2013

Quality of Long-Term Care in Medicare-and Medicaid-Certified Nursing Homes in Southwest Ohio

Cheng Wu Zhang

Wright State University - Main Campus

Follow this and additional works at: http://corescholar.libraries.wright.edu/mph

Part of the Geriatric Nursing Commons, and the Public Health Commons

Repository Citation
Zhang, C. W. (2013). Quality of Long-Term Care in Medicare-and Medicaid-Certified Nursing Homes in Southwest Ohio. Wright State University, Dayton, Ohio.

This Master’s Culminating Experience is brought to you for free and open access by the Master of Public Health Program at CORE Scholar. It has been accepted for inclusion in Master of Public Health Program Student Publications by an authorized administrator of CORE Scholar. For more information, please contact corescholar@www.libraries.wright.edu.
Quality of Long-Term Care in Medicare- and Medicaid-Certified Nursing Homes in Southwest Ohio

Culminating Experience for Master of Public Health Program

Cheng Wu Zhang

Chair: William Spears, Ph.D.

Reader: Cristina Redko, Ph.D.

Wright State University Boonshoft School of Medicine
Acknowledgements

I would like to offer my special thanks to Dr. Spears, Dr. Redko, and all the members of Master of Public Health Program in Wright State University, for their patient guidance, continuing support and useful critiques of this culminating experience work. My grateful thanks are also extended to Ms. Lori Metivier for her help in my entire study in the program.

Finally, I wish to thank my family for their support and encouragement throughout my study.
Table of Contents

Abstract ............................................................................................................................................4
Introduction......................................................................................................................................5
Purpose Statement............................................................................................................................5
Literature Review.............................................................................................................................7
Methods..........................................................................................................................................20
Results............................................................................................................................................25
Discussion ......................................................................................................................................32
Public Health Implications.............................................................................................................35
References......................................................................................................................................38
Appendices.....................................................................................................................................43
Abstract

Background: Long-term care facilities provide a wide range of services over a sustained period of time to people of all ages with functional limitations and chronic conditions. Nursing homes provide 24 hour nursing care support and long-term housing.

Objectives: The purpose of this study is to explore the relationships among nursing home ownership, care processes and quality outcomes in Medicare- and Medicaid-certified nursing homes in Ohio.

Methods: This is a descriptive study that uses the Centers for Medicare and Medicaid Services’ (CMS) Minimum Data Set (MDS). There were 198 Medicare and Medicaid certified nursing homes located in Southwest Ohio included in this study.

Results: The data analysis revealed that non-profit nursing homes provide more licensed nursing staff and Certified Nursing Assistant (CNA) hours per resident per day than for-profit facilities (p < 0.001). Higher levels of licensed nursing staff and CNA care had no influence on quality outcomes or five star rating measures

Conclusions: This study demonstrates that nursing home ownership plays a significant role in nursing staff care and quality of care outcomes. When nursing staff care hours reach state legislation minimum required level, there is no significant impact on quality outcome measures. Quality of care outcomes are not determined by nursing staffing alone. Pressure ulcer prevalence rates, typically use as a quality measure may not be sensitive to differences in staffing hours.

Keywords: licensed nursing, certified nursing assistant, nursing staff care hours, quality outcomes
Quality of Long-Term Care in Medicare- and Medicaid-Certified Nursing Homes in Southwest Ohio

Long-term care covers a wide range of services provided over a sustained period of time to people of all ages with chronic conditions and functional limitations. Nursing homes provide long-term housing, support and 24 hour nursing care. The Centers for Medicare & Medicaid Services (CMS) (2008) report that about 1.5 million Americans reside in 16,000 nursing homes on any given day. Despite federal policy changes, state regulation reforms and consumer advocates initiatives, little improvement has been achieved in nursing home care facilities in the United States, and this has become a significant public concern (Huber & Hennessy, 2005).

Quality of long-term care is an ongoing issue that has improved significantly in the past 30 years since the passage of the Omnibus Budget Reconciliation Act of 1987 (OBRA 87) (Wunderlich & Kohler, 2001). As the national population ages, medical technology advances, and life expectancy increases, the demand for higher quality long-term care continues as an increasingly challenging public health concern. There is evidence from academic researchers, government reports, and social media that the quality of long-term care services for older persons is variable and in many cases does not meet the expectations of the public, the users and their families (Huber & Hennessy, 2005). The growing demand for services, unsustainable high cost for care, ineffective quality of care monitoring, and measurement influences the quality of long-term care.

Purpose Statement

Nursing homes are a crucial part of the long-term care system; these institutions serve people with the most intense service needs. Nursing home services require continuous hands-on activities and are costly. The Centers for Medicare & Medicaid Services (CMS) survey indicates
that Medicare and Medicaid at a national level spend on average 59 percent of its budgets on nursing home care (Wiener, Freiman, & Brown, 2007). The state of Ohio 2009 CMS report indicates that 72 percent of the state Medicaid budget was spent on nursing homes care (Ohio. Department of Aging, n.d.). This study reviews the national long-term care policy, regulation requirements, and the impact on quality of long-term care in nursing homes and the relationship between nursing staff component and quality of care outcomes. The focus is on the nursing home ownership, adequate nursing staff level and influence of nursing skills on quality of care outcomes.

