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Nursing Home Quality and Financial Performance: Is There a Business Case for Quality?

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Abstract

This study examines the relationship between nursing home quality and financial performance to assess whether there is a business case for quality. Secondary data sources included the Online Survey Certification and Reporting (OSCAR), Certification and Survey Provider Enhanced Reporting (CASPER), Medicare Cost Reports, Minimum Data Set (MDS 2.0), Area Resource File (ARF), and LTCFocus for all free-standing, nongovernment nursing homes for 2000 to 2014. Data were analyzed using panel data linear regression with facility and year fixed effects. The dependent variable, financial performance, consisted of the operating margin. The independent variables comprised nursing home quality measures that capture the three dimensions of Donabedian's structure-process-outcomes framework: structure Registered Nurse (RN) hours per resident day, Licensed Practical Nurse (LPN) hours per resident day, Certified Nursing Assistant (CNA) hours per resident day, RN skill mix), process (facility-acquired restraints, facility-acquired catheters, pressure ulcer prevention, and restorative ambulation), and outcomes (facility-acquired contractures, facility-acquired pressure ulcers, hospitalizations per resident, rehospitalizations, and health deficiencies). Control variables included size, average acuity index, market competition, per capita income, and Medicare Advantage penetration rate. This study found that the operating margin was lower in nursing homes that reported higher LPN hours per resident day and higher RN skill mix (structure); higher use of catheters, lower pressure ulcer prevention, and lower restorative ambulation (process); and more residents with contractures, pressure ulcers, hospitalizations and health deficiencies (outcomes). The results suggest that there is a business case for quality, whereas nursing homes that have better processes and outcomes of care perform better financially.

Keywords

nursing homes, financial performance, quality, structure-process-outcome

> **What do we already know about this topic?**
> Weech-Maldonado and colleagues (2003) reported that nursing homes that had higher quality of care were able to lower resident costs contributing to superior financial performance; however, these studies were limited to a cross-sectional analysis of a limited state sample from 1996.
> **How does your research contribute to the field?**
> This study contributes to the literature by examining the relationship between nursing home financial performance (operating margin) and quality using a national longitudinal database (2000-2014) and an expanded set of structure, process, and outcome measures of quality.
> **What are your research's implications toward theory, practice, or policy?**
> Producing a high quality of care may allow nursing homes to become more efficient, or it may allow the nursing home to have higher revenues due to higher quality, which can ultimately improve financial performance.

Introduction

Nursing homes face constant challenges delivering high-quality care to high-need residents in a competitive and highly regulated environment. The industry faces multiple challenges, including the growing number of substitutes and rivals, shifting resident and payer mix, changes in reimbursement policies, demands for accountability and transparency, and greater federal and state regulation.[1] Nursing homes must balance the challenge of delivering high-quality

care while remaining financially solvent in this turbulent environment. But are profits and quality necessarily antagonistic as widely understood, or is there is a business case quality? This is the question explored in this study.

Nursing homes must be able to balance quality care with financial performance because as the health care adage goes "no margin, no mission." Poor financial performance has been associated with organizational failure and closure in nursing homes.[2,3] Nursing home industry revenues have been adversely affected by changes in state and federal reimbursement policies, falling occupancy, and changing payer mix.[1] At the same time, the cost of delivering resident care has increased due to nurse staffing mandates, liability insurance costs, and worsening resident acuity,[4] placing the nursing home industry in a precarious financial situation.

A commonly held notion is that higher quality may be associated with higher costs,[5] yet quality of care and financial performance should not be viewed as incompatible goals.[6] For instance, the quality improvement movement posits that improvements in quality and reductions of costs can be achieved simultaneously through more efficient and streamlined processes of delivering care.[5,7,8] Yet the typical cost function of economic theory postulates that greater quality of care is associated with greater costs.[9]

The existing health services research literature provides some evidence that the association between financial performance and quality may be more nuanced.[10,11] Within the nursing home industry, Weech-Maldonado and colleagues[6,12] have reported that nursing homes that had higher quality of care were able to lower resident costs contributing to superior financial performance. However, these studies[6,12] were limited to a cross-sectional analysis of a limited state sample from 1996. Parker and Werner[13] found that quality was positively associated with financial performance, but only after Nursing Home Compare public reporting requirements went into effect in 2002. However, this study was limited to a small number of quality measures and data through 2006. Therefore, this study contributes to the literature by examining the relationship between nursing home financial performance (operating margin) and quality using a national longitudinal database (2000-2014) and an expanded set of structure, process, and outcome measures of quality.

Quality: A Structure-Process-Outcome Perspective

Before we discuss the relationship between quality and financial performance, it is important to define quality. Donabedian's structure-process-outcome (SPO) framework is commonly used in quality assessment. According to the SPO framework, when good structure is in place, it will lead to better processes and ultimately better outcomes.[14] *Structure* is defined as the environment where care is provided and the attributes of the health care setting where care is delivered.[15] The structure of the health care setting can have a direct influence on patient outcomes. Nurse staffing is an important structural indicator of quality.[16] Nursing homes typically employ 3 different types of nursing staff: RNs, LPNs, and CNAs. There are 2 measures of nurse staffing patterns: nurse staffing intensity and RN skill mix. *Nurse staffing intensity* refers to the number of nursing hours per resident day. Research suggests a positive association between nurse staffing intensity (especially for registered nurses) and resident outcomes within nursing homes.[17,18] In a systematic review of nursing home staffing, Bostick and colleagues[19] concluded that "there is a proven association between higher total staffing levels (especially licensed staff) and improved quality of care." *RN skill mix* is measured as the ratio of RN full-time equivalents (FTEs) to total licensed nurse staffing (RN FTEs plus LPN FTEs). Skill mix assesses the availability of more skilled nursing staff and the degree of RN supervision. Lower RN skill mix may result in higher workloads for RNs, as LPNs and CNAs are less autonomous in their functioning.[20] RN skill mix has been found to have an independent effect on quality of care.[21]

