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The Role of Severe Dementia in Nursing Home Report Cards

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Abstract

Health care report cards are intended to improve quality, but there may be considerable heterogeneity in who benefits. In this article, we examine the intended and unintended effects of quality reporting for nursing home residents with severe dementia relative to other residents, using a difference-in-differences design to examine selected reported and unreported quality measures. Our results indicate that prior to public reporting, nursing home residents with severe dementia were at significantly higher risk of poor outcomes on most reported quality measures. After public reporting was initiated, outcomes for nursing home residents with severe dementia did not consistently improve or worsen. We see no evidence that individuals with severe dementia are being avoided by nursing homes, despite their potential negative impact on quality scores, but we do find an increase in coding of end-stage disease. Additional risk-adjustment, stratification, or additional quality measures may be warranted.

Keywords

long-term care; nursing homes; quality; public reporting; dementia

Introduction

Caring for people with Alzheimer's disease and other dementia is a critical aspect of contemporary health care and promises to become even more important as the population ages and prevalence increases. Some place estimates of the prevalence of Alzheimer's Disease at approximately 50% among individuals over the age of 85; by this reckoning an estimated 11 to 16 million people in the United States will have it by the middle of this century (Alzheimer's Association, 2007). Many of those afflicted will require care in a nursing home. Depending largely on public payers, nursing homes serve approximately 1.6 million residents at any given time in the United States. Dementia is the single most common reason for nursing home admission (Alzheimer's Association, 2007), resulting in a majority of residents having some form of dementia. Thus, the quality of care in nursing homes is critical for appropriate care of individuals with dementia.

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Policies designed to improve quality may, however, have heterogeneous impacts. In this article, we examine the intersection between one major policy initiative aimed at improving the quality of nursing home care—public reporting of nursing home quality—and the challenges of the high prevalence of dementia, especially severe dementia, among nursing home residents. We investigate three specific concerns: (a) that some reported measures are potentially inappropriate for nursing home residents with severe dementia, (b) that unreported aspects of quality important to nursing home residents with severe dementia may be neglected, and (c) that nursing homes may avoid admitting or retaining nursing home residents with severe dementia or will change coding practices to omit them from the measures.

Dementia and Quality Improvement

Dementia is generally defined as a group of disorders that cause progressive and irreversible cognitive decline. Although there are some pharmaceutical treatments that claim to slow progression for some individuals, there are no known ways of preventing the disease and its ultimate progression.

Care of nursing home residents with dementia is inherently different from care of residents without dementia in several important ways. First, dementia is a terminal illness with a limited life expectancy. Cognitive and functional decline is an anticipated and expected part of the disease process. However, relative to other terminal diseases, there are significant barriers to providing appropriate care to people with end-stage dementia, including lack of recognition of dementia as a terminal illness, lack of reliable prognostic markers, and variability in survival (Sachs, Shega, & Cox-Hayley, 2004). For this reason, patients with dementia are substantially less likely than other terminal patients to be categorized as having end-stage disease or to enroll in hospice even though death may be imminent; less than 10% of all hospice patients have dementia (Alzheimer's Association, 2007). Compared with those with cancer, individuals with dementia in their last year of life are more likely to receive inappropriate care (to be restrained and to have feeding tubes) and are less likely to have a do-not-resuscitate order (Mitchell, Kiely, & Hamel, 2004). Second, nursing home residents with dementia (even at moderate stages) are a vulnerable population and at greater risk for adverse events and complications from care than their counterparts without dementia, as they often cannot articulate their concerns and preferences or monitor even basic aspects of the quality of the care they are receiving. Third, dementia is a challenging condition for caregivers. Individuals with dementia may require increased monitoring to prevent wandering or harm, may not be able to participate in their own health care and maintenance, and may be unable to recognize and acknowledge long-time caregivers. Finally, the presence of dementia complicates other types of care that may seem straightforward in individuals without dementia. In the presence of dementia, the risk-benefit ratio of treating nondementia illnesses is different in that decision-making capacity, reporting of adverse effects, and treatment adherence may all be lower (Brauner, Muir, & Sachs, 2000). Nursing home residents with dementia are therefore more likely than other residents to experience a variety of adverse events and the standards of care for these adverse events among individuals without dementia may not apply. These distinctions become most important as the dementia

progresses into late stages; therefore, we focus in this study on nursing home residents with severe dementia.

