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Broadening the Lens: A Systems Approach to Nursing Home Quality Improvement

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Broadening the Lens:

A Systems Approach to Nursing Home Quality Improvement

by

Kelly M. Smith

A dissertation submitted in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy
School of Aging Studies
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DEDICATION

The subsequent dissertation is dedicated to my daughter, Addison Grace Smith. As this chapter of our life ends, I reflect on all the wonderful memories we have made. Spending the past six and a half years as your mother has been my greatest pleasure and nothing could be more fulfilling. I have watched you grow into an inquisitive, intelligent, charming, loving, and beautiful human being and I thank God for you every single day.

Throughout your life, you will have many victories and, likely, as many defeats. My wish is that you will seize the opportunity to grow from the defeats as much as you celebrate the victories. Most importantly, you must never give up! Let not fear or provocation prevent you from reaching for the stars and achieving your dreams. Your creator has put you on this earth and blessed you with an abundance of talents. Use your gifts wisely, trust in him to guide you on your journey, and always know just how special you are- your loving mother.

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with a level of detail she probably would have traded for an eye gouging. I am eternally grateful

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ABSTRACT

The National Quality Award Program, sponsored by the American Healthcare Association National Center for Assisted Living, was implemented to cultivate continuous quality improvement in nursing homes and assisted living facilities. Based upon the Baldridge Criteria for Performance Excellence, the program utilizes a systems-based or Big "Q" approach to quality and requires applicants to examine seven categories of their organizational environment including: 1) leadership, 2) strategy, 3) customers, 4) measurement, analysis, and knowledge management, 5) workforce, 6) operations, and 7) results. The subsequent dissertation examines whether award status is associated with better performance on publicly reported quality measures and financial performance within the nursing home setting. Findings suggest implementation of Baldridge principles may promote improved quality; however, further research is warranted to fully understand the relationship.

<div align="center">**CHAPTER ONE: BACKGROUND**</div>

Malcolm Baldridge Criterial for Performance Excellence

The American Health Care Association and the National Center for Assisted Living (AHCA/NCAL) established the National Quality Award Program (NQAP) for long-term care organizations (e.g., skilled nursing care centers, assisted living facilities) in 1996. The NQAP emanates from the Malcolm Baldridge National Quality Award (MBNQA) instituted by the U.S. Congress in 1987 under the leadership of President Ronald Reagan. In response to strong foreign competition in the automobile manufacturing industry, the Reagan Administration sought to promote awareness of quality management and improve competitiveness in U.S. companies (Leonard & McGuire, 2007).

Accordingly, Malcolm Baldridge, the Secretary of Commerce, developed a model for performance improvement, which identified essential elements (Baldridge principles) required for performance excellence. Based upon the work of other quality management pioneers including Robert Deming, Joseph Juran and Karou Ishikawa, the Malcolm Baldridge Criteria for Performance Excellence (Baldridge Criteria) employed a systems-based, or big "Q" approach, wherein businesses utilize a broad, comprehensive lens to assess quality. Quality improvement efforts using a big "Q" approach examine all facets of a business (e.g., internal/external customer relationships, the voice of the consumer, financial performance) as well as product and service performance quality. Conversely, a little "q" approach focuses on one facet or measure of quality in a specific area. However, to truly achieve performance excellence, all systems within an

organization must operate at a high level and be aligned (National Institute of Standards and Technology, 2015).

Baldridge's system-based model became the basis for the Malcolm Baldrige National Quality Improvement Act and the origination of the MBNQA. Accordingly, the legislation mandates the U.S. President to recognize companies which have demonstrated excellence in quality ("Malcolm Baldridge National Quality Improvement Act of 1987," 1987). The validity of the Baldridge Criteria has been demonstrated (Evans & Jack, 2003). Specifically, Evans and Jack (2003) illustrated a relationship between Baldridge Criteria-based internal management approaches and various endogenous (e.g., employee satisfaction, process performance, internal productivity) and exogenous (e.g., customer satisfaction, market share, financial performance) factors. Additionally, an empirical test by Goldstein and Schweikhart (2002) suggest the framework is an appropriate and effective quality management assessment tool to improve organizational performance in healthcare settings.

The National Quality Award Program

The national-level MBQNA serves as the basis for the NQAP to assist and support long term care providers in their quality journey (Baldridge Performance Excellence Program, 2015). Established on the basis of the Baldridge Criteria used in the MBNQA, the NQAP is a three-level (Bronze, Silver, Gold) progressive program, which provides evaluation criteria, educational resources and tools for nursing homes (NHs) to conduct performance improvement activities by fostering a systems-based or big "Q" model to assess performance (Baldridge Performance Excellence Program, 2015). NQAP utilizes three progressive levels defined as: 1) Bronze-Commitment to Quality; 2) Silver-Achievement in Quality; and 3) Excellence in Quality

(American Health Care Association, 2016). In order to progress to the next level, the criteria for the prior level(s) must also be achieved.

Eligibility for a NQAP award includes the following: NHs must: 1) be an AHCA/NCAL member in good standing; 2) have the ability to produce direct care staffing turnover data for the past three years; 3) have undergone three Medicare/Medicaid certification surveys with survey deficiency scores less than their state's average and must not have received a regulatory deficiency at the immediate jeopardy or substandard quality of care level; and, 4) agree to participate in a quality award education program during the application year. Similar to the MBNQA, AHCA/NCAL's NQAP utilizes a trained board of examiners to assess applications and evidence of performance improvements of NH applicants.

Healthcare Criteria for Performance Excellence

Based upon the Baldridge Criteria's core set of overarching values and concepts (e.g., visionary leadership, patient-focused excellence, managing by fact, valuing people), the Healthcare Criteria for Performance Excellence (Healthcare Criteria) provides the foundation for "integrating key performance and operational requirements within a results-oriented framework" (Baldridge Performance Excellence Program, 2015). Applicants assess their organization's operating environment as well as relationships with suppliers, consumers, and other partners (See Figure 1.) (Baldridge Performance Excellence Program, 2015).

Figure 1. Health Care Criteria for Performance Excellence Overview and Structure.

Using the Healthcare Criteria, Bronze-level applicants make a commitment to quality by exploring their vision, mission, and key operational components which may lead to success through the development of an organizational profile. The focus of the organizational profile is to describe key components of the business, the organizational environment, and organizational relationships. At the Bronze-level, the expectation is for NHs to assess their organizational processes to identify opportunities for improvement in their delivery of quality care. Applicants are deemed to be in the beginning stages of their quality improvement journey and evidence of process improvement is not expected.

Silver-level applicants must complete the organizational profile and describe their operations in seven (7) categories: 1) leadership, 2) strategy, 3) customers, 4) measurement, analysis, and knowledge management, 5) workforce, 6) operations, and 7) results. To receive a Silver-level award, applicants must demonstrate the organization is at least in the beginning stages of using systematic process improvement efforts to improve measures the NH has

identified as important to their success. The board of examiners assess each application on the organization's approach, deployment of the approach, the presence of learning (refinement of efforts through periodic evaluation and improvement of the process), and integration of efforts across all processes and work units.

Finally, Gold-level applicants are required to comply with Bronze and Silver requirements and, additionally, demonstrate systematic process improvement efforts have been implemented and resulted in improvement. The goal of applicant assessments at all levels is to facilitate identification of performance gaps, process inefficiencies, and improve the NHs' competitiveness in their market (Leonard & McGuire, 2007). A brief description of the seven categories of the Healthcare Criteria is provided in Appendix A.

The Healthcare Criteria used to evaluate NQAP applicants stresses a systems-based approach to improve operational effectiveness. Therefore, it is expected NQAP awardees should achieve higher quality care and experience better financial performance when they win the award. Therefore, the purpose of this dissertation is to determine if NQAP award status is associated with better quality and financial performance.

Conceptual Framework

Guided by Porter's product differentiation strategy (Porter, 1998), this dissertation examines the impact of NH success in applying Baldridge principles prescribed in the Healthcare Criteria and subsequent NQAP award receipt. According to Porter's product differentiation strategy, organizations may employ efforts to create unique products or services to be competitive within an industry and set itself apart from competitors (Porter, 1980, 1998). Moreover, differentiation can take many forms including branding, customer services and other dimensions such as quality. Porter suggests if differentiation is achieved, organizations are better

positioned to defend against competitive forces within an industry including competitors (other NHs within the same market), potential new entrants (new NHs entering the market), substitutes (assisted living, home and community-based services), buyers (Medicare, Medicaid, private pay residents), and suppliers (contract care/services provided to serve residents).

Regulatory mandates provide higher Medicare reimbursements for post-acute care. Therefore, providers may seek to differentiate themselves based on quality to attract more post-acute patients from hospital referrals. From a legislative perspective, public reporting was initiated to incentivize NH providers to compete on quality by informing consumers of care quality when making a NH selection. Therefore, the current regulatory environment and use of public reporting on Nursing Home Compare (NHC) encourages NHs to differentiate their services by improving quality.

The financial viability of the NH industry has been a concern for decades. Prior to the Balanced Budget Act of 1997 and repeal of the Boren Amendment, States had control over reimbursement rates for Medicaid. However, many states have chosen to withhold Medicaid reimbursement rate increases in an effort to resolve budgetary shortfalls creating financial issues for NHs with many questioning the sustainability of the industry. Consequently, differentiation on quality has become a mechanism for NHs to maintain steady revenue streams and set themselves apart from competitors (Bowblis, Lucas, & Brunt, 2015; Weech-Maldonado, Neff, & Mor, 2003a; Wiener & Stevenson, 1998).

Industry-based association memberships, such as AHCA/NCAL, are often a mechanism deployed by an organization to differentiate itself against competitors. Further, participation in a trade association often affords members access to both tangible (information, services, products) and intangible benefits (e.g., common purpose, networking). Within this dissertation framework,

we speculate NHs, which become members of AHCA/NCAL and subsequently apply for and successfully receive a NQAP award are doing so in order to differentiate themselves within the industry based upon quality.

New Contribution

  This research makes several new contributions to the literature by examining whether the deployment of the systems-based organizational assessment and utilization of Baldridge principles required by the Healthcare Criteria improves process and outcome measures. First, this work seeks to build upon previous research in the NH literature, which demonstrates NQAP award recipients, when examined cross-sectionally, perform better on most facility-level quality indicators and receive fewer regulatory deficiencies (Castle, Olson, Shah, & Hansen, 2016 & Hansen, 2016). Therefore, the first study in this dissertation will examine NQAP award recipients' performance on 23 publicly reported quality measures from NHC, a web-based tool designed to assist consumers in making informed NH selection choices. The NHC measures are derived from resident-level assessments taken at regular intervals, reported quarterly, and provide a more concise picture of quality in the NH setting than annual recertification surveys used in prior research examining quality of NQAP award recipients.

  Given NHs dependence on government reimbursement to subsist and the eminent move toward value-based payment systems, it is important to investigate mechanisms, which may guide quality improvement in the NH setting. Therefore, the second study in this dissertation will examine NQAP award recipients' financial performance at the time of winning. The Baldridge principles contained within the Healthcare Criteria drive NHs to define priorities, guide strategic development to create action plans, and directly links strategic objectives to outcomes, which are deemed important to the organization. Presumably, a systems-based approach to continuous

quality improvement will create a more efficient environment allowing NHs to incur lower costs, achieve higher revenues, and ultimately experience better profit margins.

CHAPTER 2: THE NATIONAL QUALITY AWARD PROGRAM: IS AWARD STATUS ASSOCIATED WITH BETTER PERFORMANCE ON QUALITY MEASURES?

Introduction

According to the American Health Care Association (2015), approximately 1.4 million people reside in over 15,000 NHs across the country. Despite the efforts of policy makers, providers and stakeholders, the quality of NH care has undergone significant criticism and has remained an enduring concern. One of the key issues associated with quality improvement is that "quality" itself is extremely difficult to define (Castle & Ferguson, 2010). If asked, providers may suggest quality means the prevention of medical errors. Consumers may indicate quality signifies the absence of a condition, or the promotion of spiritual well-being and regulators may believe quality equates to a smaller number or absence of regulatory violations. Regardless, one's vantage point determines what quality means to them. Thus, operationally defining "quality" is extremely difficult making measurement a major challenge.

Historically, the NH certification process has cultivated a compliance culture (Castle & Ferguson, 2010). Noteworthy, quality assurance is both retrospective and reactive as providers attempt to determine why a standard was not met rather than continuously seeking opportunities for improvement. Unfortunately, such an approach has created a fragmented focus on quality (i.e., multi-tasking incentive problem) which manifests when one focal area improves and another area suffers (Bowblis & Lucas, 2012; Konetzka, Brauner, Shega, & Werner, 2014 Shega, & Werner, 2014).

The Patient Protection and Affordable Care Act 2010 (ACA) seeks to broaden the scope of NH quality improvement efforts by requiring NHs to focus on performance improvement through continual analysis of organizational performance and plans for improvement. As defined by the Centers for Medicare and Medicaid Services (2013), performance improvement entails engaging in a proactive process to prevent and/or decrease the likelihood of substandard care. By identifying opportunities for improvement in their processes, NH leadership can detect underlying root causes, which lead to systemic problems, so they can be prevented. Consistent monitoring of quality data, development of interventions, and utilization of feedback loops are tools NHs may use in their performance improvement efforts to determine if interventions are efficacious. As of November 2017, certified NHs are required to submit QAPI plans to surveyors during inspections (Centers for Medicare & Medicaid Services, 2018b). Undoubtedly, the new regulations will require an adjustment in NH leadership's approach to quality initiatives.

Association-sponsored award programs such as the NQAP provides educational support and fosters a systems-based approach to quality improvement, which may guide NH QAPI efforts. A recent study by Castle and colleagues (2016) examined the performance of NQAP award recipients on aggregated facility-level quality indicators (e.g., % of residents physically restrained, % of residents receiving antipsychotic medication) and deficiency citations. Findings demonstrated NQAP award recipients achieved higher quality levels on most assessed outcomes and were able to sustain the improvement over a four-year period. Therefore, findings from their study suggest, participation in the NQAP and subsequent award receipt may serve as a mechanism for NHs to improve quality as prescribed by the ACA.

Literature Review and Hypotheses

Quality of Care in NHs. The quality of NH care has been a topic widely explored. Researchers have examined various facets of the NH regulatory and operational environment as well as public/private initiatives to determine what elicits higher quality of care. Despite extensive efforts on behalf of legislators, providers, and stakeholders, the formula for delivering consistent, high-quality care remains a mystery.

Multiple studies have examined the impact of regulatory changes on improving quality. For example, after the implementation of OBRA '87, studies suggested processes of care such as physical restraint use (Castle, Fogel, & Mor, 1997; Hawes et al., 1997), catheter use (Hawes et al., 1997; Zhang & Grabowski, 2004), psychotropic drug use (Shorr, Fought, & Ray, 1994), and pressure ulcers declined (Fries et al., 1997; Zhang & Grabowski, 2004). Other studies examining regulatory deficiencies suggest higher staffing levels are related to lower deficiency citations (Harrington, Zimmerman, Karon, Robinson, & Beutel, 2000; Kim, Kovner, Harrington, Greene, & Mezey, 2009; Park & Stearns, 2009). These findings were strengthened by Bowblis (2011) and Hyer, et al. (2011) who used total deficiency scores (i.e., weighted by scope and severity) to analyze the relationship between staffing and deficiencies (Bowblis, 2011b; Hyer et al., 2011).

Other studies have focused on the stringency of regulations for staffing in relation to quality. One study found higher direct care staffing requirements led to higher staffing hours for licensed practical nurses (LPNs) and certified nursing assistants (CNAs) and better risk-adjusted urinary incontinence and ADL decline (Mukamel et al., 2012). Another study examining the effects of quality standards and nurse staffing requirements indicated higher total direct care staffing (RNs, LPNs and CNAs combined) lowered the use of feeding tubes but increased the use of physical

restraints (Bowblis & Lucas, 2012). However, NH responsiveness to staffing standards may be more likely when non-compliance enforcement is higher (Bowblis, 2011a).

Mandated public reporting or report cards, also known as the bottom-up approach, have also produced mixed results. One study examined publicly reported (e.g., percent of short-stay residents who did not have moderate or severe pain, percent of short-stay residents whose walking improved) and non-publicly reported quality measures (improved pain and locomotion) for post-acute care before and after the implementation of the NHC website (Werner, Konetzka, & Kruse, 2009). The authors found NHs, which improved on publicly reported quality measures also improved on non-publicly reported measures suggesting a spillover effect of improvement efforts. Bowblis and colleagues (2015) suggested public reporting of antipsychotic and psychoactive medication reduced use; however, the long-term impact was inconclusive. According to Werner and colleagues (2010), short stay care quality improved after public reporting and consumers chose NHs with higher quality care. Despite somewhat positive findings, other researchers warn public reporting has the ability to widen the gap between low and high quality NHs (Werner et al., 2009) and may incentivize NHs to re-hospitalize higher-risk post-acute residents in an effort to improve quality scores (Konetzka, Polsky, & Werner, 2013 2012).