Process refers to any actions that are directly performed on the resident throughout the delivery of their care.[22] Process indicators indicate what is being done to the resident but may not capture its appropriateness. This article will focus on 4 nursing home process variables: utilization of urethral catheters, use of restraints, pressure ulcer prevention, and restorative ambulation.

Outcomes are defined as the states or levels of well-being which result from care processes.[15] Good structures and processes may directly affect positive outcomes.[18] The outcome variables explored in this study are facility-acquired contractures, facility-acquired pressure ulcers, hospitalizations, rehospitalizations, and health deficiencies.

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Conceptual framework. Financial performance or profitability is the result of revenues and costs, and organizations may improve profitability by increasing revenues, decreasing costs, or both. Using tenets from economic theory and strategic management, we posit that nursing homes with better quality will be able to achieve improved financial performance through reduced costs, increased revenues, or both.

The cost function of economic theory portrays the relationship between average costs and the rate of production or output.[23] However, different providers may have different cost functions based on their level of productivity, or how effectively input resources (ie, labor, supplies, technology) are transformed into outputs (ie, patient days). Providers can increase their productivity through improved processes aimed at reducing input resources (labor and materials) required to produce a unit of output, which can result in lower costs. One of the most effective ways to increase productivity is through processes aimed at prevention of defects or poor quality of care. In this case, productivity improves because of less waste (scrap) and rework.[24] As such, nursing homes may be able to increase their productivity and lower costs through higher quality, or improved processes and outcomes of care, as a result of reduced rework and waste.

On the revenue side, the demand function of economic theory represents the relationship between output and price. Organizational reputation for delivering high-quality services may decrease the elasticity of demand, which can allow firms to charge higher prices, and as a result earn higher revenues.[25] This would also be in line with the principles of Porter's Product Differentiation Strategy, whereas organizations may choose to focus on quality to distinguish themselves from the competition.[26] By producing a high-quality product, a business may be shielded from competitive pressures by creating loyal customers and decreasing customer sensitivity to price.[12]

In efforts to improve nursing home competition based on quality, the Centers for Medicare & Medicaid Services (CMS) began public reporting of quality of US nursing homes through its Web site Nursing Home Compare in 2002.[27] This includes data on nurse staffing, clinical quality measures, and inspection results. This allows consumers or their agents, such as family members, providers, employers, and insurers, to use publicly reported quality information to search and select nursing homes with higher quality. This market-based reform has been found to be effective in increasing the demand for high-quality care, as well as incentivizing providers to improve the quality of care.[28] As such, nursing homes may choose a differentiation strategy based on quality as a competitive strategy.

Hypotheses. Nursing hours are an input resource into the production of nursing home care. As such, changes in nurse staffing patterns can influence costs and thus may have an important impact on financial performance.[29] Medicaid is the largest payer of nursing home care but its reimbursement rates are approximately 20% lower than private pay rates,[30]

and facilities are generally not compensated for higher staffing beyond statutory requirements. Compensation also varies significantly among different nurse skill mixes. In 2012, RN nurses in nursing homes reported an average annual salary of $61 220, while LPNs and CNAs reported annual salaries of $43 570 and $24 650, respectively.[31] As such, an increase in RN intensity and skill mix may significantly increase costs.

On the contrary, increased RN intensity and skill mix may result in lower costs through better processes and outcomes of care. For example, prior research has shown that increased RN staffing can result in lower costs through its positive effect on outcomes.[12] Furthermore, nursing homes may choose to improve their nurse staffing patterns as part of a differentiation strategy. And as previously noted, this may result in improved revenues as a result of greater resident satisfaction and lower sensitivity to price. Finally, states have been implementing nursing home pay-for-performance systems for Medicaid reimbursement, which incentivize increased RN staffing.[32] Nursing homes in these states may increase RN staffing as a mechanism to improve their Medicaid reimbursement.[33] Therefore, we hypothesize the following:

> **Hypothesis 1:** Nursing homes with better structural quality (higher RN staff intensity and RN skill mix) will experience higher financial performance.

As previously noted, higher quality does not necessarily lead to higher costs.[34] Improved quality, achieved through innovative or efficient care processes, may result in fewer defects and/or avoidable complications, which, in turn, will lower the amount of waste or rework, thereby reducing the costs of delivering care.[35] As such, nursing homes that produce higher process quality care may be able to reduce costs and ultimately have better financial performance. For example, nursing homes that engage in pressure ulcer prevention may experience short-term higher costs as a result of increased CNA staffing use; however, in the long-term, the facility may still be able to experience lower costs as a result of lower incidence of pressure ulcer and pressure ulcer treatment costs. On the contrary, nursing homes that do not focus on efficient and effective ways of delivering care may have wasteful processes that will contribute to worse financial performance. High-quality processes will also reflect a better utilization of the organization's staffing. Conversely, nursing homes with poor quality processes could be seen as inefficient in their delivery of care and may be associated with poor financial performance.

