ Where } \varepsilon_{ijt} \sim \Gamma(\alpha, 1).$$

Adjustment for repeat observations of the nursing home was done by estimating marginal models using Generalized Estimating Equations (GEE) with a log-link and gamma variance. The GEE model provides marginal estimates, for which the effect is averaged over all values of the covariates, which could be correlated. Results were consistent across various working correlation structures, including exchangeable, independent, or unstructured AR1, and the results reported here use an exchangeable correlation. Sensitivity analyses examined the importance of (a) using a 3-year running average for chain standardization by trying either a 1 and 4-year running average prior to an event; and (b) removing small nursing homes, which might have been less able than medium and large nursing homes to adjust staffing.

RESULTS

Table 1 shows the distribution of chains by size across the study period, from 2002 to 2010. In general, there were more for-profit chains than nonprofit chains across size categories. On average, there were 37 small nonprofit chains per year operating 173 nursing homes, and 69 small for-profit chains operating 365 nursing homes. There were on average 29 medium nonprofit chains operating 222 nursing homes in comparison to 77 medium for-profit chains (with 647 homes); and there were 21 large nonprofit chains (operating 493 homes) as compared to 74 large for-profit chains (with 1,313 homes). Thirty-seven of the for-profit chains were defined as very large (these chains operated 2,927 homes).

Table 2 presents descriptive information on variables from analyses. For staffing measures, nursing homes reported on average 3.16 hours per resident day and 0.28 RN to total nurse staffing hours. During the study period, both staffing measures showed significant differences by chain ownership status; at the same time, the average hours per resident day remained fairly steady while staff mix in homes declined significantly across this period (these trends are shown in the available online supplement). The ranges for both staffing measures were narrow, with the interquartile range of hours per resident day from 3.07 to 3.33 and the interquartile range of staff mix from 0.25 to 0.31. On average, approximately 4 percent of nursing homes experienced acquisitions, and almost 8 percent of nursing homes experienced chain switches each year. Among nursing homes that were acquired by a chain, most facilities (58%) had fewer hours per resident day than the acquiring chain average, and

almost two-thirds (64%) had lower staff mix than the acquiring chain average. These percentages were similar among nursing homes that experienced a chain switch (64% and 65% had fewer hours per resident day and lower staff mix, respectively). Given the similarities among nursing homes experiencing acquisitions and chain switches, we combined data on homes acquired both ways in our multivariate analyses. The difference between a nursing home and the chain average for staff hours per resident was on average 0.56 (standard deviation, $sd=0.84$); likewise, nursing home difference from the chain average staff mix was, on average, 0.12 ($sd=0.10$).

Table 3 reports the effect of covariates on the absolute difference between nursing home staffing levels and national and state chain standards estimated by the GEE models. To evaluate hypothesis 1, we examined how chain type impacted the difference between a nursing home's staffing and the chain standard by chain type. Among for-profit chains and compared to the reference category of medium chains, large chains had wider dispersion---an approximately 6% greater spread in staffing hours per resident day ($p<.01$) and approximately 6% greater spread in staff mix ($p<.001$). In contrast, among the very large for-profit chains, homes had a smaller dispersion in staff hours per resident day when compared to national averages, with an almost 4% smaller spread than medium chains ($p<.05$), but still had larger dispersion when compared to chain state averages. These very large for-profit chains still had 15% greater dispersion than medium-sized chains when comparing staff mix against both state and national averages. Among small and medium-sized nonprofit chains, facilities did not show significantly different variation from chain averages when compared to medium for-profit chains. However, among large nonprofit chains, nursing homes had less dispersion of hours per resident day when comparing to national averages (this result was not-significant when comparing to chain state averages) while the same facilities had significantly wider dispersion on staff mix than medium-sized for-profit chains, regardless of whether we used the national or state chain average. Thus, the results only partially support hypothesis 1.

In support of hypothesis 2, the difference between a nursing home's staffing and the chain average (for both the hours per resident and staff mix) decreased with time following an ownership change by approximately 2-3% per year ($p<.01$), suggesting nursing homes adapt to chain-standardized staffing levels over time. This effect held across comparisons except when looking at the differences in staff mix in comparison to the state chain average, which was statistically insignificant.