In the United States nursing homes are the only sector of long-term services that are under federal and state regulation. Nursing homes are regulated through licensure and monitoring of Medicare and Medicaid payment programs. This study explores the existing relationships among nursing home structures, care processes and quality outcomes. This information may be useful to policy makers, care providers and care seekers to improve long-term care in the nursing home setting by promoting adequate requirements for nursing staff skills and manpower standards.

**Literature Review**

**Quality of Long-Term Care**

The quality of long-term care is multidimensional and encompasses clinical care issues, functional independence, quality of life and patients’ and families satisfaction with care (Mor 2007). The Institute of Medicine (IOM) defined the quality of care as “the degree to which health services for individuals and populations increases the likelihood of desired health outcomes and are consistent with current professional knowledge (Lohr, 1990, p. 4). The American Medical Association (AMA) describes the quality of care as “the care that consistently
contributes to the improvement or maintenance of quality and/or quality of life” (Billmeyer et al., 1986, p. 1032).

Before Congress passed Medicare and Medicaid legislation in 1965, long-term care in the United States was mainly provided by the individual’s family or small scale private providers and was operated as an adult care or terminal care business model. The purpose of the Medicare and Medicaid was to provide medical care for the elderly and poor. By placing long-term care in the Medicare and Medicaid system, the government has played a major role in paying for nursing home care. In 1986, the Institute of Medicine (IOM) Committee on Nursing Home Regulations published a milestone report “Improving the Quality of Long-term Care in Nursing Homes” (Wunderlich & Kohler, 2001). This report shifted the focus of nursing home care regulations from the ability to provide care to the quality of care received by nursing home residents. Based on the IOM recommendations in 1987, Congress passed “the Omnibus Budget Reconciliation Act of 1987 known as OBRA 87 (Wiener et al., 2007).

Long-term care encompasses a variety of chronic care by various providers in various settings. The services include assistance with basic activities of daily living, such as bathing, eating to instrumental activities of daily living, including household activities; life management and human, technique assistance and chronic illness treatment assistance (Harrington, 2001).

**Definition of Long-term Care**

Long-term care can be classified into “institutional-based “nursing home care and “home and community-based” care. Home and community–based care refers to non-institutional long-term care settings that include recipients’ homes, assisted living facilities, board and care a group living arrangement, and adult foster homes (Stone, 2000). Nursing homes are defined as facilities with three or more beds that routinely provide nursing care services (Jones, Dwyer,
Bercovitz & Strahan, 2009). Services may be provided by Medicare, Medicaid, both Medicare and Medicaid, or licensed by the state as a nursing home. Nursing homes are a crucial component of the long-term care system. Nursing homes serve people with the most intense service needs. Of all the long-term care provider types, only Medicare- and Medicaid-certified nursing homes and Medicare-certified home health agencies operate under federal quality regulations. Long-term care is regulated by the Centers for Medicare & Medicaid Services (Stone, 2000).

Nursing homes are the major institutional setting for long-term care; these facilities serve people with the most intense service needs. Nursing homes are a high-stress health care environment which provide not only daily living and medical care but also must deal with the social and psychological needs of a special population. Nursing home residents require care that attends to their personal losses and suffering (Wunderlich & Kohler, 2001). The services require continuous hands-on activities. As a result the labor costs are high. Nursing homes primarily engage in providing residents skilled nursing care and related services for residents who require medical or nursing care and rehabilitation services for the rehabilitation of injured, disabled, or sick persons (Jones et al., 2009).

**Quality Assurance**

Since the government is the principal purchaser of nursing home care through Medicare and Medicaid programs, nursing homes must meet the requirements from CMS for participation in government long-term care programs, in order to receive long-term care service payment. CMS relies on surveys and certification processes administered by state agencies to monitor and assess nursing homes compliance for licensure and Medicare and Medicaid certification requirements. The nursing home survey is a continuing series of national sample surveys of
nursing homes, their residents, and their staff. The most frequently used source of data was the On-line Survey and Certification Automated Records (OSCAR). The OSCAR is a national database network maintained by the CMS in cooperation with the state long-term care surveying agencies. OSCAR is a compilation of all the data elements collected by surveyors during the inspection survey conducted at nursing facilities for the purpose of certification for participation in the Medicare and Medicaid programs (Bostick, Rantz, Flesner, & Riggs, 2006).

Nursing home quality assurance changed substantially since OBRA 87 was enacted. This act established higher measurement standards and quality of life of the nursing home resident as part of the requirement for quality control. It also established requirements standards for Medicare and Medicaid programs and certification, enforcement of nursing home licensure requirements, and survey processes.

