

Factors influencing nursing home response to quality measure publication: A resource dependence perspective

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Background: The Centers for Medicare and Medicaid Services provides a report card on nursing homes at a Web site called Nursing Home Compare (NHC) that includes information on 19 clinical quality measures (QMs). The information is intended to inform consumer choice, to provide a focus for state regulatory initiatives, and to promote nursing home quality improvement efforts.

Purpose: This study aimed to determine what factors were associated with nursing homes' investment in quality after publication of the NHC report card.

Methodology: A 2007 survey sent to nursing home administrators nationally inquired about their response to publication of QMs on NHC. Survey data were merged with data on QMs and organizational characteristics from NHC. The dependent variables represent actions requiring a significant investment of resources in staffing and/or equipment. Independent variables tested hypotheses regarding the influence of constituent groups, competition, and managed care participation on investment. We estimated logistic regression models adjusting for clustering within states.

Findings: The degree to which nursing homes perceive that the report card influences key constituencies (professional referral sources, consumers, and state surveyors) is associated with the odds of committing substantial resources to improve report card performance. Facilities with lower reported QM scores were three times more likely to make certain investments than high-quality facilities in competitive markets. Perceived QM validity and close monitoring of scores also motivates investment.

Practice Implications: A substantial proportion of nursing homes now perceive that the report card influences professional referrals, consumer choice, and state survey investigatory process. This suggests that QM publication may indeed have a competitive impact as it concerns these constituencies, thus increasing the stakes in improving the scores and making substantial investments much more likely.

Public release of individual provider report cards has emerged as a major component in the effort to enhance health care system quality. Motivating publication is the expectation that making information about quality easily accessible to residents will increase the demand for quality, generating positive incentives for provid-

ers to invest in quality improvement (Mukamel, Weimer, & Mushlin, 2007; Stevenson, 2006). Even in the absence of a demand response to report cards, providers who receive information about their performance relative to their peers may be motivated to improve quality because of professional pride or organizational mission (Gormley & Weimer,

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1999; Hibbard, Stockard, & Tusler, 2005; Robinowitz & Dudley, 2006).

The Centers for Medicare and Medicaid Services (CMS) provides a report card on nursing homes at a Web site called Nursing Home Compare (NHC; <http://www.medicare.gov/NHCompare>), which includes information on 19 clinical quality measures (QMs; CMS, 2006). The information is intended to inform consumer choice, to provide a focus for state regulatory initiatives, and to promote nursing home quality improvement efforts. Previous research on the basis of an administrator survey conducted after the initial publication of the QMs in November 2002 found that nursing homes reported that they were more likely to respond to quality of care disclosure by reorganizing staff, by retraining staff, or by changing care protocols rather than investing in more resource intensive interventions, such as increasing staffing or compensation (Mukamel et al., 2007; Mukamel, Weimer, Spector, Ladd, & Zinn, 2008). This measured approach appears to have been a rational initial response to early QM publication. To implement changes effectively, nursing homes need not only to review their scores but also to understand reasons for poor scores, identify actions that could potentially improve them, and then implement those actions. These efforts require time to be sequentially undertaken. Responses to this initial survey also indicated that administrators perceived little influence on potential residents and referral sources that may have curtailed the motivation to commit to significant resource investments immediately after publication onset. However, nursing homes now have several years of experience with NHC, providing sufficient time to determine whether report card scores influence consumer demand and, if so, to reconsider committing resources to improve them.

Consequently, in this study, we investigated the impact of the NHC report card on quality improvement efforts in nursing homes in the longer run, 5 years after the initial publication of the report card. In particular, we considered whether, contrary to earlier findings, nursing homes were motivated to invest substantial resources (e.g., by hiring new staff, by increasing wages, and/or by purchasing equipment) in response to the publication of the NHC QMs. Arguing from a resource dependence perspective, we hypothesized that the report card creates incentives for nursing homes to take actions to improve quality to secure an adequate flow of resources from key constituencies (Mukamel et al., 2007; Zinn, Spector, Hsieh, & Mukamel, 2005). We also considered whether market and organizational factors contribute to the likelihood that nursing homes will commit resources to improve quality in response to QM publication.

