Culture Change and Nursing Home Quality of Care

David C. Grabowski, PhD,*,[1] A. James O'Malley, PhD,[2] Christopher C. Afendulis, PhD,[1] Daryl J. Caudry, PhD,[1] Amy Elliot, PhD,[3] and Sheryl Zimmerman, PhD[4]

[1]Department of Health Care Policy, Harvard Medical School, Boston, Massachusetts.
[2]The Dartmouth Institute for Health Policy and Clinical Practice, Dartmouth College, Lebanon, New Hampshire.
[3]Pioneer Network, Chicago, Illinois.
[4]The Cecil G. Sheps Center for Health Services Research and The School of Social Work,
University of North Carolina at Chapel Hill.

*Address correspondence to David C. Grabowski, PhD, Harvard Medical School, Department of Health Care Policy, 180 Longwood Avenue, Boston, MA 02115-5899. E-mail: grabowski@med.harvard.edu

Purpose of the Study: Culture change models are intended to improve the quality of life for nursing home residents, but the impact of these models on quality of care is unknown. We evaluated the impact of the implementation of nursing home culture change on the quality of care, as measured by staffing, health-related survey deficiencies, and Minimum Data Set (MDS) quality indicators. **Design and Methods:** From the Pioneer Network, we have data on whether facilities were identified by experts as "culture change" providers in 2004 and 2009. Using administrative data, we employed a panel-based regression approach in which we compared pre–post quality outcomes in facilities adopting culture change between 2004 and 2009 against pre–post quality outcomes for a propensity score-matched comparison group of nonadopters. **Results:** Nursing homes that were identified as culture change adopters exhibited a 14.6% decrease in health-related survey deficiency citations relative to comparable nonadopting homes, while experiencing no significant change in nurse staffing or various MDS quality indicators. **Implications:** This research represents the first large-scale longitudinal evaluation of the association of culture change and nursing home quality of care. Based on the survey deficiency results, nursing homes that were identified as culture change adopters were associated with better care although the surveyors were not blind to the nursing home's culture change efforts. This finding suggests culture change may have the potential to improve MDS-based quality outcomes, but this has not yet been observed.

Key Words: Person-centered care, Nursing homes, Quality of care

An important development in the nursing home sector over the last 30 years is the "culture change" movement. This initiative has been driven by a series of innovative care models that reconceptualize the structure, roles, and processes of nursing home care to transform nursing homes from health care institutions to person-centered homes offering long-term care services. Key elements of culture change nursing homes include resident direction, homelike atmosphere, close relationships, staff empowerment, collaborative decisionmaking, and quality-improvement processes (Koren, 2010).

Although a key emphasis of the culture change nursing home movement has been to improve the quality of life for residents (Grant, 2008; Kane, Lum, Cutler, Degenholtz, & Yu, 2007; Stone et al., 2002), the effect of culture change on traditional quality of care measures is unclear. The objective of this study is to examine the relationship

between culture change adoption and a range of different nursing home quality of care measures including staffing, health-related survey deficiencies, and quality indicators. The methodological novelty of our study relates to the use of a panel-based "difference-in-differences" study design, the construction of a national comparison group, the size of our sample, and adjustment for important differences using propensity score matching in a large sample of nursing homes.

Background

Conceptual Framework

From a conceptual standpoint, culture change may have potential positive or negative effects on quality of care. The direction of this relationship hinges on the complementarity of quality of care and quality of life in the delivery of nursing home care. If quality of care is a strong complement to quality of life, then culture change models should improve quality of care. For example, by offering a more person-centered model of care, staff members presumably become more engaged in meeting resident needs (i.e., better quality of care), and avoidable incidents like pressure ulcers or weight loss may be less likely to occur (i.e., resulting in better quality of life). Moreover, by maintaining resident dignity, we should expect very little use of inappropriate interventions like physical restraints. On the other hand, culture change models may provide improved quality of life and resident direction at the expense of lower day-to-day quality. For example, by allowing greater resident autonomy, culture change nursing homes may experience a higher fall rate or increased weight loss.

Thus, we hypothesize that culture change will improve quality, assuming the production of better quality of life and quality of care are complementary. However, we recognize the alternate hypothesis that culture change may have a null or negative relationship with quality of care, assuming quality of life and medical outcomes are not necessarily associated, or that nursing homes produce better quality of life at the expense of improved quality of care.

Previous Literature

A number of studies have evaluated the impact of specific culture change initiatives on nursing home quality of care (for a full review of this literature, see Shier, Khodyakov, Cohen, Zimmerman, & Saliba, 2014). One of the few studies to examine culture change broadly (i.e., beyond a single model or initiative) was a recent study of person-centered care in 107 Veterans Affairs (VA) nursing homes (Sullivan et al., 2013). The VA nursing homes were scored using the Artifacts of Culture Change Tool and considerable variation was found in the use of person-centered care across providers. In a cross-sectional analysis, the Artifacts score was positively associated with Minimum Data Set (MDS)-based quality, suggesting that person-centered homes provide better quality of care. Alternately, due to the cross-sectional design, this result is also consistent with the possibility that nursing homes with better care adopted person-centered strategies.