> **Hypothesis 2:** Nursing homes with higher process quality will experience better financial performance.

Better resident outcomes not only may result in lower costs but also may provide the opportunity to generate higher revenues. A differentiation strategy focused on quality may be particularly important as nursing homes face stiffer competition for private pay residents. Nursing homes' occupancy rates have declined from 86% in 2004 to 81% in 2016, as

consumers seek alternatives sources of long-term care, such as assisted living and home- and community-based services.[36] As such, nursing homes are increasingly competing for a dwindling number of private-paid residents. Nursing homes may use quality as a way to differentiate themselves given the public reporting of quality measures.

Nursing homes may also compete based on quality in the postacute care market. Postacute care with its higher reimbursement rates is becoming increasingly important for nursing homes.[37] Medicare and Medicare Advantage average per diem rates of $503 and $433, respectively, are more than double those of Medicaid.[38] From 1994 to 2009, postacute care expenses increased approximately 27%, and spending at nursing homes represented the largest portion of that growth.[39] Nursing homes may increase their RN staffing to attract post-acute care residents,[40] and increased RN staffing can have an effect on the overall quality of nursing homes. Similarly, nursing homes may engage in quality improvement activities as a mechanism to address consumer demand for higher quality nursing homes after public reporting of quality.[28]

Finally, while nursing homes may not compete based on quality to attract Medicaid residents, states have been implementing pay-for-performance systems for Medicaid reimbursement, targeting process and outcomes of care, such as use of restraints and pressure ulcers.[32] In these states, nursing home efforts to improve quality may also result in increased reimbursement rates. Therefore, we hypothesize the following:

> **Hypothesis 3:** Nursing homes with higher outcomes quality will experience better financial performance

Methods

Data

The data for this study come from 6 different sources: Online Survey Certification and Reporting (OSCAR) data file; its successor, the Certification and Survey Provider Enhanced Reporting (CASPER); Medicare Cost Reports; Minimum Data Set Plus (MDS 2.0); the Area Resource File (ARF); and Brown University's LTCFocus data set. OSCAR/CASPER provides data on facility characteristics, staffing, and operations. The information contained in OSCAR/CASPER is routinely collected through the Medicare and Medicaid certification process and is updated annually. The Medicare Cost Reports provide financial and resident utilization data for nursing homes receiving Medicare reimbursement. The MDS 2.0 contains demographic information on residents, as well as standardized assessment items on activities of daily living (ADL), behavioral/emotional problems, oral/nutritional status, skin condition, treatments, and medications. Each resident is assessed upon admission to a nursing home and then each quarter subsequently. The ARF contains information on the socioeconomic and market characteristics at the county level. LTCFocus is an aggregated data set that has data from a variety of primary and secondary sources, including MDS, CMS's Nursing Home Compare, ARF, Bureau of Labor Statistics, Residential History File, OSCAR/CASPER and state policy surveys.

Study Group

The study uses a national population of nursing homes of approximately 16 500 facilities per year. Hospital-based facilities (approximately 2200 facilities a year) were removed from the study group because they may behave differently from freestanding facilities due to their direct ties with hospitals. Similarly, government facilities (approximately 700 facilities a year) were also removed from the study group because they are less amenable to market forces compared with private facilities. The study also excludes facilities with no Medicare beds (approximately 2300 facilities a year), because financial data were only available for facilities with Medicare cost reports. Finally, cases with revenues and costs in excess of 5 standard deviations from the mean were excluded from the study. The final study group consisted of 173 021 nursing home-year observations for the years 2000 to 2014, or an average of 11 535 facilities per year.

Dependent Variable

The dependent variable for this analysis is *operating margin*—a widely used financial measure which indicates the entity's operating profitability. Using the Medicare Cost Report data, we calculated operating margin by first determining the adjusted operating costs, which consist of operating expenses less all capital costs (costs associated with capital buildings, capital equipment, and interest). Once adjusted operating costs were calculated, we determined the operating margin as follows:

$$\text{Operating margin} = \left(\begin{array}{c} \text{net patient revenue} - \\ \text{adjusted operating costs} \end{array} \right)$$
$$/ \text{ net patient revenue.}$$

Independent Variables

The independent variables consist of nursing home quality measures that encompass all 3 dimensions of Donabedian's SPO framework. To address potential endogeneity between quality and financial performance, we used lagged quality variables as predictors.

Structural measures of quality

Nurse staffing intensity. This consists of RN hours per resident day, LPN hours per resident day, and CNA hours per resident day.

RN skill mix. This is operationalized as the ratio of the number of RN FTEs to the number of RN FTEs plus LPN FTEs.

