Person-centered Care Practices and Quality in Department of Veterans Affairs Nursing Homes

Is There a Relationship?

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Objective: To examine variation in culture change to a person-centered care (PCC) model, and the association between culture change and a composite measure of quality in 107 Department of Veterans Affairs nursing homes.

Methods: We examined the relationship between a composite quality measure calculated from 24 quality indicators (QIs) from the Minimum Data Set (that measure unfavorable events), and PCC summary scores calculated from the 6 domains of the Artifact of Culture Change Tool, using 3 different methods of calculating the summary scores. We also use a Bayesian hierarchical model to analyze the relationship between a latent construct measuring extent of culture change and the composite quality measure.

Results: Using the original Artifacts scores, the highest performing facility has a 2.9 times higher score than the lowest. There is a statistically significant relationship between the composite quality measure and each of the 3 summary Artifacts scores. Depending on whether original scores, standardized scores, or optimal scores are used, a facility at the 10th percentile in terms of culture change compared with one at the 90th percentile has 8.0%, 8.9%, or 10.3% more QI events. When PCC implementation is considered as a latent construct, 18 low performance PCC facilities have, on an average, 16.3% more QI events than 13 high performance facilities.

Conclusions: Our results indicate that culture change to a PCC model is associated with higher Minimum Data Set-based quality. Longitudinal data are needed to better assess whether there is a causal relationship between the extent of culture change and quality.

Key Words: nursing home quality, nursing home culture change, person-centered care

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Implementation of a person-centered care (PCC) model in long-term care has been a growing movement since the 1986 Institute of Medicine's report *Improving the quality of care in nursing homes* and the subsequent Nursing Home Reform Act under the Omnibus Reconciliation Act of 1987.[1] A PCC model incorporates individualized care by including resident and employee preferences in decision making.[2,3] To implement PCC practices, it is necessary for nursing homes (NHs) to change the culture (ie, care and work practices), in addition to altering the physical layout of units. Culture change to a PCC model is theorized to improve both resident quality of life and clinical care, and improve staff autonomy and satisfaction.[2,4–10] Studies of PCC model implementation suggest that these efforts can positively influence patient outcomes.[11] However, existing studies examine a slightly different form of PCC in a small number of settings.[11] To better understand the impact of culture change to a PCC model in NHs, it is critical to examine the effectiveness of efforts in a large group of facilities that use the same measures of PCC progress.

The Department of Veterans Affairs (VA) is committed to providing high-quality PCC in its NHs. This commitment is reflected in part by renaming NHs to Community Living Centers (CLCs). Within the VA, culture change to a PCC model was launched in 2005 at a VA-wide summit meeting and was included in the 2006 VA strategic plan. VA is the ideal location for research on the impact of the PCC model; it is an integrated health care system with 133 NHs, has encouraged CLCs to implement PCC practices, and regularly collects and reviews data both on PCC progress (using the Artifacts of Culture Change Tool) and NH quality. The objectives of this paper are to examine, using cross-sectional data, (1) variation in culture change to a PCC model in CLCs; and (2) the association between culture change and NH quality, using alternate approaches for scoring the Artifacts of Culture Change Tool.

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METHODS

PCC: Conceptual Model and Measurement Instrument

The conceptual framework underlying culture change to a PCC model in VA is the *Holistic Approach to Transformational Change Model* (HATCh),[12] which theorizes that improved resident outcomes will result from decreasing the institutional nature of long-term care, and incorporating individualized care by including resident and employee needs in decision making.[13] HATCh is centered on 3 overlapping and interrelated types of changes: workplace practices, care practices, and environment. The HATCh model also emphasizes the importance of leadership, the family/community, and adherence to governmental standards for care in providing a context for the change effort.

The HATCh model suggests that implementing PCC practices improves resident outcomes. For example, changes to work place practices that provide employees with more flexibility and latitude in delivering care are hypothesized to enhance task meaningfulness, improve employee satisfaction, and in turn, the clinical quality of care. Likewise, changes to care practices are theorized to have an influence on resident care quality by increasing responsiveness to resident preferences. For example, with respect to dining, making food options tailored to resident preferences and serving it in a manner reminiscent of dining at home (eg, avoiding the use of trays)[14] has been found to reduce the risk of weight loss.[7] Changes to the physical environment of care to make it less institutional are theorized to have an effect on resident perceptions of care and overall satisfaction.