Conceptual Framework and Hypotheses

There are several different theoretical perspectives on how organizations, such as nursing homes, respond to evolving

environmental pressures and demands. The conceptual framework guiding this analysis is resource dependence theory, a perspective that characterizes the environment in terms of other organizations and constituencies with which the focal organization engages in exchange relationships (Thompson, 1967; Pfeffer & Salancik, 1978). The resource dependence perspective emphasizes strategic choice, with organizations deemed to have the ability to interpret their environment and to actively modify the elements contained therein (Pfeffer & Salancik 1978). This theoretical framework has been used to study the development of horizontal and vertical integration strategies in rural hospitals, boundary-spanning activities in freestanding and multihospital system hospitals, the development of hospital consortia, the evolution of hospital-physician affiliation arrangements, and nursing home organizational innovation (Zinn, Weech, & Brannon, 1998). A central argument of this perspective is that no single organization can generate all the resources it needs for survival, making it necessary to take strategic action to ensure access to essential resources. Thus, organizational actions are viewed as rational, deliberate attempts to reduce dependence on other organizations in the environment that control critical resources. Strategic responses are aimed at lowering the level of uncertainty in the environment by securing a stable flow of resources. However, stakeholders that provide resources (such as referrals for nursing home care) frequently seek accommodations, in return, from the resource recipient. Because most organizations depend on the resources traded in these exchanges for survival, they will accommodate to constituent demands to avoid disruption (Oliver, 1990). Changes in organizational structure or behavior may be required to accommodate the demands of resource providers to secure a stable flow of resources (Oliver, 1990). In the context of this study, long-term care providers, particularly in a heavily regulated industry that is predominantly proprietary serving an "at-risk" population, must be constantly attuned to potential changes in the competitive environment brought on by market or regulatory forces.

The publication of the NHC report card represents a major change in the operating environment that could influence the nursing home's ability to attract and retain a major resource, resident referrals. Nursing homes may anticipate that their key constituencies, potential residents, and families or agents (such as physicians and social workers) will attend to reported quality shifting demand toward facilities with better scores. For example, nursing homes depend on admission referrals from hospital discharge planners, case managers, and other health professionals. In 1999, 46% of current nursing home residents were admitted from a hospital (Jones, 2002), making hospital discharge planners a particularly key group of potential data users. Although the extent to which discharge planners and case managers use NHC remains an open question (Stevenson, 2006), Bearingpoint (2004) found that 63% of

700 discharge planners who responded to a telephone survey were aware of NHC.

Thus, whether nursing homes are motivated to invest substantial resources in response to QM publication may depend on whether the QMs are perceived to influence professional referrals, prompting our first hypothesis:

Hypothesis 1: Nursing homes quality investments in response to QM publication will be associated with perceived influence on professional referrals.

Not all admissions stem from professional referrals. The information on NHC was intended to inform residents' and families' decision regarding choice of nursing home, and NHC has become one of the most frequently visited sites on the CMS Web site (National Quality Forum, 2004). A recent study by Castle (2009) indicates that 31% of consumers used Internet sources in choosing a nursing home and that 12% specifically recalled using NHC. In summarizing the limited available information on consumer response to reported nursing home quality information, Stevenson (2006) concluded that because some factors pose barriers to effective use of these tools whereas others pose opportunity, the overall potential is unclear. At the least, however, reporting can help consumers and families identify problems and avoid the poorest quality providers in a locality (Stevenson, 2006). Thus, to the extent that nursing homes perceive that the reported QMs factor into the nursing home selection decision, they would be motivated to commit resources to improve them:

Hypothesis 2: Nursing home quality investments in response to QM publication will be associated with perceived influence on choices made by potential residents and their families.

The number and type of deficiencies cited by state investigators during the annual Medicare and Medicaid program participation recertification survey site visit has both direct and indirect financial implications. The direct costs include fines and the administrative burden of responding to cited deficiencies with plans of correction. In addition, as a consequence of public reporting, facilities with higher deficiencies relative to other facilities in the local market may be placed at a competitive disadvantage if this information influences admission referrals as discussed with respect to our first hypothesis. Nursing homes may anticipate that state regulators will use the NHC reports to focus their investigative efforts, potentially leading to deficiency citations. Thus, nursing homes that believe the reported QMs influence state surveyors may take substantial effort to minimize any negative impact from their publication.