Process measures of quality

Facility-acquired restraints. The use of physical restraints in nursing homes has been actively discouraged in the past 2 decades. The Omnibus Budget Reconciliation Act (OBRA) of 1986 mandated nursing homes to reduce the use of restraints establishing that "residents have a right to be free from . . . any physical or chemical restrains imposed for the purposes of discipline or convenience."[41] The literature has linked use of restraints with numerous deaths and injuries.[42] The OSCAR/CASPER variable is defined as the proportion of residents with restraints minus those residents who had restraints upon admission to the nursing home.[43]

Facility-acquired catheters. Urethral catheterization has been found to place residents at greater risk for urinary tract infections and long-term complications including renal failure[44,45] and has been used in previous research as an indicator of poor quality.[46] It is a CMS quality measure used in the Nursing Home Compare Web site. The OSCAR/CASPER variable was defined as the proportion of residents with catheters minus those residents who had catheters upon admission to the nursing home.[43]

Pressure sore prevention. This variable is constructed as a facility composite score (0-4) of pressure sore prevention processes derived from 4 MDS dichotomous (yes/no) items: turning/repositioning program, pressure relieving seat, pressure relieving mattress, and ointment application. These 4 variables were selected based on factor analysis with Varimax rotation of all skin care processes captured by the MDS. The pressure sore prevention composite had adequate internal consistency showing a Cronbach alpha of 0.82. Pressure sore prevention is an important process indicator as nursing home residents are highly susceptible to developing pressure sores because of their limited mobility. Ensuring a regular turning schedule reduces the likelihood of pressure sores. Similarly, provision of a pressure relieving device distributes pressure over a greater body surface area lowering the risk of pressure sores.[47]

Restorative ambulation. This is a facility-level continuous variable that measures the facility's average number of days in a week that residents are walked using restorative nursing aides. It is generated by dividing the resident-level MDS restorative variable that represents the number of days, of 15 minutes or more of restorative ambulation, provided in the 7 days before the assessment date by the total number of residents in the facility. Nursing home residents on a restorative program are more likely to maintain their functional mobility because they walk on a regular basis.

Outcome measures of quality

Facility-acquired contractures. These abnormal manifestations occur when a muscle shortens or there is joint fixation. Contractures are commonly seen among persons with immobility or central nervous system disorders[48] and can lead to functional disability, immobility, infections, and discomfort.[49] The development of contractures is considered a failure of the nursing home to meet federal quality of care standards.[49,50] The OSCAR/CASPER variable was defined as the proportion of residents with contractures minus those residents who had contractures upon admission to the nursing home.[43]

Facility-acquired pressure ulcers. These are injuries to the skin and underlying tissue and have been used as an indicator of nursing home quality.[51] The OSCAR/CASPER variable was defined as the proportion of residents with pressure ulcers minus those residents who had pressure ulcers upon admission to the nursing home.[43]

Hospitalizations. Nursing home hospitalizations not only have a high financial cost to Medicare but they impose a high personal cost on nursing home residents by increasing the risks of complications and infections.[52] The primary reasons for hospitalizations include heart failure, electrolyte imbalance, respiratory infection, sepsis, and urinary tract infections. Many of these conditions can be promptly addressed if the nursing home provides its residents effective care in an infection-free environment.[53-55] Hospitalizations are defined in LTCFocus as the number of hospitalizations from the facility in the calendar year for every 365 nursing home resident days.

Thirty-day SNF rehospitalization. The reduction in rehospitalizations of nursing home residents is considered an important policy goal as it reflects the quality of care the facility delivers to its residents.[56] Rehospitalization is defined in LTCFocus as the proportion of residents admitted to *skilled nursing facility* (SNF) who were rehospitalized directly from SNF within 30 days of hospital discharge.

Health deficiencies. This represents a count measure of the number of deficiencies cited in CMS' State Operations Manual.[57] This OSCAR/CASPER measure includes all health-related citations, such as inappropriate treatment to prevent and treat pressure sores, urinary tract infections, resident freedom and significant medication errors but exclude life safety violations that pertain to physical plant requirements.

Control Variables

Control variables include organizational and market variables that may be associated with financial and quality performance: size, average acuity index, Herfindahl-Hirschman

Table 1. Descriptive Statistics for Study Variables.

	Mean	SD	N
Financial performance			
Operating margin (%)	9.98	9.36	173 021
Structure			
RN hours per resident day	0.36	0.51	171 093
LPN hours per resident day	0.79	0.62	170 975
CNA hours per resident day	2.19	0.98	170 796
RN to nurse ratio	0.30	0.18	171 114
Process			
Facility-acquired catheterization	0.02	0.03	122 572
Facility-acquired restraints	0.04	0.07	122 572
Pressure sore prevention[a]	1.46	0.85	94 051
Restorative ambulation[a]	1.96	2.31	94 051
Outcomes			
Facility-acquired contractures	0.11	0.14	122 572
Facility-acquired bedsores	0.03	0.04	122 572
Hospitalizations per resident	0.91	0.48	155 265
Rehospitalizations	15.42	10.88	158 296
Health deficiencies	5.95	5.55	145 812
Control			
Total beds	113	59	171 124
Average acuity index	11.26	1.39	171 124
Herfindahl-Hirschman Index	0.24	0.26	139 320
Per capita income	$34 978	$11 430	139 406
Medicare Advantage (managed care) penetration rate	17.06	15.17	139 658

Note. N= nursing home-year observation.
[a]Data for these variables were available only from 2000 to 2009.

Index (HHI), per capita income, and Medicare Advantage (MA) (managed care) penetration. Nursing home size is measured by the number of beds. The acuity is a measure of resident acuity at the facility level and it is based on resident mobility and nursing factors. A facility with higher resident acuity may have higher revenues but at the same time may face higher costs than facilities with lower acuity. HHI, a measure of competition at the county level, has been found to influence quality and financial performance. It is defined as the sum of the squares of market shares (based on beds) for nursing homes in each county. Scores close to "0" represent highly competitive markets, while scores of "1" represent a monopolistic market. Per capita income was derived from ARF at the county level and is used as a marker for socioeconomic conditions of the market which may influence both nursing home quality and financial performance. The MA penetration rate is the proportion of all Medicare beneficiaries in the county who are enrolled in a Medicare managed care organization. Increased MA penetration may affect the demand for postacute services and ultimately the financial performance of nursing homes.