The passage of OBRA 87 has resulted in a dramatic improvement in the quality of care in nursing home settings. In 1990, the CMS initialized the implementation of a uniform nationwide clinical assessment of nursing home resident’s care and nationally implemented in 1991 as a resident assessment instrument. The Minimum Data Set (MDS) is a uniform instrument used in the U.S. for nursing home resident condition assessment (Rahman & Applebaum, 2009). The MDS was designed based on IOM recommendations in 1986 for improving the quality of long-term care. The MDS served for multiple purposes: to collect base-line data set at nursing home resident admission and generates individualized inform care plans; to develop quality indicators for nursing home evaluation; to serve as a data source for nursing home payment system and to guide for continuing quality improvement and future intervention (Rahman & Applebaum, 2009). In 1996, the MDS was mandated for all Medicare- and Medicaid-Certified nursing
homes. In 1997, the MDS was incorporated into Medicare’s prospective payment system for skilled nursing homes.

To insure nursing homes comply with state and federal regulations the CMS was given the responsibility of inspecting nursing homes to each state department of health. The department of health conducts inspection in nursing homes annually. Inspection was based on federal and state regulations for certification of Medicare and Medicaid program requirements and MDS based resident inform care plan. During an inspection any violations of the nursing home requirements are identified by the inspection team and communicated verbally and through a formal written report (CMS, 2008). These violations are called deficiencies. U.S. Department of Health and Human Services (DHHS) defines “a nursing home quality deficit as a finding that a nursing home failed to meet one or more Federal health requirements during an annual health inspection or a complaint inspection. Inspectors identify health deficiencies by observing the nursing home's performance, its practices, or the conditions in the facility” (CMS, n.d. c). Currently, the quality deficiency is an integrated quality indicator for measuring a nursing home’s adequacy. Quality deficit issues in nursing homes care are frequently appearing on headlines of social media’s reports. Quality deficits are a driving force for federal and state government regulation policy changes. Monitoring the quality has resulted in substantially improved nursing home care; this is especially true in reducing the use of physical restraints, respecting individual freedoms, and multi-psychiatric medication usage (Mor, Casswell, Littlehale, Niemi, & Foegel, 2009).

**Quality Measurement**

For the past thirty years, most long term care research has concentrated on residents, family, nursing staff and community factors related to quality of care outcomes. Each researcher
had interpreted their research results based on researchers’ preferences. As more sophisticated models of quality of long term care are being discussed and tested, defining quality of care in long-term care becomes an increasingly complex task (Huber & Hennessy, 2005).

The quality of long-term care in nursing home setting is a multidimensional topic. Long-term care public policy has changed from time to time to adapt to social ethics or social economic issues (Stone, 2000). Public policies, economic efficiency, social ethics, and health professional standard underlying the common assumptions of quality of care (Wunderlich & Kohler, 2001). The majority of research in the past focused on quality outcomes. Few studies have been designed using a systematic approach using a mode such as Donabedian’s Structure-Process-Outcome (SPO) framework.

Donabedian developed the structure – process – outcome framework for measuring healthcare quality in 1988. Since then this framework has been commonly used in assessment of hospital quality of care (Spilsbury, Hewitt, Stirk, & Bowman, 2011). The framework has three domains: structure, process and outcome. Structure measures the resources and abilities used to provide care and services such as ownership, staffing; process measures interaction and activities for residents by long-term care professionals-actions used to provide care such as physical restraint and antipsychotics medication usage; and outcomes refer to the residents’ conditions resulting from the care processes such as pressure ulcers and quality deficient citations (Breen, Zhang, & Unruh, 2010). Donabedian’s framework is widely accepted as an evaluation model for quality of care. By using Donabedian’s framework into long-term care nursing homes research, the common conclusions from current research indicated that nursing staff plays a critical role in the quality of long-term care in the nursing home setting. Nursing staff has positive but not a linear relationship with health outcomes. Skill level of nursing staff affects some specific
resident populations such as resident have multi- chronic medical conditions; care processes, and health outcomes (Bostick et al., 2006). This framework applies to nursing homes but it is limited by lack of external environment factors such as social, legal, and political influences of care providers. The framework does not take into account residents’ demographic characteristics, such as age, sex, case mix (Mor, 2007). The relationship between nursing home structure, the process of providing care, and health outcomes needs to be explored in more detail.