Several studies have evaluated particular culture change models although not without methodological limitations. One such model is Green House homes, a small-house culture change model that emphasizes resident direction and staff empowerment. In an early evaluation of the program, Kane and colleagues (2007) compared MDS outcomes in four 10-person Green House homes relative to both other individuals residing in the traditional part of that same nursing home and individuals in another local (traditional) nursing home with the same owner. Relative to both comparison groups, very few of the MDS outcomes were statistically significant although those that were generally suggested better quality in the Green House program.

The Eden Alternative is a culture change initiative that seeks to improve quality of life for nursing home residents and create a more homelike environment, accompanied by the engagement and empowerment of staff in affecting this change. Two different evaluations of the Eden Alternative have been conducted. The first was a pre–post comparison of two nursing homes run by the same organization (Coleman et al., 2002). The residents in the nursing home adopting the Eden model did not experience any differential change after 1 year in survival, functional status, cognition, or nutritional status as measured by administrative reports. Interestingly, staff turnover was found to increase after the implementation of the Eden model. In a separate pre–post evaluation of Eden conducted in six Texas nursing homes (Ransom, 2000), the program was significantly associated with decreased behavioral incidents, pressure ulcers, and infections; such a design does not account for methodological biases, however.

The Wellspring model, a confederation of 11 freestanding nursing homes in eastern Wisconsin,

is a culture change model with the goal of both improving clinical care and the staff working environment. In a pre–post evaluation of these 11 facilities relative to all other facilities in Wisconsin, Stone and colleagues (2002) found that Wellspring facilities showed relative improvement in deficiency citations and staff retention. However, few pre–post differences were observed in the MDS-based quality measures.

Our Contribution

Collectively, these previous studies show a modest and somewhat varied positive association between culture change activities and nursing home quality of care; however, previous research has suffered from limited study designs (e.g., cross sectional), inappropriate comparison groups (e.g., all other facilities in a state), and small samples from a single culture change model. Our primary methodological contributions to this literature include a "difference-in-differences" study design, the construction of a national comparison group, the size of our sample, and adjustment for important differences using propensity score matching.

Rather than relying on a cross-sectional design that assumes culture change and nonculture change homes are balanced with respect to other risk factors at a single point in time (e.g., Sullivan et al., 2013) or a pre–post study design that assumes similar trajectories of outcomes over time in the absence of the intervention (e.g., Ransom, 2000), we combine these two approaches to identify the change over time following the introduction of culture change in nursing homes relative to similar nursing homes not adopting culture change over this same time period. It is well known that a cross-sectional identification strategy will lead to misleading inferences if any unobserved factors that affect quality are correlated with culture change adoption. For example, if better quality nursing homes adopt culture change (Grabowski, Elliot, Leitzell, Cohen, & Zimmerman, 2014), then a cross-sectional model will provide an overestimate of the association between culture change and quality. Similarly, a pre–post design will not account for secular trends in the outcomes of interest. For example, physical restraint use has been declining nationally (Grabowski, Bowblis, Lucas, & Crystal, 2011), and it would be misleading to attribute the entire decline to a facility's adoption of culture change. Our strategy has the advantage of both balancing the analytic sample on observed

risk factors at baseline and "differencing out" time invariant unobservable risk factors and secular trends. This is achieved by examining pre–post differences in facilities adopting culture change relative to the pre–post differences in nonadopters for a matched sample of nursing homes.

A potential challenge associated with a "difference-in-differences" approach is reliance on the assumption that nursing homes that ultimately adopt culture change are similar to the comparison group (nonadopters). Previous culture change research has often generated a selected comparison group that may be very different from the culture change group. For example, the Wellspring evaluation used all facilities in Wisconsin in the comparison group, whereas the Green House evaluation used a comparison group of individuals residing either in the traditional unit of the facility or a neighboring facility with the same owner, who were ultimately older and had more disabilities. In order to address this issue, we implement a propensity score matching approach to construct our control group. Thus, our research approach is to compare the change in care and outcomes for a facility adopting culture change relative to the change for a *similar* facility not adopting culture change.

Finally, many of the existing studies to date have only looked at a single culture change intervention in a limited number of facilities. The Eden Alternative (1 or 6 nursing homes), Green House (1 nursing home), and Wellspring model (11 nursing homes) were all based on relatively small samples of facilities. Our treatment group includes the adoption of culture change in 251 facilities, and so our estimates can be interpreted as the "average" change in quality for a culture change adopter compared with the control nursing homes.

Methods

Data

This study merged together data from multiple sources. We constructed our measure of culture change from a survey undertaken by the Pioneer Network in 2004 and 2009. The 12 members of the Pioneer Network Board of Directors and 13 collaborating national culture change experts (i.e., representatives from leading culture change models, consultants and advocates including the Eden Alternative, The Green House model, Action Pact, Planetree, B&F Consulting, and state culture change coalitions) were asked to identify nursing homes that best exemplified settings engaged in sustained

culture change innovation. For the purpose of identification, "best exemplify" was defined as nursing homes deeply engaged in change for 2 years or more in key organizational areas of care practice, environment, and workplace. Experts were provided a specific framework for each key organizational area to assist in the identification of nursing homes and to promote consistency in choice criteria. Specifically, experts were provided with the "Continuum of a Person-Directed Culture" developed by Sue Misiorski and Joanne Rader and with specific examples of a person-directed culture in areas such as care assignment, dining, and bathing (Pioneer Network, 2012). Given these criteria, we emphasize that our definition required a comprehensive adoption of the tenets of culture change. Any nursing homes partially adopting culture change—30% of nursing homes were estimated to have implemented some tenet of culture change by 2007 (Doty, Koren, & Sturla, 2008)—were not categorized as culture change adopters for the purposes of our study. Importantly, a facility could have been identified as a culture change facility by multiple experts, but the experts did not review the facilities identified by other experts as part of this survey process, and so some facilities that adopted culture change as defined earlier could have been missed. For our analyses, we defined adopters as facilities not identified by experts as culture change facilities in the 2004 survey but then identified in the 2009 survey.