Analysis

This study utilized panel data linear regression with facility fixed effects (FE) to examine the relationship between lagged

quality measures (SPO model) and financial performance (operating margin). FE focuses on within-facility variations in financial performance as a result of quality. As such, it controls for time-invariant unobservable variables that may explain between-facility differences.[58] Finally, year FE are included to control for time trends. The level of statistical significance was set at alpha = 0.05. All analyses performed using Stata 13.0 for Windows.

We ran 4 separate regression models for different quality measures as independent variables: (1) structure: staffing variables; (2) process: restraints and catheters; (3) process: pressure ulcer prevention and restorative ambulation; and (4) outcomes: contractures, pressure ulcers, hospitalizations, 30-day rehospitalization, and deficiencies. Two different regression models were run for the process measures, because data for pressure prevention and restorative ambulation were only available from 2000 to 2009, while data for restraints and catheters were available for the complete study period.

Results

Table 1 has the descriptive statistics for all the dependent and independent variables. Tables 2 to 5 present the results of the panel data linear regression. In terms of *structural quality measures*, Hypothesis 1 was not supported. Each additional hour of LPN staffing per resident inpatient day

Table 2. Fixed Effects Regression Analysis for the Relationship Between Nursing Home Structure Quality and Financial Performance (Operating Margin).

Quality variables	Coefficient
Structure variables	
RN hours per patient day[a]	−0.15
LPN hours per patient day[a]	−0.34**
CNA hours per patient day[a]	−0.06
RN skill mix	−0.66*
Control variables	
Total beds	0.01
Average acuity index	−0.10***
Herfindahl-Hirschman Index	−0.01
Per capita income	0.01***
Medicare Advantage (managed care) penetration rate	0.01**

[a]Variable lagged by 1 year.
*$P \leq .05$. **$P \leq .01$. ***$P \leq .001$.

Table 3. Fixed Effects Regression Analysis for the Relationship Between Nursing Home Process Quality and Financial Performance (Operating Margin).

Quality variables	Coefficient
Process variables	
Facility-acquired catheterization[a]	−2.58**
Facility-acquired restraints[a]	−0.21
Control variables	
Total beds	0.01*
Average acuity index	−0.10***
Herfindahl-Hirschman Index	−0.09
Per capita income	0.01***
Medicare Advantage (managed care) penetration rate	0.01***

[a]Variable lagged by 1 year.
*$P \leq .05$. **$P \leq .01$. ***$P \leq .001$.

Table 4. Fixed Effects Regression Analysis for the Relationship Between Nursing Home Process Quality and Financial Performance (Operating Margin).

Quality variables	Coefficient
Process variables	
Pressure sore prevention[a]	0.15*
Restorative ambulation[a]	0.08***
Control variables	
Total beds	0.01***
Average acuity index	−0.07*
Herfindahl-Hirschman Index	0.34
Per capita income	0.01***
Medicare Advantage (managed care) penetration rate	0.01***

[a]Variable lagged by 1 year.
*$P \leq .05$. **$P \leq .01$. ***$P \leq .001$.

Table 5. Fixed Effects Regression Analysis for the Relationship Between Nursing Home Outcomes Quality and Financial Performance (Operating Margin).

Quality variables	Coefficient
Outcome variables	
Facility-acquired contractures	−0.84***
Facility-acquired bedsores	−3.93***
Hospitalizations per resident	−0.22*
Rehospitalizations	−0.01
Health deficiencies	−0.02***
Control variables	
Total beds	0.01
Average acuity index	−0.10**
Herfindahl-Hirschman Index	−0.01
Per capita income	0.01***
Medicare Advantage (managed care) penetration rate	0.01***

[a]Variable lagged by 1 year.
*$P \leq .05$. **$P \leq .01$. ***$P \leq .001$.

decreased operating margin by 0.3% ($P < .01$), and each additional 10% increase in RN skill mix decreased operating margin by 0.1% ($P < .05$). On the contrary, RN and CNA staffing intensity were not significantly associated with financial performance. In terms of *process quality measures*, Hypothesis 2 was partially supported. Every 10% increase in facility-acquired catheterization decreased operating margin by 0.3% ($P < .01$), while each additional pressure sore prevention activity increased operating margin by 0.2% ($P < .05$), and each additional day of restorative ambulation increased operating margin by 0.1% ($P < .001$). However, facility-acquired restraints were not significantly associated with financial performance. In terms of *outcome quality measures*, Hypothesis 3 was partially supported. Every 10% increase in pressure ulcers and facility-acquired contractures decreased operating margin by 0.4% and 0.1%, respectively ($P < .001$). Similarly, each additional hospitalization per 365 nursing home resident days reduced operating margin by 0.2% ($P < .05$), and each additional 10 deficiencies decreased operating margin by 0.2% ($P < .001$). The rehospitalization rate was not significantly associated with financial performance.

With respect to the control variables, larger nursing homes experienced better financial performance. Similarly, those located in markets with higher per capita income and higher MA penetration experienced higher financial performance.