VA uses the Artifacts of Culture Change Tool (see Appendix A.1) to measure the extent of culture change to a PCC model. As noted by Bowman and Schoeneman[13], "artifacts are the physical evidence that can be readily seen by an observer: structures for living and working, objects for daily use, rituals and activities, dress, and ways in which people interact."(p4) The instrument was developed in 2001 by the Centers for Medicare & Medicaid Services (CMS).[13] The tool categorizes artifacts into the domains of the HATCh model, with the exception that an Outcomes domain is added to the tool, and Regulations and Government are not represented directly because of the indirect effect they have on model elements (Table 1). Points are assigned to each artifact to indicate whether "a facility has a certain thing, is making progress toward it, or does not have it at all. Points reflect total change, partial change, or no change to individual items."(p19)13 Points assigned to each artifact in a domain are summed to arrive at a domain score.

The Artifacts of Culture Change Tool measures visible changes associated with PCC implementation, important as it is relatively straightforward to determine the existence of artifacts. For many of the artifacts, their existence defines what is meant by PCC, as documented by Bowman and Schoeneman.[13] However, there are important shortcomings: (1) the scoring of the individual items and their aggregation to domain scores is on the basis of the judgment of tool developers; and (2) there are important aspects of PCC that are not well reflected in visible artifacts. These include, for example, the extent to which residents are engaged in ongoing activities in the facility and the nature of the relationship between caregivers and residents. Nevertheless, the Artifacts of Culture Change Tool is a useful indicator of visible PCC-related changes in culture. It is currently used by over 300 non-VA community NHs and by the VA to measure the extent of change towards a PCC model.[15]

As of fiscal year (FY) 2007, the Geriatrics and Extended Care office at VA Central Office began requiring CLCs to submit data from the Artifacts of Culture Change Tool twice each year. When the Artifacts of Culture Change Tool was adopted in 2007, Geriatrics and Extended Care removed items that were not applicable to the VA setting (see Supplemental Material, Appendix A.1, Supplemental Digital Content 1, http://links.lww.com/MLR/A381). The

TABLE 1. Domain-to-Item Mapping for the Artifacts of Culture Change Tool and the Proportion of Total Points Allocated to Each Domain Under the Current Method of Scoring and Under Optimal Scoring*

			Total Points	Proportion Total Points	
Domains	**Item**	**Items**	**VA Possible**	**VA**	**Optimal Scoring**
Care practices	Meals and snacks, individualized daily routines, bathing routines, "I" format care plan	1–9	45	0.13	0
Environment	Households, private rooms, removal nursing station, accessibility indoors and outdoors, individualization of rooms, removal of overhead paging, bathing and laundry	10–32	180	0.51	0.25
Family/ community	Intergenerational, community access, entertaining options, reciprocity	33–38	30	0.08	0.14
Leadership	CNAs attend conferences, residents and families on quality committees, residents have staff buddy, inclusive decision making	39–43	25	0.07	0.41
Workplace practices	Consistent staffing, self-scheduling, attending conferences, cross-training, performance evaluation tied to culture change, job development	44–62	55	0.15	0
Outcomes	Longevity, turnover, use of agency staff, census	63–65	20	0.06	0.20
Total		1–65	355		

*Under current scoring, the composite is determined by summing up the domain scores; under optimal scoring, weights are determined to optimize the correlation of the resulting summary score and the MDS-based composite measure of quality.

MDS indicates Minimum Data Set; VA, Department of Veterans Affairs.

domain points that were removed include care practices (25 points), environment (140 points), work practices (15 points), and outcomes (45 points), resulting in a total of 355 points instead of the original 580 points. In this paper, we use data from the Artifacts of Culture Change Tool completed by CLCs at the end of FY 2008.

Measuring Resident Outcomes

Minimum Data Set (MDS) data are a core component of the Resident Assessment Instrument required for quarterly assessments and care planning of long-stay NH residents. From the MDS data, a set of 24 quality indicators (QIs) was developed to evaluate NH care quality (see Supplemental Material, Appendix A.2, Supplemental Digital Content 2, http://links.lww.com/MLR/A382).[16] These indicators, which measure rates of unfavorable events (eg, falls) or patient states (eg, depression), are provided to each non-VA NH and used by regulators as a preliminary step in the certification process.[17] The VA monitors these 24 QIs and sends monthly reports to each CLC on their QI rates. Four of the QIs are stratified by high-risk versus low-risk residents, resulting in a total of 28 QIs.