**Measures of Nursing Home Structure**

**Nursing home ownership.**

In the United States, nursing homes can be classified based on the type of ownership. Nursing homes are owned by either for-profit or non-profit organizations or the U.S. government. For-profit nursing homes are investor-owned health care corporations. To these corporations nursing homes are a business intended to produce profit for their shareholders. Non-profit nursing homes are tax-exempt organizations with a mission to provide a service to their communities. Sixty seven percent of nursing homes in the United States are for-profit (Harrington, 2001). The Institute of Medicine report “For-Profit Enterprise in Health Care” concluded that for-profit nursing facilities tended to devote fewer resources to direct patient care (Gray, 1986). In a comparison to non-profit nursing homes, for-profit nursing homes had lower nursing staff levels and higher number of deficiencies identified by public regulatory agencies than non-profit nursing homes (Spilsbury et al., 2011). Another system review and meta-analysis in Canada indicated that most studies suggest a trend towards higher quality care in not-for-profit facilities than in for-profit nursing homes, many studies, however, showed no significant differences in quality by ownership and was not explained by common hypotheses (Comondore et al., 2009).
Nursing home staffing measures.

The care delivered in the nursing home setting is a low-tech labor intensive service. The majority tasks of nursing home care are to provide assistance to residents’ daily living activities, such as grooming, bathing, dressing, eating, hygiene, toileting, transferring and nursing care activities for their chronic disease treatment and disabilities rehabilitation. Nursing staff are classified according to their certification and skills as registered nurses (RNs), licensed practical nurses (LPNs), and certified nursing assistants (CNAs). Registered nurses have between two to six years of nursing education. Licensed practical nurses have minimum one year of nursing training. RNs and LPNs work together to plan care, implement care and treatment, and evaluate residents’ outcomes. CNAs must have completed a competency evaluation program or nurse assistant training within four months of their permanent employment. CNAs work under the direction of a licensed nurse (LIC) to assist residents with activities of daily living (CMS, n.d. a). The quality of nursing home care rests entirely in the hands of nurses (Stone, 2000).

The National Nursing Home Survey report 1995 indicated that there was 52.7 full-time-employee (FTE) staff per 100 beds providing direct patient care in nursing homes in 1995. Employees providing nursing care had a ratio of 51.6 FTE’s per 100 beds. CNAs are the largest subgroup comprising 33.9 FTE’s per 100 beds, followed by LPNs (10.5 FTE’s per 100 beds and RNs (7.2 FTE’s per 100 beds) (Strahan, 1997).

Federal law requires all Medicare- and/or Medicaid-certified nursing homes provide enough staff to provide adequate care for each resident based on their needs. However, there is no Federal standard established for the best staffing levels (CMS, 2008). In 1987, as part of OBRA 87, the federal Nursing Home Reform Act (NHRA) mandated a minimum staffing level. Facilities must have a RN as director of nursing staff. There should be at least one RN for at
least one eight hour shift a day, seven days a week and either a RN or LPN on duty 24 hours per day. CNAs are on duty 24 hours per day to provide “sufficient staff and services to maintain the highest possible level of physical, mental, and psychosocial well-being for each resident” (Wiener et al., 2007, p. 16).

The 2007 Kaiser Family Foundation’s “nursing home care quality” report concluded that OBRA 87 had a positive impact on the quality of care which was associated with a 25 percent increase in nursing staffing between 1985 and 1995 (Wiener, Freiman, & Brown, 2007). Total nursing home staffing per 100 residents increased from 47.3 full-time equivalent staff in 1985 to 59.2 full-time equivalent staff in 1995. Implementation of minimum staffing requirements, nursing staff levels has increased and quality deficiency citations have decreased as a result (Tilly, Black, Ormond, & Harvell, 2003). But the minimum staffing requirement does not provide a specific measurable standard based on the size of facility and ratio to residents. As a result the staffing requirements are the same for facilities with resident capacities from 50 to 200 beds (Unruh & Wan, 2004).

In July 27, 2000, Nancy-Ann DeParle, Administrator of Department of Health & Human Services reported to Congress on the issue of “adequate staffing to ensure quality care in nursing homes” (Department of Health and Human Services [DHHS], 2000). She suggested that, on average, quality of care was seriously impaired when staffing falls below minimum staffing ratios based-on multivariate analyses conducted for their study. The minimum staffing requirement used for the study was based on the OBRA 87 and state licensure requirements of 25 residents per care giver ratio converted to Hours Per Resident Per Day (HPRD). The staffing requirement converted to 2 hours per resident per day for CNAs, 0.75 hour (forty-five minutes) per resident per day and for total licensed staff (RNs and LPNs), 0.2 hour (twelve minutes) per
resident per day for RNs. Nationwide, 54 percent nursing homes were below the suggested minimum staffing level for CNAs, 23 percent were below the suggested minimum staffing level for total licensed nurse (RNs + LPNs) and 31 percent were below the suggested minimum staffing level for RNs (Department of Health and Human Services [DHHS], 2000). Federal law requires all nursing homes provide adequate staff to care for residents in their facilities. However, OBRA 87’s minimum nursing staff requirement is the only one official requirement at federal level for current practice in the United States, but enforcement and regulation are based on each individual state nursing home regulations and licensure requirements.