Individual states also have the ability to set mandates which are more stringent than federal requirements. Moreover, work by Bowblis (2011) suggested when states exercise their right to mandate higher staffing than the federal minimum, resident outcomes and deficiency citations seem to improve. Additionally, a review by Mukamel and colleagues (2014) examined studies conducted from 2006 to 2012 on the impact of both top-down (regulatory) and bottom-up (report card) approaches to quality improvement and suggested the top-down approach may be more effective. Therefore, some improvement in indicators of quality of care have been identified. However, due to

inconsistent outcomes across all quality metrics, the regulatory approach to improvement is moving towards a focus on continual performance improvement rather than simply quality assurance.

Various studies have also examined the operational environment within NHs. For example, studies have demonstrated a relationship between quality and staffing levels including usage and turnover (e.g., Castle & Anderson, 2011; Castle, Engberg, & Men, 2007; Hyer et al., 2011; Weech-Maldonado, Meret-Hanke, Neff, & Mor, 2004), ownership and profit status (e.g., Davis, 1993; O'Neill, Harrington, Kitchener, & Saliba, 2003; Weech-Maldonado et al., 2012) as well as market factors (e.g., Starkey, Weech-Maldonado, & Mor, 2005; Weech-Maldonado, Zinn, & Brannon, 1999). Larger facilities, chain members and those with a higher census have been linked to a higher number of regulatory deficiencies (Castle, 2001). Other studies have looked at the role state policies play relative to incentives and reimbursement based on resident outcomes (Grabowski, 2001; Hyer, Thomas, Johnson, Harman, & Weech-Maldonado, 2013; Mor et al., 2011). Leadership style has also been shown to be associated with better quality of care (Castle & Decker, 2011). NH administrator level of education associated with restraint use, catheter use, inadequate pain management, low and high-risk residents with pressure ulcers (Castle, Furnier, Ferguson-Rome, Olson, & Johs-Artisensi, 2015 Olson, Johs-Artisensi, 2015).

Other work has explored the efficacy of quality improvement interventions and payment incentives. For example, Rantz and colleagues (2012) tested the efficacy of a two-year intervention in NHs relative to "outcomes measures with room for improvement". Findings demonstrated positive impacts on pressure ulcers and weight loss (Rantz et al., 2012). Another study examined the impact of the Reduce Acute Care Transfers II which consists of tools and strategies which aid NH staff in "early identification, assessment, communication, and documentation about changes in residents status which was associated with improved hospitalization rates (Ouslander et al., 2011).

Pay for performance incentives caused high performing NHs to lower performance and only those performing at the lowest levels improved (Werner, Skira, & Konetzka, 2010).

Voluntary public reporting (Mukamel, Ye, Glance, & Li, 2015 & Li, 2015) and voluntary association accreditation (Wagner, McDonald, & Castle, 2013 2013) have been shown to be related to better quality outcomes. Despite these positive findings, a report by the Kaiser Family Foundation (2015), suggests approximately 39% of all NH residents still receive suboptimal care in NHs. Recent work by Castle and colleagues (2016) examined award recipients of NQAP, the association-sponsored award and subject of this dissertation work. Findings demonstrated improvement on facility-level aggregated quality indicators (e.g., deficiency citations, antipsychotic medication use) among NQAP award recipients. Their work is the first to assess the quality of the NQAP award recipients compared to other NHs.

Based upon findings from the work of Castle and colleagues (2016), it is reasonable to expect NQAP awardees to also demonstrate better performance on other measures of quality. Therefore, the current study examined the relationship between receipt of a NQAP award and quality performance as measured by 23 quality measures publicly reported on NHC. We hypothesized deployment of Baldrige principles used in the Healthcare Criteria would be associated with better quality outcomes among NQAP award recipients when compared to similarly constructed control groups at the time of award receipt.

Method: Data and Research Design

To examine the relationship between receipt of a NQAP award and publicly reported quality measures, four sources of data were merged for 2007-2015. First, an analytic database from the American Health Care Association National Center of Assisted Living (AHCA/NCAL Analytic Database) was utilized. The AHCA/NCAL Analytic Database consists of key variables from the Online Survey Certification and Reporting Database (2008-2012), the Certification and Survey

Provider Enhanced Reporting Database (2012-2015), average total deficiency scores by state, and identification of NQAP award recipients (2010-2015). Variables, excluding award recipient information and average deficiency scores by state, consisted of widely-utilized facility-level characteristics (e.g., operational characteristics, staffing, deficiency citations) derived from inspections which occur every nine to fifteen months and are mandated for recertification to receive Medicare and Medicaid reimbursement (Office of the Inspector General, 2001). Next, the AHCA Analytic Database was merged with data from ltcfocus.org (LTCF, 2017). The LTCF data is a publicly available product maintained at Brown University Center for Gerontology and Healthcare Research. The data allows researchers to examine various resident and facility characteristics in order to carry out research in long-term care settings (Brown University, 2016). The LTCF Data were utilized for aggregated facility-level resident care requirements and an aggregated county-level measure of market concentration. Third, the Area Health Resource File contains publicly available demographic information maintained by the U.S. Health Resources and Services Administration and consists of national county-level data on demographic and socioeconomic characteristics of markets where NHs operate. Finally, data from NHC, a web-based report card developed to assist consumers in making informed decisions about NH placement, was utilized. Quality measures used in NHC have been tested and found to be valid and reliable (Morris et al., 2003) with numerous studies utilizing them to assess NH quality of care (e.g., Backhaus, Verbeek, van Rossum, Capezuti, & Hamers, 2014; Bowblis & Lucas, 2012; Konetzka et al., 2014).

These data sources were merged to create a dataset from 2010-2015 with a three-year lookback to compare NQAP award recipients and annually constructed control groups of NHs, which met the eligibility requirements to apply for a NQAP award. Construction of the annual control groups is described below.

Measures

Dependent Variables. Twenty-three (23) publicly reported NHC quality measures for both short and long-stay residents were examined. Operational definitions of the individual measures are contained in Table 1. Quality measures included in the subsequent analyses were based upon data availability during the study period of interest.

Table 1. Operational Definitions of Dependent Variables

Variable	Definition
Short Stay Measures	
Antipsychotic medication	% of short-stay residents who newly received an antipsychotic medication
Delirium	% of short-stay residents experiencing delirium
Pain	% of short-stay residents who self-report moderate to severe pain
Pressure ulcers	% of short-stay residents with pressure ulcers that are new or have worsened
Influenza vaccination[1]	% of short-stay residents assessed and given, appropriately, an influenza vaccine
Pneumonia vaccination[1]	% of short-stay residents assessed and given, appropriately, the pneumococcal vaccine
Functional improvement[1]	% of short-stay residents who made improvements in function
Long Stay Measures	
ADL decline	% of long-stay residents whose need for help with daily activities increased
Antipsychotic medication	% of long-stay residents who received an antipsychotic medication
Anti-anxiety/hypnotic medication	% of long-stay residents who received an antianxiety or hypnotic medication
Bedfast	% of long-stay residents who are bedfast
Bowel/bladder incontinence	% of long-stay low-risk residents who lose control of their bowels or bladder
Catheterization	% of long-stay residents with an indwelling catheter
Depression	% of long-stay residents who have depressive symptoms
Falls	% of long-stay residents who have experienced one or more falls with major injury
Locomotion	% of long-stay residents whose ability to move independently worsened
Pain	% of long-stay residents who self-report moderate to severe pain
Physical restraints	% of long-stay residents who were physically restrained
Pressure ulcers	% of long-stay high-risk residents with pressure ulcers
Urinary tract infection	% of long-stay residents with a urinary tract infection
Weight loss	% of long-stay residents who lose too much weight
Influenza vaccination[1]	% of long-stay residents assessed and given, appropriately, an influenza vaccine
Pneumonia vaccination[1]	% of long-stay residents assessed and given, appropriately, the pneumococcal vaccine

NOTE: [1]- higher percentages signify better quality

Independent Variables. A dichotomous independent variable, *awardee*, was created from the AHCA analytic database and utilized to evaluate the relationship between receipt of a NQAP award at the Silver or Gold level (0=no award; 1=award at the Silver or Gold level) and NH quality. NHs at the Bronze level are deemed to be just beginning their quality journey and are not required to demonstrate use of systematic processes to improve quality. Similar to the work of Castle and colleagues (2016), the subsequent analysis includes only Silver and Gold level awardees. Bronze level awardees were however eligible for inclusion in the annually constructed control groups.

Covariates. Sixteen control variables deemed to have an influence on the quality of NH care were included. First, to account for resident case mix and individual needs of NH residents, we controlled for *resident acuity.* Created by the Cowles Group (Cowles, 2002), the acuity index combines unique treatment needs of NH residents and activities of daily living dependencies on a scale ranging from 0 (*low need*) to 38 (*high need*). Derived from the OSCAR/CASPER data, the acuity index is widely utilized in NH quality literature (Grabowski et al., 2016 et al., 2017; Hyer et al., 2011 Harman, et al., 2011). We also controlled for the percentage of NH residents with a *psychiatric diagnosis* as previous research suggests individuals with psychiatric related needs are often admitted to lower quality NHs (Li, Cai, & Cram, 2013).

Facility characteristics deemed to have an impact on quality were also included. Previous research has suggested larger facilities may have the ability to restructure staffing resources, potentially influencing quality. To account for this, a measure of size, *total number of beds* was included. Additionally, the occupancy rate of a NH is commonly utilized as a proxy measure for performance (Zinn, Mor, Feng, & Intrator, 2009). Therefore, *occupancy* was also included. Profit status is also associated with quality and previous findings have suggested for-profit NHs deliver poorer quality of care than their nonprofit counterparts (Hillmer, Wodchis, Gill, Anderson, &

Rochon, 2005). Therefore, we controlled for *profit status* (0=no, 1=yes). Chain affiliation has been

shown to be related to quality (e.g., Banaszak-Holl, Berta, Bowman, Baum, & Mitchell, 2002;

Castle & Fogel, 1998; Harrington, Woolhandler, Mullan, Carrillo, & Himmelstein, 2001), albeit

findings have been mixed. Therefore, the variable *chain membership* (0=no, 1=yes) was controlled

for. We also controlled for whether or not a NH was situated in a *metropolitan area* (0=no; 1=yes)

given NHs which operate in urban areas may have access to better staffing pools and may

fundamentally address quality concerns differently. Payer source has also been found to be

associated with NH quality. For example, research suggests a higher proportion of Medicaid

residents is associated with lower quality (Mor, Zinn, Angelelli, Teno, & Miller, 2004) while a

higher proportion of Medicare is associated with higher quality (Kim, Harrington, & Greene, 2009);

therefore, we control for the *proportion of Medicaid resident* and *the proportion of Medicare

residents*. A plethora of studies have demonstrated a relationship between direct care staffing levels

and the quality of care (Castle, 2008; Harrington, Kovner, et al., 2000; Harrington, Olney, Carrillo,

& Kang, 2012; Hyer et al., 2011). Therefore, three staffing measures were also controlled for

including *RN total hours per resident day (RN HPRD), LPN total hours per resident day (LPN

HPRD)*, and *CNA total hours per resident day (CNA HPRD)*. For example, RN staffing hours per

resident day was calculated as $RN\ HPRD = (((RN_{FT} + RN_{PT}) * 2080)/365)/total\ residents)$.

The same method was repeated to calculate LPN HPRD and CNA HPRD.

Previous research examining quality suggests the market structure and operating

environment within which a NH operates has the potential to influence quality strategies. Therefore,

we included a measure of market concentration, the *Herfindahl-Hirschman Index*, as well as the

number of adults 65+ within the county, and *per capita income* by county as covariates in our final

models (Castle et al., 2016 & Hansen, 2016; Hyer et al., 2013; Hyer et al., 2011). We also

controlled for the *number of home health agencies* within the county the NH operates. Home health

agencies provide a substitution for NH care and may be an option for residents who require lower

care absent quality NH options.

Previous work has suggested states may differ on the deficiencies they emphasize during the

survey process (Castle & Ferguson, 2010). Therefore, we constructed 47 state dummy variables

(0=no; 1=yes) to control for state variation in the survey certification process, using Alabama as the

reference group. Finally, six dummy variables were created for time signifying which year the

sample was being evaluated in (e.g., Sample_2010, Sample_2011). Operational definitions of

covariates utilized in subsequent analyses are contained within Table 2.

Table 2. Operational Definitions of Covariates.

Variable	Definition
Acuity index	Level of resident care required
Psychiatric diagnosis	% of residents with psychiatric diagnosis
Total beds	Total number of beds
Occupancy	Number of residents/number of beds
Profit Status	For profit status (0=no; 1=yes)
Chain Membership	Member of a chain (0=no; 1=yes)
Medicaid	Proportion of Medicaid residents
Medicare	Proportion of Medicare residents
CNA HPRD	Hours per resident day of certified nursing assistant time
LPN HPRD	Hours per resident day of licensed nurse time
RN HPRD	Hours per resident day of registered nurse time
Herfindahl-Hirschman Index	Measure of market concentration
Home health agencies	# of home health agencies by county
Metro	Located in a metropolitan area (0=no; 1=yes)
Per capita income	Per capita income by county/$1,000
Population 65+	Proportion of population over 65 by county
Sample_(Year)	Time dummy variables signifying year of study period (2010-2015)
State	47 state dummy variables (0=no; 1=yes)

Sample Construction. Annually constructed control groups were created, based upon

eligibility to apply for the NQAP award, to examine the association between winning a NQAP

award and performance on 23 publicly reported NHC quality measures. Key variables in the AHCA

analytic database were analyzed to determine eligibility for inclusion in the control groups by

examination of non-compliance with approximately 180 regulatory standards. Deficiency citations resulting from non-compliance were then assessed on two dimensions including scope (how many residents are affected) and severity (likelihood of harming residents). Scope is trichotomized into isolated, a pattern, or a widespread practice. Severity has four categories (no harm, no harm and potential for minimal harm, actual harm, and immediate jeopardy requiring immediate corrective action).

Within this study, total deficiency scores were calculated pursuant to the methodology utilized by AHCA/NCAL for the NQAP by assigning points for individual deficiencies and their respective scope/severity (A-M). Explicitly points were assigned as follows: A=1, B=2, C=3, D=4, E=5, F=6, G=7, H=8, I=9, J=10, K=11, L=12, M=13. Then, all NHs, which had a deficiency with a scope/severity above "I", were removed from the sample.

Finally, NHs with three consecutive total deficiency survey scores with less than their respective state's average score were eligible for inclusion in the control group. For example, when constructing the control group for comparison to award winners in 2010, data from annual surveys from 2007-2009 were used and total deficiency scores were calculated. If a NH's total deficiency score was lower than their state's average for each of the years within the lookback period (2007-2009), the NH was included in the control group for 2010. This process was repeated for each year of the study period.

The number of awardees varied across the study period creating a non-stationary panel dataset. Award recipients were excluded from the control groups regardless of the year being analyzed. Final count information on the NQAP award recipients and annually constructed control groups can be found in Table 3.

Table 3. Annually Constructed Control Group Counts

Year	Award Recipients		Control Group
	Silver	**Gold**	
2010	36	1	5,333
2011	29	1	7,680
2012	46	2	7,353
2013	51	4	7,886
2014	75	3	8,308
2015	99	3	6,277

Data on all freestanding NHs in the lower 48 states was used. Given hospital-based NHs receive higher reimbursement and are able to staff at higher levels (Harrington et al., 2001), resource differences may influence the quality of care delivered. Additionally, NHs with less than 30 beds or more than 800 beds were also omitted from the control group due to operational differences (Castle et al., 2016 & Hansen, 2017) Additionally, staffing outliers were trimmed pursuant to guidelines by Harrington and colleagues (Harrington et al., 2012), and NHs with greater than 24 hours per resident day and total staffing greater than three standard deviations above the mean were considered outliers and removed from the sample. From 2010 to 2015, there were 396 NQAP award recipients at the Silver or Gold level. Of those, six could not be merged by the provider identification provided, eight were hospital based and excluded, and 32 were removed due to other data cleaning (staffing, total beds). Therefore, a final sample of 351 NQAP awardees were utilized in subsequent analyses and overall data cleaning resulted in removal of 1052 observations, which represented less than 1% of the total sample. The final data set consisted of 43,538 observations.