All control variables were statistically significantly related to dispersion from chain standards on staffing measures, although there were minimal differences when comparing models using the national and state chain averages and we summarize across both here. Dispersion of staff hours per resident day and staff mix decreased with the size of the nursing home and with the percent of residents covered by Medicaid. Dispersion in staffing measures was not related though to the percent Medicare.

Nursing homes with staffing higher than the chain average had a wider spread in staffing from the chain average than nursing homes with staffing below the chain average. The time trend variables were significant and indicated that relative to the excluded year (2002),

staffing differences in chains decreased over time. Results in sensitivity analyses did not differ significantly.

CONCLUSIONS

The analyses provided mixed results for our hypothesis that homes in larger and for-profit chains would have less dispersion from chain staffing standards. Our results indicated that homes in large for-profit chains had greater dispersion in staffing hours per resident day and staffing mix than the reference group (i.e., medium for-profit chains), which is opposite what we predicted. However, nursing homes belonging to the very largest for-profit chains had less variation in hours per resident day than the reference group (medium for-profit chains), as predicted. Large non-profit chains also had less dispersion on staff hours per resident day, supporting the idea that larger chains control staffing better but again, somewhat counter to our hypothesis that for-profit chains would control staffing better than nonprofits. And, contrary to our hypotheses, for both for-profits and nonprofits, nursing homes from larger chains had greater variation in staffing mix when compared to medium-sized for-profit chains. These results suggest that even as very large for-profit and nonprofits chains standardize staffing hours per resident day, they do not control staffing mix. In light of other recent research that has found large nursing home chains seek structural changes in facilities to minimize their risks of malpractice,³⁵ further evidence should explore how and why these organizations drive staffing changes. Especially since staffing controls did not appear equally effective or targeted to controlling staff mix as they are in controlling staff hours per resident day.

Our results provided strong evidence in support of our second hypothesis that standardization occurs post-acquisition or switch. Results showed that among all nursing homes acquired by a chain (either from independence or through chain switches), these homes experienced less variation in both staff hours per resident day and staffing mix with every year following an event. The yearly change in staffing measures relative to the chain standards was not large but it was meaningful relative to the average variation in nursing home staffing and given that, across years the cumulative effect would be substantial for staffing. At the same time, the last two decades have seen substantial churn in home ownership and some nursing homes have gone through multiple ownership changes that will have impacted facility staffing.³³ The importance of acquisition events indicates that individual nursing homes adapt internal operations, such as staffing, to externally imposed changes in ownership.

Within our analyses, the controls for time trends---dummy variables for year in the study---were also highly significant, indicating that the differences between a chain's average staffing and member home's staffing declined over the study period in all chains. These results imply that in addition to chain-specific effects, nursing homes have also been moving towards more of an industry standardization. This may have been driven by newer state regulation of staffing, or in response to government publication of quality indicators that include nurse staffing on the NHC website. Alternatively, this might indicate that chains have become more selective of facilities over time.³⁴ Our findings on control measures the models indicate that nursing homes acquired with staffing lower than a chain's average

experienced greater standardization than homes acquired with staffing levels higher than the chain average. This may be in part because chains focus their attention on avoiding published poor quality associated with lower staffing.³⁵ While past research had voiced concerns that chains provide poor quality care, this study provides evidence that chains actively reduce variation in nursing home's staffing when it is low. These effects when a facility's staffing is low suggest that nursing home chains, not just the facilities themselves, have responded to the strong external pressures during this century again to meet staffing standards and to be sensitive to external definitions of quality. Using the OSCAR datasets provided a useful initial way to explore chain-based organizational change; however, these data are limited in the availability of chain and nursing home level data. At the chain level, we know only about the number and geographic spread of nursing homes owned by the chain. For example, additional useful information on chain structure that may contribute to business strategy includes whether the chain is a management company, the extent of involvement by private investors, whether the chain is publicly traded, or finally, the extent to which the chain may be a local or community business. This leads to broader questions of what constitutes a "chain" and whether business models in the corporate nursing home industry differ in quality. Furthermore, we have not explored chain-level aggregate information that would reveal service-specific strategic approaches in particular types of care, for which resident case-mix standardization may be important, or facility strategies adapted to local market conditions. Future research exploring chain characteristics further would be useful and would extend what has been a largely preliminary look into how nursing home chains operate.