The relationship between quality of nursing home care and adequate nursing staff level has been the most discussed issue in nursing home care quality research over the past thirty years. Harrington (2001) suggests that there are two fundamental problems with the quality of care in U.S. nursing homes, inadequate staffing and a poor ratio of licensed nursing staff to CNAs. Inadequate staffing is one of the most common complaints related to nursing home care (Harrington, 2001).

Ohio Nursing Home Regulations

In the state of Ohio, regulations for nursing homes were minimal before 2001. Before this time the only staffing requirements were: one attendant (person who directly provides care to residents) on duty twenty-four hours a day, seven days a week for each fifteen residents, and at least one person working 40 hours per week for each four residents. In 2001, state legislation established the following skill mix requirements: 1) one direct care staff per fifteen residents; 2) an average of 2.75 hours per resident per day (HPRD) worked by nursing staff (RNs, LPNs and CNAs), and 3) 0.2 HPRD for RNs, 2.0 HPRD for CNAs, and 0.55 HPRD for others staff.
Process Measures

Process indicators reflect what has been done and may also help pinpoint how some care processes were poorly implemented (Castle & Ferguson, 2010). In 2004, John F. Schnell and his research team’s report of California nursing homes on issue “relationships of nursing home staffing to quality of care” indicated that high-staffed nursing homes performed significantly better on 13 of 16 care processes implemented in nursing homes care (Schnelle et al., 2004).

Urinary tract infection and antipsychotics medication usage are major care process problems among the long-term care residents, particularly in nursing homes. Therefore, they are used as process measures.

Urinary tract infections are common problems in the elderly population. It is the number one cause of infection in residents of long-term care facilities and 10.3 percent of hospital admissions was caused by urinary tract infection nationwide (Matthews & Lancaster, 2011). Due to aging-associated human body structure and functional changes, higher rate comorbid illnesses, disability and use of invasive device to deliver treatment, residents in long-term care nursing homes are at increased risk for infections and related serious consequences, such as mental status change, hospital admission, and death (Tsan et al., 2010). Although urinary tract infections are serious problems in nursing home care setting, it can although be prevented and diagnosed early based on nursing staff’s professional care skill level and efforts. Urinary tract infection is a care processes indicator which reflecting the quality and efforts on toilet training, urinary incontinence care and urinary tract catheter usage skills. Horn (2008) conducted a literature review on clinic outcomes research had revealed that with each 10-minute increase in registered nurse (RN) direct care time/ per resident per day was associated with fewer urinary tract infections (Horn, 2008).
Antipsychotic medication is a group special medication which has been used in nursing home in managing psychosis and behavioral disturbance for decades. Residents in nursing homes setting with behavioral and psychological symptoms of dementia, such as agitation and aggression, are make up a large percentage of nursing home residents. Recent national data from the OSCAR indicated that 24.6 percent nursing home residents are taking antipsychotics (Mor et al., 2009). The adverse effects of such drugs are considerable and increasing fall accident, pressure ulcer and doubling of stroke risk (Morrison, 2009). Since nursing staffs provide direct care and monitor residents 24/7, they play a critical role in clinical decision whether to prescribe antipsychotic for behavioral and psychological symptoms. Morrison (2009) reported by providing training to nursing home staff on residents behavioral and psychological symptom checklist and six-monthly review, led to a reduction on antipsychotics prescription in nursing home from 22 percent to 15 percent.

Outcome Measures

Pressure ulcer rate and health deficiency citation are the most common indicators for nursing home quality outcome researches and the important measures of the quality of clinical care in nursing homes (Wunderlich & Kohler, 2001). Pressure ulcers are a common medical condition among long-term care nursing homes residents. In 2004, 11 percent U.S. nursing home residents had pressure ulcers and prevalence rate from 2% to 28% nationwide (Park-Lee & Caffrey, 2009). Pressure ulcer usually developed by unrelieved pressure on the skin, but highly related to residents with a recent weight loss, immobilization, taking more than eight medications and recent bowel or bladder in continence. Harrington (2001) had reported that higher quality staff (ratio of RNs and LPNs to CNAs) is related to lower pressure ulcer prevalence. Hickey and her research team (2005) also indicated that decreasing nursing staff number and/ or nursing skill
level had associated a 2.1 percent higher rate of pressure ulcer. Wiener, Freiman, and Brown (2007) also stated that also nursing staff level along was a necessary factor which influences the outcome of pressure ulcer care procedure, but there were no clear linear relationship between nursing staff and pressure ulcer rate.

Health deficiency citations are frequently used as a measure of nursing home quality. The quality of long-term care in nursing home is the responsibility of each state government under the OBRA 87; state surveying agencies conduct annual inspections of every nursing home that receives Medicare and Medicaid reimbursement and investigate all quality of care complaints. When nursing homes fail to meet federal requirements, inspectors cite the nursing home for violating health standard. Mor et al. (2009) indicated that although there are very detailed, federal published surveyor guidelines review processes for inspectors to follow. There were large variations in the number and severity among states (Mor et al., 2009). Wiener and colleagues (2007) had reviewed past research report and concluded that from 1994 to 2006, the average number of deficiencies per certified nursing home increased from 7.2 to 7.5. Hyer and colleagues (2011) reported that by increase one hour of CNA’s HPRD, there is a 10 percent decrease in the total deficiency score.