Analyses

The empirical model utilized estimates the relationship between receipt of a NQAP award and 23 publicly reported NHC quality measures. Using the NH year as the unit of analysis, pooled

ordinary least squares (OLS) regression analyses were deployed and modeled as follows for each of the 23 outcome measures:

$$QM_{it} = W_{it}\alpha + X_{it}\beta + \delta i + \tau_t + \varepsilon_{it}$$

Where *QM* is equal to the actual value of the dependent variable (e.g., percentage of long-stay residents with a pressure ulcer, percentage of long stay residents who have received an antipsychotic medication), *W* represents a dichotomous variable signifying receipt of a NQAP award (0=no; 1=yes), *X* represents a series of county-level control variables (e.g. Herfindahl-Hirschman Index, per capita income), and δ_i represents a series of time-invariant facility-level fixed effects (e.g., profit status, chain membership). Finally, τ represents a set of time dummy variables (e.g., sample2010, sample2011...sample2015) to signify the year of analysis, and ε represents error within the model. As specified, the model assumes the effect of winning the award, *W,* and that the individual covariates added into the model are stable over the study period.

Given the nonstationary sample of NQAP recipients and annually constructed control groups across the study period, OLS pooled regression is more efficient and produces coefficients which depict the average relationship between the dependent and independent variables over the cross sections within the study period (Phillips & Moon, 1999). A Hausman specificity test verified the method was appropriate (Hausman, 1978).

Results

During the study period (2010-2015), there were 351 NQAP awardees at the Silver and Gold level, which received an award at the Silver or Gold level. Annually constructed control groups based upon NQAP award eligibility ranged from 5,333 to 8,308 thousand per annum. There were 12,493 unique NHs included in the annually constructed control groups and inclusion was not

restricted by year. Therefore, NHs could serve as controls during multiple years across the study period. Specific counts of the annually constructed control groups are provided in Table 3.

Within the study sample, award recipients were mostly for-profit (85%), members of a chain (83%) and located in a metropolitan area (77%). On average, NQAP award recipients had lower average deficiency scores (M=29.09, SD=8.89) than the annually constructed control groups (M=29.84, SD=9.01) and the national sample (M=31.44, SD=40.27). Descriptive statistics for award recipients, annually constructed control groups, and national comparison data are provided in Table 4.

Table 4. Study 1 Descriptive Statistics

	National (n= 15,120)		NQAP Awardees (n=351)		Group Mean Comparison Control (n= 43,187)[1]		95%	t	
Variable	Mean	SD	Mean	SD	Mean	SD	CI	(χ^2)	Df
Dependent Variables									
Short-Stay Measures									
Antipsychotic medication	3.92	7.80	4.10	7.70	3.75	7.86	-1.30, .61	-.71	28706
Delirium	1.29	2.49	1.10	1.65	1.23	2.54	-.44, .70	.46	35.33
Influenza vaccination	82.66	17.80	83.10	16.84	83.01	17.30	-2.31, 2.13	-.08	31000
Locomotion	11.74	6.57	12.91	4.92	10.79	5.60	-2.12, -4.00	-2.20*	4452
Pain	19.36	11.90	18.10	11.33	19.36	11.74	-.06, 2.57	1.87	34456
Pressure ulcers	4.06	6.98	3.48	6.38	3.50	6.74	-.71, .78	.09	36584
Pneumonia vaccination	91.48	13.30	80.32	19.59	80.38	20.28	-2.18, 2.30	.05	37232
Long-Stay Measures									
ADL decline	20.12	26.01	16.59	12.66	20.43	28.82	2.42, 5.28	5.28*	340.36
Antipsychotic medication	21.89	11.14	19.28	9.49	21.05	10.85	.66, 2.89	3.12***	287.23
Antianxiety/hypnotic medication	23.88	13.13	22.48	12.62	23.72	13.14	-1.60, 4.10	.87	80.71
Bedfast	3.78	4.84	3.01	2.52	3.92	5.07	-.03, 1.67	1.96*	38.169
Bowel/Bladder incontinence	44.57	19.25	44.69	19.45	44.48	19.26	-.20, -2.61	-.17	26009
Catheterization	4.46	4.88	4.06	4.20	4.39	4.88	-.14, .79	1.39	323.04
Depression	10.59	19.76	6.70	8.82	9.25	19.40	1.57, 3.54	5.08***	343.65
Falls	4.09	4.67	4.28	5.22	3.98	4.56	-.90, .32	-.94	385.59
Influenza vaccination	92.74	10.78	93.66	8.49	92.76	10.64	-1.98, .18	-1.63	245.35
Move independently	21.81	16.64	21.42	14.91	21.77	17.16	-3.51, 4.21	.18	4908
Pain	8.52	8.23	6.79	6.17	8.78	8.23	1.29, 2.69	5.59***	314.23
Physical Restraints	2.60	5.39	2.57	5.58	2.58	5.48	0.59, .61	.03	39454
Pneumonia vaccination	91.48	13.30	90.58	12.60	91.69	13.06	-.33, 2.54	1.51	39579
Pressure ulcers	8.23	8.02	6.59	5.72	7.83	8.03	.59, 1.88	3.74**	313.85
Urinary tract infection	7.53	6.04	6.74	5.95	7.32	6.04	-.08, 1.25	1.71	39334
Weight loss	7.83	6.04	8.11	5.46	7.87	5.29	-.83,.34	-.82	39207
Covariates									
Acuity index	11.68	1.47	12.04	1.09	11.88	1.53	-.28, -.05	-2.85*	358.18
Average deficiency score[1]	31.44	40.27	29.09	8.89	29.84	9.01	-.15, -.05	-4.13***	303.54
Psychiatric diagnosis (%)	.30	.19	.29	.17	.29	.19	-.01, .03	1.03	355.99
Total beds	116.06	62.69	114.45	47.30	113.08	60.64	-6.35, 3.66	-.53	358.44
Occupancy	.82	.16	.87	.11	.83	.15	-5.53, -3.29	-7.74***	360.13

Table 4. Study 1 Descriptive Statistics Continued

Variable	National (n= 15,120) Mean	SD	NQAP Awardees (n=351) Mean	SD	Group Mean Comparison Control (n= 43,187)[1] Mean	SD	95% CI	t (χ^2)	Df
Profit Status	73%	---	85%	---	70%	---	---	38.68***	1
Chain Membership	55%	---	83%	---	57%	---	---	98.94***	1
Medicaid	.61	.21	.61	.17	.61	.21	-2.19, 1.42	-.42***	357.63
Medicare	.14	.12	.17	.12	.14	.12	-4.47, -1.99	-5.11	43185
CNA HPRD[2]	2.55	.74	2.57	.55	2.56	.73	-.07, 0.05	-.34	359.01
LPN HPRD[2]	.91	.39	.83	.32	.91	.38	.05,.11	4.60***	356.74
RN HPRD[2]	.48	.34	.57	.31	.50	.33	-.10, -.03	-3.74**	43185
Herfindahl Index	.62	.33	.28	.31	.27	.30	-.01, -05	-.90	42564
Home health agencies	3.75	24.45	22.83	86.83	26.83	95.21	-4.80, 13.73	.95	355.86
Metro	28%	---	77%	---	64%	---	---	2.22	1
Per capita income	37,614.81	10,086.88	41,917.90	12,426.07	41,823.29	11,819.46	-1.33,1.16	-0.14	43009
Population 65+	13,738.74	39,211.63	61,694.25	135,325.33	71,627.61	156,002.00	-2.56, 26.08	1.62	356.7

Note: [1] Control group n represents # of observations across the study period (NHs could have served as controls in multiple years); [2] HPRD=hours per resident day;

Due to data availability, OLS regression was performed on 19 of the 23 outcome measures of interest. Findings partially support our hypothesis that recipients of a NQAP award would perform better on publicly reported NHC quality measures when compared to annual control groups which qualify for award eligibility within the same year. Of the 19 outcome measures, four models were statistically significant. Indwelling catheters (R^2=.14, $F(68,31287)$=72.15, $p<.0001$), self-reported moderate to severe pain (R^2=.19, $F(68,29491)$=105.97, $p<.0001$), pressure ulcers among residents at high risk (R^2=.11, $F(67,27371)$=65.74, $p<.0001$), and urinary tract infections (R^2=.14, $F(68,31568)$=58.35, $p<.0001$) were associated with receiving a NQAP award.

The analysis demonstrates award receipt is associated with a .97 percentage point (PP) decrease in the use of indwelling catheters (β=-.97, $p<.05$). Staffing levels of CNAs (β =-.13, $p<.05$) also impacted the relationship with one additional hour of CNA time being significantly related to a .13 PP decline in catheter use. Conversely, LPN (β=.60, $p<.0001$) and RN (β =.88, $p<.0001$) staffing were significantly associated with higher catheter use, a .60 PP and .88 PP increase respectively. For-profit status (β=.19, $p<.05$) and a higher percentage of Medicare residents (β =.03, $p<.0001$) was also associated with increased catheter use, a .19 PP and .03 PP respectively in the percentage of NH residents with an indwelling catheter.

Relative to the self-reported moderate to severe pain measure, our regression model illustrated a significant association between award receipt (β =-2.09, $p<.0001$) and a 2.09 PP decrease in the pain measure. Other factors deemed to be related to better pain measures include being a nonprofit NH (β=-.53, $p<.0001$) and CNA HPRD (β=-.14, $p=.05$). In contrast, LPN (β =.72, $p<.0001$) and RN (β =.66, $p<.001$) staffing as well as a higher percentage of Medicaid (β =.01, $p<.0001$) were associated with increased reporting of pain among our sample.

Model results indicate a 1.93 PP decrease in pressure ulcers for NQAP award recipients (β=-1.93, p<.001). Similar to other measures, higher CNA (β =-.36, p<.0001) staffing was associated with a .36 PP decline in pressure ulcers, while LPN (β=.33, p<.05) staffing was associated with a .33 PP increase. Higher proportions of both Medicare (β=.05, p<.0001) and Medicaid (β=.02, p<.0001) were associated with a small, yet statistically significant increase in pressure ulcers, .05 PP and .02 PP respectively.

Finally, a decline in urinary tract infections by 1.11PP was associated with NQAP award receipt (β=-1.11, p<.05). Other variables which significantly affected and were associated with a better performance on quality on the pressure ulcer measure included chain membership (β=.49, p<.0001) and the percentage of Medicaid residents (β=-.02, p. <0001).

While the other outcomes of interest were not statistically significant, the relationships were in the expected direction and many were approaching significance. Parameter estimates for regression model coefficients are provided in Table 5 for short-stay measures and Table 6 for long-stay measures including covariates. Each regression also included time and state dummy variables. Due to size, coefficients for time and state dummy variables are provided in Appendix B (short stay measures) and Appendix C (long-stay measures).

Table 5. Pooled OLS Regression Results Examining Short-Stay Quality Measures of Silver and Gold Awardees (2010-2015)[1]

	Antipsychotic Medication		Influenza Vaccination		Pain		Pressure Ulcers		Pneumonia Vaccination	
	Coefficient	S.E.	Coefficient	S.E.	Coefficient	S.E.	Coefficient	S.E.	Coefficient	S.E.
Win=1[2]	-.25	(.60)	.28	(1.31)	-1.01	(.76)	-.55	(.40)	1.29	(1.23)
Acuity index	-.05	(.04)	-.11	(.08)	-.12	(.05)*	.05	(.03)*	.11	(.08)
Psychiatric dx (%)	3.14	(.36)***	-3.02	(.67)***	.64	(.44)	.64	(.22)*	-2.80	(.68)***
Total beds	-.00	(.00)***	-.01	(.00)***	-.00	(.00)	-.00	(.00)*	-.00	(.00)*
Occupancy	-.00	(.00)	.02	(.01)*	-.02	(.01)*	-.00	(.00)	.04	(.01)***
Profit status	.14	(.14)	-1.87	(.27)***	.14	(.17)	-.20	(.08)*	-1.81	(.27)***
Chain	-.43	(.12)**	-2.39	(.23)***	-.00	(.15)	-.40	(.08)***	-1.71	(.24)***
Medicaid	.02	(.00)***	-.11	(.00)***	.04	(.00)***	.01	(.00)*	-.15	(.01)***
Medicare	-.03	(.01)***	.04	(.01)*	.00	(.00)***	-.01	(.00)*	.10	(.01)***
CNA HPRD[3]	-.16	(.09)	1.55	(.17)***	-.52	(.11)***	-.07	(.05)	1.66	(.17)***
LPN HPRD[3]	-.18	(.17)	-.32	(.34)	2.29	(.22)***	.08	(.11)	.02	(.34)
RN HPRD[3]	-.15	(.22)	.90	(.43)*	1.89	(.27)***	-.08	(.14)	2.03	(.43)***
Herfindahl Index	.23	(.37)	5.04	(.69)***	-.78	(.45)	.64	(.23)*	3.66	(.69)***
HHA[4]	.00	(.00)	-.01	(.00)***	-.00	(.00)	-.00	(.00)	-.01	(.00)***
Metro	-.16	(.17)	-2.07	(.32)***	.30	(.21)	-.05	(.11)	-2.29	(.33)***
Per capita income	.01	(.01)	-.05	(.01)**	-.06	(.00)***	.00	(.00)	-.06	(.01)***
Population 65+	.00	(.00)	-.00	(.00)*	-.01	(.00)***	.00	(.00)	-.00	(.00)
Intercept	9.53	(.96)***	90.66	(3.08)***	16.51	(1.19)***	6.27	(.62)***	71.42	(1.87)***

Notes: *=p-value<.05**= p=value<.001; ***=p-value <.0001; [1] supplemental coefficient reporting for time and state dummy variables contained in Appendix B; [2] coefficients reported for NQAP award winners only; [3] HPRD=hours per resident day; [4] HHA=Home Health Agencies

Table 6. Pooled OLS Regression Results Examining Long-Stay Quality Measures of Silver and Gold Awardees (2010-2015)[1]

	ADL Decline		Antipsychotic Medication		Falls		Incontinence		UTI	
	Coefficient	S.E.	Coefficient	S.E.	Coefficient	S.E.	Coefficient	S.E.	Coefficient	S.E.
Win=1[2]	-1.03	(1.90)	-.73	(.69)	-.30	(.33)	-.10	(1.28)	-1.11	(.39)*
Acuity index	0.25	(0.12)*	- .70	(.05)***	-.05	(.17)**	2.42	(.09)***	.28	(.03)***
Psychiatric dx (%)	-.75	(.98)	20.75	(.37)***	.50	(.17)**	-8.65	(.71)***	-.17	(.20)
Total beds	-.09	(.00)***	.00	(.00)	-.00	(.00)	.01	(.00)***	-.00	(.00)***
Occupancy	-.37	(.01)***	-.02	(.01)***	.00	(.00)	.03	(.01)	-.01	(.00)***
Profit status	-1.11	(.40)**	.75	(.15)***	-.21	(.07)*	-1.85	(.30)***	-0.02	(.08)
Chain	-2.37	(0.36)***	-.43	(.13) **	.01	(.06)	1.28	(.26)***	-.49	(.07)***
Medicaid	-.06	(.01)***	.06	(.00)***	-.02	(.00)***	-.12	(.01)***	-.02	(.00)***
Medicare	.30	(.02)***	-.02	(.00)*	.00	(.00)	.03	(.02)	.05	(.00)***
CNA HPRD[3]	0.26	(.26)	-.13	(.10)	.07	(.04)	.60	(.20)*	.29	(.05)***
LPN HPRD[3]	2.08	(.53)***	-.69	(.19)**	-.10	(.09)	1.09	(.39)*	.43	(.11)***
RN HPRD[3]	5.50	(.69)***	-1.85	(.25)***	-.01	(.12)	2.52	(.54)***	-.13	(.14)
Herfindahl Index	1.85	(1.00)	-.02	(.37)	.35	(.17)*	-3.49	(.76)***	.90	(.21)***
HHA[4]	-.01	(.03)	.00	(.00)***	-.00	(.00)	-.00	(.00)	-.00	(.00)*
Metro	.15	(.48)	.52	(.18) *	-.25	(.08)	1.27	(.36)**	.27	(.10)*
Income	.07	(.02)**	-0.02	(.01)***	-.00	(.00)	.00	(.01)	-.02	(.00)**
Population 65+	.00	(.00)	.00	(.00)	-.00	(.00)	.00	(.00)	-.00	(.00)
Intercept	54.74	(2.84)***	25.11	(1.04)***	9.63	(.48)***	3.94	(2.18)	7.49	(.59)***

