JOURNAL OF HEALTH CARE FINANCE

June/July 2014

Private Equity Ownership of Nursing Homes: Implications for Quality

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Abstract

Private equity has acquired multiple large nursing home chains within the last few years; by 2009 it owned nearly 1900 nursing homes. Despite wide-spread public concern, the empirical evidence on the purported impact of private equity ownership on nursing home quality remains limited ; *ergo* this study. Secondary data from the Minimum Data Set, the Online Survey Certification and Reporting (OSCAR) file, Brown University's Long-term Care Focus, Florida's semi-annual Nursing Home Rate Setting files, and Area Resource File (ARF) are combined to construct a longitudinal dataset for the study period 2000-2007. The final sample consists of 2822 observations after removing all not-for-profit, independent, and hospital-based facilities. Quality is operationalized through Donabedian's Structure-Process-Outcome model. Independent variables primarily reflect private equity ownership. The study was analyzed using ordinary least squares (OLS), gamma distribution with log link, logit with binomial family link, and logistic regression. Private equity nursing homes have lower RN staffing intensity and lower RN skill mix compared to the control group. Other quality measures are similar to the control group except deficiencies where private equity nursing homes perform significantly worse. Results suggest troubling shifts in nurse staffing patterns of private equity nursing homes particularly in the case of Registered Nurses. In addition, these facilities report significantly higher number of deficiencies. Implications for policy are discussed and the need for transparency and accountability in nursing home ownership and private equity investments emphasized.

Key Words: Private equity, nursing homes, quality

Innovations in the organizational structure of nursing homes, insofar as they affect quality of care and availability of financial resources are an important public policy issue. The introduction of private equity financing in the nursing home industry is an important organizational shift. Private equity refers to a "range of investments that are not freely tradable on public stock markets"; in essence, the acquired firms delist from stock exchanges and are taken private [1]. Investments are generally made in underperforming publicly traded organizations and private equity hopes to recoup its investments by improving the financial performance of acquired firms.

In recent years the US nursing home industry has witnessed large scale purchase of chains by private equity ranging from Centennial Health which was bought by Hilltopper in 2000 to Manor Care's acquisition by the Carlyle group in 2007 [2]. The Government Accountability Office (GAO) [3] has reported that in 2009 private equity owned approximately 1900 nursing homes.

Private equity investments in nursing homes have sparked a vigorous public policy debate because it is thought to be inimical to high quality of care. [4]. Private equity firms face diminished public disclosure requirements and are not subject to market discipline as they are not traded on stock markets. On the other hand, private equity fashions itself as "turnaround specialists" who invest in underperforming assets and ensure high returns by improving organizational performance through their leadership and strategic inputs.

Limited empirical evidence exists on the quality of care in private equity nursing homes. Stevenson and Grabowski [5] report no significant deterioration of quality as measured by deficiencies or resident outcomes in private equity nursing homes. On the other hand, Harrington et al. [4] report that private equity facilities experience only marginal shifts in nurse staffing but experience significantly higher deficiencies including serious deficiencies.

Using longitudinal data for the state of Florida, this study seeks to examine whether the quality of private equity nursing homes differs significantly from other for-profit (FP) facilities. Our study makes the following contributions to the literature. First, unlike prior studies, we use a difference-in difference approach with multiple time periods which gives us greater confidence in the validity of our results. Second, we take a comprehensive approach towards quality by using the well-known Donabedian's structure-process-outcome (SPO) framework. As the SPO framework has been frequently employed in studying nursing homes quality, our findings can be better compared with the extant literature. Third, we use a rich set of process and outcome variables derived from the Minimum Data Set (MDS). Finally, identifying private equity nursing homes is a challenging task due to their deliberately complex organizational structures. Our access to a specific dataset from Florida's Agency for Healthcare Administration (AHCA) provides reasonable confidence that facilities have been correctly identified in our dataset.

Quality of Care and Private Equity

Nursing home research generally associates FP ownership with lower quality of care. Hillmer et al. [6] reviewed the evidence concerning ownership status and quality of care in North American nursing homes. They report that in their sample of 38 studies with a total of 81 results, only 6 demonstrated that quality of care in NFPs was worse while 33 results indicated that quality was poorer in FP facilities. There are reasons to believe that compared to other FP nursing homes, private equity may deliver lower quality of care.