We utilized two sources of data in this study to create baseline (2004) and outcome (2009 and 2010) indicators. First, we obtained quality information derived from the MDS. The MDS instrument is designed to screen resident activities of daily living (ADL) function, cognition, affect, morbidities, and other conditions. In research studies, the MDS items demonstrated good reliability and validity (Morris et al., 1997). Nursing home regulators developed MDS Quality Indicators (QIs) from the MDS as part of the nursing home case mix and quality demonstration. MDS QIs are facility-level indicators for use by state surveyors to monitor changes in residents' health status and care outcomes and to identify potential problem areas at particular facilities. MDS QIs have shown good reliability in identifying potential quality problems (Karon, Sainfort, & Zimmerman, 1999; Zimmerman et al., 1995).

For this study, we accessed the MDS facility reports submitted by the facilities to the Centers for Medicare & Medicaid Services (CMS). These facility-level data are reported monthly and provide the proportion of residents in the numerator and denominator for the QIs. Because all residents are surveyed once per quarter, we aggregated the monthly QI data up to the quarter level. Thus, we have facility-level QI data across 12 quarters (2004 in the preperiod and 2009–2010 in the postperiod).

The second source of nursing home data is the On-line Survey, Certification and Reporting (OSCAR) system. The OSCAR system contains information from state surveys of all federally certified Medicaid (nursing facilities) and Medicare (skilled nursing care) homes in the United States. Certified nursing homes represent almost 96% of all facilities nationwide (Strahan, 1997). Collected and maintained by CMS, the OSCAR data include information about whether nursing homes are in compliance with federal regulatory requirements. Every facility is required to have an initial survey to verify compliance. Thereafter, states are required to survey each facility no less often than every 15 months, with the average being about 12 months (Harrington et al., 1999). In constructing annual facility-level observations for 2004, 2009, and 2010, we included surveys conducted within 6 months of the calendar year if there was not a survey present during the calendar year. Over 98% of the surveys were within 3 months of the calendar year. In cases in which there were multiple surveys during the study year, we used the most recent survey. Thus, we created a full cross section of nursing homes in operation in 2004 (preperiod), 2009 (postperiod), and 2010 (postperiod). In the OSCAR analyses, we had three nursing home-year observations for each facility included in the analysis. Nursing homes that were not in operation for all three study years were dropped from the analysis.

Variables

We had outcome data from 2004, 2009, and 2010. The OSCAR-based outcomes were the count of health-related survey deficiencies, registered nurse (RN) hours per resident day, licensed practical nurse (LPN) hours per resident day, and certified nurse aide (CNA) hours per resident day. Deficiencies are evaluations of poor quality made by state surveyors under the federal nursing home certification regulations. Under the direction of CMS, state surveyors use 175 consolidated measures encompassing structural, procedural, and outcome measures of quality to assign deficiencies.

When a facility fails to meet one of these standards, a deficiency or citation is given to the facility. Several alternative remedies could be imposed on facilities that receive a high number of deficiencies. These punishments include civil money penalties of up to $10,000, denial of payment for new admissions, state monitoring, temporary management, immediate termination, and other approaches. The extent and type of enforcement actions depend on the scope of problems (whether deficiencies are isolated, constitute a pattern, or are widespread) and the severity of violations (whether there is risk or harm to the residents).

We used 12 MDS-based QIs as outcomes in our analysis: ADL worsening, pain, pressure ulcers (high risk), pressure ulcers (low risk), incontinence (low risk), catheter, bedfast, worsening in mobility, urinary tract infection, increase in depression, use of physical restraints, and unexpected weight loss.

The key independent variable of interest is a dichotomous variable indicating whether the experts had identified the facility as a culture change adopter over the 2004 through 2009 period. Measures from the OSCAR that were used in the propensity score matching include whether the nursing home is a member of a chain; hospital-based; nonprofit owned, for-profit owned, or government owned; faith-based; located in an urban area; and part of a continuing care retirement community. Two measures were used in both the propensity score matching and the outcomes model: the number of beds in the nursing home and a county-level Herfindahl index (i.e., a measure of market concentration).

Sample Construction

The sample was constructed to include both pre- (2004) and post- (2009–2010) period observations for both adopting and nonadopting facilities. Once again, for the analysis of the OSCAR outcomes (staffing and deficiencies), we examined 2004, 2009, and 2010 annual data. For the MDS-based QI outcomes, we examined facility-quarter observations for all four quarters of 2004 and all eight quarters of 2009–2010. Importantly, the control variables in the quarter-level MDS analysis were obtained from the OSCAR from the same calendar year and merged into the quarter-level file.