Discussion

The primary purpose of this study was to answer a fundamental question: Is there a business case for quality in the nursing home industry? We examined the relationship between quality and financial performance utilizing tenets from economic theory and strategic management theory.

Contrary to our hypothesis, higher LPN staffing intensity and RN skill mix were associated with significantly poorer financial performance. Literature suggests that nurse staffing has an important independent impact on nursing home quality of care.[59] Therefore, policy incentives, like incremental payments for additional RN staffing, may be necessary to encourage nursing homes to improve their skill mix. Nursing home administrators, on the contrary, must ensure an appropriate mix of staff to provide the most effective and efficient level of resident care possible. Nursing homes need to find the appropriate mix of staff to facilitate financial viability without compromising the quality of care.

We classified the process variables as poor (facility-acquired restraints and catheters) and good (pressure sore prevention and restorative ambulation). When examining poor process measures, facility-acquired catheterization resulted in lower operating margin; however, facility-acquired restraints had no statistically significant impact. The use of restraints has been declining in the US for years and has become a relatively rare event. Factors such as the Nursing Home Reform Act of 1997 that mandated a reduction in restraint use within nursing homes, and the public reporting of restraint use data in Nursing Home Compare may have contributed to its sharp decrease.[60] As a result, restraints use may no longer play a large role as a quality indicator.

Good process (pressure sore prevention and restorative ambulation) resulted in better nursing home financial performance. Improved processes of care can result in greater productivity and lower costs as the facility is able to prevent negative outcomes, such as pressure ulcers and ADL decline. Treatment costs for these negative outcomes may exceed the additional staffing costs engaged in improved processes of care. Furthermore, the ability to offer the resident additional value-adding services may also attract more residents and/or a better payer mix. This process could be viewed as a potential differentiation strategy, which could lead to better financial performance.

Worse quality outcomes resulted in lower financial performance except for rehospitalizations, which was not significantly related to financial performance. This suggests that at least for rehospitalizations, the revenue associated with improvement was not sufficient to offset the additional cost of preventing rehospitalizations. SNFs were not traditionally financially penalized for sending patients back to the hospital if they needed additional care. Therefore, nursing homes may have had little incentive to bear the cost of treating the resident in-house. However, with the introduction of Value-Based Purchasing (2016) for skilled nursing care, administrators will have to be mindful that excessive rehospitalizations may be financially burdensome.

There are several recent CMS initiatives that may strengthen the business case for quality by tying revenues to quality efforts. First, the Affordable Care Act (ACA) introduced the Hospital Readmissions Penalty Program in 2012, which penalizes hospitals for excess readmissions for certain clinical conditions. This is incentivizing hospitals to develop preferred SNF networks with the goal of referring patients for postacute care to nursing homes with better processes and outcomes of care.[61] Second, The Protecting Access to Medicare Act of 2014, which will come into effect in 2019, introduces value-based purchasing payments for skilled nursing homes based on quality measures and rates of hospital readmissions.[62] With the introduction of Value-Based Purchasing (2016) for skilled nursing care, nursing homes that fail to deliver quality resident care face the risk of lowered Medicare payments.[63] Organizations will have a financial incentive to improve quality outcomes as to avoid financial penalties.

This study has several limitations. First, staffing data are based on OSCAR/CASPER data, which is self-reported and is not subject to regular audits. However, Grabowski et al[64] have found a strong intersurvey agreement between OSCAR and their own survey with respect to RN, LPN, and CNA FTEs data. Nevertheless, future studies should use staffing information based on payroll data, such as the data that are now collected through CMS' Payroll-Based Journal since 2016. Second, this study is limited to facilities with Medicare residents. This results in the exclusion of facilities that are exclusively private pay or Medicaid only. Finally, the outcomes used in this study were not risk-adjusted. However, for many of the outcome measures, we were able to focus on those that were acquired by the resident during the nursing home stay, by subtracting the events that were present upon nursing home admission. Notwithstanding these limitations, this study is an important contribution to the existing literature on the relationship between quality and financial performance particularly as it suggests a business case for quality.

Conclusions

In the face of increasing competition and restrictive payments within the nursing home industry, nursing homes face the twin challenge of delivering high-quality care while retaining financial sustainability. Therefore, a detailed understanding of the relationship between quality and financial performance is imperative. If quality does in fact lead to better financial performance, nursing homes would be incentivized to deliver high-quality care. Our results provide evidence of a positive relationship between quality and financial performance. As posited by Porter, firms may choose to pursue one of two distinct strategies to improve their financial performance over competitors: cost leadership or product differentiation. Quality of care provided by a nursing home could be the key behind the successful implementation of either strategy. Producing a high-quality of care may allow nursing homes to become more efficient, or have higher revenues due to higher quality. Therefore, our results suggest a business case for quality,

though more research would be required to establish precisely the initiatives nursing homes can adopt to improve quality.