First, private equity consistently operates under pressure to deliver high returns; profit maximization is their *raison* d'être. The high amount of debt generated in private equity transactions also increases the pressure to ensure constant cash flow. Empirical evidence also suggests that private equity facilities are more profitable; Pradhan et al. [7] show that private equity facilities in Florida report significantly higher profits than FP facilities. Private equity's emphasis on high profits may be particularly worrisome as O'Neill et al. [8] report that among proprietary nursing homes, facilities ranking in the highest 14% profit bracket were associated with significantly higher number of total as well as serious deficiencies.

Second, limited avenues are available to nursing homes to increase revenues; therefore, reducing costs may be necessary to improve financial performance. As the nursing home industry is labor intensive with high staffing costs, facilities may attempt to lower costs either by decreasing total nurse staffing or by substituting the more expensive registered nurses (RNs) for the less expensive licensed practical nurses (LPNs) or certified nursing assistants (CNAs). Extant literature strongly suggests that nurse staffing intensity as well as skill mix have a significant influence on quality of care in nursing homes [9, 10]. Cost cutting may be particularly important in Florida due to reimbursement issues. Medicaid is responsible for 61% of total nursing home revenues in Florida [11] and nationwide Medicaid rates are lower than Medicare or private pay [12].

Third, the complicated ownership and operating structures of private equity investments reduce the threat of malpractice litigation; an important incentive to improve quality (Troyer & Thompson, 2004). Private equity investments are designed to limit liability---for instance, by floating multiple companies with limited assets or by separating ownership from licensure [13].

Fourth, private equity has a short investment period typically not extending beyond 5-7 years. Private equity may adopt a different strategic outlook than long-term owners as investments in quality may not be result in immediate financial returns. Finally, private equity has limited expertise and experience in running nursing homes compared to long-term investors [4]. Since nursing homes is a highly specialized business, this may adversely affect overall performance including patient care.

Therefore, based on the discussion outlined above, we hypothesize that: **P**rivate equity nursing homes will experience poorer quality of care compared to other FP nursing homes in the state of Florida.

Methods

Data

This study combines the Online Survey, Certification and Reporting (OSCAR), Brown University's Long-Term Care (LTC) Focus dataset, MDS, the Area Resource File (ARF), and AHCA's semiannual Nursing Home Rate Setting files. OSCAR is collected as part of the certification process for Medicaid and Medicare with each nursing home inspected at least once every fifteen months**.** LTC Focus [14] hosts data "regarding the health and functional status of nursing home residents, characteristics of care facilities, and state policies relevant to long term care services and financing." MDS records nursing home residents' demographic information, health status as well the number of services that a resident has received. The ARF contains data on socioeconomic and demographic characteristics of counties where nursing homes are located. Finally, we used AHCA data to identify private equity nursing homes in Florida.

Sample

This study focuses on private equity acquisitions in Florida for several reasons. First, the state has witnessed large-scale purchase of nursing homes with private equity acquiring over 100

facilities between 2001 and 2003. Second, focusing on a single state addresses the issue of state-level regulatory differences which may affect the study results. Third, according to the 2000 US census, Florida has the highest proportion of over 65 population in US [15], and nursing homes are dominated by this demographic group. Finally, identifying private equity transactions remains a significant challenge due to the opaque nature of these deals. The unique ACHA dataset available to us facilitated this process for Florida.

The experimental group consisted of all nursing homes acquired by private equity in 2002 and 2003. Pre and post-acquisition data for these facilities from 2000-2007 is included. Several steps were taken to identify private equity acquisitions. As a first step, a search was carried out in Lexus-Nexus using the keywords "private equity nursing homes." This information was verified by downloading filings from the "Edgar" dataset maintained by the Security & Exchange Commission. To identify individual facilities, OSCAR data was supplemented by accessing websites of nursing home chains. Finally, these results were matched and cross-checked from AHCA's Nursing Home Rate Setting files. Based on our search, we identified four major nursing homes chains which divested their Florida facilities to private equity: Beverley, Genesis, Kindred and Mariner (Table 1).