Nursing Home Compare

Nursing home quality has been under scrutiny for several decades, due both to the large numbers of residents and dollars involved and to well-publicized and persistent quality problems. In the past, some of the quality problems were attributed to a lack of information about quality on which consumers could base decisions and which could inspire competition on the basis of quality.

To address this lack of information about quality, in 2002, the Centers for Medicare and Medicaid Services (CMS) released a publically accessible web-based guide called Nursing Home Compare (NHC), which rates nursing homes on long-stay and postacute care quality measures at all Medicare- or Medicaid-certified nursing homes (CMS, 2002). NHC began rating nursing homes based on 10 quality measures, 7 based on long-stay residents with chronic care needs (percent of residents with physical restraints, severe or moderate pain, urinary tract infection, worsening functioning, pressure sores among high-risk residents, and pressure sores among low-risk residents) and 3 based on post-acute measures (severe or moderate pain, delirium, and improvement in walking). Several chronic care measures were added within 2 years: the percent of chronic care residents who were more depressed or anxious (January 2004) and the percent of residents with unexpected weight loss (November 2004).

CMS launched a six-state pilot in April 2002 in which the quality measures were publicly reported for each Medicare- or Medicaid-certified nursing home in the six pilot states (Colorado, Florida, Maryland, Ohio, Rhode Island, and Washington). Then, on November 12, 2002, NHC was launched nationally, allowing consumers to compare quality measures across nursing homes nationwide (CMS, 2002; Harris & Clauser, 2002). CMS continues to put resources into this public reporting effort, updating the reported scores, changing the interface, and raising awareness among consumers and other stakeholders.

To take into account resident- and facility-level differences in risk, two strategies are used by CMS. First, exclusions are used to adjust the denominator of the measures. For example, residents who are comatose are excluded from the denominator of most of the measures, and the Weight Loss and Activities of Daily Living (ADL) measures also exclude residents who are coded as being enrolled in hospice or having end-stage disease. Second, some of the quality measures are adjusted for resident-level covariates. Importantly, none of the measures is adjusted explicitly for cognitive impairment or dementia. A study of the adequacy of risk-adjustment in NHC found that rankings of facilities by quality level using additional risk adjustment (including, for some measures, risk adjustment for impaired communication, a marker for dementia) can differ by as much as 48% from rankings based on the measures as currently reported (Mukamel, Glance, et al., 2008).

Studies of the effect of NHC on resident outcomes have affirmed generally positive but modest and inconsistent effects on quality as represented by the measures reported. Several descriptive studies found improvement in most measures after NHC was launched (Castle,

Engberg, & Liu, 2007; Zinn, Spector, Hsieh, & Mukamel, 2005). Studies that employed quasi-experimental designs to attribute changes to NHC found more modest results with improvement for only a subset of measures, most commonly pain and restraints (Mukamel, Weimer, Spector, Ladd, & Zinn, 2008; Werner, Konetzka, Stuart, et al., 2009), with one study finding no consistent improvement (Grabowski & Town, 2011). However, these modest and inconsistent average effects may be the result of considerable heterogeneity.

New Contribution

Although the majority of nursing home residents have dementia, and care of residents with dementia is inherently different in important ways, the consequences of public reporting for this group have not been studied before. As measured quality appears to improve modestly on average, the quality of care for residents with dementia may improve as well. However, there may be unintended and negative consequences of public reporting on nursing home residents with dementia. We investigate three specific concerns.

The first concern is that nursing home report cards emphasize some outcomes that may not be appropriate for residents with dementia, especially those nearing the end of life, such that nursing homes with large proportions of residents with dementia will find it difficult to score well. The American Geriatrics Society released a position statement expressing concern about the potential unintended consequences of NHC on the care of elderly residents with terminal diseases, including Alzheimer's disease (American Geriatrics Society, 2002). They pointed to several measures that may be particularly problematic: the percent of residents with worsening functioning and the percent of residents with weight loss. These are included as quality measures under the assumption that nursing home residents should be expected to improve (or not decline) in these areas. But as these are expected outcomes of terminal illness, nursing homes with large numbers of residents with severe dementia may not fare well on these measures regardless of quality improvement efforts. On the other hand, several reported measures such as the percent of residents with pain and the percent of residents who are physically restrained are appropriate quality improvement targets for residents with dementia and may lead to improved care for them as well as for other residents.