Hypothesis 3: Nursing home quality investments in response to QM publication will be associated with perceived influence on the state survey process.

According to resource dependence theory, the more competitive the environment, the greater the demands on a shared pool of resources and the more critical the ability to accommodation to the needs of resource-providing constituents (Pfeiffer & Salancik, 1978; Ulrich & Barney, 1984). Thus, we would predict that nursing homes located in markets perceived to have more intense competition for resident admissions will be more likely to make infrastructure investments desired by key constituents in response to publication of the QMs. Nursing homes disadvantaged by relatively poor QM scores may feel particularly vulnerable as a consequence of public reporting in highly competitive markets.

Hypothesis 4: In highly competitive markets, low-quality scores on NHC will be associated with nursing home investments to improve quality compared with those nursing homes with high-quality scores.

On the other hand, resource dependence theory predicts that if alternative sources for key resources can be found, this may mitigate the need to accommodate to the demands of existing constituencies. For example, having a managed care contract provides an alternative source for referrals that is not dependent on professional recommendations. It may also limit a managed care enrollee's choice of nursing home to those included on approved provider panels, eliminating competition from nonparticipating facilities. Hence, our final hypotheses:

Hypothesis 5: Having a managed care contract will be associated with a lower likelihood that nursing homes will make substantial resource investments in response to QM publication.

Methods

Data and Sample

We designed and piloted a mail survey to determine whether and how nursing homes responded to the publication of QMs on the NHC Web site and subsequently revised it on the basis of pilot study results. In the first half of 2007, we surveyed administrators in a national 10% random sample (1,407 nursing homes) of all facilities that had at least one reported QM included on NHC in 2006. To increase the response rate, we sent a second mailing to those who had not responded to the first. Administrators were asked to respond from the perspective of their facility, not of its corporation, if chain affiliated. They were reminded at several points in the survey to indicate actions taken in response to QM publication only and not for any other reason.

Of the 1,407 nursing homes contacted, 538 responded, yielding a response rate of 38.3%. By comparison, published studies on the basis of mail surveys of nursing home administrative staff report widely varying response rates, from 27%

(Kisor, 1996) to 73% (Coburn, Fralich, McGuire, & Fortinsky, 1996). Our response rate is similar to the 39.2% rate in an administrator survey of total quality management (TQM) adoption (Zinn et al., 1998). A recently published study by Castle (2009) had a response rate of 33%.

Edwards et al. (2002) identified 292 randomized controlled trials of methods to increase response rates to postal surveys. Although the published version of their article does not provide overall response rates, they provide information to do so in their supplementary article in *The Cochrane Library* (2007, Issue 4) that expanded the sample to 372 studies. The average response rate over all the control groups in the studies (no response incentives) was 39.2%, and the rate over all the various responses was 49.2%. We have been unable to uncover any systematic reviews of response rates for mail surveys of administrators. The general perception among management researchers is that they are low. Bedner and Westphal (2006) report a rate of 36% for large sample study of private sector managers.

Comparison of respondents with nonrespondents indicated that respondents were more likely to be nonprofit (43% vs. 26%) and located in West North Central States (17% vs. 11%) and less likely to be located in the Pacific states (7% vs. 11%). Respondents and nonrespondents did not significantly differ (at the .05 level) with respect to QM scores or organizational characteristics other than nonprofit status. Survey data were merged with data on QMs and organizational characteristics from the NHC Web site.

Measures

Dependent Variables. The set of actions nursing homes could possibly take in response to Federal publication of QMs included in the administrator survey were derived from several sources. The first was the predictions of economic theory with respect to firm response to market changes that could affect consumer demand. Studies of how health care providers respond to publication of "report cards" in other health care settings (Gormley & Weimer, 1999) were another source. In addition, we included an open-ended survey item to capture any potential provider responses to QM publication we may have excluded.

For this study, we focused on those actions requiring a significant commitment of resources to staff or equipment. For example, special mattresses, although potentially a substantial equipment investment, have been clinically demonstrated to reduce the incidence of pressure ulcers.