The control group consisted of all Medicare & Medicaid-certified, for-profit, chain affiliated, non-hospital-based nursing homes in Florida between the years 2000-2007. The underlying premise is to ensure that experimental and the control groups are similar to each other in their organizational structure and response to regulatory, environmental, and market conditions. For instance, hospital-based nursing homes frequently manage sub-acute patients from their own hospitals. Chain affiliated facilities may have access to greater labor and management resources and a larger patient base [16, 17]. Finally, we exclude NFPs from our sample as they may be more focused on delivering higher quality care due to their different organization, mission goals, and tax treatment. Removing NFP facilities is also appropriate because the Florida nursing home market is dominated by FPs with over 70% market share [18].

The initial dataset consisted of approximately 760 facilities for each year of the study period. Of these 760 nursing homes, approximately 200 are NFPs, 300 independent and 40 hospital-based. After removing these observations, the final analytic sample consisted of approximately 350 nursing homes per year or 2822 observations spread over the 8 year study period (2000-2007).

Table 1. Major Private Equity Nursing Homes Acquisitions in Florida (2002-2003)

Nursing Home	Private investment group	Year Effective	Number of units
Beverly	Formation	2002	49
Genesis	Formation	2003	10
Mariner	Formation	2003	20
Kindred Healthcare	Senior Health Management LLC	2003	18

Dependent Variables

The "gold standard" theoretical framework for identifying quality measures in healthcare is the Donabedian's SPO model [19]. According to this model, structural indicators of quality are the staffing patterns and organizational resources that can be associated with providing care. Process indicators refer to actions that are performed on or done to patients such as medical procedures. Outcome indicators are the states that result from care processes such as improvement in quality of life as well as decreased mortality rates. Good structures increase the likelihood of good processes, and good processes increase the likelihood of good outcomes. Good structure can also directly improve outcomes.

Structural measures of quality: Nursing homes typically employ three different types of nursing staff: RNs, LPNs, and CNAs. We use *RN hours per patient day (PPD)* as a measure of RN intensity. Literature suggests that nurse qualification has an independent effect on quality; more qualified nurses ensure lower morbidity and mortality [20]. *LPN hours PPD* and *CNA hours PPD* are measures of non-RN staffing. Skill mix is defined as the "composition of the nursing staff by licensure or educational status" [21]. In this study, *skill mix* is operationalized as the ratio of the number of RN FTEs divided by the number of RN FTEs plus LPN FTEs.

Process measures of quality reflect what is done to the patient. *Pressure sore prevention* is a facility composite score (0-4) derived from four MDS dichotomous (yes/no) items: turning/repositioning program, pressure relieving seat, pressure relieving mattress and ointment application. The pressure sore prevention composite had adequate internal consistency showing a Cronbach alpha of 0.82. *Restorative ambulation* measures the average number of days in a week that residents are walked and is generated by dividing the resident level restorative variable by the total number of residents in the facility. Nursing home residents on a restorative program are more likely to maintain their functional mobility. *Use of restraints* is defined as the proportion of residents who are physically restrained daily. The literature has linked restraints with higher morbidity, cognitive decline, as well as an overall negative influence on resident quality of life. *Use of catheters* represents the proportion of residents who had a catheter inserted and left in their bladder. It is associated with higher morbidity and mortality among elderly patients. [22]

Outcome measures consist of risk-adjusted facility-level quality indicators (QI). *ADL decline in function* consists of the proportion of residents who experienced a 4 point ADL decline (out of 16 points). *Pressure ulcer-h/l risk prevalence* measures the percentage of high- and low-risk residents who have pressure sores (stage 1-4). *Bowel decline in continence* measures the proportion of residents whose bowel functions declined. The risk-adjusted QI score is a facility- level QI score adjusted for the specific risk for that QI in the nursing facility. It can be thought of as an estimate of what the nursing facility's QI rate would be if the facility had residents with average risk. ADL and bowel decline in continence were risk adjusted using covariate models, while pressure ulcer prevalence was risk adjusted according to the stratification method. Risk adjustment in the stratification method consisted of two steps: first, a weighted average per quarter was created for the high- and low-risk measures; second, an average was obtained across quarters. These outcome measures of nursing home quality have been validated by Abt Associates [Abt 23], are part of the *CMS National Nursing Home Quality Measures*, and are currently used in the CMS Nursing Home Compare website.