To assess the relationship between PCC-based and MDS-based quality, we combined the 28 QIs into a composite measure using facility-specific opportunity-based weights, the approach used by CMS in its pay-for-performance program.[18] When observed QI rates are combined into a composite using opportunity-based weights, the resulting composite measure is the probability that an average resident experiences a QI event (see Supplemental Material, Appendix A.3, Supplemental Digital Content 3, http://links.lww.com/MLR/A383, 1). One problem with calculating the composite measure from observed QI event rates is that the rates for each indicator at each facility are based on different numbers of eligible residents and thus differ in terms of their reliability. To improve the reliability of the estimates of QI rates at different-sized facilities, we used a Bayesian hierarchical model (a multivariate normal-binomial model) to calculate the shrunken rates of each QI at each facility, which we then combined into a composite measure using opportunity-based weights (see Supplemental Material, Appendix A.3, Supplemental Digital Content 3, http://links.lww.com/MLR/A383, 2). It has been shown that the data are consistent with this type of model and that the composite measure calculated from shrunken rates in 1 year is a better predictor of next year's observed rate than a composite measure calculated from this year's observed rates.[19] This suggests that the shrunken-rate composite measure is a better estimate of an underlying persistent level of performance than an observed-rate composite measure.

In this paper, we used the composite measure of MDS-based quality calculated from rates of the 28 QIs reported in the last quarter of FY 2008.

Sample

Of the 130 VA CLCs that reported MDS QI data in FY 2008, we included 107 that, based on the average daily census, had at least 10 long-stay residents and at least one third of the residents were long-stay residents; and who submitted Artifacts of Culture Change Tool data.

Statistical Analysis

Using boxplots and descriptive statistics, we examined the variations in PCC implementation. We then evaluated the hypothesis that CLCs with higher scores on the Artifacts of Culture Change Tool had lower scores on the shrunken-rate MDS-based composite measure of quality (which, as noted, measures unfavorable events). Since, at the time of this study, the VA was not collecting data on individual Artifacts item scores within domain, we used the domain scores as input for our analysis. We considered 2 methods of combining domain scores into an overall. Thus, we construct "person-centered care" (cPCC) to distinguish the construct from the more generic term "person-centered care." Thus, we denote the construct by cPCC): (1) cPCC is considered a formative construct calculated by either summing or taking a weighted average of the individual domain scores; and (2) cPCC is considered a reflective construct, that is, an underlying latent variable that is reflected in the individual domain scores.[20]

When treating cPCC as a formative construct, we considered 3 approaches for calculating the construct: (1) *Formative Construct—Total Score*: we summed the domain scores, which is the approach used by VA and typically by others. The resulting score reflects the relative importance of each domain as envisioned by developers of the Artifacts of Culture Change Tool; (2) *Formative Construct—Standardized Score*: we standardized each domain score and then summed the standardized scores. This approach, which weights each domain equally, is most consistent with the HATCh model, which does not recognize differences in the relative importance of the dimensions defining PCC; (3) *Formative Construct—Optimal Score*: we estimated a weight for each standardized domain score that optimized the relationship between the weighted sum of standardized domain scores and the MDS-based composite measure of quality. Specifically, we used linear programming to find a set of non-negative weights that summed to 1 and that minimized the mean square error when the resulting score was used in a linear model with the quality score as the dependent variable. For each of the 3 ways of calculating a summary Artifacts score, we ran a simple regression model with the composite measure of quality as the dependent variable and the summary Artifacts score as the independent variable.

Then we treated cPCC as a reflective construct. *Reflective Construct—Bayesian Model*: the details of the model estimating the construct and its relationship to quality are shown in Supplemental Material, Appendix A.4, (Supplemental Digital Content 4, http://links.lww.com/MLR/A384). Briefly, we assumed a linear model that relates cPCC to each of the Artifacts domains. The coefficient linking cPCC to each domain reflects the strength of the relationship between the construct and the domain score. We also assumed a linear relationship between cPCC and the MDS-based composite measure of quality. Our main interest was in the coefficient linking cPCC to quality. Model parameter point estimates and interval estimates [technically called credible intervals (CI)] were estimated using Gibbs sampling as implemented in

TABLE 2. Descriptive Statistics for the Artifacts Summary Scores* and the MDS-based Composite Measure of Quality Score