Notes: *=p-value<.05**= p=value<.001; ***=p-value <.0001; [1] supplemental coefficient reporting for time and state dummy variables contained in Appendix B; [2] coefficients reported for NQAP award winners only; [3] HPRD=hours per resident day; [4] HHA=Home Health Agencies

Table 6. Pooled OLS Regression Results Examining Long-Stay Quality Measures of Silver and Gold Awardees (2010-2015) Continued[1]

	Weight Loss		Pressure Ulcers		Physical Restraints		Catheter		Depression	
	Coefficient	S.E.	Coefficient	S.E.	Coefficient	S.E.	Coefficient	S.E.	Coefficient	S.E.
Win=1[2]	-.34	(.35)	-1.92	(.54)**	-.58	(.36)	-.97	(.32)*	-1.38	(1.26)
Acuity index	.13	(.02)***	.10	(.04)*	.20	(.02)***	.13	(.02)***	-.29	(.08)**
Psychiatric dx (%)	-.26	(.18)	.67	(.31)*	.77	(.19)***	-.21	(.17)	4.08	(.64)***
Total beds	-.00	(.00)	-.00	(.00)***	-.00	(.00)	.00	(.00)	-.03	(.00)***
Occupancy	-.00	(.00)**	-.05	(.00)***	-.00	(.00)	-.01	(.00)***	-.15	(.01)***
Profit status	-0.06	(.07)	.32	(.12)*	.04	(.08)	.20	(.07)**	.21	(.27)
Chain	.05	(.07)	-.32	(.11)*	-.21	(.07) *	-.03	(.06)	-1.78	(.23)***
Medicaid	-0.02	(.00)***	.02	(.00)***	.01	(.00)***	-.00	(.00)	-.03	(.01)***
Medicare	.04	(.00)***	.05	(.01)***	.02	(.00)***	.04	(.00)***	.08	(.01)***
CNA HPRD[3]	.11	(.05)*	-.37	(.08)***	.05	(.05)	-.13	(.04)*	.26	(.17)
LPN HPRD[3]	-.03	(.10)	.37	(.16)*	.27	(.10)*	.60	(.09)***	.28	(.35)
RN HPRD[3]	-.24	(.13)	.31	(.21)	.11	(.13)	.88	(.12)***	1.63	(.45)**
Herfindahl Index	.29	(.18)	-.11	(.31)	.52	(.19)*	.40	(.17)*	1.71	(.66)*
HHA[4]	.00	(.00)	.00	(.00)	-.00	(.00)*	.00	(.00)	-.01	(.00)**
Metro	.06	(.08)	.19	(.15)	-.01	(.09)	-.05	(.08)	.04	(.32)
Income	.00	(.00)	-.00	(.01)	-.01	(.00)***	-.12	(.00)***	.01	(.01)
Population 65+	-.00	(.00)*	.00	(.00)**	.00	(.00)*	-.00	(.00)	.00	(.00)*
Intercept	11.32	(.52)***	14.68	(.88)***	3.78	(.53)***	6.27	(.48)***	23.19	(1.85)***

Notes: *=p-value<.05**= p=value<.001; ***=p-value <.0001; [1] supplemental coefficient reporting for time and state dummy variables contained in Appendix B; [2] coefficients reported for NQAP award winners only; [3] HPRD=hours per resident day; [4] HHA=Home Health Agencies

Table 6. Pooled OLS Regression Results Examining Long-Stay Quality Measures of Silver and Gold Awardees (2010-2015) Continued[1]

	Anxiety/Hypnotic Medication		Pain		Influenza Vaccination		Pneumonia Vaccination	
	Coefficient	S.E.	Coefficient	S.E.	Coefficient	S.E.	Coefficient	S.E.
Win=1[2]	-2.21	(1.48)	-2.09	(.52)***	1.23	(.82)	1.04	(.76)
Acuity index	-.16	(.16)	.05	(.03)	-.12	(.05)*	.04	(.05)
Psychiatric dx (%)	15.49	(1.06)***	.65	(.27)*	1.15	(.38)*	1.37	(.39)**
Total beds	-.00	(.00)*	-.00	(.00)***	-.01	(.00)***	-.01	(.00)***
Occupancy	-.00	(.02)	-.01	(.00)**	.01	(.01)	.03	(.01)***
Profit status	.16	(.43)	-.54	(.11)***	-.96	(.16)***	-1.48	(.16)***
Chain	.33	(.39)	.23	(.10)*	-1.58	(.14)***	-1.39	(.14)***
Medicaid	.01	(.01)	.01	(.00)***	-.01	(.00)*	-.03	(.00)***
Medicare	.08	(.02)**	.01	(01)	-.04	(.00)***	-.02	(.01)*
CNA HPRD[3]	.05	(.28)	-.14	(.07)*	.72	(.10)***	.93	(.10)***
LPN HPRD[3]	.87	(.55)	.72	(.15)***	-.72	(.20)**	-.65	(.21)*
RN HPRD[3]	3.01	(.68)***	.67	(.19) **	-.22	(.27)	.43	(.27)
Herfindahl Index	.13	(1.12)	-.04	(.28)	2.66	(.38)***	2.18	(.40)***
HHA[4]	.00	(.00)	-.00	(.00)*	-.00	(.00)***	-.00	(.00)***
Metro	-1.20	(.53)*	-.31	(.13)*	-1.33	(.19)***	-1.44	(.19)***
Income	-.04	(.02)*	-.04	(.01)***	-.01	(.01)	-.03	(.00)**
Population 65+	-.00	(.00)	-.00	(.00)*	-.00	(.00)	-.00	(.00)
Intercept	25.26	(3.08)***	13.46	(.80)***	97.86	(1.86)***	78.10	(1.12)***

Notes: *=p-value<.05**= p=value<.001; ***=p-value <.0001; [1] supplemental coefficient reporting for time and state dummy variables contained in Appendix B; [2] coefficients reported for NQAP award winners only; [3] HPRD=hours per resident day; [4] HHA=Home Health Agencies

Discussion

Findings partially support our hypotheses of NQAP award recipients would have better performance on the 19 publicly reported NHC quality measures analyzed. Building upon prior work examining the NQAP award recipients, this study demonstrates deployment of Baldridge principles to improve processes may assist NHs in achieving better quality outcomes. While these findings are promising, based upon the analyses conducted, we cannot tease out exactly what was done within the individual NHs to achieve better quality outcomes.

Consistent with Porter's product differentiation conceptual framework, NQAP award recipients were mostly for-profit and members of a chain. Therefore, we believe NHs, which applied for and won the award were doing so in order to differentiate their organization based upon quality. Implementing the Baldridge principles contained within the Healthcare Criteria requires tremendous commitment and resources. For-profit chains likely have more resources to devote leadership and staff time to develop, implement, and oversee process improvement efforts, which their nonprofit counterparts may not. Therefore, chain membership may alleviate some of the pressure NHs experience by sharing best practices with other affiliates.

It does not come as a surprise that not all quality measures of interest were significant. First, Moreover, improving processes does not necessarily change publicly reported outcomes (Werner, Konetzka, & Kim, 2013 2013). Second, within our sample, there were 337 Silver and 14 Gold level awardees. Scoring guidelines for the NQAP award do not require improvements on resident outcomes until the Gold level. At the Silver level, awardees must demonstrate they have begun to develop effective, systematic processes to improve quality outcomes. Importantly, award applicants define which outcomes are important to them in their organizational profile and

those outcomes are the focus of the process improvement efforts they report on. While it is easy

to assume NHs would want to improve on publicly reported measures like NHC, outcomes can

be anything the organization deems important (e.g., employee retention, market results).

Therefore, awardees within our sample could potentially have selected outcomes to center

process improvements around which are not contained within this study. For example,

interviews with providers in a study by Perraillon & colleagues (2017) suggest maximizing

revenue and litigation avoidance often overshadows goals of performing well on NHC quality

measures.

In our sample, Florida NHs represented 13% of the NQAP award recipients followed by

Massachusetts (n=28 or 8%) and Ohio (n=25 or 7%). A common thread among the three of the

four statistically significant models was staffing for CNAs. Yet, CNA staffing levels among

awardees and control groups were not statistically different with awardees averaging 2.57 HPRD

and the control groups averaging 2.56 HPRD. Therefore, we speculate process improvement

resulting from deployment of the Baldridge principles may have influenced award recipients to

use CNA staffing more effectively resulting in better resident outcomes. This may be due to

better strategic planning, alignment of strategic objectives and goals and the creation of effective

action plans and monitoring. Another factor may be the NQAP award recipients have found a

way to engage its CNA workforce to operate more effectively. A key Baldridge principle within

the Healthcare Criteria is assessment of all workforce segments. NH participants not only assess

core competencies of staff members and needed changes in health service offering requirements;

they are also required to assess how they manage workforce engagement. In other words, how

does the organization get "buy in" from its workforce to effectively carry out the organization's

mission. CNA staffing turnover is a major challenge among the NH workforce and has been

shown to have a negative association with NH quality (Castle, 2005, 2006). While we do not assess turnover specifically within the framework of this study, it may be an important topic to explore. This would allow further insight into why NQAP award recipients have better outcomes despite similar levels of CNA staffing.

Limitations

While this study provides important insight on the relationship between NQAP award receipt and publicly reported NHC quality measures, it is not without limitations. First, only members of AHCA/NCAL are eligible to apply for the NQAP award. We attempted to mitigate this issue by constructing annual control groups, which consisted of NHs which would also have been eligible to apply for the award if they were members. Approximately, 9,000 NHs are members of AHCA/NCAL and we did not have information on whether or not the NHs within the annual control groups were, in fact members or just higher performing NHs as defined by ACHA/NCAL's criteria for award eligibility.

Second, Bronze level award recipients were not included in this study. Given the criteria required to win a Bronze level award requires only completion of an organizational profile, it was not expected that Bronze level awardees were not expected to have implemented process improvements. Sensitivity analyses confirmed the method used in this study was appropriate. However, future work should examine whether differences exist between this group, awardees at the Silver or Gold level, and other NHs across the nation.

Examination of statistically significant facility characteristics (Table 2) suggest NQAP award winners and the annually constructed control groups had meaningful differences (e.g., profit status, occupancy, resident acuity) which likely led to the insignificant findings. While this study was exploratory in nature, future work should consider alternative matching methods such

as propensity score matching which would allow pairing based upon specified covariate values. Ultimately, this technique may provide a more balanced comparison.

Another limitation to the study is secondary data was utilized. Given the OSCAR/CASPER data elements contained within the AHCA analytic database are not collected for research purposes but rather serve as a function for administrative purposes, its validity for assessing NH quality has been questioned. Despite criticism, the data are widely relied upon within the literature examining NH quality and remains the best source of information for research purposes. Additionally, during the study period, the OSCAR was replaced with CASPER, which captures activity on a continual basis rather than a one point in time. While this change provides more accurate reporting from annual surveys, our analysis does not account for this change. Therefore, we have no way of knowing whether this change in data collection had an impact on our findings.

Finally, due to confidentiality requirements, this study does not include information on NHs, which applied for the award and were unsuccessful. A direct comparison between NQAP award winners and unsuccessful applicants may provide additional insight related to operational differences. Despite these limitations, this study establishes a positive relationship between NQAP award recipients and publicly reported NHC quality measures, suggesting deployment of Baldridge Principles may serve as a mechanism to guide quality improvement efforts.

Conclusion

This study is the first to examine the association between NHC quality measures and NHs which have won the AHCA/NCAL NQAP award at the Silver and Gold level during 2010-2015. Given the move toward value based healthcare reimbursement, it is important to understand how NHs can improve resident outcomes and this work provides additional insight into how an

association sponsored award process may guide quality improvement efforts. Given the systems based Big "Q" approach utilized in the Healthcare Criteria, further analysis is warranted to examine individual categories within the framework to determine what is driving higher quality outcomes.

In light of the new regulatory requirements within the ACA, the focus on quality improvement in NHs is shifting from quality assurance (regulatory compliance) to performance improvement (continual assessment). The Healthcare Criteria provides a comprehensive framework and roadmap for NHs to assess organizational performance, identify opportunities for improvement, develop processes to improve performance, and to utilize systematic, fact-based approaches to assess progress, all of which are essential elements of continual performance improvement. Therefore, understanding how the Healthcare Criteria can guide quality improvement in NHs is beneficial to providers, stakeholders, and the residents NHs serve.

Study 1 Implications

While this study provides insight as to how winning a AHCA/NCAL NQAP award may guide quality improvement, it also explicates a broader policy issue. As specifically designed, the NHC website produces quality information on all NHs certified to receive reimbursement from Medicare and Medicaid. The tool provides consumers the opportunity to make an educated choice when choosing a NH. However, findings within this study suggest NHC quality measure outcomes may provide a limited picture of overall quality. While resident outcomes are of extreme interest to NHs for reimbursement, they may not be of the utmost import to consumers.

Recognizing the complexity of NH care, NHs which participate in the NQAP award are required to focus on all aspects of their business, including leadership, workforce, knowledge assets, suppliers, etc. Each of these components have the capacity to improve the quality of

care; however, improvements or excellence in any of these other areas cannot be revealed from a simple search on NHC. Other work in this area also suggests providers may manipulate quality ratings through coding changes wherein no real impact occurs on resident outcomes. Therefore, this study speaks to the need for refinement of NHC as a consumer-focused tool as it may not provide a complete picture of NH quality.

CHAPTER 3: THE NATIONAL QUALITY AWARD PROGRAM: IS AWARD STATUS ASSOCIATED WITH BETTER FINANCIAL PERFORMANCE?

Introduction

Nursing homes (NHs) provide long term care services and supports to approximately 1.4 million individuals, predominantly age 65 and over (Kaiser Family Foundation, 2017). The government, through Medicare and Medicaid, pays for approximately 57% and 14% respectively, of the care delivered in the NH setting(American Health Care Association, 2018). Projections suggest a rising demand of post-acute care and an increasing complexity of resident care needs over the next two decades (Centers for Medicare and Medicaid Services, 2010). However, changes in reimbursement over the past two decades have forced NHs to operate with limited resources. Previous research suggests lower efficiency may be instigated by reductions in revenue (Zhang, Unruh, & Wan, 2007). Ultimately, the financial performance of NHs is impacted by the organization's ability to control costs and to generate new revenue. Therefore, it is important to understand how NHs can operate efficiently, with fewer resources, and maintain the quality of care delivered to residents.

Pursuant to the Balanced Budget Act of 1997 (BBA), NHs receive Medicare reimbursement under a Prospective Payment System (PPS) in which a predetermined, fixed per diem amount is paid for services and adjusted for individual NH case mix (i.e., acuity of individual residents) based upon a diagnostic related groups classification system (Medicare Learning Network, 2015). The BBA also afforded states the right to set Medicaid reimbursement rates, a cost shared by states and the federal government. Despite efforts to improve efficiency, research findings suggest provider

reports of financial instability (United States General Accounting Office, 2002) and a negative impact on overall quality (Konetzka, Norton, & Kilpatrick, 2004; Unruh, Zhang, & Wan, 2006).

Utilization of quality improvement methodology in the NH setting has been scarce and leadership's knowledge of such methods is limited (Smith, Castle, & Hyer, 2012). However, a comparison of financial performance among hospitals recognized as a Top 100 Hospital® by Thomas Reuters and hospitals receiving a MBQNA suggested award recipients may experience a higher adjusted profit margin (Foster & Chenoweth, 2011). Hospital leadership has also suggested a reliance on Baldridge principles to adjust strategic plans related to competition, markets and the economy (Shook & Chenoweth, 2012).

Examining financial performance and stability is a key component of the Healthcare Criteria. As such, NHs are required to address outputs to both external and internal customers. Within the framework of this study, senior leadership and shareholders serve as customers who are interested in the financial well-being of the organization. Regardless of profit status, NHs strive to increase revenue and lower costs. However, operational differences exist between nonprofit and for-profit NHs due to their overarching mission. Nevertheless, the Healthcare criteria warrants a high level of senior leadership commitment by linking available resources to strategic goals, in order to promote financial success (Leonard & McGuire, 2007).

Industry based association memberships, such as AHCA/NCAL, are often a mechanism deployed by an organization to differentiate itself against competitors. Further, participation in a trade association often affords members access to both tangible (information, services, products) and intangible benefits (e.g., common purpose, networking). To date, no research has explored the relationship between financial performance and the receipt of a NQAP award. Therefore, we

hypothesized that NQAP award receipt would be associated with more efficient financial performance at the time of winning the award.