This paper explored the application of a basic process common to chains across industries, namely standardization, in the context of the nursing home sector. We found that the largest for-profit and nonprofit chains demonstrated greater staffing standardization than other types of chains in their staffing levels and that nursing homes, once acquired by chains, changed their staffing to become more similar to the chain average. In other sectors, standardization signals quality control, earning members better reputations in local markets. Future research should explore whether nursing home chains with greater staffing standardization can control quality and reputation and whether market conditions impact these dynamics.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Table 1.

Distribution of Chains and Nursing Homes by Year (2002-2010)

Type of Chain	Number of Chains per Year			Number of Nursing Homes per Year		
	mean	min	max	mean	min	max
Nonprofit chains						
Small (5-6 homes)	37	34	44	173	157	187
Medium (7-11 homes)	29	25	32	222	189	261
Large (>11 homes)	21	19	24	493	460	524
For-profit chains						
Small (5-6)	69	63	74	365	337	398
Medium (7-11 homes)	77	66	89	647	566	740
Large (12-30 homes)	74	79	662	1,313	1,198	1,408
Very Large (>30 homes)	37	32	42	2,927	2,734	3,142
Total	342	334	350	6,140	6,026	6,285

Table 2.

Descriptive Statistics on Chain Events and Staffing, Chain-owned Nursing Homes (pooled for 2002-2010)

Table 2a. Descriptive statistics on nursing home characteristics, including likelihood of events and staffing measures (average annual rates across 2002-2010)*

	Mean	Std Dev	Min	Max
Percent of NHs experiencing events (pooled over all nursing homes annually 2002-2010)				
Acquisition	4		0	100
Chain switch	7.7		0	100
Key staffing measures				
Hours per resident day (DCHPRD)	3.16	0.08	3.07	3.33
Staffing mix (RN2NRS)	0.28	0.02	0.25	0.31
Acuity Index	11.17	0.09	11.04	11.31
Total beds	107.88	0.35	107.39	108.43
% Medicaid	62.83	1.59	61.06	65.15
% Medicare	14.75	1.31	12.33	16.04

Table 2b. Descriptive statistics on nursing home comparisons to chain measures (average annual rates across 2002-2010)*

	Chain Nat'l Avg		Chain State Avg	
	Mean	Std Dev	Mean	Std Dev
Chain average for staffing measures				
Average hours per resident day	3.26	0.03	3.15	0.04
Average staffing mix	0.28	0.02	0.28	0.01
Absolute Difference (NH vs. Chain Avg)				
Hours per resident day	0.56	0.08	0.65	0.08
Staffing mix	0.12	0.01	0.14	0.01
Difference in staffing prior to event (Range=0-100)				
% NHs among those experiencing acquisition				
NH (DCHPPD) > Chain (DCHPPD)	41.78		43.92	
NH (DCHPPD) < Chain (DCHPPD)	58.22		56.08	
NH (RN2NRS) > Chain (RN2NRS)	36.10		38.38	
NH (RN2NRS) < Chain (RN2NRS)	63.90		61.62	
% NHs among those with chain switch				
NH (DCHPPD) > Chain (DCHPPD)	36.18		39.96	
NH (DCHPPD) < Chain (DCHPPD)	63.82		60.04	
NH (RN2NRS) > Chain (RN2NRS)	34.55		39.79	
NH (RN2NRS) < Chain (RN2NRS)	65.45		60.21	

* Note: Distribution of yearly mean of measures (2002-2010)

Table 3.