The dependent variables used to test our hypotheses are dichotomous, coded as 1 if the administrator indicated that the following actions were undertaken specifically in response to publication of the QMs and not for any other reason:

- A new nursing director was hired.
- A new medical director was hired.
- Additional clinical staff were hired.
- Staff wages were increased.

- Other initiatives (besides increasing wages) to hire or retain staff were undertaken.
 - New equipment or technology was purchased.
- Otherwise these variables were set to 0.

Independent Variables. Our first three hypotheses are based on administrator perceptions of the degree of influence NHC has on referral sources. Strategic responses are influenced not only by objective market forces but also by how such factors are perceived by organizational decision makers (Alexander, Burns, Morrissey, & Johnson, 2001). Given the degree of information uncertainty in most health care markets, how that information is obtained, organized, and interpreted by decision makers is a prime determinant of strategic response. Differences in how decision makers enact their environments at least partially accounts for why organizations pursue different strategies despite facing similar environmental conditions (Weick, 1979; Walsh, 1995). From an empirical perspective, there are several studies that have investigated the validity of perceptual data. Shortell and Zajac (1990) evaluated the validity and reliability of hospital CEO perceptions in the context of the Miles and Snow strategic typology. In that study, archival data validated hospital CEO self-typing, leading them to conclude that key informant perceptions of an organization's strategic orientation is a reasonable approach to identifying strategy. In their study of CEO perceptions of market competition and strategic response, Alexander et al. (2001) found CEO perceptions of competition were related to four of five dimensions of physician-hospital integration, providing support for their prediction that perceptual measures of hospital market competition are associated independently with the adoption of strategy.

Respondents to the administrator survey were asked to gauge on a 5-point scale the influence they perceive the QMs on NHC have on the decision-making behavior of key constituents. Specifically, respondents were asked the degree to which the QMs influence professional referrals to nursing homes (Hypothesis 1), nursing home choice by potential residents and others involved in that decision (Hypothesis 2), and surveyors conducting the annual state certification process (Hypothesis 3). From these responses, we created dichotomous variables on the basis of whether influence was ranked as high or low. To measure perceived competition (Hypothesis 4), we asked administrators to rate the intensity of competition in their local market on a scale from 1 (*lowest competition*) to 5 (*highest competition*). We dichotomized this variable on the basis of whether administrators ranked their markets at the highest level of competition. This variable was interacted with a measure of quality on the basis of QM scores reported on NHC in November 2004. For each facility, we calculated the number of QM scores that fell into the bottom 20% of the distribution of facility scores within each state. Facilities with three or more scores in the bottom 20% of the state

distribution (the mean of our sample facilities) were assigned a value of 1 (0 otherwise). To test the influence of perceived competition (Hypothesis 4), we ran two sets of analyses, one (available from the authors) without the competition/quality interaction term and one with it. In the former, the hypothesis that higher competition would be associated with investment was not borne out in any of the models, and low quality was associated with increasing wages only. For that reason, we present the alternative model in which competition is interacted with low quality. Finally, the survey asked administrators whether they had one or more managed care contracts. A dichotomous variable was constructed on the basis of their response.

Other variables controlled for factors that could influence nursing home response to report card publication in addition to those hypothesized. To evaluate the perceived validity of the QMs, we included a dichotomous variable on the basis of a question from the administrator's survey that asked whether the QMs reflected the true quality of care provided by the nursing home. Because whether nursing homes respond to publication may also reflect the level of attention paid to it, we included a variable indicating whether the facility reviewed its QMs every quarterly publication. A number of studies have found differences in response to changing regulatory or market conditions associated with ownership status, which may reflect differences in organizational mission (Aronson, Zinn, & Rosko, 1994; Spector, Seldon, & Cohen, 1998; Harrington, Woolhandler, Mullan, Carillo, & Himmelstein, 2003). Chain affiliation can signify greater resource availability, particularly access to capital that could provide flexibility in responding to QM publication (Greene & Monahan, 1981; Harrington et al., 2003). On the other hand, centralized corporate control may place restrictions on decision making in member facilities. We constructed dichotomous variables to represent for-profit status and chain membership. Finally, prior decisions with respect to strategic positioning and resource allocation may also determine whether and how facilities respond to report card publication. Prior research found an association between strategic orientation and the likelihood of early response to public reporting of the NHC QMs (Zinn, Spector, Weimer, & Mukamel, 2008). We constructed dichotomous variables for each of the four strategic types identified in the Miles and Snow typology (defender, analyzer, prospector, and reactor), derived from the response to the self-identified strategic type item included in the administrator survey (Miles, Snow, Meyer, & Coleman, 1978). Descriptions and summary statistics for all dependent and independent variables included in the models can be found in Table 1.