Declaration of Conflicting Interests

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References

1. Lord J, Davlyatov G, Thomas KS, Hyer K, Weech-Maldonado R. The role of assisted living capacity on nursing home financial performance. *Inquiry*. 2018;55. doi:10.1177/0046958018793285.
2. Bowblis JR. Ownership conversion and closure in the nursing home industry. *Health Econ*. 2011;20:631-644.
3. Feng Z, Lepore M, Clark MA, et al. Geographic concentration and correlates of nursing home closures: 1999-2008. *Arch Intern Med*. 2011;171:806-813.
4. Bishop CE. Where are the missing elders? the decline in nursing home use, 1985 and 1995. *Health Aff*. 1999;18:146-155.
5. Hicks LL, Rantz MJ, Petroski GF, Mukamel DB. Nursing home costs and quality of care outcomes. *Nurs Econ*. 2004;22:178-192.
6. Weech-Maldonado R, Neff G, Mor V. The relationship between quality of care and financial performance in nursing homes. *J Health Care Finance*. 2003;29:48-60.
7. Fleming ST. The relationship between quality and cost: pure and simple? *Inquiry*. 1991;29:38.
8. Mukamel DB, Spector WD. Nursing home costs and risk-adjusted outcome measures of quality. *Med Care*. 2000;38:78-89.
9. Newhouse JP. Toward a theory of nonprofit institutions: an economic model of a hospital. *Am Econ Rev*. 1970;60:64-74.
10. Dong GN. Performing well in financial management and quality of care: evidence from hospital process measures for treatment of cardiovascular disease. *BMC Health Serv Res*. 2015;15:45.
11. Weech-Maldonado R, Shea D, Mor V. The relationship between quality of care and costs in nursing homes. *Am J Med Qual*. 2006;21:40-48.
12. Weech-Maldonado R, Neff G, Mor V. Does quality of care lead to better financial performance? the case of the nursing home industry. *Health Care Manage Rev*. 2003;28:201-216.
13. Park J, Werner RM. Changes in the relationship between nursing home financial performance and quality of care under public reporting. *Health Econ*. 2011;20:783-801.
14. Donabedian A. Basic approaches to assessment: structure, process and outcome. In: *The Definition of Quality and Approaches to Its Assessment: Explorations in Quality Assessment and Monitoring*. Ann Arbor, MI: Health Administration Press; 1980:77-128.
15. Donabedian A. Evaluating the quality of medical care. *Milbank Mem Fund Q*. 1966;44:166-206.
16. Kane RL. Assuring quality in nursing home care. *J Am Geriatr Soc*. 1998;46:232-237.
17. Institute of Medicine. *Improving the Quality of Care in Nursing Care*. Washington, DC: The National Academies Press; 2001.
18. Weech-Maldonado R, Meret-Hanke L, Neff MC, Mor V. Nurse staffing patterns and quality of care in nursing homes. *Health Care Manage Rev*. 2004;29:107-116.
19. Bostick JE, Rantz MJ, Flesner MK, Riggs CJ. Systematic review of studies of staffing and quality in nursing homes. *J Am Med Dir Assoc*. 2006;7:366-376.
20. Buchan J, Dal Poz MR. Skill mix in the health care workforce: reviewing the evidence. *Bull World Health Organ*. 2002;80:575-580.
21. Konetzka RT, Stearns SC, Park J. The staffing–outcomes relationship in nursing homes. *Health Serv Res*. 2008;43:1025-1042.
22. Thomas KS, Hyer K, Castle NG, Branch LG, Andel R, Weech-Maldonado R. Patient safety culture and the association with safe resident care in nursing homes. *Gerontologist*. 2012;52:802-811.
23. Bishop CE. Nursing home cost studies and reimbursement issues. *Health Care Financ Rev*. 1980;1:47-64.
24. Johnson RD, Kleiner BH. Does higher quality mean higher cost? *Int J Qual Reliab Manag*. 1993;10:68-80.
25. Shetty Y. Managing product quality for profitability. *SAM Adv Manag J*. 1988;53:33-38.
26. Porter ME. Industry structure and competitive strategy: keys to profitability. *Fin Anal J*. 1980;36:30-41.
27. Centers for Medicare & Medicaid Services (CMS). *SNF Quality Reporting Program Public Reporting*. Baltimore, MD: CMS; 2018.
28. Werner R, Stuart E, Polsky D. Public reporting drove quality gains at nursing homes. *Health Aff*. 2010;29:1706-1713.
29. Castle NG, Engberg J, Men A. Nursing home staff turnover: impact on nursing home compare quality measures. *Gerontologist*. 2007;47:650-661.
30. Hackmann MB, Pohl RV. *Patient vs. Provider Incentives in Long Term Care*. National Bureau of Economic; Cambridge, MA; 2018.
31. Time F. *RN, LPN & CNA Salaries*. http://work.chron.com/rn-lpn-cna-salaries-22326.html. Published August 1, 2018. Accessed January 4, 2019.
32. Werner RM, Konetzka RT, Polsky D. The effect of pay-for-performance in nursing homes: evidence from state Medicaid programs. *Health Serv Res*. 2013;48:1393-1414.
33. Hyer K, Thomas KS, Johnson CE, Harman JS, Weech-Maldonado R. Do Medicaid incentive payments boost quality? Florida's direct care staffing adjustment program. *J Aging Soc Policy*. 2013;25:65-82.
34. Douglas TJ, Fredendall LD. Evaluating the Deming management model of total quality in services. *Decis Sci J*. 2004;35:393-422.
35. Binns G. The relationship among quality, cost, and market share in hospitals. *Top Health Care Financ*. 1991;18:21-32.
36. Harrington C, Carrillo H. *Nursing Facilities, Staffing, Residents and Facility Deficiencies, 2009 through 2015*. Menlo Park, CA: The Henry J. Kaiser Family; 2017.