The second concern is that unmeasured or unreported quality will be ignored or may even decline as resources are diverted to those aspects of quality that are rewarded. Unreported measures of post-acute care quality, which included urinary tract infection and declining functioning, did not improve as much as the reported post-acute measures in one study of the effect of NHC on quality (Werner, Konetzka, & Kruse, 2009). The fear is that nursing home report cards may not reflect aspects of quality that are most important to residents with dementia. In a study of the chronic care population with severe cognitive impairment, for example, reduced physical restraint use due to reporting on NHC was associated with increased use of antipsychotic medications, unreported for the first 10 years of NHC (Konetzka, Brauner, Shega, & Werner, 2014).

In this article, we examine two additional unreported outcomes, increased depression or anxiety and potentially preventable hospitalizations and how they change in the context of NHC. Although the percentage of residents with depression and anxiety was a validated nursing home quality measure (J. Morris et al., 2003), arguably important to nursing home

residents with dementia, it was not included in the original launch of NHC. Another unreported quality measure that would impact on residents with late-stage dementia is rates of potentially preventable hospitalization. Lower rates may reflect better quality of care for late-stage dementia, but there is no hospitalization measure in NHC. There is increasing interest in low hospitalization rates as a marker of nursing home quality (Grabowski, O'Malley, & Barhydt, 2007; Intrator et al., 2007; Konetzka, Spector, & Limcangco, 2008; Konetzka, Spector, & Shaffer, 2004; Ouslander, Weinberg, & Phillips, 2000). For nursing home residents with dementia, the hospital presents as a foreign, hostile environment, increasing the risk of further functional decline, increasing the risk of delirium, and increasing the risk of complications through medication error on transfer back to the nursing home; thus, avoiding hospitalizations is especially important for residents with dementia (Sachs et al., 2004). Nursing homes interested in achieving low hospitalization rates presumably need to provide resources and staffing in the facility such that more adverse events could be avoided or treated in the facility and fewer transfers needed. If facilities focus quality improvement efforts on reported measures, we may see lack of commensurate improvement or even declines in quality of care for these unreported aspects of quality, for all residents and not necessarily just those with severe dementia.

The third concern we examine is that nursing homes may avoid admitting or retaining residents with severe dementia due to an inability to score well on many of the reported measures. It may or may not be possible for nursing homes to change this aspect of their populations, given that there are few alternatives for individuals with severe dementia and that dementia is prevalent among potential nursing home users. Residents that enter a nursing home with little or no dementia may also progress to severe dementia over time. Nonetheless, evidence of “cream-skimming” has emerged in other sectors. For example, after the release of report cards for cardiac surgeons in New York, 67% of cardiac surgeons reported refusing to treat at least one patient in the preceding year who was perceived to be high risk (Burack, Impellizzeri, Homel, & Cunningham, 1999). If nursing home residents with dementia are at higher risk for poor outcomes on measured quality, and risk adjustment is not adequate, nursing homes may attempt to avoid admitting individuals with dementia. Alternatively or in addition, because residents coded as end-stage or hospice, are excluded from the reported quality measures, nursing homes have an increased incentive to code these for their sicker residents.

Our specific goal is therefore to examine differential improvement on appropriate (pain, physical restraints) and potentially inappropriate (worsening functioning, weight loss) measures by dementia status; to examine whether quality in several important but unreported domains of care (increased depression or anxiety, potentially preventable hospitalizations) may have declined; and to examine whether the percent of residents with dementia or coded with end-stage disease or hospice changed after public reporting was implemented. We assess these questions using a rigorous quasiexperimental design that allows us to plausibly connect any changes over time in these outcomes to the implementation of public reporting.

Conceptual Approach

Health care providers subject to public reporting may respond by improving the quality of care they deliver, whether out of fear of losing market share or through an inherent desire to compare well with one's peers (Kolstad, 2013). However, improvement in reported scores may be heterogeneous across types of patients or aspects of quality. Holmstrom and Milgrom's theory of multitasking (Holmstrom & Milgrom, 1991), originally conceptualized in the context of optimal contracts for employee performance, predicts that providing incentives for performance in one area may harm performance in another area if a worker engages in multiple tasks. While the employer may hope that high performance on the rewarded task is correlated with high performance in other tasks, the extent to which this is true depends on whether the process of excelling on one task is largely a *complement* or a *substitute* to the process of excelling on the other task. If the two processes are complements, then the effort devoted to performance on one task is expected to spill over to performance on the other task, and an incentive directed at either task should raise overall performance. If the two processes are substitutes, then effort devoted to improving performance on one task is not likely to lead to improved performance on the other task; indeed, if the total amount of resources (or work time) is limited, performance on the second task could decline as resources are increasingly shifted toward the incentivized task.