Variable	Mean (SD)	25th and 75th Percentile (Ratio of 75th to 25th Percentile)	Min and Max (Ratio of Max to Min)
Artifacts Total Score	181.3 (38.8)	154–205 (1.3)	95–279 (2.9)
Artifacts Standardized Score	0 (3.7)	−2.5 to 2.2	−7.9 to 9.0
Artifacts Optimal Score	0 (0.65)	−0.49 to 0.46	−1.6 to 1.6
Quality Score	0.138 (0.021)	0.124–0.151 (1.2)	0.082–0.208 (2.6)

*Total Score is calculated by summing the domain scores; Standardized Score is calculated by standardizing each of the domain scores and then summing the standardized scores. Optimal Score is calculated from weights that optimize the correlation of the resulting score and the MDS-based composite measure of quality.
MDS indicates Minimum Data Set.

WinBUGs.[21] We ran this model using both the original domain scores and the standardized domain scores. The coefficient linking cPCC to quality was similar in both the analyses. We reported results using the standardized scores.

Case mix is a potential confounder of the relationship between PCC and quality. To measure the case mix, the VA uses the 53-RUG-III classification system that came into effect in January 2006 for Medicare payment to skilled nursing facilities. A case mix score calculated from the resource utilization group (RUG) score categories was positively correlated with the MDS-based composite quality measure ($r = 0.16$), although the correlation was not statistically significant. However, there was no relationship between RUG scores and any of the summary Artifacts scores ($-0.06 < r < 0.06$). Hence, as the case mix measured by the RUG scores was not a confounder, we did not include it in the analyses that follow.

This study was approved by the VA Boston Healthcare System Institutional Review Board.

RESULTS

Within each Artifacts domain, the facility scores were generally distributed symmetrically, with the exception of the Outcomes domain where there were some extreme outliers (see Supplemental Material, Appendix A.5, Supplemental Digital Content 5, http://links.lww.com/MLR/A385). There was significant variation in the domain scores across facilities. For example, the facility at the 75th percentile had a score between 1.4 and 1.8 times higher than the facility at the 25th percentile.

Table 1 shows the proportion of total possible points associated with each Artifacts domain when the original scoring was used, and when the optimal scoring was used. The high weight assigned to the Environment has been a source of concern about the Artifacts Tool and, as noted, is not consistent with the underlying conceptual HATCh model. When weights were chosen to maximize the relationship between Artifacts score and quality, much more weight was given to Leadership and Outcomes (although as shown in Supplemental Material, Appendix A.1, Supplemental Digital Content 1, http://links.lww.com/MLR/A381, the domain names do not always communicate well about the Artifacts under the domain). It is also interesting that 2 domains, Care Practices and Workplace Practices, received 0 weight under optimal weighting. The impact of these domains on MDS-based quality is being picked up by other domains with which these domains are correlated.

TABLE 3. Correlations Between Artifacts Domain Scores, Artifacts Summary Scores*, and the MDS-based Composite Measure of Quality

	Care Practices	Environment	Family/ Community	Leadership	Workplace Practices	Outcomes	Total Score	Standardized Score	Optimal Score	Quality Score
Care practices	1									
Environment	0.405†	1								
Family/ Community	0.323†	0.354†	1							
Leadership	0.498†	0.242§	0.334†	1						
Workplace practices	0.469†	0.393†	0.309†	0.480†	1					
Outcomes	0.048	0.082	0.078	0.018	−0.168	1				
Total Score	0.695†	0.825†	0.584†	0.574†	0.687†	0.216§	1			
Standardized Score	0.740†	0.668†	0.647†	0.694†	0.670†	0.286‡	0.966†	1		
Optimal Score	0.557†	0.638†	0.583†	0.808†	0.471†	0.371†	0.874†	0.925†	1	
Quality Score	−0.085	−0.158	−0.144	0.200§	−0.072	−0.092	−0.191§	−0.202§	−0.247‡	1

*Total Score is calculated by summing up the domain scores. Standardized Score is calculated by standardizing each of the domain scores and then summing the standardized scores. Optimal Score is calculated from weights that optimize the correlation of the resulting score and the MDS-based composite measure of quality.
†Correlation is statistically significant at the 0.001 level.
‡Correlation is statistically significant at the 0.01 level.
§Correlation is statistically significant at the 0.05 level.
MDS indicates Minimum Data Set.