We also include two non-risk adjusted quality outcomes. *Deficiencies*, recommended as a quality measure by the Institute of Medicine [24], are an overall measure of nursing home quality and is the sum of all state and federal deficiencies. Because facilities can be surveyed any time between 9 to 15 months, we used the latest survey if more than one was conducted in a calendar year. *Actual harm citation* (1= yes, 0=no) indicates whether a facility received an actual harm citation (deficiencies 'F' or higher) on the state survey [5]. Table 2 provides the descriptive statistics of all the dependent, independent, and control variables.

Independent Variables

Private equity ownership: A dichotomous variable (0, 1) for nursing home ownership: whether the said nursing home is owned by private equity or not. Nursing homes are coded as 1 starting with the first year of acquisition by private equity.

Year prior equity acquisition: A dichotomous variable coded as 1 in the year prior to private equity acquisition of a particular nursing home and 0 otherwise. This variable is designed to capture if nursing home behavior changes just before acquisition. For instance, nursing homes may focus on improving financial performance to extract the maximum valuation.

Years post-acquisition: This indicates the number of years a nursing home has been owned by private equity. This variable is used as the literature indicates that the length of private equity ownership has an independent effect on the performance of acquired firms. This variable is coded as 0 prior to acquisition, and 0 in the year of acquisition; it is coded as 1, 2, and 3 and so on in subsequent years.

Control Variables

Control variables include organizational and market variables that may be associated with quality: Size, payer mix, occupancy rate, acuity index, market competition, metropolitan location, and per capita income. Nursing home size is measured by the number of residents. Literature suggests that larger facilities have lower staffing and are associated with higher number of deficiencies [25]. Payer mix variables are the percentages of Medicare and Medicaid residents. Nursing homes with a greater proportion of Medicaid patients may have poorer quality due to resource constraints [26]. The occupancy rate is the percentage of nursing home beds occupied by residents. Facilities with higher occupancy rates may have better quality as higher consumer demand may translate into greater availability of resources [25]. To account for the level of resident care needs, we used resident acuity index created by the Cowles Research Group [27] and derived from the OSCAR files. It combines a range of activities of daily living dependencies and special treatment needs for all residents in a facility on a scale of 0 (*low need*) to 38 (*high need*). We use two measures of market competition: Herfindahl-Hirschman Index (HHI) and excess capacity. HHI is a measure of market concentration and it is calculated as the sum of the squared market shares (based on resident days of care) of all the nursing homes within a county. HHI represents perfect competition when it registers a score of 0, while a score of 1 represents a monopolistic market. Excess capacity is the average number of empty beds per facility in the county. We control for competition as nursing homes located in more competitive markets may be forced to deliver higher quality in order to capture market share [4]. Finally, we include Metropolitan location (1=yes, 0= no) and the per capita income to control for differences in economic conditions across markets which may affect resource availability and in turn, quality.

Table 2. Descriptive Statistics of Independent, Dependent, and Control Variables

Variables	N	Mean/ Frequencies*	Standard Deviation
Independent variable			
Equity Ownership*	2686	15.12%	-
Dependent variables			
RN hours PPD	2686	0.27	0.16
LPN hours PPD	2686	0.87	0.22
CNA hours PPD	2686	2.52	0.54
Skill mix	2686	0.24	0.12
Pressure sore prevention	2686	1.80	0.66
Restorative ambulation	2686	0.63	0.51
% of restraints	2672	0.09	0.07
% of catheters	1282	0.09	0.06
ADL decline 4-point	2678	0.13	0.04
Pressure ulcer h/l risk prevalence	2672	0.09	0.04
Bowel worsening	2642	0.16	0.06
# of deficiencies	2686	7.83	5.16
Actual harm citation*	2647	0.15	0.36
Control variables			
Size	2686	122	39
Census Medicare	2686	0.18	0.10
Census Medicaid	2686	0.61	0.18
Census Other	2686	0.21	0.13
Occupancy rate	2685	0.89	0.10
Acuity index	2686	11.58	1.13
HHI	2681	0.11	0.16
Excess capacity	2686	14.71	5.71
Metro*	2552	89.11%	-
Per capita income	2552	$37,238.86	$9,673.00

Model

Our study is a longitudinal study (2000-2007) and is organized as a difference-in-difference (DID) model with multiple time periods, By using a DID model, we ensure that the 'treatment effect' is isolated and our results are not vitiated by confounding factors. . We also control for potential clustering of facilities within private equity investor groups by using dummy variables. To address the potential issue of endogeneity of ownership status, we use facility level fixed effects. Fixed effects models are used when there are unobservable characteristics that do not change over time but may be correlated with the independent variables---in this case, acquisition by private equity.