In the context of public reporting and other types of quality improvement incentives, Holmstrom and Milgrom's theory implies that measuring and rewarding quality in some areas may harm quality in other areas. The quality of health care is clearly multidimensional while quality measures and rewards for quality improvement target only some dimensions of quality. We adopt this theory in hypothesizing that NHC may have unintended negative consequences for nursing home residents with dementia.

Empirical Approach

To identify the effects of public reporting, we take advantage of the fact that six pilot states were subject to NHC 7 months earlier than the rest of the United States, providing a natural experiment. This enables us to employ a classic differences-in-differences model, estimating the effect of NHC on the pilot states using the rest of the nation as a control and then the effect of NHC on the rest of the United States using pilot states as a control. The estimate of interest is captured in a "NHC" treatment indicator that is specific to the time of implementation for nursing homes in pilot and nonpilot states. The underlying secular trend is captured in quarterly time dummies. Thus, the combined estimate is net of the underlying secular trends, strengthening the case for causal attribution to NHC.

Study Population

Nursing homes typically serve two populations, chronic care residents in need of assistance with functional and cognitive impairment and short-stay, post-acute residents in need of rehabilitative care following an acute hospitalization. We focus in this article on the chronic care population that is most relevant to late-stage dementia. Our quantitative analyses thus include all chronic care residents of Medicare- and/or Medicaid-certified U.S. nursing homes

during 1999 to 2008, spanning 2002 when NHC was released. Individual measures vary in the subset of residents qualifying for inclusion.

Data

We use a 1999 to 2008 panel of observations from two merged data sets, the Minimum Data Set (MDS) 2.0 and MedPAR. The MDS is collected at regular intervals for every resident in a Medicare- or Medicaid-certified nursing home regardless of individual payer source. Information is collected on residents' race, age, home ZIP code, health, physical functioning, mental status, and general well-being. These data are used by the nursing home for care planning, by governments to calculate prospective payment rates for Medicare-covered post-acute stays, and in many states for Medicaid-covered long-term care. For chronic care residents, assessments are performed on admission, quarterly, and when a significant change in status occurs. We use all assessments that qualify for inclusion in NHC and limit our sample to the same target assessments (the last assessment per resident per quarter) that CMS uses in its calculation of the chronic care quality measures to avoid overweighting sicker residents who may have more frequent assessments.

The MDS is the data source used by CMS to calculate the quality measures reported on NHC. We use the technical definitions of the quality measures provided by CMS (J. Morris et al., 2003) to calculate each nursing home's quality measures for long-stay residents over the time period of the study. By recreating the quality measures from the MDS, we are able to calculate the quality measures both before and after NHC was released on the group of residents we study.

The MedPAR files contain final action stay records for Medicare-covered inpatient services, with each record representing a hospital discharge. MedPAR data were used to calculate one of our measures of unreported quality (hospitalization), and were linked to MDS data using a common unique beneficiary identifier provided by CMS.

Dependent Variables

The quality of care in nursing homes is measured by 6 primary variables (see Table 1). We focus in this study on a subset of measures that provide variation in appropriateness for residents with dementia and reporting status during the time period of the study, though other measures are included in NHC. Pain and restraints are appropriate and reported at the initial launch of NHC; worsening functioning is reported but potentially inappropriate; weight loss is unreported at initial launch and potentially inappropriate; and both the preventable hospitalization measure and increased depression or anxiety are appropriate but unreported at the initial launch.

The quality measures are reported in Nursing Home Compare as percentages, where the numerator is the number of residents who met the measure definition (e.g., the number of residents whose need for help with daily activities has increased) and the denominator is the total number residents included in the measure. We apply exclusions as defined in available technical definitions of the measures (Abt Associates, 2003). For our resident-level analyses, we define each of these quality measures as a dichotomous variable (1 if the resident

qualifies in the measure's numerator; 0 if the resident was eligible for the measure but did not qualify for the numerator).

To determine potentially preventable hospitalizations of Medicare beneficiaries, we link MDS data to MedPAR data using unique beneficiary identifiers. We define potentially preventable hospitalizations based on AHRQ's Prevention Quality Indicators project (Davies et al., 2009), which developed a set of indicators for conditions for which good outpatient care can potentially prevent the need for hospitalization or for which early intervention can prevent complications or more severe disease. These conditions have been used in the nursing home setting as well, as high-quality primary care in the nursing home can similarly prevent hospitalizations (Carter, 2003; Intrator, Zinn, & Mor, 2004). Potentially preventable hospitalizations are measured as a dichotomous variable (1 if the resident is hospitalized during a quarter, 0 otherwise).