Literature Review and Hypotheses

Financial Performance of NHs. Research on the financial performance and quality within the NH industry is mixed. Approximately 2/3 of NHs operate on a proprietary basis (Jones, 2002; Kaffenberger, 2000) and studies suggest for-profit facilities may deliver lower quality care than their nonprofit counterparts (O'Neill et al., 2003), consistent with a profit-maximization model. O'Neill and colleagues (2003) suggest for-profit NHs may not be willing to invest in quality initiatives requiring large capital investments and reduction in profit to stakeholders. Additionally, the researchers also suggest increasing proprietary profit is more likely to have an adverse impact on care quality than in a nonprofit NH. This may be due to the obligation of nonprofit NHs to reinvest any profits back into the organization which may include quality improvement initiatives (Hillmer et al., 2005). More recent analyses suggest quality outcomes and higher costs are not mutually exclusive (Weech-Maldonado et al., 2012; Weech-Maldonado et al., 2003a); (Park & Werner, 2011).

Aside from direct reimbursement, regulatory activity also has the ability to affect NH profitability. For example, one study suggested federally mandated staffing levels may negatively impact NH profitability given licensed nursing staff is the biggest expenditure (Bowblis & Brunt, 2014). Another study suggests mandated publicly reported performance measures may be linked to higher profit margins subsequent to quality improvement efforts; however, the results were only approaching significance (Park, Konetzka, & Werner, 2010).

Other factors associated with financial profitability include the racial composition of NH residents (Chisholm, Weech-Maldonado, Laberge, Lin, & Hyer, 2013), ownership by a private

equity firm (Cadigan, Stevenson, Caudry, & Grabowski, 2015) and quality of care (Weech-Maldonado et al., 2012). Previous research suggests the uncertainty of financial returns for quality improvement activities may hinder NHs from allocating already scarce resources to quality efforts (Castle et al., 2016). However, practices of management within a NH can positively impact care quality (Castle & Decker, 2011; Temkin-Greener, Zheng, Cai, Zhao, & Mukamel, 2010 Zhao & Mukamel, 2010).

Work by Weech-Maldonado and colleagues (2003) demonstrated NHs which attempted to differentiate themselves based on quality care, experienced lower patient costs and reported better overall financial performance. As such, organizations attempting to differentiate themselves from competitors through receipt of a NQAP award, may operate more efficiently and achieve better financial performance.

Within this dissertation framework, we speculate NHs, which become members of AHCA/NCAL and subsequently apply for and successfully receive a NQAP award are doing so in order to differentiate themselves within the industry based upon quality. Therefore, we hypothesized that NQAP award recipients would have higher total profit margins and higher operating profit margins as compared to a control group, as a result of systematically improving organizational processes utilized in the Healthcare Criteria.

Method: Data & Research Design

To examine the relationship between receipt of a NQAP award and financial performance, four sources of data were merged for 2008-2015. First, an analytic database from the American Health Care Association National Center of Assisted Living (AHCA/NCAL Analytic Database) was utilized. The AHCA/NCAL Analytic Database consists of key variables from the Online Survey Certification and Reporting Database (2008-2012), the Certification and Survey Provider Enhanced Reporting Database (2012-2015), average total deficiency scores by state, and identification of

NQAP award recipients (2010-2015). Variables, excluding award recipient information and average

deficiency scores by state, consisted of widely-utilized facility-level characteristics (e.g.,

operational characteristics, staffing, deficiency citations) derived from inspections which occur

every nine to fifteen months and are mandated for recertification for Medicare and Medicaid

reimbursement (Office of the Inspector General, 2001). Next, the AHCA Analytic Database was

merged with data from ltcfocus.org (LTCF). The LTCF data is a publicly available product

maintained at Brown University Center for Gerontology and Healthcare Research. The data allows

researchers to examine various resident and facility characteristics in order to carry out research in

long-term care settings (Brown University, 2016). The LTCF Data was utilized for aggregated

facility-level resident care requirements and an aggregated county-level measure of market

concentration. Third, the Area Health Resource File contains publicly available demographic

information maintained by the U.S. Health Resources and Services Administration and consists of

national county-level data on demographic and socioeconomic characteristics of markets where

NHs operate. Finally, Medicare Cost Report (MCR) data were utilized for all NHs, which had a

reporting period of at least 360 days. The MCRs are derived from annual financial data submitted

by all NHs certified to receive reimbursement from the CMS. The reports contain information on

individual facility characteristics, utilization, costs, and charges and is publicly available for use by

researchers. While the quality of this data has been questioned (Kane & Magnus, 2001), the MCR

data remain the most practicable option to assess NH financial performance and has been widely

relied upon (Bowblis, 2011a; Chisholm et al., 2013; Weech-Maldonado et al., 2012).

These data sources were merged to create a dataset from 2011-2015 with a three-year

lookback to compare NQAP award recipients and annually constructed control groups of NHs,

which met the eligibility requirements to apply for a NQAP award. Construction of the annual control groups is described below.

Measures

Dependent Variables. To examine NH profitability, two main dependent variables were utilized. First, *operating profit margin* was calculated. Based upon previous work, this measure has been utilized to assess financial performance of NHs (e.g.,Weech-Maldonado et al., 2012; Weech-Maldonado et al., 2003a) in order to understand NH profit margins without the influence of non-operating revenue (e.g., charitable contributions, earned interest). The analysis of the operating profit margin assesses operational efficiency (Weech-Maldonado et al., 2012) and focuses solely on core business operations (Gapenski, 1999). As such, *operating profit margin* was calculated as:

[Operating profit margin= (net patient revenue-operating cost)/ net patient revenue]

To calculate *net patient revenue*, contractual allowances and discounts was deducted from total patient revenues. Expenses directly attributable to patient revenues was then summed and treated as operating costs.

Second, total profit margin was examined which has been used in previous studies assessing the financial performance of NHs (Weech-Maldonado et al., 2003a). Total profit margin is an overall measure of financial performance, which includes all expenses (operating, non-operating) and revenues (operating and non-operating) and was calculated as follows:

[Total profit margin = net income/ total revenue]

To gain a full understanding of the underlying components of NH financial performance, operating revenue per patient-day and operating costs per patient day were also included. To understand revenue accrued based upon services provided to residents, operating revenue per patient-day was calculated as follows:

[Operating revenue per patient day=operating revenues/ total patient days]

In order to understand expenses accrued based solely upon services provided to residents, operating costs per patient day was calculated as follows:

[Operating costs per patient day= operating costs/total patient days]

Independent Variables. A dichotomous independent variable, *awardee*, was created from the AHCA analytic database and utilized to evaluate the relationship between receipt of a NQAP award at the Silver or Gold level (0=no award; 1=award at the Silver or Gold level) and NH quality. NHs at the Bronze level are deemed to be just beginning their quality journey and are not required to demonstrate use of systematic processes to improve quality. Similar to the work of Castle and colleagues (2016), the subsequent analysis includes only Silver and Gold level awardees. Bronze level awardees were however eligible for inclusion in the annually constructed control groups.

Covariates. A total of sixteen control variables deemed to have an influence on the quality of NH care were included. First, to account for resident case mix and individual needs of NH residents, we controlled for *resident acuity.* Created by the Cowles Group(2002), the acuity index combines unique treatment needs of NH residents and activities of daily living dependencies on a scale ranging from 0 (*low need*) to 38 (*high need*). Derived from the OSCAR/CASPER data, the acuity index is widely utilized in NH quality literature (Grabowski et al., 2016 et al., 2017; Hyer et al., 2011 Harman, et al., 2011). We also controlled for the percentage of NH residents with a *psychiatric diagnosis* as previous research suggest individuals with psychiatric related needs are often admitted to lower quality NHs (Li et al., 2013).

Facility characteristics deemed to have an impact on quality were also included. Specifically, previous research has suggested larger facilities may have the ability to restructure staffing resources, potentially influencing quality. To account for this, a measure of size, *total*

number of beds was included. Additionally, the occupancy rate of a NH is commonly utilized as a

proxy measure for performance (Zinn et al., 2009). Therefore, *occupancy* was also included. Profit

status is also associated with quality and previous findings have suggested for-profit NHs deliver

poorer quality of care than their nonprofit counterparts (Hillmer et al., 2005). Therefore, we

controlled for *profit status* (0=no, 1=yes). Chain affiliation has been shown to be related to quality

(e.g., Banaszak-Holl et al., 2002; Castle & Fogel, 1998; Harrington et al., 2001), albeit findings

have been mixed. Therefore, the variable *chain membership* (0=no, 1=yes) was be controlled for.

We also controlled for whether or not a NH was situated in a *metropolitan area* (0=no; 1=yes) area

given NHs which operate in urban areas may have access to better staffing pools and may

fundamentally address quality concerns differently. Payer source has also been found to be

associated with NH quality. For example, research suggests a higher proportion of Medicaid

residents is associated with lower quality (Mor et al., 2004) while a higher proportion of Medicare

is associated with higher quality (Kim, Harrington, et al., 2009); therefore, we control for the

proportion of Medicaid resident and the *proportion of Medicare residents*. A plethora of studies

have demonstrated a relationship between direct care staffing levels and the quality of care (Castle,

2008; Harrington, Kovner, et al., 2000; Harrington et al., 2012; Hyer et al., 2011). Therefore, three

staffing measures were also controlled for including *RN total hours per resident day*, *LPN total

hours per resident day*, and *CNA total hours per resident day*. For example, RN staffing hours per

resident day was calculated as $RN\ HPRD = (((RN_{FT} + RN_{PT}) * 2080)/365)/total\ residents)$.

The same method was used to calculate LPN HPRD and CNA HPRD.

     Previous research examining quality suggests the market structure and operating

environment within which a NH operates has the potential to influence quality strategies. Therefore,

we included a measure of market concentration, *Herfindahl-Hirschman Index*, as well as the

number of adults 65+ within the county, and *per capita income* by county as covariates in our final

models (Castle et al., 2016 & Hansen, 2016; Hyer et al., 2013; Hyer et al., 2011). We also

controlled for the *number of home health agencies* within the county the NH operates. Home health

agencies offer a substitution for NH care and may be an option for residents who require lower care

absent quality NH options.

Previous work has suggested states may differ on the deficiencies they emphasize during the

survey process (Castle & Ferguson, 2010). Therefore, we constructed 47 state dummy variables

(0=no; 1=yes) to control for state variation in the survey certification process using Alabama as the

reference group. Finally, six dummy variables were created for time signifying which year the

sample was being evaluated in (e.g., Sample_2010, Sample_2011). Operational definitions of

covariates utilized in subsequent analyses are contained within Table 7.

Table 7. Operational Definitions of Study 2 Covariates.

Variable	Definition
Acuity index	Level of resident care required
Psychiatric diagnosis	% of residents with psychiatric diagnosis
Total beds	Total number of beds
Occupancy	number of residents/number of beds
Profit status	For profit status (0=no; 1=yes)
Chain	Member of a chain (0=no; 1=yes)
Medicaid	Proportion of Medicaid residents
Medicare	Proportion of Medicare residents
CNA HPRD	Hours per resident day of certified nursing assistant time
LPN HPRD	Hours per resident day of licensed nurse time
RN HPRD	Hours per resident day of registered nurse time
Herfindahl Index	Measure of market concentration
Home health agencies	# of home health agencies by county
Metro	Located in a metropolitan area (0=no; 1=yes)
Per capita income	Per capita income by county/$1,000
Population 65+	Proportion of population over 65 by county/1,000
Sample_(Year)	Time dummy variables signifying year of study period (2011-2015)
State	46 state dummy variables (0=no; 1=yes)

Sample Construction

Annually constructed control groups were created to examine the association between winning a NQAP award and financial performance. NHs were selected based upon eligibility to apply for the NQAP award. Key variables in the AHCA analytic database were analyzed to determine eligibility for inclusion in the control groups by examination of non-compliance with approximately 180 regulatory standards. Deficiency citations resulting from non-compliance were then assessed on two dimensions including scope (how many residents are affected) and severity (likelihood of harming residents). Scope is trichotomized into isolated, a pattern, or a widespread practice. Severity has four categories (no harm, no harm and potential for minimal harm, actual harm, and immediate jeopardy requiring immediate corrective action).

Within this study, total deficiency scores were calculated pursuant to the methodology utilized by AHCA/NCAL for the NQAP by assigning points for individual deficiencies and their respective scope/severity (A-M). Explicitly points were assigned as follows: A=1, B=2, C=3, D=4, E=5, F=6, G=7, H=8, I=9, J=10, K=11, L=12, M=13. Then, all NHs, which had a deficiency with a scope/severity above "I", were removed from the sample.

Finally, NHs with three total deficiency scores less than their respective state's average score for three years prior to winning the award were included in the control group. For example, when constructing the control group for comparison to award winners in 2011, data from annual surveys from 2008-2010 were used and total deficiency scores were calculated. If a NH's total deficiency score was lower than their state's average for each of the years within the lookback period (2008-2010), the NH was included in the control group for 2011. This process was repeated for each year of the study period.

The number of NHs included in the annually constructed control groups varied across the study period creating a non-stationary panel dataset. Award recipients were excluded from the control groups regardless of the year being analyzed. A total of 11,960 unique NHs were included in the annually constructed control groups over the study period.   Final count information on the NQAP award recipients and annually constructed control groups can be found in Table 8.

Table 8. Annually Constructed Control Group Counts

	Award Recipients		
Year	**Silver**	**Gold**	**Control Group**
2011	29	1	7,680
2012	46	2	7,352
2013	51	4	7,583
2014	75	3	8,308
2015	77	3	5,307

The final sample was then limited to NQAP award recipients and controls with a fiscal year beginning in January of the year of interest if the NH reported at least 360 days within the fiscal year. For example, a NH application for an award would be submitted by January; however, applicants are not notified of award receipt until June of the same year. Given the purpose of this study was to examine whether or not process improvements NHs undergone in order to win the NQAP award resulted in better financial performance, this fiscal period was used as it would likely reflect financial benefits which may be realized subsequent to process improvements.

Other data cleaning consisted of removing hospital-based NHs from the sample given hospital-based NHs receive higher reimbursement and are able to staff at higher levels (Harrington et al., 2001). Therefore, resource differences may influence the quality of care delivered. NHs with less than 30 beds or more than 800 beds were also omitted from the control group due to operational differences. Additionally, staffing outliers were trimmed pursuant to guidelines by Harrington and colleagues (Harrington et al., 2012), and NHs with greater than 24 hours per resident day and total

staffing greater than three standard deviations above the mean were considered outliers and removed from the sample.

In order to trim outliers from the MCRs, the cost and revenue variables were winsorized by omitting values which were in the lowest 1st percentile or top 99th percentile (Bowblis, 2015) A final sample of 291 NQAP awardees were utilized in subsequent analyses. A final sample of 38,809 observations were included in subsequent analyses.

Analyses

The empirical models estimated the relationship between receipt of a NQAP award and four measures of financial performance. Using the NH year as the unit of analysis, pooled ordinary least squares (OLS) regression analyses were deployed and modeled as follows for each of the four outcome measures:

$$FP_{it} = W_{it}\alpha + X_{it}\beta + \delta i + \tau_t + \varepsilon_{it}$$

Where *FP* is equal to the expected value of the dependent variable (e.g., total profit margin, operating profit margin), *W* represents a dichotomous variable signifying NQAP award receipt (0=no; 1=yes) and *X* represents county-level covariates (e.g., per capita income, population 65+). Additionally, δ represents time-invariant facility-level characteristics (e.g., profit status, chain membership) and *T* is equal to a set of time dummy variables (e.g., sample2010, sample2011…sample2015) which signify the year of analysis. As modeled, the analyses assume the effect of winning the award (*W*) and the individual covariates added into the model are stable over the study period.

Given the nonstationary sample of NQAP recipients and annually constructed control groups across the study period, OLS pooled regression is more efficient and produces coefficients which depict the average relationship between the dependent and independent variables over the cross

sections within the study period(Phillips & Moon, 1999). A Hausman specificity test verified the method was appropriate (Hausman, 1978).

Results

During the study period (2011-2015), there were 291 NQAP awardees, which received an award at the Silver or Gold level. Annually constructed control groups based upon NQAP award eligibility ranged from 5,307 to 8,308 thousand per annum. There were 11,960 unique NHs included in the annually constructed control groups and inclusion was not restricted by year. Therefore, NHs may serve as controls during multiple years across the study period.

Within the study sample, award recipients were mostly for-profit (82%), members of a chain (83%) and over half (65%) were located in a metropolitan area. On average, NQAP award recipients had lower average deficiency scores (M=19.19, SD=9.20) than the annually constructed control groups (M=29.82, SD=9.01) and the national sample (M=31.44, SD=40.27). NQAP award recipients had on average higher total profit margins (M=.010, SD=.037) than the control groups (M=.003, SD=.162) and better operating profit margins (M=.001, SD=.197) compared to control groups (M=-.080, SD=1.141). Descriptive statistics for award recipients, annually constructed control groups, and national comparison data are provided in Table 9.