Statistical Methods

We estimated six separate logistic regression models in which the dependent variables were the nursing home

Table 1

Means of variables included in the models

	Mean
Dependent variables (0,1)	
Hired a new nursing director in response to QM publication	0.13
Hired a new medical director in response to QM publication	0.07
Hired additional staff in response to QM publication	0.17
Increased staff wages in response to QM publication	0.20
Took other initiatives to hire/retain staff in response to QM publication	0.12
Purchased new equipment/technology in response to QM publication	0.13
Independent variables (0,1)	
QMs influence professional referrals	0.50
QMs influence choice of nursing home facility	0.56
QMs influence state survey process	0.44
Perceived high competition in local market	0.45
Facility contracts with managed care organization(s)	0.51
Three or more scores in bottom 20% of state QM distribution	0.49
Interaction of high competition and low quality	0.24
Belief that QMs reflect true quality of care	0.57
Review of scores every quarter	0.56
For-profit status	0.57
Chain affiliation	0.50
Prospector	0.22
Defender	0.37
Analyzer	0.36
Reactor	0.05

Note. QM = quality measure.

action taken in response to publication and the independent variables were the hypothesized factors leading to that action. Because of concerns about clustering of nursing homes within states and the potential correlation of observations, inference was based on the Huber–White sandwich estimator of variance. As the independent variables were the same in all regression, there were no efficiency gains to be made by estimating these models as SURE, and therefore we estimated each model separately. We used the LOGISTIC procedure available in STATA.

Findings

Table 1 presents summary statistics for the variables included in the analytical models. With respect to actions

undertaken, one in five nursing homes increased wages in response to publication, presumably to attract and retain clinical staff. Half the administrators perceive that the QMs influence professional referrals, over half believe that the QMs influence consumer choice, and 44% perceive that the QMs influence state survey investigations. Almost half (45%) ranked their operating environment at the highest level of competition and more than half (51%) had a managed care contract.

Table 2 presents the results of the logistic regression models, estimating the likelihood that nursing homes will invest in response to QM publication on the NHC Web site. As indicated, there is considerable support for our first hypothesis. The perception that the reported QMs influence referrals from health care professionals such as hospital discharge planners and case managers increased the odds of hiring a new nursing director or medical director by 2.3 and 2.6 times, respectively. In addition, the odds of taking other initiatives to hire or retain staff almost doubled and of purchasing new technology/equipment more than doubled. The perception that the reported QMs influence

professional referrals was not significantly associated with hiring additional staff or with increasing wages.

There is less support for our second hypothesis, however. Although the belief that the QMs influenced consumer choice of nursing home was associated with over a twofold increase in the odds of hiring new staff, this variable was not statistically significant in the other models.

The perception that the published QMs influence the state survey process (Hypothesis 3) had a statistically significant association with all the resource allocation decisions with the exception of taking other initiatives to attract and retain staff. Perceived influence on the annual state survey process almost doubled the odds of hiring a new nursing director and more than tripled the odds of hiring a new medical director. It more than doubled the odds of hiring additional clinical staff. Finally, this perception increased the odds of increasing wages 1.4 times and of purchasing new equipment or technology 1.8 times.