Key Independent Variables

Our main independent variables are a resident-level indicator for severe dementia, a NHC indicator for when public reporting was present, and the interaction between the two. We define an indicator for severe dementia using the Cognitive Performance Score (CPS; J. N. Morris et al., 1994), a tool for categorizing cognitive impairment using MDS data that has been well-validated against other tools such as the Mini-Mental Status Exam. We follow J. N. Morris et al. (1994) in categorizing residents with a CPS of more than 4 as having severe impairment or late-stage dementia. Mild or moderate dementia is defined as a CPS of 2 to 4, and a CPS of 0 or 1 indicates the absence of dementia. We then aggregate to the facility-level percentage of residents in each category. We conduct robustness checks using several other validated approaches to identifying nursing home residents with severe dementia, including the MDSCOGS scale and the ADL-SF scale (Hartmaier, Sloane, Guess, & Koch, 1994; van der Steen et al., 2006). Because these results were qualitatively similar to results using the CPS, we present only the CPS-based results.¹

The main policy variable of interest is a measure- and state-specific indicator variable for whether the measure of interest was publicly reported as part of NHC ($NHC = 0$) or after ($NHC = 1$). NHC was launched nationally in November 2002; for the six states participating in the NHC pilot program, the release date for the initial set of reported measures was April 2002, 7 months before the national launch, and we define it as such.

Analysis

To assess whether nursing homes residents with and without dementia experience similar improvement from NHC, we first examine descriptive trends in each outcome by dementia status. To include resident-level risk adjustors and to control for time-invariant facility-level attributes that could otherwise bias our estimates, we then use facility fixed-effects regression in a difference-in-differences framework. The difference-in-differences estimator is based on two sources of variation: an indicator for severe dementia and the timing of

¹The MDS 2.0 includes an indicator for diagnosis of dementia, but the variable is subject to missing and inconsistent data such that presence of dementia is highly underestimated. We therefore use the validated CPS scale instead.

implementation, with the interaction between the two of primary interest. The full specification is

$$Q_{rt} = \alpha + \beta_1 NHC_{ht} + \beta_2 SevereDementia_{rt} + \beta_3 NHC_{ht} \times SevereDementia_{rt} + X_{rt} + \gamma_t + \varepsilon_{rt}$$

In this equation, r indexes the resident, h indexes the nursing home, and t indexes the quarter-year. The dependent variable, Q_{rt} , is a dichotomous quality measure for resident r at time t . Quarterly time dummies γ_t capture secular trends in the control group. Control variables X include age, age squared, female, and indicators for each of 20 comorbidities available in MDS: dehydration, diabetes, peripheral vascular disease, aphasia, cerebral palsy, stroke, hemiplegia, muscular sclerosis, paraplegia, quadriplegia, Parkinson's disease, seizure disorder, TIA, brain injury, schizophrenia, asthma, chronic obstructive pulmonary disease, anemia, cancer, and renal failure. The coefficient on NHC reflects the change in the probability of the outcome after NHC among residents without severe dementia; the coefficient on severe dementia captures differences in the probability of triggering the outcome attributable to severe dementia status; and the interaction term captures differential changes in the probability of triggering the outcome that are attributable to NHC for residents with severe dementia over and above the change for residents without severe dementia.

Finally, we assess whether nursing home practices may have changed with respect to the percent of residents in the facility with severe dementia or the coding of endstage disease and hospice status. To assess whether NHC affected these outcomes, we run facility fixed-effects regressions at the facility level, regressing the percent of residents coded as having end-stage disease or being on hospice as dependent variables on our policy indicator NHC. In these regressions, identification is based solely on whether pilot states experienced changes in these outcomes earlier than nonpilot states.

Results

On average over the entire study time, 18% of residents in a nursing home are classified as having severe or late-stage dementia (see Table 2). Figure 1 depicts descriptive trends over time in each of the six outcomes by dementia status, including the risk adjustment built in to each of the reported measures, but without additional risk adjustment. Among the appropriate and reported measures (pain and physical restraint use), large differences in the outcomes by dementia status exist at baseline (prior to 2002). Residents with severe dementia are substantially less likely to trigger the pain measure but far more likely to be physically restrained. All groups appear to improve on the pain measure after NHC is implemented in 2002, with a seemingly less steep decline for the severe dementia group. Residents with severe dementia appear to be driving the reduction in restraint use, exhibiting a steeper decline. By 2008, the gap in restraint use by dementia status narrows considerably.