Table 10 provides parameter estimates for the model regression coefficients. Regression models examining total profit margin and operating profit margin did not support our hypothesis that NQAP award recipients would experience better financial outcomes. However, examination of operating costs PPD, while not significant, suggests an inverse relationship between winning a NQAP award and costs. Additionally, the relationship between receipt of an NQAP award and revenue, while not significant, suggested a positive relationship.

Table 9. Descriptive Statistics for Study 2.

Variable	National (n= 15,120)		NQAP Recipients (n=291)		Group Mean Difference Control (n= 36,518)[1]		95%	t	
Dependent Variables	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**CI**	**(χ^2)**	**df**
Operating revenue PPD[2]	179.232	75.431	264.740	89.113	261.944	196.322	-17.34, 9.21	.60	215.54
Operating costs PPD[2]	185.463	89.761	259.791	88.40	276.118	234.654	2.87, 28.15	2.42*	238.14
Total profit margin	.007	.198	.010	.037	.003	.162	-0.01, -0.00	-3.03*	234.96
Operating profit margin	-.624	13.721	.001	.197	-.080	1.141	-.11, -.05	-5.12***	279.11
Covariates									
Acuity index	11.68	1.47	12.087	1.031	11.594	1.517	-.28, -.04	-2.61*	302.08
Psychiatric diagnosis (%)	.30	.19	.293	.172	.299	.187	-.02, .02	.10	28211
Total beds	116.06	62.69	114.687	48.056	113.710	61.397	-6.11, 5.07	-.18	300.01
Occupancy	.82	.16	86.610	10.835	82.589	14.664	-5.29, -2.76	-6.28	301.22
Profit Status	73%	---	82%	---	69%	---	---	24.01***	1
Chain Membership	55%	---	83%	---	57%	---	---	82.55***	1
Medicaid (%)	.61	.21	61.782	17.099	60.751	20.971	-2.92, 1.05	-.93	299.08
Medicare (%)	.14	.12	16.645	11.784	13.962	11.768	-4.00, -1.28	-3.82***	28211
CNA HPRD[3]	2.55	.74	2.605	.538	2.567	.722	-.10, .02	-1.28	301.14
LPN HPRD[3]	.91	.39	.837	.327	.912	.375	0.38, .11	3.97***	297.86
RN HPRD[3]	.48	.34	.570	.308	.511	.330	-.11, -.03	-3.79***	28211
Herfindahl Index	.62	.33	.296	.322	.279	.306	-.15, -.07	-5.77***	286.82
Home health agencies	3.75	24.45	20.196	77.196	25.767	92.287	-4.80, 13.73	.95	355.86
Metro	28%	---	65%	---	62%	---	---	7.54*	1
Income	37.62	10.09	41.927	13.043	42.308	12.019	-.58, 2.44	1.22	293.42
Population 65+/1,000	13.738	39.211	56.932	127.588	42.308	12.019	16.64, 46.35	4.17***	300.61

Note: [1] Control group n represents # of observations across the study period (NHs could have served as controls in multiple years). [2] PPD=per patient day; [3] HPRD=hours per resident day.

Table 10. OLS Regression Results Examining Financial Performance of Silver and Gold Awardees (2011-2015)[1]

Variable	Total Profit Margin		Operating Profit Margin		Operating Revenue PPD		Operating Costs PPD	
	Coefficient	S.E.	Coefficient	S.E.	Coefficient	S.E.	Coefficient	S.E.
Win=1[2]	.007	(.009)	.032	(.067)	-6.543	(17.155)	-14.839	(18.002)
Acuity index	.003	(.000)**	.013	(.005)*	3.981	(1.238)**	2.549	(1.1444)*
Psychiatric dx (%)	-.009	(.006)	-.058	(.039)	16.541	(9.910)	34.061	(9.580)**
Total beds	.000	(.000)***	.000	(.000)***	-.023	(.030)	-.171	(.029)***
Occupancy	.000	(.000)***	.003	(.000)***	.215	(.135)	-.371	(.131)*
Profit Status	.013	(.002)***	.147	(.017)***	-44.741	(4.289)***	-70.545	(4.100)***
Chain	-0.01	(.002)***	.000	(.014)	11.663	(3.621)**	1.657	(3.462)
Medicaid (%)	.000	(.000)***	.009	(.000)	-1.488	(.116)***	-2.911	(.112)***
Medicare (%)	.000	(.000)***	.010	(.000)***	1.530	(.191)***	-.003	(.185)
CNA HPRD[3]	-.000	(.001)	-0.020	(.010)*	5.337	(2.631)*	11.332	(2.535)***
LPN HPRD[3]	-.003	(.003)	.013	(.020)	15.668	(5.174)*	21.904	(4.978)***
RN HPRD[3]	-.009	(.004)*	-.036	(.026)	57.436	(6.602)***	75.964	(6.496)***
Herfindahl Index	-.000	(.000)	-.000	(.000)	-12.224	(10.393)	-14.684	(9.962)
HHA[4]	.010	(.000)	-.000	(.000)	-.123	(.039)*	-.070	(.035)*
Metro	-.000	(.002)	-.004	(.019)	10.053	(4.916)*	15.594	(4.706)**
Income	-.000	(.000)	-.003	(.000)	.798	(.187) ***	1.626	(.186)***
Population 65+	.000	(.000)	-.000	(.000)	.058	(.027)*	.034	(.025)
Intercept	-.138	(.017)***	-1.15	(.120)***	207.819	30.711)***	373.354	(29.436)***

Note*=p-value<.05**= p=value<.001; ***=p-value <.0001; [1] supplemental coefficient reporting for time and state dummy variables provided in Appendix E. [2] Results are reported for award recipients only; [3] HPRD=hours per resident day; [4] HHA=Home health agencies

Discussion

Within the product differentiation conceptual framework, we expected NQAP award recipients would experience better financial outcomes when compared to other high performing NHs at the time of award. Presumably, by differentiating the organization based upon quality, an organization would be able to be more selective about its case mix and potentially charge higher prices to private pay residents. This subsidization could in theory allow them to experience better financial performance and higher profit margins. While our hypothesis was not supported, this study provides new insight into the financial environment of NQAP award winners compared to other high performing NHs.

Within our sample, NQAP award winners, on average, had higher occupancy levels, residents with higher acuity, and a slightly higher proportion of Medicaid residents. Post hoc analyses suggested a statistically significant difference in operating costs PPD between NQAP awardees ($259.79) and control groups ($276.12) which would result in an approximate $6,598 reduction in costs for a 30 day period. There were also statistically significant differences in total profit margin and operating profit margin between the two groups (see Table 8).

Assessment of all work processes is a key component of the Healthcare Criteria beginning with strategic planning for meeting customer's key requirements as well as planning for the future. Our non-significant findings may be due to the timing of the MCRs utilized for assessment. For example, we selected MCRs for the same fiscal year as the award was achieved. Given the majority of NQAP award recipients were Silver level awardees, they may have just begun to implement systematic processes to improve their organization. Therefore, any process improvements implemented may not have translated to financial impact. Future work may be benefit from

utilization of MCRs for the year after or potentially two years after award receipt to determine if there are differences in profit margins.

Historically, many believed NH quality and costs were inversely related. In other words, the more a NH invested, the better the quality. Within this study, costs of NQAP award recipients were lower and revenues were slightly higher even with comparable direct care staffing level, the highest expenditure for NHs. Therefore, deployment of Baldridge Principles may improve NH financial performance.

Limitations

While this study provides insight information relative to the financial performance of NQAP award recipients, it is not without limitations. First, our study utilized the fiscal year of award receipt to analyze financial performance. Given the majority of NQAP awardees within our sample were Silver level recipients, process improvements may not have been in effect long enough to see an impact on financial performance.

Second, only members of AHCA/NCAL are eligible to apply for the NQAP award. We attempted to mitigate this issue by constructing annual control groups, which would also have been eligible to apply for the award if they were members. Approximately, 9,000 NHs are members of AHCA/NCAL and we did not have information on whether or not the NHs within the annual control groups were, in fact members or just higher performing NHs. Second, Bronze level award recipients were not included in this study. Given the criteria required to win a Bronze level award requires only completion of an organizational profile, it was not expected that Bronze level awardees would have implemented process improvements. However, future work should examine whether differences exist between this group and national NHs.

Another limitation to the study is secondary data was utilized. Given the OSCAR/CASPER data elements contained within the AHCA analytic database is not for research purposes but rather a

function for administrative and payment purposes, its validity for assessing NH quality has been questioned. However, the data relied upon is widely utilized within the literature examining NH quality and remains the best source of information for research purposes. Additionally, during the study period, the OSCAR was replaced with CASPER, which captures activity on a continual basis rather than a one point in time. While this change provides more accurate reporting from annual surveys, our analysis does not account for this change. Therefore, we have no way of knowing whether this change in data collection had an impact on our findings.

Examination of statistically significant facility characteristics (Table 8) suggest NQAP award winners and the annually constructed control groups had meaningful differences (e.g., profit status, occupancy) which likely led to the insignificant findings. While this study was exploratory in nature, future work should consider alternative matching methods such as propensity score matching which would allow pairing based upon specified covariate values. Ultimately, this technique may provide a more balanced comparison. Additionally, the use of MCRs was limited to only those NHs who had filed a cost report for the fiscal years in questions. Additionally, financial information within the MCRs can be unreliable and include information such as negative revenues.

Finally, due to confidentiality requirements, this study does not include information on NHs, which applied for the award and were unsuccessful. A direct comparison between NQAP award winners and NH applicants would allow for a more detailed comparison on awardees and other high quality NHs. Despite these limitations, this study is the first to examine the financial performance among NQAP award recipients compared to other high performing NHs.

Conclusion

The financial performance of the NH industry has experienced instability over the past three decades. Projections suggest national health expenditures for Medicare and Medicaid are projected to increase per annum by 7.4% and 5.8% from 2017-2026 (Centers for Medicare & Medicaid

Services, 2018a). Given the increase in alternative options for long-term care (e.g., home health agencies, assisted living facilities), the acuity level of NH residents being cared for will continue to increase. While NHs with a higher proportion of Medicare and private pay residents which likely have access to more capital than their competitors (Medicare Payment Advisory Commission, 2016), NHs with a high proportion of Medicaid residents may not fare as well. An increase in Medicaid reimbursement is not likely, therefore, identifying ways to improve the efficiency and financial performance of NHs is one of great import now and increasingly so in the next two decades as baby boomers require long-term care.

Study 2 Implications

Findings from this study, while not significant in our pooled OLS Regression Models, do suggest NQAP award recipients are finding ways to reduce costs and increase revenue. Given the movement toward value-based reimbursement and overall quality, identifying mechanisms for NHs to deploy for quality improvement efforts is critical. Specifically, Florida SB 2506 has proposed a Quality Incentive Program to reward high quality and/or high efficiency NHs, specifically, those with a NHC 4 or 5 Star Quality Rating or Gold Seal Status. Under the proposed bill, potential projected outlays exceed $258 million additional reimbursement to Florida's NHs(Parker, August, 2017). Therefore, poor quality is no longer an option, as NHs bottom line will suffer if they do not rise to the challenge.

One of the major components of the Healthcare Criteria's focuses on resource use, operational effectiveness, and financial results. We speculate that through integration and organization of all processes within the operating environment, NQAP award winners were able to identify opportunities for improvement in their work processes, which are moving them in the right direction and may ultimately lead to greater financial impacts in the form of better profit margins.

Given the instability of the NH financial environment, identifying how tools such as Baldridge

principles contained in the Healthcare Criteria that may improve financial performance is

imperative.

CHAPTER 5: CONCLUDING REMARKS

Discussions of Findings

The two studies contained within this dissertation attempted to provide insight on whether or not NHs which have won a NQAP award perform better on publicly reported quality measures and experience better financial performance. Given the enduring concern surrounding the quality of care, NH residents receive and the financial instability of the NH industry, this study illustrates the value of implementing Baldridge-based principles within an organization.

First, performance on publicly reported NHC quality measures were examined. While only four of the 23 measures were significant, associations between NQAP receipt and each individual measure were in the right direction and approaching significance. Given the criteria for the Silver level award only requires NHs to be in the beginning stages of developing process improvements, NHs within the study period may been in the beginning stages of developing process improvements. Notably, some NHAs are not given carte blanche to make decisions about choice of improvement efforts nor the resources implementation may take. Full implementation of Baldridge's systems based approach may take five to seven years (Leonard & McGuire, 2007); therefore, NHs may be at a disadvantage because of financial stress and historically high staff turnover among direct care workers, specifically CNAs.

The QAPI framework developed by CMS through a collaborative effort with key stakeholders, consumer groups, and subject matter experts is similar to that of the Baldridge framework and has been provided as a resource for QAPI (Siegel, Young, Zysberg, & Santillan, 2015). Absent reimbursement for NHs to engage in continuous quality improvement efforts, NHs

may have been hesitant to make the commitment; however, individual states' such as Florida's commitment to quality may incentivize them to follow suit.

Implications of Dissertation Research

Projections suggest NHs will serve residents with higher care needs over the next two decades due to other options for long-term care (e.g., assisted living, home health) despite the historic financial instability of the industry subsequent to the BBA. Therefore, the importance of delivering high quality care is vital. The latest legislation under the ACA requires NHs to develop a Quality Assurance Performance Improvement Plan; however, research suggests leadership may lack the necessary skills (Smith et al., 2012).

Given the newly published QAPI regulations, the Healthcare Criteria may serve as a roadmap to guide NH leadership on their quality improvement path and may improve organization efficiency resulting in better financial performance. The systems-based Healthcare Criteria provides a big "Q" approach for NHs to assess organizational performance, identify opportunities for improvement, develop systematic processes to improve performance, and to utilize fact-based analyses to assess progress. Understanding how the Healthcare Criteria may improve the quality of care and financial performance of NHs is beneficial to NH providers, the residents they serve, as well as policymakers to ensure the viability of an industry primarily serving vulnerable older adults.

It is well-known top leadership plays an important role in NH quality improvement efforts, CNAs may also serve as a leader in improving participation among staff in QI efforts which has the potential to improve their job satisfaction as well as contribute to improving the quality of care delivered (Woo, Milworm, & Dowding, 2017 2017). Senior leadership communication and engagement of all levels of staff is critical and necessary to achieve high performance levels while staying true to the organization's missions and values.

Implementing Baldridge principles through the application of the Healthcare Criteria is time consuming and requires consistent commitment at all levels of the organization, which may deter some NHs from embarking on the journey. However, both of the studies contained herein suggest AHCA/NCAL membership and going through the application process for the NQAP may allow NHs to differentiate themselves based upon quality and experience better financial returns. CMS recently announced its Patient over Paperwork Initiative. In accordance with the White House Administration's desire to cut the "red tape" for businesses, the Patient over Paperwork Initiative seeks to streamline regulation by analyzing the meaningfulness of current quality measurement data. Given the time consuming nature of the (reducing administrative task time)current data reporting, the initiative should elicit more time between care providers and their patients (Centers for Medicare & Medicaid Services, 2018b). What remains to be seen is whether quality will suffer. Previous research has examined the impact of whether incentives "the carrot" or regulations "the stick" are more efficacious in promoting quality. Most research suggests the stick is the most influential (Mukamel et al.)

Future Directions

Findings from both studies offer several opportunities for future research relative to NHs which apply for and successfully receive a NQAP award. First, the use of propensity score matching could be deployed in order to achieve a more balanced comparison between NQAP award winners and control groups. Additionally, similar to Castle and colleagues (2016), the analysis of the relationship between award receipt and publicly reported quality measures could be examined longitudinally to determine if significant relationships exist following the award receipt in subsequent years rather than analyzing the year the award was won. Given that Silver level awardees are not required to demonstrate actual outcome improvement, it may take more time than was allotted to see these differences in NHC quality measures.

Another measure of quality that has not received as much attention are consumer complaints. A study by Hansen and colleagues (2017) suggest complaints and complaint investigations have the ability to provide additional information regarding the quality of care outside of the data researchers typically focus on. The Healthcare Criteria specifies the need to assess an organization's process to engage customers and assess satisfaction/dissatisfaction. Therefore, NQAP awardees may experience less consumer complaints to state agencies as they are proactively dealing with consumer concerns. Therefore, future work will examine how quality award winners compare to other NHs relative to complaints (Hansen, Hyer, Holup, Smith, & Small, 2017).