The interaction terms make the interpretation of the effect of perceived competition more complex (Hypothesis 4). Table 3 presents the odds ratios for taking an

Table 2

Logistic regression analyses odds ratios (standard errors in parentheses; N = 500)

	Hired new nursing director	Hired new medical director	Hired more clinical staff	Increased staff wages	Other initiatives to hire/retain staff	Purchased new equipment/technology
QMs influence professional referrals	2.31 (.88)**	2.64 (1.04)***	0.95 (0.30)	1.11 (0.33)	1.86 (0.66)**	2.54 (1.05)**
QMs influence choice of facility	0.83 (0.31)	0.66 (0.24)	2.29 (0.75)***	1.23 (0.35)	1.06 (0.40)	0.94 (0.39)
QMs influence state survey process	1.87 (0.50)***	3.41 (1.31)****	2.30 (0.72)***	1.44 (0.25)**	1.33 (0.29)	1.84 (0.54)**
Perceived competition	0.40 (0.21)*	1.36 (0.82)	0.86 (0.37)	0.34 (0.13)***	0.39 (0.22)*	2.84 (1.2)***
Competition × Quality	4.68 (3.38)**	1.10 (1.02)	1.68 (0.94)	3.37 (1.59)***	2.80 (1.76)*	0.34 (0.20)*
Managed care contract	0.64 (0.17)*	0.37 (0.16)***	0.67 (0.14)*	0.71 (0.17)	1.07 (0.43)	0.92 (0.24)
Low relative quality performance	0.70 (0.27)	1.22 (0.73)	0.70 (0.24)	0.93 (0.24)	1.06 (0.35)	1.80 (0.86)
Belief that QMs reflect true quality of care	1.05 (0.32)	2.11 (0.76)**	1.66 (0.42)**	1.99 (0.57)***	1.78 (0.53)**	1.76 (0.55)**
Quarterly review of QMs	2.01 (0.60)**	3.50 (0.1.80)***	1.38 (0.42)	1.45 (0.37)	0.99 (0.28)	1.59 (0.44)*
For-profit status	0.89 (0.22)	0.81 (0.30)	1.12 (0.25)	1.51 (0.48)	1.02 (0.34)	0.71 (0.21)
Chain affiliation	1.22 (0.32)	1.20 (0.52)	0.97 (0.23)	0.85 (0.23)	0.94 (0.23)	0.86 (0.22)
Defender	0.87 (0.35)	0.79 (0.40)	1.67 (0.72)	1.50 (0.49)	1.78 (0.77)	0.67 (0.27)
Analyzer	1.22 (0.48)	0.99 (0.53)	2.91 (1.19)****	1.08 (0.35)	1.87 (0.79)	1.38 (0.59)
Reactor	0.71 (0.51)	0.79 (0.99)	1.56 (1.19)	1.05 (0.61)	1.84 (1.48)	0.78 (0.53)
Wald chi-square	78.71****	89.28****	81.12****	41.92****	46.54****	68.53****
Pseudo-R ²	0.095	0.152	0.101	0.071	0.059	0.10
% Observations correctly classified	87.2	93.4	83.2	80.2	87.6	87.6

Note. QM = quality measure.

* $p \leq .10$. ** $p \leq .05$. *** $p \leq .01$. **** $p \leq .001$.

Table 3

**The effect of competition
(Stratified × Quality) on the likelihood
of response to QM publication**

	Odds of taking action		
	Low quality	High quality	SE
Hired new nursing director			
High competition	3.26*	1.0	1.81
Low competition	0.70	1.0	0.27
Hired new medical director			
High competition	1.34	1.0	0.86
Low competition	1.22	1.0	0.73
Hired more clinical staff			
High competition	1.18	1.0	0.38
Low competition	0.70	1.0	0.24
Increased staff wages			
High competition	3.13**	1.0	1.24
Low competition	0.93	1.0	0.24
Other initiatives to hire/retain staff			
High competition	2.95*	1.0	1.52
Low competition	1.06	1.0	0.35
Purchased new equipment/technology			
High competition	0.61	1.0	0.25
Low competition	1.80	1.0	0.86

Note. QM = quality measure.

* $p < .05$. ** $p < .01$.

action for a low-quality facility compared with a high-quality facility, stratified by competition. The values presented in Table 3 were calculated as linear combinations of the coefficient estimates in Table 2. As indicated by Table 3, low-quality facilities had three times greater odds of hiring a new nursing director, increasing wages and taking other actions to hire or retain staff in high competition markets than high-quality facilities. In low competition markets, there was no difference between high- and low-quality facilities (as defined by their QM scores) for any type of quality investment.