37. Reaves EL, Musumeci M. *Medicaid and Long-Term Services and Supports: A Primer*. Washington, DC: The Kaiser Family Foundation; 2015.

38. National Investment Center for Seniors Housing & Care (NIC). *Skilled Nursing Data Report Key Occupancy & Revenue Trends*. Annapolis, MD: NIC; 2018.

39. Chandra A, Dalton MA, Holmes J. Large increases in spending on postacute care in Medicare point to the potential for cost savings in these settings. *Health Aff*. 2013;32:864-872.

40. Tyler DA, Feng Z, Leland NE, Gozalo P, Intrator O, Mor V. Trends in postacute care and staffing in US nursing homes, 2001-2010. *J Am Med Dir Assoc*. 2013;14:817-820.

41. Castle NG. Physical restraints in nursing homes: a review of the literature since the Nursing Home Reform Act of 1987. *Med Care Res Rev*. 1998;55:139-170.

42. Castle NG, Anderson RA. Caregiver staffing in nursing homes and their influence on quality of care: using dynamic panel estimation methods. *Med Care*. 2011;49:545-552.

43. Bowblis JR, Meng H, Hyer K. The urban-rural disparity in nursing home quality indicators: the case of facility-acquired contractures. *Health Serv Res*. 2013;48:47-69.

44. Ouslander JG, Kane RL. The costs of urinary incontinence in nursing homes. *Medical Care*. 1984:69-79.

45. Warren JW. Catheter-associated urinary tract infections. *Int J Antimicrob Agents*. 2001;17:299-303.

46. Zinn JS, Brannon D, Weech R. Quality improvement in nursing care facilities: extent, impetus, and impact. *Am J Med Qual*. 1997;12:51-61.

47. Centers for Medicare & Medicaid Services. *RAI MDS Users Manual*. Washington, DC: Centers for Medicare & Medicaid Services; 2008.

48. Fergusson D, Hutton B, Drodge A. The epidemiology of major joint contractures: a systematic review of the literature. *Clin Orthop Relat Res*. 2007;456:22-29.

49. Wagner LM, Capezuti E, Brush BL, Clevenger C, Boltz M, Renz S. Contractures in frail nursing home residents. *Geriatr Nurs*. 2008;29:259-266.

50. Jamshed N, Schneider E. Are joint contractures in patients with Alzheimer's disease preventable? *Ann Long Term Care*. 2010;18:26-33.

51. Park-Lee E, Caffrey C. Pressure ulcers among nursing home residents: United States, 2004. *NCHS Data Brief*. 2009;(14):1-8.

52. Ouslander JG, Lamb G, Perloe M, et al. Potentially avoidable hospitalizations of nursing home residents: frequency, causes, and costs. *J Am Geriatr Soc*. 2010;58:627-635.

53. Kramer A, Eilertsen T, Goodrich G, Min S. *Understanding Temporal Changes in and Factors Associated With SNF Rates of Community Discharge and Rehospitalization*. Washington, DC: Medicare Payment Advisory Commission; 2007.

54. Bishop C, Meagher J, Perloff J, Zolotutsky G. *Event Analysis of All-Cause and Ambulatory Care Sensitive Hospitalization of Long-Stay Nursing Home Residents* (CMS Contract Number HHSM-500-2005-000201). Baltimore, MD: Centers for Medicare & Medicaid Services; 2010.

55. Walsh EG, Freiman M, Haber S, Bragg A, Ouslander J, Wiener JM. Cost drivers for dually eligible beneficiaries: potentially avoidable hospitalizations from nursing facility, skilled nursing facility, and home and community-based services waiver programs. Contract Report. Washington, DC: Centers for Medicare & Medicaid Services; 2010.

56. Minott J. Reducing Hospital Readmissions. *Academy Health*. 2008.

57. Medicare CF, Services M. *State Operations Manual. Chapter 7—Survey and Enforcement Process for Skilled Nursing Facilities and Nursing Facilities*. Baltimore, MD: Centers for Medicare & Medicaid Services; 2014.

58. Allison PD. *Fixed Effects Regression Methods for Longitudinal Data Using SAS*. SAS Institute; Cary, NC; 2005.

59. Castle NG, Engberg J. Further examination of the influence of caregiver staffing levels on nursing home quality. *Gerontologist*. 2008;48:464-476.

60. Konetzka RT, Brauner DJ, Shega J, Werner RM. The effects of public reporting on physical restraints and antipsychotic use in nursing home residents with severe cognitive impairment. *J Am Geriatr Soc*. 2014;62:454-461.

61. Evans M. Hospitals select preferred SNFs to improve postacute outcomes. *Mod Healthc*. 2015;45:14-15.

62. US 113th Congress. H.R.4302 - Protecting Access to Medicare Act of 2014, https://www.congress.gov/bill/113th-congress/house-bill/4302; 2014.

63. Centers for Medicare & Medicaid Services (CMS). *Prospective Payment System and Consolidated Billing for Skilled Nursing Facilities (SNFs) for FY 2016, SNF Value-Based Purchasing Program, SNF Quality Reporting Program, and Staffing Data Collection*. Baltimore, MD: CMS; 2016.

64. Grabowski DC, Feng Z, Intrator O, Mor V. Recent trends in state nursing home payment policies. *Health Aff*. 2004:W4-363-73.