Finally, the Healthcare Criteria consists of seven individual components including Leadership, Strategy, Customers, Measurement Analysis, Workforce, Operations, and Results. It may be beneficial to examine the relationship between these components (to the extent data is available) to determine if performance on one component drives overall performance. For example, structural equation modeling could be utilized to determine the strength of each of these individual components relationships with the outcomes of interest. We suspect leadership would have a strong relationship given they set the tone for the organization and are ultimately charged with carrying out the organization's mission, managing resources, and assuring the deliverance of high quality of care.

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APPENDIX A. Healthcare Criteria for Performance Excellence Excerpt

Category	Description	Bronze	Silver	Gold
Organizational Profile	**P.1 Organizational Description:** *What are your key organizational characteristics?*	x	x	x
	P.2 Organizational Situation: *What is your organization's strategic situation?*	x	x	x
Leadership	**1.1 Senior Leadership:** *How do senior leaders lead the organization?*		x	x
	1.2 Governance and Society Responsibilities: *How do you govern your organization and fulfill your societal responsibilities?*		x	x
Strategy	**2.1 Strategy Development:** *How do you develop your strategy?*		x	x
	2.2 Strategy Implementation: *How do you implement your Strategy?*		x	x
Customers	**3.1 Voice of the Customer:** *How do you obtain information from your patients and other customers?*		x	x
	3.2 Customer Engagement: *How do you engage patients and other customers by serving their needs and building relationships?*		x	x
Measurement, Analysis, and Knowledge Management	**4.1 Measurement, Analysis, and Improvement of Organizational Performance:** *How do you measure, analyze, and then improve organizational performance?*		x	x
	4.2 Knowledge Management, Information, and Information Technology: *How do you manage your organizational knowledge assets, information, and information technology infrastructure?*		x	x
Workforce	**5.1 Workforce Environment:** *How do you build an effective and supportive workforce environment?*		x	x
	5.2 Workforce Engagement: *How do you engage your workforce to achieve a high-performance work environment?*		x	x
Operations	**6.1 Work Processes:** *How do you design, manage, and improve your key health care services and work processes?*		x	x
	6.2 Operational Effectiveness: *How do you ensure effective management at your operations?*		x	x
Results	**7.1 Health Care Process Results:** *What are your health care and process effectiveness results?*		x	x
	7.2 Customer-Focused Results: *What are your customer-focused performance results?*		x	x
	7.3 Workforce-Focused Results: *What are your work-force performance results?*		x	x
	7.4 Leadership and Governance Results: What are your senior leadership and governance results?		x	x
	7.5 Financial and Market Results: What are your financial and marketplace performance results?		x	x

Appendix B. Supplemental Pooled OLS Regression Results Examining Short-Stay Quality Measures of Silver and Gold Awardees (2010-2015)[1]

	Antipsychotic Medication		Influenza Vaccination		Pain		Pressure Ulcers		Pneumonia Vaccination	
	Coefficient	S.E.	Coefficient	S.E.	Coefficient	S.E.	Coefficient	S.E.	Coefficient	S.E.
Sample_2010	---	---	3.04	2.44	-0.53	0.25*	4.47	0.14***	15.55	0.41***
Sample_2011	-6.43	0.17***	-0.08	2.43	4.17	0.22***	-5.83	0.12***	13.44	0.36***
Sample_2012	-6.64	0.16***	2.48	2.43	2.71	0.22***	-6.38	0.12***	15.15	0.35***
Sample_2013	-6.90	0.16***	3.87	2.43	0.45	0.22*	-6.75	0.12***	15.95	0.35***
Sample_2014	-7.08	1.25***	0.00	.	-2.85	1.63	-6.82	0.85***	12.46	2.59***
AR	2.00	0.67*	5.31	1.41**	0.07	0.86	0.75	0.43	6.74	1.31***
AZ	-0.26	0.64	6.51	1.23***	10.08	0.79***	0.20	0.42	7.97	1.28***
CA	-0.71	0.45	1.32	0.91	4.36	0.57***	1.28	0.30***	2.53	0.91***
CO	0.63	0.54	-4.31	1.08***	4.80	0.68***	0.58	0.36	-4.37	1.07*
CT	-0.16	0.51	-1.87	1.01	4.09	0.64***	0.58	0.34	0.47	1.02*
DC	0.00	.	0.00	.	0.00	.	0.00	.	0.00	.
DE	0.52	1.13	2.69	2.18	-0.55	1.38	0.73	0.73	3.19	2.17**
FL	0.87	0.42*	0.21	0.84	2.26	0.53***	1.01	0.28**	3.50	0.85***
GA	1.81	0.69*	1.70	1.11	-0.82	0.74	1.03	0.39*	3.08	1.16***
IA	1.52	0.50*	2.15	0.99*	3.40	0.62***	1.34	0.32***	3.02	0.97***
ID	0.40	0.89	0.44	1.54	8.18	1.07***	0.03	0.56	3.93	1.69**
IL	0.59	0.50	-2.16	1.00*	2.28	0.63	1.56	0.33***	0.01	1.00*
IN	0.56	0.44	-1.04	0.90	1.72	0.57	1.16	0.30***	-0.43	0.90*
KS	1.57	0.62*	-2.22	1.10*	4.96	0.73***	0.99	0.38*	-3.40	1.12*
KY	1.12	0.51*	2.30	1.01*	2.71	0.64***	0.89	0.34*	3.64	1.02***
LA	1.69	0.51**	-1.40	0.96	0.62	0.62	1.06	0.32**	1.08	0.96*
MA	0.03	0.45	5.10	0.90***	3.57	0.57***	1.14	0.30***	5.78	0.90***
MD	0.55	0.52	-0.19	1.02	-1.08	0.65	0.93	0.35*	1.22	1.04
ME	-1.47	3.16	-0.97	7.44	8.37	4.09*	1.41	2.22	-0.33	6.73***
MI	-0.11	0.43	-2.69	0.88*	2.81	0.56***	0.96	0.29**	-0.31	0.89
MN	-0.05	0.47	-1.62	0.96	7.84	0.60***	0.63	0.32*	0.81	0.96*
MO	0.55	0.45	-3.42	0.89***	3.77	0.56***	1.13	0.29***	-4.83	0.88***

	Antipsychotic Medication		Influenza Vaccination		Pain		Pressure Ulcers		Pneumonia Vaccination	
	Coefficient	S.E.	Coefficient	S.E.	Coefficient	S.E.	Coefficient	S.E.	Coefficient	S.E.
MS	0.78	0.88	-1.52	1.45	0.04	0.98	1.69	0.50**	1.24	1.49***
MT	0.44	0.83	-3.49	1.71*	9.77	1.06***	0.92	0.54	-7.50	1.64***
NC	0.33	0.48	-0.23	0.92	2.08	0.59**	0.45	0.31	1.51	0.95***
ND	2.15	1.39	-0.77	3.94	10.55	1.77***	1.94	0.97*	-11.20	2.71
NE	1.39	0.64*	0.11	1.19	5.12	0.77***	0.50	0.39	-1.07	1.17*
NH	0.45	0.84	5.60	1.68**	3.77	1.07**	1.66	0.57*	10.14	1.73***
NJ	-0.07	0.50	3.10	1.00*	-2.01	0.63**	2.04	0.33***	5.13	1.01***
NM	-0.05	1.15	-8.65	2.94*	9.50	1.60***	0.69	0.82	-10.00	2.49***
NV	1.11	0.87	-0.66	1.68	6.95	1.13***	1.51	0.61*	-0.67	1.84
NY	0.11	0.44	2.25	0.90*	-0.52	0.56	1.23	0.30***	4.35	0.90***
OH	-0.02	0.41	0.75	0.81	6.93	0.52***	0.83	0.27*	3.40	0.82***
OK	2.35	0.75**	-1.37	1.41	10.37	0.91***	2.07	0.46***	-2.92	1.36
OR	-0.98	0.65	-2.05	1.25	10.48	0.81***	0.28	0.43	-0.74	1.29
PA	0.37	0.40	-1.62	0.81*	3.33	0.51***	1.10	0.27***	0.95	0.81*
RI	0.06	0.76	0.64	1.76	5.33	1.01***	1.70	0.54	2.57	1.64
SC	1.44	0.76*	1.61	1.31	-2.76	0.86**	1.40	0.46*	3.52	1.38***
SD	0.47	0.91	-3.42	1.58*	5.69	1.10***	2.69	0.54*	-3.69	1.61*
TN	1.04	0.57	-0.45	1.04	-0.31	0.68	1.11	0.36***	-1.43	1.09
TX	0.92	0.60	-3.37	1.03**	0.34	0.70	0.73	0.36*	-2.36	1.09*
UT	0.00	.	1.54	16.40	58.14	11.37***	4.03	6.16	-3.58	18.70
VA	0.69	0.69	-1.39	1.35	0.92	0.92	0.85	0.49	-0.31	1.48*
VT	-0.09	1.65	-4.32	3.03	2.14	2.09	0.39	1.07	-1.97	3.24
WA	0.35	0.82	1.61	1.59	8.30	1.09***	0.99	0.58	3.25	1.74*
WI	-0.51	0.71	2.68	1.34*	5.33	0.91***	0.68	0.48	7.38	1.45***
WV	2.14	4.76	-0.99	9.50	-3.63	6.58	1.35	3.57	-1.53	10.83

Note: *=p<.05, ** p<.001, ***p<.0001

Appendix C. Supplemental Pooled OLS Regression Results Examining Long-Stay Quality Measures of Silver and Gold Awardees (2010-2015)

	ADL Decline		Antipsychotic Medication		Falls		Incontinence		UTI	
	Coefficient	S.E.	Coefficient	S.E.	Coefficient	S.E.	Coefficient	S.E.	Coefficient	S.E.
Sample_2010	-3.44	.62***	---	---	---	---	16.85	0.40***	-1.69	0.13***
Sample_2011	19.11	.54***	3.96	0.18***	-4.80	0.09***	7.14	0.39***	-3.09	0.11***
Sample_2012	-2.21	.54***	2.75	0.18***	-4.90	0.09***	8.63	0.38***	-3.66	0.11***
Sample_2013	-3.01	.54***	0.44	0.18*	-5.01	0.09***	9.24	0.38***	-4.62	0.11***
Sample_2014	-.78	4.03	-2.56	1.36	-5.27	0.64***	11.62	2.85***	- 5.10	0.83***
AR	-2.83	1.95	-1.55	0.70	0.61	0.33	0.91	1.42	0.35	0.41
AZ	6.88	2.01**	-0.59	0.76	0.89	0.36*	10.97	1.51***	2.72	0.42***
CA	1.23	1.39	-6.57	0.50***	-0.91	0.24***	4.75	1.02***	1.34	0.29***
CO	.96	1.60	-3.86	0.59***	0.39	0.28	6.90	1.13***	1.74	0.33***
CT	1.62	1.55	-0.05	0.57	0.10	0.27	3.43	1.10*	0.74	0.32*
DC	0.00	.	0.00	.	0.00	.	0.00	.	0.00	.
DE	3.87	3.18	-2.59	1.19*	0.65	0.56	1.86	2.34	2.10	0.66**
FL	.57	1.29	-0.96	0.47*	-0.03	0.22	4.07	0.91***	2.82	0.27***
GA	.85	1.72	-0.21	0.70	0.16	0.33	5.30	1.21***	1.99	0.36***
IA	1.83	1.42	-2.56	0.51***	0.16	0.24	3.18	1.07*	3.03	0.29***
ID	2.48	2.67	-1.65	0.99	0.05	0.47	12.15	2.34***	1.03	0.55
IL	-.80	1.53	-1.88	0.55**	0.37	0.26	1.37	1.07	2.11	0.32***
IN	3.13	1.36*	-2.40	0.49***	0.46	0.23	8.06	0.98***	1.47	0.28***
KS	1.05	1.58	-3.03	0.59***	1.32	0.27***	2.77	1.20*	3.36	0.33***
KY	3.10	1.52*	-1.36	0.56*	0.69	0.26*	7.35	1.10***	3.09	0.32***
LA	3.12	1.44*	-0.75	0.52	0.68	0.25*	0.11	0.99	2.22	0.30***
MA	.80	1.37	-0.27	0.49	0.22	0.23	11.11	0.97***	2.09	0.28***
MD	3.63	1.60*	-3.87	0.59***	0.20	0.28	9.49	1.15***	0.34	0.33
ME	1.75	11.05	1.75	3.72	-0.80	1.76	1.36	8.80	2.40	2.16
MI	-1.54	1.36	-7.72	0.48***	-0.21	0.23	7.38	0.97***	0.96	0.28**
MN	.13	1.45	-6.12	0.52***	0.60	0.24*	8.83	1.08***	0.77	0.30*
MO	.57	1.33	-2.30	0.48***	0.58	0.23*	-1.13	0.96	2.18	0.28***
MS	-1.25	2.12	-1.23	0.84	-0.53	0.40	5.27	1.52**	1.23	0.44*

	ADL Decline		Antipsychotic Medication		Falls		Incontinence		UTI	
	Coefficient	S.E.	Coefficient	S.E.	Coefficient	S.E.	Coefficient	S.E.	Coefficient	S.E.
MT	1.95	2.36	-4.11	0.86***	0.63	0.40	3.63	1.80**	1.29	0.49*
NC	5.04	1.45**	-5.09	0.54***	0.44	0.26	12.10	1.02***	2.78	0.30***
ND	6.13	3.42	-4.29	1.38**	0.19	0.65	2.05	2.36	-0.43	0.70
NE	3.72	1.68*	-2.50	0.62***	0.60	0.29*	6.42	1.32***	2.32	0.35***
NH	1.33	2.51	-1.17	0.91	1.48	0.43**	8.74	1.86***	2.26	0.53***
NJ	2.34	1.55	-4.78	0.56	-0.18	0.26	-6.17	1.09***	1.08	0.32*
NM	4.61	3.73	-3.83	1.29***	1.59	0.59*	6.58	2.58*	0.55	0.78
NV	5.47	2.91*	-2.10	1.03*	-0.40	0.48	7.45	2.12**	2.13	0.60**
NY	7.30	1.36***	-3.36	0.49***	-0.06	0.23	3.38	0.94**	1.60	0.28***
OH	1.60	1.24	-2.78	0.45***	0.48	0.21*	1.86	0.88*	2.89	0.26***
OK	6.91	1.91**	-3.12	0.72***	1.52	0.33***	1.08	1.44	3.07	0.40***
OR	8.18	2.09***	-4.22	0.79***	-0.63	0.37	5.05	1.99*	2.24	0.43***
PA	5.15	1.23***	-2.40	0.44***	0.25	0.21	13.04	0.87***	0.72	0.26*
RI	8.15	2.43*	-2.89	0.85**	0.49	0.40	2.56	1.81	3.64	0.51***
SC	7.36	2.10**	-4.26	0.85***	-0.30	0.40	12.97	1.55***	3.38	0.44***
SD	.78	2.11	-5.07	0.77***	1.27	0.36**	8.79	1.78***	1.34	0.44*
TN	2.17	1.66	0.89	0.64	0.06	0.30	4.18	1.17**	2.42	0.35***
TX	6.00	1.63**	-0.21	0.63	0.88	0.30*	4.74	1.17***	2.30	0.34***
UT	0.00	.	0.00	.	-2.99	3.24	0.00	.	3.25	3.47
VA	4.78	2.33*	-0.98	0.80	0.17	0.38	11.70	1.74***	1.62	0.48**
VT	.91	4.97	-1.68	1.73	0.99	0.82	11.21	4.71*	1.78	1.03
WA	-3.11	2.75	0.26	0.94	0.11	0.44	11.44	2.16***	1.31	0.57*
WI	-2.55	2.25	-5.94	0.80***	0.13	0.38	4.17	1.89*	0.98	0.47*
WV	10.76	16.62	-6.12	5.60	-0.40	2.65	14.53	10.08	2.14	3.48

Note: *=p<.05, ** p<.001, ***p<.0001

Appendix C. Supplemental Pooled OLS Regression Results Examining Long-Stay Quality Measures of Silver and Gold Awardees (2010-2015) Continued