As expected, having a managed care contract (Hypothesis 5) decreased the odds of hiring a new nursing director by about 1.4 times, a new medical director by 1.6 times, and additional clinical staff by 1.3 times. There was no statistically significant association with the remaining dependent variables.

With respect to the control variables included in the models, the belief that the reported QMs are valid reflections of the quality of care was associated with all but one of the actions: It doubled the odds of hiring a new medical

director and increased the odds of hiring more clinical staff and increasing wages about 1.7 and 2 times, respectively. It also increased the odds of taking other initiatives to hire or retain staff and of purchasing new equipment or technology about 1.8 times. Quarterly review of the QMs, an indicator of the frequency and regularity of monitoring, doubled the odds of hiring a new nursing director and more than tripled the odds of hiring a new medical director. It increased the likelihood of purchasing new equipment about 1.6 times but was not significantly associated with hiring clinical staff, increasing wages or taking other initiatives to acquire or retain staff.

Neither for-profit status nor chain affiliation had a statistically significant association with our investment measures. Finally, although analyzer status almost triples the odds of hiring more staff, strategic orientation was not associated with any of the other investment decisions.

Conclusions

In a review of the extant literature on the influence of publicly reported nursing home quality on consumers, providers, and purchasers, Stevenson (2006) concluded that evidence to date was inconclusive and called for further research to better inform the effectiveness of this policy initiative. In this study, we investigated the factors associated with the likelihood that nursing homes will invest resources intended to improve quality in response to publication of individual nursing home QMs on the NHC report card. Resource dependence theory predicts that nursing homes will take decisive actions designed to improve performance on the reported QMs if these decisions help to secure and protect the flow of resources from key constituencies. Our results provide considerable support for this prediction. For example, the influence of QMs on professional referral sources greatly increased the odds of hiring a new medical or nursing director as well as purchasing new equipment or technology. It may be that professional referral sources (physicians, hospital discharge planners, etc.) are perceived to have first-hand personal knowledge of the reputations of the clinical leadership (represented by medical and nursing directors) in the nursing homes in their market on the basis of prior experience and are more likely to hold them accountable for the quality of care delivered, as documented by NHC. If the existing clinical leadership is perceived by referral sources as ineffective on the basis of the reported QMs, nursing home management may be motivated to replace them to improve scores and the facility's quality reputation. On the other hand, influence on consumer choice was associated only with hiring additional staff in response to publication. Staffing information is also provided on the NHC Web site, and consumers who consult the site for QM information likely access the information on staffing levels as well. Consumer awareness of

the quality implications of staffing level differences may motivate nursing homes to increase staffing.

If the reported QM scores focus state surveyor investigation efforts, the scores may be a major influence on the number and type of cited deficiencies, placing the facility at direct financial and competitive risk. The perceived influence of the reported QMs on the state survey process was associated with all but one of the investments. This may be a reflection of the relative degree of influence the QMs are perceived to have on team conduct during annual site visits compared with other constituencies. Consumers and referral sources are likely to take factors in addition to reported QMs into account in their decision-making process, and these other factors (such as location or religious affiliation) may take priority over the QMs. However, these other factors are inconsequential in the state survey process. In highly competitive markets, low-quality facilities are more likely than high-quality facilities to hire a new nursing director, to increase staff wages, and to take other initiatives to hire or retain staff, although there was no association with other investments, such as purchasing equipment. This may reflect that low-quality facilities are most vulnerable to the demand effects of bad publicity in markets where consumers have choices. Investments intended to improve QM scores may reduce vulnerability.

It could be argued that facilities would have an incentive to invest in quality if doing so helps to retain a managed care contract. Thus, if the published QMs were perceived as influencing how managed care organizations pursue and retain nursing home affiliations, facilities would be motivated to take action to improve their scores. However, having a managed care contract decreased the likelihood of hiring a new medical director, nursing director, or new clinical staff. It may be that having a reliable source of admissions that bypasses professional referral sources and limits consumer choice to contracted facilities provides a buffer that lessens the motivation to invest in response to QM publication. The greater the volume of referrals from managed care sources, the larger the buffering effect. Thus, efforts encouraging managed care enrollment may have the unintended consequence of diminishing the impact of public quality reporting.