The general model is as follows

$Y^{it}=\alpha + \beta_1 PE^{it} + \beta_2 C^{it} + \beta_3 prePE^{it} + + \beta_4 T^{it} + \beta_5 Year^{it} + \sum \mu^{it}$

Where

Y: Dependent Variables

i: Individual facility

t: Each individual year in the dataset.

PE: Private equity ownership
C: Control variables
Year PE: Year prior equity acquisition
T: Years post-acquisition
Year: Number of years in the dataset
μ: Error term

Dependent variables were classified as ratios, proportions, count, and dichotomous, so the type of regression used varied based on the distribution. RN hours PPD, LPN hours PPD, CNA hours PPD, skill mix, pressure sore prevention, restorative ambulation, pressure ulcer h/l risk prevalence are considered *ratio* variables. ; To satisfy the normality assumption of the ratio variables, the skewness and kurtosis should be as close to 0 and 3 as possible. To improve the distribution, outliers ---defined as five standard deviations above or below the means---were dropped [28] while in other cases transformations were necessary. Log, square root, and cube transformations were attempted. In the case of log transformations for ratio variables, if kurtosis is less than 4, generalized linear model (GLM) with log link and gamma family distribution was used otherwise ordinary least squares (OLS) regression was used [29]. Based on this strategy, OLS was used for CNA hours PPD, skill mix, pressure sore prevention, and restorative ambulation, while GLM) was used for RN hours PPD, LPN hours PPD and pressure ulcer h/l risk prevalence. The use of restraints, use of catheters, ADL decline in function, bowel decline in continence are considered *proportions*, and a logit model with odds ratios was estimated. The number of deficiencies is considered a count variable, therefore, a negative binomial regression was employed. Finally, actual harm citation is a *dichotomous* variable, and a logistic regression was used and the odds ratio calculated. The data was analyzed using the STATA 12 software.

Results

Multivariate regression results are shown on Table 3. Hypothesis #1 states that private equity owned nursing homes are likely to experience poorer quality of care compared to other investor owned nursing homes. The regression results offer partial support for our hypothesis.

In terms of structural (staffing) variables, results suggest that private equity nursing homes have 29% lower RN hours PPD compared to the control group ($p<.001$). On the other hand, private equity owned facilities have 7% higher LPN hours PPD ($p<.05$). Similarly, private equity facilities report 12% higher CNA hours PPD compared to the control group ($p<.001$); however CNA hours decrease with years of equity ownership ($p<.05$). It is important to note that in the year prior to acquisition, private equity nursing homes report 6% higher LPN hours PPD ($p<.05$); they also report 4% higher CNA hours PPD but this finding is only marginally significant. The shift in nurse staffing is reflected in the skill mix with private equity nursing homes reporting a 25% lower skill mix than the control group ($p<.001$).

In terms of process variables, private equity nursing homes report worse quality of care. With every year of private equity ownership, facilities report 5% lower pressure sore prevention ($p<.001$)**.** In the case of restorative ambulation while there is no statistically significant difference between private equity facilities and the control group**,** restorative ambulation declines by approximately 5% ($p< .01$) with each additional year under private equity ownership. Results for use of restraints and use of catheters are statistically non-significant**.**

In terms of outcome variables, private equity nursing homes have 9% higher pressure ulcer h/l risk prevalence (p<.05). In addition, these facilities report 21% higher deficiencies as compared to the control group (p<.01). However, private equity nursing homes have sharply lower odds of being reported for actual harm citation (p<.01). All other results are not statistically non-significant.