	Weight Loss		Pressure Ulcers		Physical Restraints		Catheter		Depression	
	Coefficient	S.E.	Coefficient	S.E.	Coefficient	S.E.	Coefficient	S.E.	Coefficient	S.E.
Sample_2010	-3.85	0.11***	-2.96	0.18***	-4.58	0.12***	-3.37	0.10***	15.77	0.40***
Sample_2011	-4.33	0.10***	-6.74	0.16***	-5.00	0.10***	-4.17	0.09***	-1.98	0.36***
Sample_2012	-4.19	0.10***	-7.21	0.16***	-5.44	0.10***	-4.59	0.09***	-2.29	0.36***
Sample_2013	-4.10	0.10***	-7.71	0.16***	-6.04	0.10***	-5.27	0.09***	-3.26	0.36***
Sample_2014	-4.85	0.73***	-6.44	1.16***	-6.10	0.76***	-5.14	0.68***	-3.66	2.64
AR	-0.81	0.36*	1.48	0.58*	0.51	0.37	0.51	0.33	-1.40	1.29
AZ	-0.29	0.37	0.83	0.60	-0.21	0.38	2.09	0.35**	4.73	1.33**
CA	-0.92	0.25**	0.28	0.40	1.34	0.26***	0.90	0.24**	0.26	0.91
CO	-0.15	0.30	-0.78	0.48	0.74	0.31*	2.03	0.27***	4.76	1.06***
CT	-0.39	0.29	-0.61	0.45	0.39	0.30	0.12	0.26	1.49	1.03
DC	0.00	.	0.00	.	0.00	.	0.00	.	0.00	.
DE	-1.26	0.58*	-0.25	0.91	-0.19	0.60	-0.74	0.54	-0.37	2.08
FL	-0.22	0.24	0.94	0.37*	1.29	0.25***	0.50	0.22*	1.67	0.85*
GA	0.44	0.32	1.58	0.50*	-0.03	0.33	-0.57	0.29*	4.71	1.14***
IA	-1.09	0.26***	0.55	0.43	0.20	0.27	2.25	0.24***	4.19	0.93***
ID	-0.45	0.49	-1.97	0.82*	0.00	0.50	1.50	0.45**	0.97	1.77
IL	0.60	0.28*	1.05	0.45*	1.18	0.29***	1.58	0.26***	6.58	1.01***
IN	0.23	0.25	0.66	0.40	0.15	0.26	0.80	0.23**	1.96	0.89*
KS	-0.29	0.29	0.47	0.51	-0.66	0.30*	1.01	0.27**	5.98	1.03***
KY	0.98	0.28**	1.08	0.44*	1.79	0.29***	1.27	0.26***	3.69	1.01**
LA	-0.12	0.27	3.07	0.42***	2.35	0.27***	1.07	0.25***	0.44	0.95
MA	-1.26	0.25***	-0.12	0.39	1.17	0.26***	0.56	0.23*	3.51	0.90***
MD	-1.44	0.29***	1.69	0.46**	0.23	0.30	-0.16	0.27	3.45	1.05**
ME	-0.83	1.91	-2.24	2.91	-2.36	1.98	3.48	1.77*	11.69	7.34
MI	0.06	0.25	0.92	0.39*	1.05	0.26***	0.95	0.23***	2.68	0.90*
MN	-0.17	0.27	-0.10	0.43	0.32	0.27	1.64	0.25***	5.45	0.96***

	Weight Loss		Pressure Ulcers		Physical Restraints		Catheter		Depression	
	Coefficient	S.E.	Coefficient	S.E.	Coefficient	S.E.	Coefficient	S.E.	Coefficient	S.E.
MO	-0.73	0.24*	1.55	0.40***	0.37	0.25	0.94	0.23***	2.01	0.88*
MS	0.26	0.39	2.05	0.64**	2.44	0.41***	-0.42	0.36	-1.43	1.41
MT	0.05	0.44	-1.08	0.79	-0.20	0.45	1.87	0.41***	4.13	1.58**
NC	0.91	0.27**	2.15	0.41****	0.59	0.28*	0.27	0.25	2.72	0.96*
ND	-0.72	0.62	0.29	1.08	-2.12	0.64**	0.66	0.57	9.83	2.19***
NE	-1.18	0.31***	-0.13	0.54	-0.36	0.31	1.73	0.29***	9.79	1.09***
NH	0.13	0.46	-0.53	0.76	0.56	0.48	2.11	0.43***	5.22	1.67*
NJ	0.04	0.29	2.51	0.45***	1.56	0.29***	0.09	0.26	2.55	1.02*
NM	1.19	0.68	2.27	1.11*	0.72	0.70	0.14	0.63	1.84	2.46
NV	-0.92	0.53	1.70	0.83*	0.36	0.55	2.20	0.49***	0.87	1.92
NY	-0.79	0.25*	2.49	0.39***	0.85	0.26**	0.52	0.23*	10.70	0.90***
OH	0.31	0.23	0.68	0.36	1.34	0.24	1.28	0.21***	10.92	0.82***
OK	0.59	0.35	2.85	0.64***	0.00	0.36***	1.49	0.33***	6.44	1.25***
OR	0.14	0.38	0.36	0.63	0.17	0.39	2.07	0.36***	10.40	1.35***
PA	-0.06	0.23	0.88	0.35*	0.39	0.23	1.22	0.21***	4.69	0.82***
RI	-0.71	0.45	2.14	0.73*	0.47	0.46	0.35	0.42	3.36	1.61*
SC	1.13	0.39*	1.72	0.61*	2.15	0.40***	-0.59	0.36	2.63	1.39*
SD	-0.01	0.39	2.66	0.75**	0.01	0.40	2.95	0.36***	5.83	1.40***
TN	0.64	0.31*	0.45	0.48	1.82	0.32***	0.51	0.28	0.55	1.10
TX	-1.27	0.30***	0.78	0.48	0.04	0.31	0.62	0.28*	5.84	1.07***
UT	1.63	3.07	0.00	.	0.36	3.17	0.63	3.47	6.01	11.02
VA	0.09	0.42	1.61	0.67*	-0.38	0.44	-0.02	0.39	2.39	1.53
VT	0.42	0.92	-0.14	1.44	-0.33	0.94	1.91	0.84*	11.17	3.26**
WA	-1.25	0.50*	0.21	0.79	-0.24	0.52	1.03	0.47*	9.37	1.81***
WI	-0.39	0.41	-0.18	0.68	-0.09	0.43	1.74	0.38***	2.87	1.47*
WV	-0.56	3.07	1.04	4.68	-4.58	0.12	1.41	2.84	3.68	11.05

Note: *=p<.05, ** p<.001, ***p<.0001

Appendix C. Supplemental Pooled OLS Regression Results Examining Long-Stay Quality Measures of Silver and Gold Awardees (2010-2015) Continued

Variable	Anxiety/Hypnotic Medication		Pain		Influenza Vaccination		Pneumonia Vaccination	
	Coefficient	S.E.	Coefficient	S.E.	Coefficient	S.E.	Coefficient	S.E.
Sample_2010	-2.42	.19*	-10.19	0.17***	-2.07	1.49	12.67	0.24***
Sample_2011	-3.01	.14***	-1.19	0.15***	-2.22	1.49	16.66	0.22***
Sample_2012	0.78	.13	-3.10	0.15***	-0.15	1.48	17.11	0.22***
Sample_2013	.98	.20**	-5.10	0.15***	0.49	1.48	17.27	0.22***
Sample_2014	-4.22	.15	-6.32	1.12***	0.00	.	16.58	1.59***
AR	-1.83	1.65	0.89	0.54	2.24	0.81*	4.26	0.78***
AZ	-0.25	2.31	5.40	0.56***	2.65	0.78*	4.33	0.81***
CA	-3.36	1.34*	1.43	0.38	0.73	0.55	3.16	0.55*
CO	-7.73	1.56***	2.46	0.44	-3.16	0.64***	-1.86	0.64***
CT	-3.33	1.63	0.31	0.43	-1.15	0.61	1.71	0.62
DC	0.00	.	0.00	.	0.00	.	0.00	.
DE	-3.06	2.96	1.03	0.87	3.25	1.26*	4.77	1.27
FL	-0.08	1.33	0.25	0.35	-0.84	0.51	2.11	0.52***
GA	-5.62	2.52*	1.54	0.47**	1.86	0.65*	4.12	0.69*
IA	-5.00	1.39**	1.89	0.39***	0.43	0.56	3.62	0.56*
ID	0.00	.	4.20	0.76***	0.67	0.97	3.72	1.06*
IL	-3.89	1.51*	1.08	0.42*	0.58	0.61	1.61	0.61
IN	-6.13	1.35***	0.95	0.37	0.53	0.54	1.38	0.54
KS	-6.73	1.85**	2.88	0.44***	0.35	0.60	1.24	0.63*
KY	0.43	1.54	2.62	0.42***	0.92	0.60	3.00	0.61**
LA	-3.28	1.48*	1.07	0.39*	1.08	0.57	1.35	0.58
MA	-5.44	1.35***	-0.09	0.37	1.75	0.54*	4.31	0.55***
MD	-7.16	1.64***	-0.76	0.44	1.64	0.63*	2.43	0.64
ME	7.23	7.40	5.29	3.00	3.70	4.66	-4.84	4.18
MI	-5.63	1.34***	1.24	0.37**	-2.49	0.54***	1.29	0.54
MN	-10.92	1.46***	3.23	0.40***	0.20	0.57	2.05	0.58
MO	-2.83	1.27*	2.59	0.37***	-0.11	0.53	-2.32	0.53***

Variable	Anxiety/Hypnotic Medication		Pain		Influenza Vaccination		Pneumonia Vaccination	
	Coefficient	S.E.	Coefficient	S.E.	Coefficient	S.E.	Coefficient	S.E.
MS	-8.17	2.74*	2.83	0.58***	0.38	0.81	3.49	0.86
MT	-5.40	2.19*	4.93	0.68***	-2.29	0.96*	-2.81	0.95***
NC	-0.16	1.66	2.23	0.40***	-0.38	0.57	2.88	0.58
ND	-7.75	2.22**	2.15	0.94*	-2.11	1.62	2.45	1.34***
NE	-8.00	1.77***	2.86	0.47***	-0.17	0.64	1.92	0.66
NH	-6.77	2.98*	3.06	0.70***	1.48	0.97	5.48	1.01***
NJ	-3.84	1.49*	-1.72	0.43***	2.46	0.62***	3.98	0.62***
NM	-8.73	2.72**	4.17	1.05***	-8.60	1.68***	-8.83	1.48***
NV	-6.00	6.30	2.65	0.81**	-4.02	1.06***	-1.22	1.15
NY	-7.37	1.29***	-0.44	0.37	2.03	0.55**	4.83	0.55***
OH	-3.21	1.27*	3.22	0.34***	-0.54	0.49	2.08	0.50***
OK	3.02	1.96	5.82	0.54***	0.36	0.74	-1.08	0.76*
OR	-7.46	2.33**	6.19	0.62***	-3.95	0.78***	-0.17	0.81
PA	-4.12	1.17**	1.79	0.34***	-0.59	0.49	1.24	0.50
RI	-9.02	1.98***	0.16	0.68	0.51	1.03	1.69	0.97
SC	-4.19	3.02	0.65	0.58	1.86	0.80*	4.93	0.85*
SD	-6.42	3.02*	3.53	0.60***	-0.52	0.80	1.66	0.84*
TN	1.29	2.68	0.02	0.46	0.96	0.63	-0.22	0.67
TX	0.00	.	1.75	0.45***	0.45	0.61	1.79	0.65*
UT	0.00	.	5.08	7.77	4.80	5.94	5.52	6.70
VA	0.00	.	1.04	0.63	-0.43	0.84	1.82	0.92
VT	0.00	.	3.93	1.43*	-2.36	1.77	0.49	1.98
WA	0.00	.	4.54	0.77***	-0.46	0.99	3.03	1.10
WI	0.00	.	2.05	0.64*	1.53	0.82	4.23	0.90***
WV	0.00	.	0.33	4.51	2.02	5.95	3.03	6.72

Note: *=p<.05, ** p<.001, ***p<.0001

Appendix D. Supplemental OLS Regression Results Examining Financial Performance of Silver and Gold Level Awardees (2011-2015)

Variable	Total Profit Margin		Operating Profit Margin		Operating Revenue PPD		Operating Costs PPD	
	Coefficient	S.E.	Coefficient	S.E.	Coefficient	S.E.	Coefficient	S.E.
Sample_2011	0.08	0.02**	-1.39	0.06***	-52.24	16.27**	3.24	4.87
Sample_2012	0.00	0.00	-0.02	0.02	-15.55	4.32**	-14.68	4.80*
Sample_2013	0.00	0.00	-0.03	0.02	-18.48	4.27***	-16.02	4.76**
Sample_2014	-0.02	0.02	-0.05	0.13	22.04	32.77	29.20	36.02
AR	0.01	0.01	0.04	0.09	-7.03	23.05	-31.45	22.50
AZ	0.01	0.01	-0.03	0.09	-31.84	23.36	-7.86	22.19
CA	0.01	0.01	0.06	0.07	26.16	18.78	1.88	18.23
CO	0.02	0.01	0.14	0.08	-12.67	20.82	-47.33	20.33*
CT	-0.03	0.01	-0.27	0.09*	19.92	22.75	103.22	22.11***
DC	0.00	.	0.00	.	0.00	.	0.00	.
DE	-0.06	0.02*	-1.29	0.14***	34.13	36.06	83.19	35.89*
FL	0.00	0.01	-0.13	0.07	7.87	18.70	22.05	18.02
GA	-0.08	0.02***	-0.41	0.14*	-21.33	34.73	-1.81	29.08
IA	0.03	0.01**	0.34	0.07***	-76.39	19.13***	-135.40	18.45***
ID	0.05	0.02**	0.08	0.12	2.92	31.39	-22.94	28.58
IL	0.02	0.01*	0.09	0.08	73.01	19.55**	38.47	19.13
IN	0.03	0.01*	0.10	0.07	-18.68	18.76	-47.09	18.11*
KS	0.03	0.01*	0.17	0.08*	-54.68	20.69*	-87.89	19.89***
KY	0.00	0.01	0.00	0.08	-17.10	19.85	-23.83	19.31
LA	0.04	0.01**	0.03	0.08	-8.51	19.44	-0.17	18.76
MA	0.00	0.01	0.11	0.07	-8.29	18.67	-30.81	18.02
MD	-0.02	0.01	-0.38	0.08***	34.24	21.37	65.16	20.71*
ME	0.04	0.11	0.08	0.76	-7.42	194.70	-46.36	217.51
MI	0.00	0.01	-0.01	0.07	12.44	18.72	10.15	18.06
MN	0.00	0.01	0.15	0.08	-55.13	20.44**	-79.98	19.76***
MO	0.02	0.01*	0.07	0.07	-39.82	18.53*	-58.89	17.93*
MS	0.01	0.02	-0.05	0.12	9.43	30.57	0.60	25.28
MT	0.02	0.02	0.17	0.11	-27.76	27.51	-54.26	26.54*
NC	0.01	0.01	-0.10	0.10	-5.54	25.88	14.23	24.72
ND	0.01	0.05	0.36	0.38	-55.25	98.28	-121.56	109.49
NE	0.01	0.01	0.23	0.09*	-58.06	22.79*	-98.73	21.75***

Variable	Total Profit Margin		Operating Profit Margin		Operating Revenue PPD		Operating Costs PPD	
	Coefficient	S.E.	Coefficient	S.E.	Coefficient	S.E.	Coefficient	S.E.
NH	0.03	0.02	0.07	0.12	12.33	29.91	-5.78	28.51
NJ	-0.01	0.01	0.03	0.08	36.66	19.38*	38.60	18.77*
NM	0.01	0.02	0.04	0.13	-5.25	33.64*	-13.00	35.15
NV	0.01	0.02	0.04	0.14	28.00	34.70	7.87	32.47
NY	-0.01	0.01	-0.03	0.07	51.69	18.57	55.58	17.96*
OH	0.01	0.01	0.09	0.07	-23.59	18.06	-47.84	17.40*
OK	-0.07	0.01***	-0.05	0.10	-31.33	24.55	1.12	23.02
OR	0.04	0.01*	0.19	0.09*	28.47	23.91	-15.75	23.08
PA	0.00	0.01	-0.01	0.07	15.45	18.04	36.08	17.44*
RI	0.02	0.01	0.20	0.11*	16.97	26.98	-35.73	26.28
SC	0.01	0.02	-0.18	0.14	-25.00	35.69	-3.39	32.23
SD	0.02	0.02	0.21	0.12	-65.96	29.56	-110.14	27.83***
TN	-0.01	0.01	-0.04	0.09	-25.73	22.23	-19.36	20.93
TX	0.01	0.01	-0.02	0.09	-44.63	22.60*	-57.90	20.47*
UT	0.00	.	0.00	.	0.00	.	0.00	.
VA	0.01	0.01	0.04	0.09	-19.70	23.74	-24.84	24.27
VT	0.00	0.02	0.08	0.16	-6.75	41.72	-27.10	44.22
WA	0.00	0.01	-0.01	0.10	-7.16	25.77	-11.12	26.59
WI	0.00	0.01	0.13	0.09	-29.37	24.09	-57.61	24.33*
WV	0.05	0.06	0.04	0.44	62.90	113.36	45.42	126.44

Note: *=p<.05, ** p<.001, ***p<.0001