After excluding observations from the 14 states without culture change adopters as identified by the experts, we had a total of 15,225 facilities in operation in the remaining states in 2004. Using the Pioneer Network survey, we eliminated 110 nursing homes that had already adopted culture change in 2004. As noted, we eliminated these facilities because we wanted to compare outcomes in facilities newly adopting culture change relative to similar facilities not adopting culture change over this same time period; had we compared facilities that had adopted culture change earlier, the potential outcomes of that change might have occurred earlier and not been observable in our data. We had 275 nursing homes that were in operation in 2004 and adopted culture change by 2009. Of these 275 facilities, we had matching MDS and OSCAR data in all three study years (2004, 2009, 2010) for 252 nursing homes. In terms of nonadopters, we had full data (2004, 2009, 2010) for 12,866 nursing homes.

We used propensity score matching to construct the comparison group for the culture change adopters at baseline (in 2004). When we conducted the propensity score match, one adopter and 531 nonadopters fell outside the common support (or overlap space) and were omitted from the sample, leaving us with a final sample of 251 adopters and 12,335 nonadopters. In the analyses presented in the article, we used a 10:1 matching algorithm in which every adopting nursing home is matched to 10 comparison facilities based on the propensity score computed from the estimated model shown in the Supplementary Material. Thus, our final analytic sample contained 251 adopters and 2,510 matched nonadopters. We experimented with several matching rules before selecting optimal matching with replacement, thereby allowing the same control nursing home to contribute replicate observations to the final analytic sample. Importantly, our analyses were robust to a series of different matching rules and ratios of control-to-adopter facilities. Matching was performed using the "psmatch2" procedure in Stata.

Our propensity score model included the range of baseline (2004) covariates noted earlier. We also included a "dummy" variable for state, which meant that any states without a culture change adopter over the period of study dropped out of the analysis. Specifically, the following states were excluded: Arizona, Delaware, Georgia, Hawaii, Idaho, Kentucky, Nevada, New Hampshire, New Mexico, South Dakota, Utah, Vermont, Virginia, and West Virginia.

Initial exploratory analyses revealed that the nursing homes that ultimately adopted culture change over the study period exhibited better performance in 2004 for several of the quality measures relative to nonculture change adopters. These baseline quality scores were highly correlated with the amount of change in the quality measures over time. That is, the better performing nursing homes at baseline that ultimately adopted culture change had less room for improvement (i.e., the culture change nursing homes encountered ceiling effects). Thus, we included all of the 2004 quality measures as predictors in the propensity score model. Specifically, in addition to the above-named predictors, the final propensity model included the 2004 home-level values of the three OSCAR staffing measures (RN, LPN, and CNA hours per resident day), the survey deficiencies measure, and the 12 MDS-based QIs.

If these baseline (2004) quality measures were not included in the propensity score model, we would need to account for the interaction between them and culture change status in the outcome analysis because nursing homes with worse baseline values improved more on average. This interaction approach is less desirable than propensity score matching due to the increased reliance on correctly specifying the parametric form of the model. Such models can be problematic if misspecified and the interpretation/computation of the estimated treatment effect is more challenging, especially when interactions are involved (Ai & Norton, 2003).

Therefore, the extensive baseline (2004) balance induced by matching on our very rich propensity score model simplifies the outcome model and avoids using interaction effects with baseline quality measures because the average baseline risk between the culture change and control group homes is equalized. In this way, even if interactions with baseline quality measures are prominent, an outcome model with only an overall difference-in-differences effect still yields valid and interpretable results. Specifically, the coefficient of the difference-in-differences effect is the average effect of culture change for the population of nursing homes with characteristics similar to those of the actual culture change cohort of nursing homes. One can think of this effect as approximating a weighted average of the effect of culture change with respect to the distribution of the baseline quality measure among the culture change nursing homes.

Analysis

We estimated the relationship between culture change and various measures of quality. The analysis used an approach similar to Elliot (2010) in a recent culture change paper examining financial outcomes. The basic intuition was to propensity score match culture change and traditional nursing homes at baseline. Then, using a "difference-in-differences" methodology, we analyze the pre–post differences for facilities adopting culture change relative to the differences over this same time period for similar facilities not adopting culture change. Thus, using data from 2004, 2009, and 2010, we estimated the following general equation at the facility level:

$$Y_{it} = \eta_i + \lambda_t + \beta CC_i Post_t + \gamma X_{it} + \varepsilon_{it} \qquad (1)$$

in which Y is an outcome for nursing home i at time t, CC is an indicator for culture change adoption, Post indicates whether the observation is from the "post" period (2009–2010), X is a vector of covariates, η_i and λ_t are nursing home and time fixed effects, and ε are the randomly distributed errors. The key parameter of interest was the coefficient of the culture change adoption measure (CC) multiplied by the post time period indicator. By virtue of including the post variable and β being time-invariant, the effect of the CC intervention is parsimoniously represented by a single coefficient. The inclusion of the nursing home fixed effects account for any (observed or unobserved) time-invariant nursing home-specific omitted variables correlated with the propensity to change the delivery of nursing home services. Such variables may include, for example, facility management practices and geographic characteristics. The time fixed effects, measured at the year level for the OSCAR outcomes and the quarter level for the MDS outcomes, control for national trends in nursing home delivery that may be correlated with the adoption of culture change such as federal policy changes and the expectations of the elderly population. The inclusion of η_i and λ_t makes the main effects of the interaction variables, CC and post, unidentified, and so these are not explicitly represented in Equation 1. Thus, the basic identification strategy implicit in Equation 1 purges the unobserved and potentially confounded cross-sectional heterogeneity by relying on within-facility variation in culture change adoption and by using facilities that did not implement culture change as a control for unrelated time-series variation. The analysis balanced

the groups through matching based on baseline risk, thereby making the results less susceptible to model misspecification.