**Five-star Rating System**

In 2008, the CMS had created a five-star quality rating system for nursing homes. The five-star rating is a tool to assist consumers in selecting a nursing home and intended to provide consumers with a snap-shot vision of a nursing home. It is an integrated quality rating system from the nursing home compare website. The five-star scale ranges from 1 to 5. One star indicates the facility is rated “much below average”, 3 stars is a “above average” rating, and 5 stars is a “much above average” rating (CMS, n.d. b).
Star ratings are given for health inspections, staff, and quality measures. The health inspections rating is also called “Survey Report” rating. This measure incorporates information from the most recent three onsite inspections, including both the “standard” and “any complaint” surveys. The staffing rating has information about the number of hours of care on average provided to each resident each day by nursing staff. The quality measures rating use information from nine different physical and clinical quality measures for nursing home residents (CMS, n.d. b).

**Research Questions**

Question 1: What are the current demographic characteristics of Medicare- and Medicaid-certified nursing homes in greater Dayton area?

a) Total number of Medicare- and Medicaid-certified nursing home,

b) The percentage of For-profit nursing homes,

c) The percentage of Non-profit nursing homes,

d) RN to LPN ratio,

e) RN + LPN to CNAs ratio,

f) RN to (RN+LPN+CNAs) ratio,

g) CNAs to (RN+LPN+CNAs) ratio

Question 2: Describe the association between nursing home ownership and nursing staff compositions?

Question 3: What is the current nursing staff composition level (HPRD) comparing to national average level? (Total, RNs, LPNs and CNAs)

Question 4: What is the relationship between nursing staff composition level including total HPRD, RNs, LANs and CNAs and care process and outcome factors?
Question 5: Is there any difference in care process and outcome factors when comparing between above and below national average level?

Methods

This study explores the relationships among nursing home structures, care processes and quality outcomes in Southwest Ohio. This is a descriptive study that uses the CMS Minimum Data Set. Nursing Home Compare data set is a cross-section, aggregated survey data set collected by CMS to monitor the quality of care in Medicare- and Medicaid-certified nursing home settings in the United States.

Long-term care nursing homes are classified into: Medicare certified, Medicaid certified, Medicare and Medicaid certified, and state certified four types of subgroup. Medicare- and Medicaid-certified nursing homes are under both federal and state regulatory requirements for measurement and quality control of practices. These nursing homes are subject to inspection or survey by virtue of their certification to participate in Medicare and Medicaid, and /or licensure by the state in which they operate (CMS, n.d. a). The information collected the results for local nursing homes can be compared to national and state average level. In state of Ohio, there were 954 nursing homes participated Medicare and /or Medicaid certification programs. The Ohio Department of Health licenses and inspects nursing homes and residential care facilities; the Ohio Department of Aging administrates “Area Agencies on Aging”. Ohio has twelve area agencies, each serving a multi-county planning and service area. Agencies create local plans based on the population and resources in their communities (Ohio Department of Aging, n.d.). The study sample was defined as the nursing homes which participated Medicare and Medicaid certification program; located in “Council on Aging of Southwestern Ohio” and “Area Agency on Aging, PSA 1 & 2” regions, which including Butler, Clermont, Clinton, Hamilton, Warren
and Champaign, Clark, Darke, Greene, Logan, Miami, Montgomery, Preble and Shelby (14 counties); and had health survey between March 25, 2011 to December 11, 2012.

The data set was collected from the Medicare website “Nursing Home Compare-Quality Measures” section (CMS, n.d. b). There were 213 nursing homes had met the definition of this study project. After carefully evaluated abstracted dataset, there was one nursing home participated Medicare certification program only and 14 other nursing homes had inadequate datasets which were all been eliminate from this project. The final sample set had 198 nursing homes.

The Nursing Home Compare website provides information that allows consumers to compare information about nursing homes. It contains quality of care information on every Medicare- and Medicaid-certified nursing home in the country, including over 17,000 nationwide. The nursing home quality measures come from resident assessment data that nursing homes routinely collect on the residents at their admission and quarterly during stay. The information was self-reported by nursing homes. All of these data are reported by the nursing homes themselves. Nursing home inspectors review it, but don’t formally check it to ensure accuracy (CMS, n.d. b). These assessment data have been converted to develop quality measures that give consumers another source of information that shows how well nursing homes are caring for their resident's physical and clinical needs. It was an anonymous publicly published aggregated data set. Therefore, there was no human subject risk relating to individuals enrolled in any nursing home facilities and no financial incentive related to any organization.