For the potentially inappropriate measures (ADL worsening and unexpected weight loss), the group with severe dementia is more likely to trigger the adverse outcomes both at baseline and in 2008, consistent with expectations, although the gap by dementia status

narrows over time. Contrary to expectations, the largest improvement in each measure is among those with severe dementia.

For the appropriate but unreported measures (increased depression or anxiety and potentially avoidable hospital admissions), evidence is mixed. Residents with moderate dementia experience higher rates of depression or anxiety than residents without dementia or with severe dementia. Trends over time in this measure look fairly flat, even though the measure was added to NHC.² For hospital admission, which is never reported on NHC, we see a slight increase at the beginning of the panel that is concentrated among those without severe dementia, and flat trends thereafter.

Table 3 presents the results of the resident-level, facility fixed-effects regressions using the difference-in-differences framework. The coefficients on severe dementia reveal that residents with severe dementia do consistently worse at baseline on the potentially inappropriate measures (ADL worsening and weight loss) as well as on the appropriate restraints measure. The magnitudes of these differences are substantial: a 16 percentage-point higher probability of being physically restrained; an 8 percentagepoint higher probability of experiencing ADL worsening; and a 2 percentage-point higher probability of weight loss. There was no clear pattern of improvement under NHC; residents with severe dementia exhibited more improvement on some measures and less on others as indicated by the coefficients on the interaction term between severe dementia and NHC. The magnitudes of the interaction term can be interpreted as the differential change in the probability of triggering the outcome after NHC when a resident has severe dementia over and above residents without severe dementia, for example, residents with severe dementia experienced a 1.7 percentage-point increase in the probability of pain under NHC over and above a 1.5 percentage point decline in the probability of pain for residents without severe dementia, meaning that while residents without severe dementia experienced decreased pain, the net effect for residents with severe dementia was close to zero. In terms of unreported but appropriate outcomes, residents with severe dementia exhibited a relative decline in hospital admissions, but a relative increase in the depression/anxiety measure compared with other residents, and the net effect of NHC on these outcomes across all residents was small.

Table 4 depicts the difference-in-difference estimators for facility fixed-effects regressions of the percent severe dementia, the percent moderate dementia, the percent coded as end-stage, and the percent coded as hospice. The launch of NHC had no significant effect on the percent of residents with severe dementia or moderate dementia or the percent of residents coded as being on hospice. However, there was a statistically significant increase in the percent of residents coded as having end-stage disease. The effect was modest (an increase of just over one-tenth of 1%, or about 1,800 nursing home residents) but represents a 5% increase with respect to the 2.3% of residents coded as end-stage on average.

².Note that the increased depression/anxiety measure was removed and replaced with a depression-only measure after the time period of our analysis.

Discussion

Prior to public reporting, nursing home residents with severe dementia scored worse on two out of three reported clinical quality measures than residents without severe dementia. The exception was pain, which may be due to an ascertainment bias whereby pain is not well coded in the presence of dementia (Wu, Miller, Lapane, Roy, & Mor, 2005). The tendency of residents with severe dementia to score poorly on reported measures persists regardless of whether the measure is deemed appropriate or inappropriate and even when controlling for age, gender, and a multitude of comorbidities.

In response to NHC, quality of care for nursing homes residents with severe dementia did not consistently improve or worsen. The lack of relative decline among residents with severe dementia was contrary to expectations for the potentially inappropriate measures of worsening functioning and weight loss, where nursing homes could presumably do little to prevent these adverse outcomes in the presence of severe dementia. One possible explanation is that there was little change overall on these measures (regardless of dementia status). The lack of any improvement may indicate that perhaps the mechanisms to improve on these measures are either too costly or too unclear for nursing homes to pursue them. In any case, fears that nursing home residents with dementia may be harmed by the publication of the weight loss and worsening functioning measures appear to be unwarranted. Similarly, we find no strong evidence for a multitasking problem.