Results

In 2004, we identified 13,118 nursing homes in 36 states that met our sample criteria (see Table 1). On average, for example, their bed size was 112 (SD = 67.82), they had 6.39 (SD = 5.46) deficiencies, and ADLs worsened for 16% (SD = 9.9%) of their residents. Over the 2004–2009 period, the experts suggested that 251 (2%) of these facilities adopted a culture change paradigm as defined in this study.

After these adopters were matched to comparison facilities using propensity scores, the treatment and comparison were quite balanced. Comparing Tables 2 and 3, it is evident that after matching, the two groups did not differ on chain membership, hospital-based status, ownership, faith-based status, or being part of a continuing care retirement community; the adopting facilities were still slightly larger than nonadopters, however (141 beds vs. 133 beds, $p < .05$). Using this propensity-matched comparison group, we analyzed the relationship between culture change adoption, as defined by expert opinion, and both the OSCAR and MDS outcomes. Among the OSCAR outcomes (see Table 4), nursing homes adopting culture change exhibited a 0.93 (14.6%) decrease in health-related survey deficiencies. We did not observe a statistically significant association with RN, LPN, or CNA staffing per resident day. In a set of unreported specification checks, we also did not observe a statistically significant association between culture change and total licensed staff (RNs plus LPNs) or the staff skill mix (licensed staff/total staff).

We also examined the association between culture change adoption and the 12 MDS-based QIs (see Table 5). Across all 12 indicators, our estimates did not suggest a statistically significant association between culture change adoption and quality of care at conventional levels of significance ($p < .05$). We should note, however, that those facilities adopting culture change were associated with a small improvement (<1%) in ADL worsening, which was marginally significant ($p < .10$). We grouped the MDS QIs using factor analysis into two composite measures that score the nursing homes with respect to two underlying quality dimension. Using a simple rule of assigning items to factors if their factor loading exceeded 0.3 in

Table 1. Descriptive Statistics (N = 13,118 nursing homes)

Variable	Mean	SD
Online survey certification and reporting (OSCAR) covariates		
Total number of beds	112	67.82
Herfindahl Index	0.19	0.22
	N = 39,093 observations	
OSCAR outcomes		
RN hours per resident day	0.43	0.59
LPN hours per resident day	0.82	0.50
CNA hours per resident day	2.27	0.95
Health-related survey deficiencies	6.39	5.46
	N = 39,093 observations	
Minimum data set (MDS) outcomes (mean %)		
ADL worsened	0.160	0.099
Bedfast	0.046	0.077
Catheter	0.071	0.069
Incontinence low risk	0.492	0.162
Mobility worsened	0.155	0.108
More depressed	0.149	0.101
Pain	0.080	0.087
Physical restraints	0.049	0.067
Pressure ulcers, high risk	0.130	0.094
Pressure ulcers, low risk	0.027	0.055
Urinary tract infection	0.092	0.066
Unexpected weight loss	0.092	0.069
	N = 126,980 observations	

Notes: Both the OSCAR and MDS files include observations from 2004, 2009, and 2010. OSCAR data are annual data, whereas the MDS are quarterly data. RN = registered nurse; LPN = licensed practical nurse; CNA = certified nurse aide; ADL = activities of daily living.

Table 2. Comparison of Adopting and Nonadopting Nursing Homes by Baseline Covariates, Prior to Propensity Matching

	Culture change adopters	Nonadopters
Chain membership	0.438***	0.542
Hospital-based status	0.044	0.052
Nonprofit ownership	0.669***	0.253
For-profit ownership	0.239***	0.702
Faith-based status	0.195***	0.051
Urban location	0.721	0.682
Continuing Care Retirement Community	0.235***	0.068
Total beds	141***	115
Herfindahl Index	0.174	0.185
N	251	12,335

***$p < .01$.

Table 3. Comparison of Adopting and Propensity-Matched Comparison Nursing Homes by Baseline Covariates

	Culture change adopters	Propensity-matched nonadopters
Chain membership	0.438	0.429
Hospital-based status	0.044	0.043
Nonprofit ownership	0.669	0.691
For-profit ownership	0.239	0.213
Faith-based status	0.195	0.198
Urban location	0.721	0.709
Continuing Care Retirement Community	0.235	0.238
Total beds	141**	133
Herfindahl Index	0.174	0.179
N	251	2,510

$**p < .05$.

magnitude, we assigned the catheter, urinary tract infection, weight loss, bedfast, pain, and the two pressure ulcer measures to factor 1, whereas the depression, ADL worsening, and mobility worsening were assigned to factor 2. In these factor analyses, we also did not observe a statistically significant relationship between culture change and MDS quality. The factor analysis results are available upon request from the authors.

Discussion

Although a number of previous studies have evaluated the quality of care under different culture change initiatives, this study represents the first effort of which we are aware to evaluate the association of culture change, defined broadly, on quality of care using a panel data approach. Culture change adoption, as defined by expert opinion, was associated with a 14.6% decline in health-related survey deficiencies. Culture change adoption was not associated with nurse staffing or MDS-based QIs. These results suggest several lessons for policymakers, providers, and researchers.