Table 2 shows descriptive statistics for the Artifacts summary scores and the MDS-based composite measure of quality. There was significant variation in these score across facilities. Table 3 shows the correlation of the various scores. With the exception of the Outcomes domain, the other Artifacts domains had a relatively high correlation with each other, which is consistent with an underlying latent construct cPCC. As expected, the quality score had a negative correlation with all of the domain scores, although the relationship was statistically significant only for the Leadership domain. The quality score had a negative and statistically significant correlation with all of the Artifacts summary scores. In the regression model, the coefficient linking the Artifacts summary score to the quality score was statistically significant: Total Score coefficient (95% CI), −0.0001 (−0.0002 to 0.0000); Standardized Score coefficient: −0.0011 (−0.0022 to −0.0001); and Optimal Score coefficient: −0.008 (−0.0141 to −0.0019). To illustrate the implication of these coefficients, a facility at the 10th percentile, in terms of PCC implementation, compared with one at the 90th percentile had 8.0% more QI events using the Total Score, 8.9% more using the Standardized Score, and 10.3% more using the Optimal score.

Table 4 shows the coefficients and 95% CIs from the Bayesian model. The coefficients linking the Artifacts latent score cPCC to each of the first 5 domain scores (the α_{1k}s, see Appendix A.4) were largely similar, which reflects the fact that the scores were standardized, and were statistically significant. The coefficient associated with the Outcome domain was not statistically significant. Although it would be reasonable to drop the Outcomes domain from the model, we decided to retain it as it is part of the Artifacts of Culture Change Tool. Our main interest was in the coefficient that relates cPCC to the MDS-based composite measure of quality. Although the 95% CI overlapped 0, there was over a 97% chance that the coefficient was negative. The model indicates that a resident in a facility at the 10th percentile of the cPCC score had about a 6.7% higher chance of developing a QI event than a resident in the facility at the 90th percentile.

Figure 1 is a plot of the cPCC scores and 95% CIs calculated from the standardized domain scores. Most of 95% CIs overlapped, and so it was difficult to distinguish differences between most of the facilities. However, it is clear that there was a set of high-performing facilities (those in which the lower end of the 95% CI did not cover 0, n = 13) that differed from a set of low-performing facilities (those in which the upper end of the 95% CI did not cover 0, n = 18). The average quality score in the low-performing facilities (0.150) was 16.3% higher than in the high-performing facilities (0.129), a statistically significant difference.

TABLE 4. Coefficients Relating Artifacts Standardized Domain Scores to the Artifacts Latent Score

	Coefficient (95% Credible Interval)
Latent variable coefficient for	
Care practices	0.680 (0.476–0.903)
Environment	0.583 (0.379–0.803)
Family/Community	0.555 (350–0.774)
Leadership	0.650 (0.448–869)
Workplace practices	0.663 (0.456–0.885)
Outcomes	0.024 (−0.191 to 0.241)
Coefficient for Artifacts latent score	−0.0048 (−0.0100 to 0.0002)
Probability Artifacts latent coefficient is negative	0.971
Correlation Artifacts: latent score and MDS-based composite measure of quality	−0.213 (−0.330 to −0.095)

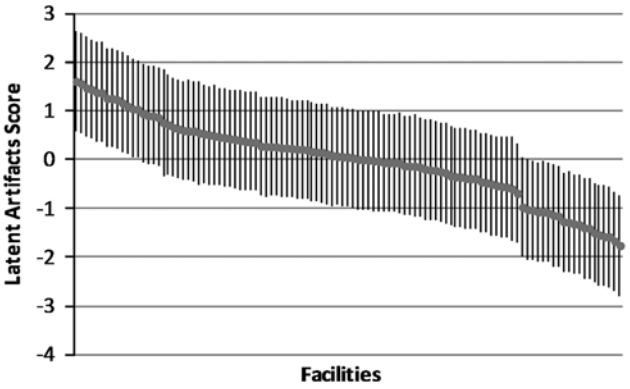

FIGURE 1. Facilities Listed From Highest Artifacts Latent Score to Lowest Score.