With respect to the controls, the belief that the QMs are valid reflections of the actual quality of care increases the likelihood of taking all the actions with the exception of hiring a new nursing director. That the perceived legitimacy of the measures promotes commitment to improving them is buttressed by the finding that facilities that monitor measures every quarterly publication are also more likely to invest in their improvement. If the measures are perceived as valid, then they merit regular attention and the commitment of resources to improve them. Finally, self-identified strategic type, in particular a prospector orientation, was found to be associated with the likelihood of response to QM publication in prior research (Zinn et al.,

2008). However, that study reflected initial QM publication when responses were of a much more preliminary nature. Given the uncertainty regarding the competitive impact of the report card at that early stage, responses may have been partially premised on prior patterns of strategic response to environmental change. Now that the QMs are an established fixture in the regulatory environment, experience may have replaced strategic predilection as a determining factor.

Although our findings suggest that nursing homes are responding to the reporting of QM scores, the survey did not probe in depth about the degree of commitment of facilities or their knowledge and ability to be effective in bringing about actual quality improvement. In addition, although there were no differences with respect to QM performance or any other organizational characteristics, respondents were more likely to be nonprofit and located in certain geographical regions than nonrespondents. This may limit generalizability to some extent. Because the data are cross sectional, causality cannot be conclusively established, and relationships should be interpreted as associative rather than causal. Most importantly, it should be recognized that our data are largely self-reported by nursing home administrators and may therefore be subject to response bias. Despite anonymity, there is a possibility that respondents tried to present themselves more positively than is actually the case. However, the high percentage of respondents who admit to making no investments in response to publication makes it unlikely that our queries promoted this form of response bias.

Despite these potential limitations, our findings have implications for policy and practice. It is among the first to investigate the impact of a publicly released report card on nursing home behavior. Nursing homes treat a frail and clinically complex population, in a long-term rather than acute-care setting, with different processes of care and different market conditions, including much more public payer involvement (Mukamel & Spector, 2003). All of these may mitigate the effectiveness of report cards in motivating actions intended to improve quality. However, that nursing homes are more likely to act in response to the NHC report card on the basis of its perceived influence on key constituencies suggests that efforts on the part of CMS to increase public awareness may increase report card effectiveness (Stevenson, 2006). Education and dissemination of evidence-based information about effective strategies and their costs may prove to be an important complimentary policy initiative. Additional research directed at understanding the relationships between specific responses and resident outcomes may offer important insights into the potential long-term impact of report cards. The fact that public reporting was not uniformly effective also suggests that other policies aimed at improving nursing home quality, such as state survey process reform, should continue to be pursued in tandem with this market-oriented policy.

Practice Implications

Managers are responsible for making decisions in the best interest of their organizations, even under conditions of incomplete information regarding the right course of action. When information is insufficient or unreliable, intuition may enter in to the decision-making process. Our study indicates that managerial perceptions of what influences stakeholders and competition are associated with the likelihood of taking strategic action in response to publication of QMs on NHC. Thus, the question is not whether perceptions influence decisions but the confidence managers have in them. To make appropriate decisions on the basis of perceptions, managers need to understand and acknowledge the social, cultural, and professional values that shape and may potentially bias them.

With respect to management practice, responses to a survey conducted shortly after initial publication in November 2002 indicated that nursing home administrators perceived little if any competitive impact from the report card and that their responses were limited to actions that did not require major resource investment. For example, responses were more likely to be related to changes in work protocol and training of existing staff than to hiring additional staff. However, the passage of time appears to have changed this “wait and see” mindset with respect to the competitive impact of public reporting. The current survey, conducted in early 2007, indicates that a substantial proportion of nursing homes now perceive that the report card influences professional referrals, consumer choice, and state survey investigatory process. This suggests that nursing home now perceive that QM publication may indeed have a competitive impact as it concerns these constituencies, thus building a business case for quality. By increasing the stakes in improving the scores, substantial investments become much more likely. However, further research is needed to determine what efforts are most effective in improving quality and increasing consumer demand.

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