The finding that culture change was associated with fewer health-related survey deficiencies (i.e., a composite measure encompassing structural, procedural, and outcome measures of quality) suggests culture change may improve nursing home processes of care. Alternately, the surveys who rated these deficiencies were not blind to the efforts related to culture change, and so it is feasible that they recognized those efforts through their ratings. We did not find that culture change was associated with MDS outcomes, other than being marginally related to an extremely modest improvement in the ADL worsening measure. Nevertheless, the deficiencies finding suggests culture change has the potential to improve care outcomes moving forward. The deficiencies finding may also relate to the significant time investment that early culture change innovators spent on educating surveyors about the benefits of supporting choice and autonomy for residents in nursing homes (Beck, Gately, Lubin, Moody, & Beverly, 2014). For example, early culture change efforts in Kansas influenced the development of the Promoting Excellent Alternatives in Kansas initiative, which allowed the state to promote culture change through the survey process. In Missouri, the provider–surveyor relationship evolved to include a culture change coordinator in the survey agency to promote adoption in the state. At the federal level, these grassroots efforts are reflected in the 2009 revisions to the Interpretive Guidelines for nursing home surveyors that included an increased focus on resident choice and autonomy.

Our findings that culture change had no statistically significant association with staffing or

Table 4. Impact of Culture Change Adoption on Staffing and Health-Related Survey Deficiencies

	(1) RN hours per resident day	(2) LPN hours per resident day	(3) CNA hours per resident day	(4) Survey deficiencies
Culture change adoption	0.00350 (0.0198)	–0.0169 (0.0300)	0.111 (0.0762)	–0.933*** (0.334)
Herfindahl Index	0.0137 (0.0738)	0.0221 (0.118)	0.542 (0.417)	0.637 (1.455)
Total beds (100s)	–0.0043 (0.0196)	–0.0189 (0.0144)	0.000788 (0.026)	0.401 (0.247)
Constant	0.418*** (0.0270)	0.702*** (0.0285)	2.266*** (0.0832)	3.806*** (0.408)
Observations	8,712	8,710	8,706	8,714
R^2	0.027	0.039	0.012	0.055

Notes: Robust standard errors in parentheses. The models were estimated using least squares regression. The comparison group (nonadopting facilities) was constructed using propensity score matching. The regressions include facility and quarter fixed effects. RN = registered nurse; LPN = licensed practical nurse; CNA = certified nurse aide.

$***p < .01$.

The Gerontologist

MDS-based quality may relate to several conceptual or practical factors. Given the early history of the culture change movement and the focus on resident quality of life, improvement in quality of care in terms of clinical outcomes may not have been a motivation for organizational changes. This assertion is further supported by the fact that we found that the better quality nursing homes at baseline were generally the ones that were found to adopt culture change. It will be important to analyze the implications of culture change for quality of care using data from the most recent generation of culture change adopters. It may be the case that more recent adopters have focused on both quality of life and clinical outcomes.

More generally, it is an open question as to whether better quality of care and better quality of life are complementary outputs in the production of nursing home care. Specialization is fairly common in health care (Detsky, Gauthier, & Fuchs, 2012), and it is not uncommon for providers to excel in certain dimensions of care while being roughly "average" in others. Similar to how certain nursing homes specialize in outcomes for postacute care (Li, Cai, Yin, Glance, & Mukamel, 2012), culture change adopters may specialize in quality of life for long-stay residents.

Toward that end, we know that the adoption of culture change is not random (Grabowski et al., 2014). Although we constructed the control group by propensity score matching on observable characteristics at baseline, we acknowledge that we cannot control for unobservables associated with culture change adoption. Most specifically, facilities that adopt culture change likely have differences in leadership and management practices relative to nonadopters. A related concern is that culture change adopters are often undertaking other activities outside of "culture change" to improve quality. The gold standard study would randomize nursing homes at baseline to receive culture change or not and then follow them over time. However, the required funding and complicated logistics of such a study makes a randomized intervention unlikely. Indeed, perhaps the only setting for such a randomized intervention might be in the VA, and they have already embarked on a major (nonrandomized) culture change initiative (Sullivan et al., 2013). Thus, it is likely that the best evidence on culture change and quality will come from longitudinal observational studies. Moving forward, we see several potential ways in which researchers can continue to build and improve on our analysis.

Table 5. Impact of Culture Change Adoption on Quality Indicators

Outcome	Culture change estimate	N
ADL worsening	−0.00827* (0.00479)	26,716
Pain	−0.00430 (0.00401)	26,735
Pressure Ulcers, High Risk	−0.00495 (0.00420)	26,714
Pressure Ulcers, Low Risk	−0.00285 (0.00267)	26,659
Incontinence, Low risk	−0.00184 (0.00978)	26,716
Catheter	−0.00195 (0.00264)	26,734
Bedfast	−0.00171 (0.00247)	26,734
Mobility worsening	0.000445 (0.00542)	26,713
Urinary tract infection	0.00203 (0.00332)	26,734
More depressed	0.00556 (0.00532)	26,722
Physical restraints	−0.00414 (0.00401)	26,734
Weight loss	0.00250 (0.00289)	26,734

Notes: Robust standard errors are presented in parentheses. Each row represents a separate regression estimated using least squares. The comparison group (nonadopting facilities) was constructed using propensity score matching. Each regression includes a county-level Herfindahl Index (a measure of competition) and the total number of beds along with facility and quarter fixed effects.

$*p < 0.1$.

What Is in the Black Box?