Nursing homes compare data set come from two sources: CMS’s Health Inspection database and Minimum Data Set (MDS) repository. The data set has been proved by Medicare and Medicaid recertification board for its reliability and validity (CMS, n.d. b). The health
inspection database is based on the reports from state health inspection agencies. The inspection report covers 190 items related to facility inspection including: staff level measurement, health deficiencies investigations, quality of care and quality of life of nursing home residents (CMS, n.d. b). The Minimum Data Set (MDS) is a federal mandated clinic assessment instrument for all residents in Medicare- or Medicaid-certified nursing homes. MDS is a comprehensive functional capabilities and medical conditional assessment tool for each resident as their baseline record. MDS includes 19 categories questionnaire and completed by licensed health care professional. MDS assessments are required for residents on admission to the nursing facility and then quarterly (CMS, n.d. b).

The data for this project was selected from the nursing home compare website databases section “Long Stay Quality measures”. The long stay quality measures include all residents in an episode whose cumulative days in the facility is greater than or equal to 101 days at the end of the target period. An episode is a period of time spanning one or more stays, beginning with an admission and ending with either a discharge or the end of the target period (whichever comes first). A target period is the span of time that defines the QM reporting period-a calendar quarter (CMS, n.d. b).

The independent variables include: Ownership, HPRD of RNs, LPNs and CNAs. The dependent variables are: fall with major injury, pressure ulcer rates, and five-star rating systems. The ownership data was collected from general information section; HPRD of RNs, LPNs and CNAs information was abstracted from staff section; and other independent variables information was chosen from quality measure section (CMS, n.d. b).
Study Measures

This study project wants to compare these conditions with the same period national average level in order to identify the reasonable nursing staffing level, adequate composition ratio, and the relationship between nursing home staff composition and the quality of long-term care outcomes.

The independent variables are measures of nursing home structure which are 1) Nursing home ownership; 2) the size of nursing homes; and 3) Hour Per Resident Day (HPRD).

Nursing home ownership can be classified into three categories: For-Profit, Non-Profit and Government entities.

The size of nursing homes were grouped based on current average number of national nursing home’s Medicare and Medicaid certified bed into two group: below national average level-less than 107 beds and above national average level - 108 beds above.

HPRD was defined as direct contact time for daily care process provided by nursing staff. Nursing staff’s skill levels were defined as following: A registered nurse (RN) is a nurse who has graduated from a nursing program at a college or university and has passed a national license exam. A licensed practice nurse (LPN) is a nurse who has completed a practical nursing program and is licensed by state to provide routing patient care under the direction of a RN or physician. Certified nursing assistant (CNA) is a person trained in basic nursing techniques and direct patient care who practices under the supervision of a RN (CMS, n.d. a).

The dependent variables are measures of care process and care outcomes. The care process indicators are fall with major injury, urinary tract infection rate, physical restraint usage rate and antipsychotics usage rates and pressure ulcers.
Currently, nursing home compare data base has listed 13 quality measures for long-stay nursing residents (CMS, n.d. b). Based on meta-literature review published by Mor et al. (2009) and Bostick et al. (2006) this project had selected four care process measures-rate of fall with major injury, urinary tract infection, physically restraint, antipsychotics use and two care outcome measures - pressure ulcer rates and health deficiency. The outcome indicators used in this study are pressure ulcer rate and nursing home deficiency citation numbers.

Fall with major injury was defined as the ratio of nursing home resident had diagnosis of injury due to falls. Urinary tract infection was identified as the ratio of nursing home resident had of urinary tract infection during their stay. Physically restraint means that residents were confined or in the home in such a manner that the freedom for normal egress from the home is dependent upon the unlocking by others and antipsychotics use was the ratio of nursing home residents were on antipsychotics.

Data was abstracted from Nursing Home Compare website and recorded into SPSS version 20 software. The study conducted statistical analyses using SPSS version 20. The basic analysis approach was \( t \)-test.

The data set was limited by aggravation characteristic and lack of presentation of environment factors such as nursing home resident’s demographic characteristics and socioeconomic status.

The focus of this study is nursing homes; the data used for this study contain no information about residents of nursing homes. Exempt status for this study was applied for and received from the Wright State University Institutional Review Board.
Results

This study evaluates the characteristics of long-term care in Medicare- and Medicaid-certified nursing homes in Southwest Ohio (PSA1 & 2) and compares with the state of Ohio dataset. Table 1 shows general information about study subjects. A total of 904 Ohio and 209 of Southwest Ohio Medicare- and Medicaid-certified nursing homes were included in this study. At the state level, 81% were owned by for-profit organizations compared 19% of nursing homes owned by non-profit organizations. Southwest Ohio showed a similar pattern, 73% of nursing homes were owned by for-profit and 27% of nursing homes were operated by non-profit organizations.