Both the regressions and the descriptive trends reveal that while many of the quality measures converged over time by dementia status, absolute differences remain. The persistence of differences by dementia status for the reported clinical quality measures suggests that additional risk adjustment for severe dementia may be warranted, especially when the measure is of questionable appropriateness for this population. Risk-adjustment could take the form of including the CPS or an indicator for severe dementia as a covariate, similar to covariate adjustment used in some of the reported measures currently. However, because nursing homes were able to improve some of these outcomes among residents with severe dementia, additional risk-adjustment may counter quality improvement incentives. The mechanisms for this improvement need further investigation through qualitative research. In addition, additional measures that are better markers for high-quality end-of-life care may be warranted.

An alternative to additional risk-adjustment would be the reporting of quality measures stratified by severe dementia status. Stratification would allow comparison of outcomes only among residents with severe dementia, eliminating the need to correctly specify the risk-adjustment equation. It could also be useful to consumers who want to search directly for a nursing home that provides high-quality care for residents with dementia. The potential disadvantage of stratification is that it would require the reporting of a duplicate set of measures, adding to the complexity of the system even as CMS is attempting to simplify it. In addition, numbers within each stratum might be too small for confidential and reliable reporting. Nonetheless, given the importance of dementia as a reason for nursing home admission, stratification is a reasonable option.

The lack of effects of NHC on the percent of residents with severe dementia suggests that nursing homes are not avoiding residents with severe dementia (and/or is consistent with a lack of response to NHC by residents with severe dementia in terms of avoiding or switching out of nursing homes that do not score well). This indicates lack of selection behavior on the part of nursing homes, at least with respect to dementia. However, avoiding these residents may be thought of as an extreme response, as coding for end-stage disease or hospice would remove the resident from the denominator of the measures. While hospice status requires actual enrollment in hospice and involves the preferences of the resident and family, coding for end-stage disease does not. Thus, it is not surprising that we find an increase in the coding of end-stage disease in response to NHC. To the extent that the coding simply reflects an increased incentive to document accurately, this change does not necessarily reflect a gaming of the system. Alternatively, the increased coding of end-stage disease may reflect upcoding of severity to remove residents with severe dementia from the reporting pool.

In late 2008, the NHC system was modified to include star ratings: separate ratings for staffing, inspections, and the clinical quality measures, plus a combined overall rating. Although the clinical quality measures still appear on NHC, they have arguably become less prominent. Furthermore, the percent of long-stay residents who lose too much weight and the percent of residents who have depressive symptoms are not included in the calculation of stars for the current 5-star system. In view of our results revealing that nursing home residents with severe dementia score consistently worse on the clinical measures, in conjunction with prior studies documenting the inadequacy of risk-adjustment, the declining emphasis on clinical outcome measures in this context is perhaps warranted. Ongoing changes to the reporting system should consider and reflect the quality of care experienced by the growing population of nursing home residents with severe dementia.

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Figure 1.
Nursing home quality by dementia status among chronic-care nursing home residents.

Table 1.

Selected Nursing Home Quality Measures.

Measure	Included in initial release of NHC?	First publication date	Relationship to dementia
Percent of residents with moderate to severe pain	Yes	April 2002 for pilot states; November 2002 for nonpilots	Appropriate
Percent of residents who were physically restrained	Yes	April 2002 for pilot states; November 2002 for nonpilots	Appropriate
Percent of residents who are more depressed or anxious	No	January 2004	Appropriate
Percent of residents with a potentially preventable hospital admission	No	never reported	Appropriate
Percent of residents whose need for help with daily activities has increased	Yes	April 2002 for pilot states; November 2002 for nonpilots	Potentially inappropriate
Percent of residents who lose too much weight	No	November 2004	Potentially inappropriate

Note. NHC = Nursing Home Compare.

Table 2.

Description of the National Sample of Nursing Homes, 1999 to 2008.

Characteristic	Mean percent of residents	SD
Dementia status		
Severe dementia	17.9	12.4
Moderate dementia	50.4	16.4
Exclusions and quality measures		
End-stage disease	2.3	4.0
On hospice	2.2	3.6
Moderate to severe pain	7.5	8.8
Need for help with daily activities has increased	16.9	13.0
Physically restrained	7.8	9.4
More depressed or anxious	14.8	11.8
Lose too much weight	11.0	10.2
Potentially preventable hospital admission	7.4	5.9
Control variables		
Age	80.1	7.0
Female	69.8	12.0
Dehydrated	0.5	2.4
Diabetes	22.3	11.0
Peripheral vascular disease	6.2	6.9
Aphasia	3.9	5.8
Cerebral palsy	0.7	2.4
Stroke	16.7	9.8
Hemiplegia	7.4	6.0
Muscular sclerosis	0.8	1.5
Paraplegia	0.4	1.1
Parkinson's	3.2	3.0
Quadriplegia	0.6	2.4
Seizure disorder	4.2	4.2
TIA	1.8	2.5
Brain injury	0.4	1.7
Schizophrenia	2.4	5.7
Asthma	1.8	2.4
Chronic obstructive pulmonary disease	10.3	7.5
Anemia	12.7	9.6
Cancer	5.1	5.1
Renal failure	3.8	4.2
Number of facilities	18,560	
Number of residents	11,937,360	
Average number of assessments per resident	5.1	

Note. TIA = transient ischemic attack.