Table 3. Multivariate regression results for private equity nursing homes quality as indicated by structural , process, and outcome variables (N= 2546)

Dependent variable	Year prior equity acquisition	Equity owned	Years post acquisition
Structural variables	B (SE)	B (SE)	B (SE)
RN hours PPD	-0.084(.063)	-0.292*** (.073)	0.003(.015)
LPN hours PPD	0.057*(.028)	0.069*(.032)	-0.01(.006)
CNA hours PPD^^	0.108(.059)	0.304***(.069)	-0.072***(.014)
Skill mix^^	-0.021(.012)	-0.059***(.014)	0.001(.003)
Process variables			
Pressure sore prevention^^	-0.022(.016)	-0.099***(.019)	0.001(.004)
Restorative ambulation^^	-0.049*(.053)	-0.125(.062)	-0.034**(.012)
Use of restraints^	-0.0914(.315)	1.125(.424)	0.974(.081)
Use of catheters^	-	1.180(.619)	1.030(.152)
Outcome variables			
ADL-4 point decline^	1.144(.374)	1.155(.416)	0.983(.089)
Bowel worsening^	1.140(.341)	1.307(.422)	0.978(.081)
Pressure ulcer-h/l risk prevalence	-0.028(.040)	0.093*(.045)	0.019(.010)
Total deficiencies	0.118(.075)	0.214*(.087)	0.022(.018)
Actual harm citation^	1.70^{+}(.49)	0.53**(.19)	1.40(.45)

Significance levels: *p<.05; **p<.01; p<***.001 ^: Odds ratio All models adjusted for the following control variables: size, payer mix, occupancy rate, acuity index, market competition, , metropolitan location, and per capita income. ^^ Converted to percentages for reporting in the results section.

Discussion

Private equity nursing homes in Florida have lower RN staffing and higher LPN and CNA staffing compared to other FP nursing homes. The change in nurse staffing pattern is reflected in the sharply lower skill mix of private equity nursing homes. These facilities also report worse results on pressure sore prevention and restorative ambulation and have a significantly higher number of deficiencies and pressure ulcer h/l risk prevalence.

Our staffing results are broadly similar to findings from prior studies on private equity nursing homes [4, 5]. An important distinction, however, is that contrary to previous research, our sample of private equity nursing homes did not have lower RN staffing prior to their acquisition. Our results suggest that private equity may be engaged in substituting expensive but skilled RNs with cheaper and less skilled nurses possibly as a cost-cutting measure.

Another possible explanation for the change in staffing may be legislative mandates. The Florida Senate Bill (SB) 1202 imposed minimum CNA staffing levels in Florida and was fully implemented from the year 2003 [30]. SB 1202 provided incentives for Florida nursing homes to increase their licensed nursing ratios (RNs and LPNs). Private equity nursing homes may have

complied with the law by disproportionately increasing the number of LPNs instead of the more expensive RNs.

Private equity nursing homes performed worse in pressure sore prevention and pressure ulcer hl/ risk prevalence; both these measures may be positively impacted by CNA nurse staffing [30]. Studies have shown that increasing CNA staffing without adequate RN supervision may bring little additional benefit [31]. Another possible explanation may be that as reported by Thomas et al. [30], one of the unintended consequences of SB 1202 was the decline in indirect care staff (housekeeping, dietary and laundry staff) as nursing homes may be using the newly mandated CNAs for indirect care.

Deficiencies remain a cause of concern as not only private equity facilities report significantly higher number of deficiencies but there was a positive association of deficiencies with progressive years of equity ownership. Literature suggests that RN staffing has a strong influence on deficiencies [32] while another study by Kim and colleagues [21] indicates that skill mix is negatively related to serious deficiencies in nursing homes. Our findings on deficiencies are similar to those reported by Harrington et al. [4]; However, we also report that private equity facilities are less likely to be cited for serious deficiencies. It is possible that private equity focusses more on serious deficiencies as they are likely to attract stringent regulatory action including monetary fines.

Policy and Managerial Implications

Much attention has recently been focused on private equity nursing home investments with many arguing that the inordinate focus on profits may lower quality of care. Our results do suggest that generally private equity nursing homes deliver poorer quality of care with especially troubling shifts in nurse staffing and significantly higher number of deficiencies.