DISCUSSION

Our results show noticeable variation across facilities in culture change to a PCC model and a relationship between the extent of culture change as measured by the Artifacts of Culture Change Tool and the MDS-based composite quality measure. Although the correlation between Artifacts scores and the quality measure was modest (< −0.25), the correlation was higher than most of the correlations among commonly used hospital performance measures.[22] From cross-sectional analyses, we cannot draw any conclusions about causality. However, we do believe there was something different in those facilities that performed better in both the Artifacts of Culture Change Tool and the MDS-based QIs. Literature suggests that NHs with good patient outcomes have the basics of clinical care and processes in place that surround the tasks the staff are consistently responsible for completing—for example, helping residents with ambulation, nutrition, hydration, and toileting/bowel regularity, preventing pressure ulcers, and managing pain.[23,24] Besides these basic care processes, better patient outcomes follow from consistent and strong nursing and administrative leadership, the use of team and group processes to fulfill tasks, and an active QI program able to target and measure interventions to improve outcomes.[24] NHs with these attributes may well be more attracted to and better able to implement the key components of the PCC model.[5,25–29]

As noted, there is support in the literature for the individual Artifacts items. However, there is no comparable support for scoring of the items. In fact, as White et al[30] have shown, the priority assigned to different Artifacts items differs across stakeholder groups and across individuals within stakeholder groups. These differences highlight the

conceptual challenge in validating weights assigned to items that comprise a formative construct.

We did not have access to scores for the individual Artifacts items and so we could only consider alternative scoring at the domain level. It is interesting that the correlation between the Artifacts summary scores and the quality score was slightly higher when the Artifacts Standardized Score was used, rather than the raw scale Artifacts Total Score. In the analysis that treats cPCC as a latent construct, the relationship between cPCC and the quality score was slightly stronger when standardized scores were used. Standardized scores treat the Artifacts domains equally, something that, as noted, is more consistent with the HATCh model, the underlying conceptual framework of the Artifacts of Culture Change Tool. Some of the controversy surrounding Artifacts of Culture Change Tool scoring might be alleviated if domain scores were first standardized and then a summary score calculated by summing the standardized domain scores. This seems more reasonable than assuming that because a particular domain has more Artifact items, it is a more important indicator of PCC practices. Recently, the VA started collecting individual Artifacts item scores within each domain, and has converted back to the CMS 580 point instrument. Data at the individual item level will allow evaluation of alternative weightings for individual items.

The score resulting from the optimal weights is probably not useful as a way to summarize PCC implementation. However, these weights do highlight Artifacts domains particularly associated with the MDS-based composite measure of quality. The Leadership domain mainly has to do with bringing caregivers, families, and residents together in care planning and delivery; the Outcomes domain primarily has to do with stability of the staff. It is not surprising that a stable staff and widespread engagement in care planning and delivery are associated with improved performance in the MDS-based QIs.

A strength of the Artifacts of Culture Change Tool is that it measures visible changes resulting from an underlying change in culture. However, in the same sense that visible artifacts provide anthropologists and sociologists with only a partial glimpse into societies, the Artifacts of Culture Change Tool provides only a partial picture of the extent of PCC implementation. We used the Artifacts Tool because it is the primary assessment method used by VA for measuring culture change to a PCC model. Other pilot research is underway in VA (and outside VA) to test alternate measures of PCC. For example, both an 8 domain staff assessment of PCC practices[31] based on the Oregon Better Jobs Better Care project,[32] and a standardized, observation-based tool for researchers to measure staff behaviors related to staff-resident interactions and staff members' engagement of residents[33] are being piloted in the VA. It would be useful to compare Artifacts of Culture Change Tool scores to quality-of-life measures from the resident perspective, but these measures are still under development. It is often difficult to assess quality of life of NH residents because of the cognitive impairments of many residents, which makes measurement of these outcomes very difficult.[34]

One of the strengths of our study is that it was conducted across a large number of facilities that differed widely in terms of the MDS-based QIs, and in which a common model of PCC was implemented and measured with the same instrument. There, undoubtedly, are large differences in leadership style and the amount and success of ongoing QI improvement activities across the 107 facilities. It may well be that some low-performing facilities, in terms of their MDS scores, were the most motivated to implement the PCC model, significantly attenuating any relationship between PCC scores and MDS scores.

Longitudinal data are needed to better test the hypothesis that PCC leads to improvements in patient outcomes. However, even with longitudinal data, it is likely to be difficult to determine causality. One of the challenges is that the PCC model encompasses a long-term, diffused set of interventions that often take place contemporaneously with other QI efforts. Thus, it is critical that future PCC research takes into account other ongoing facility activities that may influence changes in quality.

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