Table 3.

Facility Fixed Effects Difference-in-Difference Regressions of Resident-Level Quality Outcomes by Severe Dementia Among Chronic Care Nursing Home Residents.

	Reported measures			Unreported measures (at initial launch)		
	Appropriate		Potentially inappropriate	Appropriate		Potentially inappropriate
	Pain	Restraints	ADL worsening	Potentially preventable hospital admission	Increased depression/anxiety	Weight loss
Post-NHC	-0.0149 *** (0.0009)	0.0112 *** (0.0009)	-0.0004 (0.0008)	0.0101 *** (0.0004)	-0.0016 * (0.0008)	-0.0007 (0.0006)
Severe dementia	-0.0608 *** (0.0005)	0.1597 *** (.0014)	0.0806 *** (0.0005)	-0.0066 *** (0.0002)	-0.0195 *** (0.0008)	0.0245 *** (0.0004)
Post *severe dementia	0.0173 *** (0.0005)	-0.0659 *** (.0016)	-0.0181 *** (0.0006)	-0.0054 *** (0.0002)	0.0045 *** (0.0004)	-0.0011 *** (0.0004)
Number of resident-quarter observations	45,898,985	48,719,632	40,412,142	60,662,747	45,788,565	34,226,631
Number of facilities	15,915	16,062	15,656	18,560	15,913	14,076

All linear fixed effects models with each dependent variable estimated separately. All regressions control for quarterly time dummies, average age, average age squared, percent female, and the percentage of residents with each of the following: dehydration, diabetes, peripheral vascular disease, aphasia, cerebral palsy, stroke, hemiplegia, muscular sclerosis, paraplegia, quadriplegia, Parkinson's disease, seizure disorder, TIA, brain injury, schizophrenia, asthma, chronic obstructive pulmonary disease, anemia, cancer, and renal failure. NHC = Nursing Home Compare; ADL = activities of daily living; TIA = transient ischemic attack.

 $p < .01$.

**
 $p < .05$.

*
 $p < .10$. Standard errors clustered on the nursing home to account for repeated observations. Standard significance levels are presented without adjustment for multiple comparisons. If a Bonferroni adjustment (Bonferroni, 1936) is applied, the coefficient on post-NHC for increased depression/anxiety becomes nonsignificant, and the coefficient on post*severe dementia for weight loss loses one level of significance. All other significance levels remain unchanged.

Table 4.

Facility Fixed Effects Difference-in-Difference Regressions of the Effect of Nursing Home Compare (NHC) on Aggregate Characteristics of Chronic Care Nursing Home Residents.

	Percent of residents coded as severe dementia	Percent of residents coded as moderate dementia	Percent of residents coded as end-stage disease	Percent of residents coded as hospice
Post-NHC	-0.045 (0.083)	0.115 (0.113)	0.110 *** (0.034)	-0.009 (0.028)
Number of facility-quarter observations	652,923	652,923	652,905	652,923
Number of facilities	18,566	18,566	18,566	18,566

Note. All linear fixed effects models with each dependent variable estimated separately. Dependent variables on 1 to 100 scale. All regressions control for quarterly time dummies, average age, average age squared, percent female, and the percent of residents with each of the following: dehydration, diabetes, peripheral vascular disease, aphasia, cerebral palsy, stroke, hemiplegia, muscular sclerosis, paraplegia, quadriplegia, Parkinson's disease, seizure disorder, transient ischemic attack, brain injury, schizophrenia, asthma, chronic obstructive pulmonary disease, anemia, cancer, and renal failure.

 $p < .01$.

**
 $p < .05$.

*
 $p < .10$. Standard errors clustered on the nursing home to account for repeated observations. Standard significance levels are presented without adjustment for multiple comparisons. If a Bonferroni adjustment (Bonferroni, 1936) is applied, all significance levels remain unchanged.