Exponentiated Parameter Estimates from a GEE Model Predicting ABSOLUTE DIFFERENCE of Facility and Chain Average Staffing Measures

VARIABLES	Using Chain National Average		Using Chain State Average	
	(1) Staff Hrs Per Resident	(2) Staff Mix	(3) Staff Hrs Per Resident	(4) Staff Mix
Chain type*				
FP_small	-0.04 (0.04)	-0.05 (0.03)*	-0.08 (0.04)**	-0.10 (0.03)***
FP_medium (ref)	---	---	---	---
FP_large	0.06 (0.03)**	0.06 (0.02)***	0.15 (0.03)***	0.13 (0.02)***
FP_very large	-0.08 (0.03)***	0.14 (0.02)***	0.05 (0.03)*	0.24 (0.02)***
NFP_small	-0.05 (0.06)	-0.07 (0.05)	-0.04 (0.06)	-0.07 (0.05)
NFP_medium	0.02 (0.07)	0.004 (0.04)	0.05 (0.06)	0.04 (0.04)
NFP_large	-0.13 (0.07)*	0.12 (0.03)***	0.06 (0.06)	0.16 (0.04)***
Years since acquisition/switch				
No acquisition or switch (ref)	---	---	---	---
Years since independ. NH	-0.02 (0.01)***	-0.01 (0.004)***	-0.01 (0.005)**	-0.001 (0.004)
Years since in another chain	-0.02 (0.004)***	-0.02 (0.004)***	-0.02 (0.004)***	-0.01 (0.004)**
Staffing prior to acquisition/switch				
No acquisition or switch (ref)	---	---	---	---
Facility > chain	0.19 (0.03)***	0.11 (0.02)***	0.07 (0.03)***	0.02 (0.02)
Facility < chain	-0.05 (0.02)**	-0.05 (0.02)***	0.01 (0.02)	-0.09 (0.02)***
Facility Control Variables				
Acuity Index	-0.002 (0.007)	-0.02 (0.004)***	-0.009 (0.007)	-0.01 (0.004)***
Total number of beds/10	-0.002 (0.0003)***	-0.002 (0.0002)***	-0.002 (0.0003)***	-0.001 (0.0002)***
Standardized percent Medicaid*	-3.60 (0.62)***	-0.57 (0.18)***	-3.18 (0.58)***	-0.73 (0.18)***
Standardized percent Medicare*	0.16 (1.17)	0.47 (0.32)	0.48 (1.08)	0.69 (0.30)**
Time trend*				
Year=2002 (ref)	---	---	---	---
Year=2003	-0.007 (0.018)	0.008 (0.012)	-0.021 (0.024)	-0.052 (0.012)***
Year=2004	-0.073 (0.020)***	-0.023 (0.013)*	-0.100 (0.023)***	-0.031 (0.013)**

VARIABLES	Using Chain National Average		Using Chain State Average	
	(1) Staff Hrs Per Resident	(2) Staff Mix	(3) Staff Hrs Per Resident	(4) Staff Mix
Year=2005	-0.086 (0.025) ***	-0.044 (0.014) ***	-0.071 (0.026) ***	-0.086 (0.014) ***
Year=2006	-0.097 (0.027) ***	-0.094 (0.014) ***	-0.092 (0.027) ***	-0.119 (0.015) ***
Year=2007	0.029 (0.026)	-0.095 (0.015) ***	-0.011 (0.026)	-0.115 (0.015) ***
Year=2008	0.255 (0.025) ***	-0.099 (0.016) ***	0.136 (0.025) ***	-0.149 (0.016) ***
Year=2009	0.295 (0.025) ***	-0.131 (0.016) ***	0.243 (0.026) ***	-0.144 (0.016) ***
Year=2010	0.307 (0.027) ***	-0.066 (0.017) ***	0.250 (0.028) ***	-0.093 (0.017) ***
Constant	-0.365 (0.092) ***	-1.817 (0.050) ***	-0.221 (0.090) **	-1.805 (0.051) ***
Observations	42,305	42,526	42,305	42,526
Number of facilities	6,976	7,008	6,976	7,008

1. Robust standard errors in parentheses; P-test for significance:

p<0.01

**
p<0.05

*
p<0.1

2. Small chains = 5-6 nursing homes; medium chains = 7-11 nursing homes; large for-profit chains = 12-30 nursing homes and large nonprofit chains = 12 or more nursing homes; very large for-profit chains > 30 nursing homes.

3. Time trend uses cumulative dummies by year; for example, year 2003 is coded as 1 in 2003 and every year following.

4. Percent Medicaid (centered & rescaled) = (Percent Medicaid-50) / (5*100) and percent Medicare (centered & rescaled) = (Percent Medicare-13) / (5*100).