An important contribution of this research is that it combines several different culture change models to provide an overall estimate of the relationship between culture change adoption and nursing home quality. However, although the different culture change approaches share some common dimensions, significant variation exists across models with respect to such principles as small home environments, consistent worker assignment, and staff empowerment. Thus, in order for this research to provide meaningful guidance to providers and policymakers, further research will be required to investigate the elements of culture change that underlie these results. Indeed, our inability to detect a relationship between culture change and resident outcomes as measured by the QIs may reflect the variability in which culture change is implemented across sites and also the fact that, as a movement, culture change focuses primarily on the processes of care (not including staffing ratios, however, based on the results of this study). If nursing homes expressly focused their culture change efforts toward a given outcome, it is conceivable that change in QIs might be observed. For now, though, that point remains a hypothesis requiring further study.

Importance of Mixed Methods Research

This study relied solely on a quantitative analysis of culture change adoption and quality of care. Future research should look to pair this type of quantitative analysis with qualitative analyses that improves our understanding of the underlying culture change models and our understanding of the processes that led to quality changes (if evidenced). For these results to be replicable, we need to understand how providers lowered deficiency citations, for example.

Rigorous Studies of Particular Culture Change Models

Another approach to determining what is in the black box is to apply a similar estimation strategy to the specific culture change models. For example, research is already under way to evaluate the Green House model using this "difference-in-differences" approach. By matching facilities (or even residents) at baseline, we can evaluate the impact of a specific culture change initiative on quality of care.

Measuring the Degree of Culture Change

Another area for future research would be to incorporate an index of culture change adoption similar to the Artifacts score used in the recent VA culture change study (Sullivan et al., 2013). For example, a compelling study design would be to compare the quality change in those facilities that exhibit a large increase in their Artifacts score over time relative to those with a smaller change. The VA nursing homes would be one potential place to apply this study design. Indeed, the recently published study was based on cross-sectional data from 2008. The Artifacts score could be updated using 2013 data, and a difference-in-differences analysis could be undertaken. Similar work could also be conducted in the general nursing home population, but it would require collection of a consistent culture change index over time.

Need for a Standardized Demonstration

To date, the culture change movement has largely been provider-driven without major government involvement. However, if culture change is ultimately shown to offer greater value relative to the traditional nursing home model, policymakers might consider the adoption of policies to further encourage this model. A government-sponsored standardized demonstration, similar to the Cash-and-Counseling or Value-Based Purchasing Demonstrations, would greatly increase our knowledge base around this model. Such a panel-based demonstration could systematically address the following questions: What are the implications for quality of care and quality of life? What are the costs to nursing homes of implementing and sustaining culture change? What impact does culture change have on Medicare and Medicaid spending? What elements of culture change affect quality and cost outcomes?

Limitations

This research is limited in several ways. First, as noted earlier, although we match adopters and nonadopters on observable characteristics, unobserved differences that influence selection into culture change may have biased our estimates. For example, perhaps, nursing homes that implemented culture change had already adopted many of the principles associated with culture change prior to formal implementation, thereby biasing our estimates downward. If so, positive associations with culture change could not have been detected. Second, our definition of culture change is based on expert opinion. This expert opinion approach makes "false positives" unlikely, but we acknowledge that these experts may have missed other facilities that adopted culture change (i.e., "false negatives"), which again would have biased our estimates toward the null and confounded our ability to detect positive associations of culture change. Similarly, our definition of culture change required comprehensive implementation of the model. Thus, if some "true" or "partial" culture change adopters were included in our comparison group, this would have biased our results downward against finding a positive impact of culture change adoption on nursing home quality. Third, and as noted earlier, our finding that culture change adopters had fewer deficiencies may relate to bias on the part of the government surveyors if their survey evaluation was influenced by the adoption of culture change rather than a true improvement in performance.

Another limitation is that we used a binary definition of culture change that was recorded only in 2004 and 2009. Unfortunately, we do not know the exact date of culture change adoption, although the Pioneer Network required that culture change have been in place for 2 years for a provider to be identified as a "culture change" nursing home. Thus, all facilities identified as culture change in the 2009

survey had culture change in place since 2007. Nevertheless, we acknowledge that later adoption of culture change over the study period might have biased our estimates downward if the impact on quality is delayed following implementation. In addition, given that the culture change movement is evolving, we do not know whether our results from this earlier period generalize to more recent and future adopters of these models. Finally, this study does not evaluate other potential outcomes related to quality of life/engagement or organizational impact such as lower staff turnover or higher resident occupancy.

Summary

In a novel large-scale longitudinal evaluation of culture change on quality of care of nursing home residents, we found that the adoption of culture change, as defined by expert opinion, was associated with fewer government-assigned health-related deficiency citations. We did not observe any significant association with nurse staffing or MDS-based QIs. Future research will be necessary to determine why adoption was associated with deficiencies, and if changes in QIs occur as the movement matures. In the meantime, these results provide important guidance for providers, policy-makers, and researchers.

References

Ai, C., & Norton, E. C. (2003). Interaction terms in logit and probit models. *Economics Letters*, *80*, 123–129.

Beck, C., Gately, K. J., Lubin, S., Moody, P., & Beverly, C. (2014). Building a state coalition for nursing home excellence. *The Gerontologist, 54*(Suppl. 1), S87–S97. doi:10.1093/geront/gnt110

Coleman, M. T., Looney, S., O'Brien, J., Ziegler, C., Pastorino, C. A., & Turner, C. (2002). The Eden Alternative: Findings after 1 year of implementation. *Journal of Gerontology: Medical Sciences*, *57*, M422–M427.