Apart from concerns over quality, the most pressing issue is of transparency. The deliberately complex organizational structures constructed by private equity not only hinder the ability of regulators to monitor quality but also limit legal remedies available to aggrieved residents. A recent GAO [3] report has pointed out that the CMS Provider Enrollment, Chain, and Ownership (PECOS) dataset did not provide sufficient information about ownership of private equity nursing homes or the relationships between the multiple owners listed for a facility which actually belongs to the same investor. The recently passed Patient Protection and Affordability Care Act of 2010 (PPACA) may help address some of these concerns by mandating greater transparency in nursing home ownership including additional information about operators who may be providing management or consulting services. However this data is unlikely to be publicly available before 2014 [33].

Stevenson and Grabowski [5] argue that CMS regulation of nursing home quality is not based on ownership but reflects facility level outcomes and deficiencies. If the behavior of a facility is guided by its ownership, a facility-based approach may be ineffectual. While equally applicable to non-private equity chains, it becomes especially important in this case as the complicated ownership structures—for instance, separation of ownership and licensure---creates legal walls between facilities, and the identification of a common owner may be challenging. It also protects them from other possible chain-wide sanctions including termination from Medicare and Medicaid programs. Serious thought needs to be given to an expanded regulatory framework shifting the “locus of accountability” from facility to the chain-level recognizing that chain is not merely an amalgamation of disparate units but represents a common governing and operational philosophy.

Another worrying aspect of private equity is the short investment period. Assuming a reasonable priori that improving quality of care incurs substantial initial costs, private equity may conclude that such an investment makes little financial sense. Even data-driven efforts like Nursing Home Compare are blunt tools and most facilities would be expected to congregate near the mean. Development of more granular measures of quality and sharper linkages between quality and reimbursement is required. The importance of a strong regulatory framework cannot be stressed enough with adequate market based incentives; improved financial incentives for higher quality with concomitant strong penalties for failing to deliver mandated quality.

Finally private equity nursing homes have introduced changes in nurse staffing *prima facie* structured to save costs. Nurse staffing will continue to be a primary target for cost-savings if these nursing homes face additional financial pressures. The role of minimum nurse staffing in improving quality has been strongly emphasized in the literature. Hyer et al. [34] recently reported that Florida nursing homes' quality has significantly improved since the imposition of minimum nurse staffing regulations in the state. Imposition of federal minimum nurse staffing levels may be helpful and should be seriously considered by CMS.

From a managerial perspective, private equity may believe that achieving financial goals is more important than emphasizing quality improvement. However, regulators are increasingly moving towards a regime which actively rewards good quality while financially penalizing poor quality of care. For instance, Nursing Homes Quality Initiatives (NHQI) launched by CMS in 2001 aims to improve nursing home quality through a mixture of public reporting, penalties, and financial incentives [35]. Therefore, nursing home managers would require a fine balance between quality and financial returns.

This study presents several limitations. First, staffing data are based on OSCAR, which is self-reported and is not subject to regular audits. However, a study by Grabowski [36] found a strong inter-survey agreement between OSCAR and their own survey with respect to RN, LPN, and CNA full-time equivalents (FTEs) data. Second, private equity investments are relatively recent in nature; more recent data may be required to understand its full effects. For example, we report a decline in RN staffing with every progressive year of private equity ownership. It is possible that more recent data may show an even more negative impact of lower RN staffing on quality. Therefore, conclusions should be drawn conservatively from our study. Finally, this study is restricted only to Florida which may make generalizations across states and at the national level difficult.

Conclusions

Should private equity be allowed to invest in nursing homes? Any proposal to limit private equity may be untenable in the absence of a "smoking gun" evident of deliberate malfeasance especially in an industry dominated by proprietary chains. The focus therefore has to be on the twin issues of transparency and accountability.

Transparency and accountability are inextricably linked. Without ensuring that nursing homes ownership is more transparent, accountability cannot be fixed. And without a strengthened regulatory framework which attempts to move beyond facility level monitoring system, accountability would be limited. These are challenges which may be particularly relevant to private equity ownership but are by no means limited to them. Addressing them would help achieve what engages policymakers, regulators, and patients alike: To ensure that nursing homes

deliver high quality care and in instances where this expectation is belied, effective tools are available to punish the guilty and to compensate the victims.

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