Detsky, A. S., Gauthier, S. R., & Fuchs, V. R. (2012). Specialization in medicine: How much is appropriate? *Journal of the American Medical Association*, *307*, 463–464. doi:10.1001/jama.2012.44

Doty, M. M., Koren, M. J., & Sturla, E. L. (2008). *Culture change in nursing homes: How far have we come? Findings from the Commonwealth Fund 2007 National Survey of Nursing Home*. New York: The Commonwealth Fund.

Elliot, A. (2010). Occupancy and revenue gains from culture change in nursing homes: A win-win innovation for a new age of long-term care. *Seniors Housing & Care Journal*, *18*, 21–36.

Grabowski, D. C., Bowblis, J. R., Lucas, J. A., & Crystal, S. (2011). Labor prices and the treatment of nursing home residents with dementia. *International Journal of the Economics of Business*, *18*, 273–292.

Grabowski, D. C., Elliot, A., Leitzell, B., Cohen, L. W., & Zimmerman, S. (2014). Who are the innovators? Nursing homes implementing culture change. *The Gerontologist, 54*(Suppl. 1), S65–S75. doi:10.1093/geront/gnt144.

Grant, L. A. (2008). Culture change in a for-profit nursing home chain: An evaluation. Retrieved March 2, 2013, from http://www.commonwealthfund.org/~/media/Files/Publications/Fund%20Report/2008/Feb/Culture%20Change%20in%20a%20For%20Profit%20Nursing%20Home%20Chain%20%20An%20Evaluation/Grant_culturechangefor%20profitnursinghome_1099%20pdf.pdf.

Harrington, C., Swan J. H., Wellin, V., Clemena, W., & Carrillo, H. M. (1999). *1998 State Data Book on Long Term Care Program and Market Characteristics*. San Francisco, CA: Department of Social and Behavioral Sciences, University of California.

Kane, R. A., Lum, T. Y., Cutler, L. J., Degenholtz, H. B., & Yu, T. C. (2007). Resident outcomes in small-house nursing homes: A longitudinal evaluation of the initial green house program. *Journal of the American Geriatrics Society*, *55*, 832–839. doi:10.1111/j.1532-5415.2007.01169.x

Karon, S. L., Sainfort, F., & Zimmerman, D. R. (1999). Stability of nursing home quality indicators over time. *Medical Care*, *37*, 570–579.

Koren, M. J. (2010). Person-centered care for nursing home residents: The culture-change movement. *Health Affairs (Millwood)*, *29*, 312–317. doi:10.1377/hlthaff.2009.0966

Li, Y., Cai, X., Yin, J., Glance, L. G., & Mukamel, D. B. (2012). Is higher volume of postacute care patients associated with a lower rehospitalization rate in skilled nursing facilities? *Medical Care Research and Review*, *69*, 103–118. doi:10.1177/1077558711414274

Morris, J. N., Nonemaker, S., Murphy, K., Hawes, C., Fries, B. E., Mor, V., & Phillips, C. (1997). A commitment to change: Revision of HCFA's RAI. *Journal of the American Geriatrics Society*, *45*, 1011–1016.

Pioneer Network. (2012). Continuum of person-directed culture. Retrieved June 19, 2013, from http://www.pioneernetwork.net/Data/Documents/ContinuumPersonDirectedCulture.pdf.

Ransom, S. (2000). Eden alternative: The Texas Project. Retrieved March 2, 2013, from https://digital.library.txstate.edu/bitstream/handle/10877/4087/fulltext.pdf.

Shier, V., Khodyakov, D., Cohen, L. W., Zimmerman, S., & Saliba, D. (2014). What does the evidence really say about culture change in nursing homes? *The Gerontologist, 54*(Suppl. 1), S6–S16. doi:10.1093/geront/gnt147

Stone, R. I., Reinhard, S. C., Bowers, B., Zimmerman, D., Phillips, C. D., Hawes, C., . . . Jacobson, N. (2002). Evaluation of the Wellspring Model for Improving Nursing Home Quality. Retrieved March 2, 2013, from http://www.commonwealthfund.org/~/media/Files/Publications/Fund%20Report/2002/Aug/Evaluation%20of%20the%20Wellspring%20Model%20for%20Improving%20Nursing%20Home%20Quality/stone_wellspringevaluation%20pdf.pdf.

Strahan, G. W. (1997). *An Overview of Nursing Homes and Their Current Residents: Data From the 1995 National Nursing Home Survey*. Rockville, MD: National Center for Health Statistics, Centers for Disease Control and Prevention, U.S. Department of Health and Human Services.

Sullivan, J. L., Shwartz, M., Burgess, J. F. Jr, Peköz, E. A., Christiansen, C. L., Gerena-Melia, M., & Berlowitz, D. (2013). Person-centered care practices and quality in Department of Veterans Affairs nursing homes: Is there a relationship? *Medical care*, *51*, 165–171. doi:10.1097/MLR.0b013e3182763230

Zimmerman, D. R., Karon, S. L., Arling, G., Clark, B. R., Collins, T., Ross, R., & Sainfort, F. (1995). Development and testing of nursing home quality indicators. *Health Care Financing Review*, *16*(4), 107–127.