Table 1

<table>
<thead>
<tr>
<th>Measures</th>
<th>Southwest Ohio</th>
<th>Ohio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>Total Nursing Homes</td>
<td>209</td>
<td>100.00</td>
</tr>
<tr>
<td>Location (Area Agency on Aging)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PSA 1 Region</td>
<td>120</td>
<td>57.40</td>
</tr>
<tr>
<td>PSA 2 Region</td>
<td>89</td>
<td>42.60</td>
</tr>
<tr>
<td>Ownership</td>
<td></td>
<td></td>
</tr>
<tr>
<td>For-Profit</td>
<td>152</td>
<td>72.70</td>
</tr>
<tr>
<td>Non-Profit</td>
<td>57</td>
<td>27.30</td>
</tr>
<tr>
<td>Beds (Avg)</td>
<td>101</td>
<td>98</td>
</tr>
<tr>
<td>Residential Care HPRD* (Avg)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RNs</td>
<td>0.64</td>
<td>0.69</td>
</tr>
<tr>
<td>LPNs</td>
<td>0.95</td>
<td>0.88</td>
</tr>
<tr>
<td>Licensed Nurses</td>
<td>1.59</td>
<td>1.57</td>
</tr>
<tr>
<td>CNAs</td>
<td>2.31</td>
<td>2.31</td>
</tr>
<tr>
<td>Quality of Care (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pressure Ulcer</td>
<td>5.97</td>
<td>6.29</td>
</tr>
<tr>
<td>Falls w/ Injury</td>
<td>3.45</td>
<td>3.46</td>
</tr>
</tbody>
</table>

*HPRD: Hours per Resident Day

Source: CMS, n.d. b

Residential Care Staffing – Ownership

Table 2 summarizes results by nursing home ownership for Southwest Ohio and state of Ohio. Non-profit nursing homes provide 13 minutes of additional licensed nursing staff care per patient per day than for profit nursing homes (p < 0.001). Non-profit nursing homes provide 28
minutes more of CNA care per patient per day than do for-profit facilities. The non-profit nursing homes in the state of Ohio exceeded the amount of care provided by for-profit nursing homes in a similar pattern. Licensed nursing staff provides 10 minutes more of care per patient per day and CNA staff provides 25 minutes more care per patient per day ($p < 0.001$).

Table 2

<table>
<thead>
<tr>
<th>Measures</th>
<th>For-Profit</th>
<th>Non-Profit</th>
<th>T-test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean  N  SD</td>
<td>Mean  N  SD</td>
<td>Sig</td>
</tr>
<tr>
<td>Residential Care HPRD (Avg)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RN</td>
<td>0.62 151 0.20</td>
<td>0.70 56 0.22</td>
<td>0.019</td>
</tr>
<tr>
<td>LPN</td>
<td>0.91 151 0.26</td>
<td>1.06 56 0.39</td>
<td>0.012</td>
</tr>
<tr>
<td>Licensed Nurses</td>
<td>1.53 151 0.34</td>
<td>1.75 56 0.46</td>
<td>0.001</td>
</tr>
<tr>
<td>CNA</td>
<td>2.18 151 0.26</td>
<td>2.65 56 0.63</td>
<td>0.001</td>
</tr>
<tr>
<td>Quality of Care (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pressure Ulcer</td>
<td>6.11 150 3.80</td>
<td>5.59 57 3.00</td>
<td>0.302</td>
</tr>
<tr>
<td>Falls w/ Injury</td>
<td>3.38 150 2.30</td>
<td>3.64 57 2.07</td>
<td>0.438</td>
</tr>
<tr>
<td>Five-star Rating</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health Inspection</td>
<td>2.92 151 1.22</td>
<td>3.23 57 1.24</td>
<td>0.112</td>
</tr>
<tr>
<td>Nurse Staffing</td>
<td>2.25 151 1.14</td>
<td>3.48 56 0.97</td>
<td>0.001</td>
</tr>
<tr>
<td>Quality Measures</td>
<td>3.38 150 1.20</td>
<td>3.70 57 0.91</td>
<td>0.039</td>
</tr>
</tbody>
</table>

* HPRD: Hours per Resident Day; Dif-M*: Mean differences

**Quality of Care – Ownership**

In Southwest Ohio there is no difference between non-profit and for-profit nursing homes in the quality of care measures, such as pressure ulcer and falls with injury. Across the state of Ohio there is a statistically significant, difference ($p < 0.001$) between non-profit and for-profit nursing homes on quality of care measures. Results are mixed for pressure ulcers and falls with
major injury. Non-profit nursing homes report an average prevalence rate of 5.3% for pressure ulcers (this is 21% lower than the 6.4% rate reported by for-profit nursing homes). However, for falls with major injury non-profit nursing homes report an average prevalence rate of 3.8% falls with injury (this is 20% higher than the rate reported by for-profit nursing homes (3.4%).

**Five-star Ratings – Ownership**

Results for the five-star rating measures for Southwest Ohio indicate that there is a statistically significant difference between non-profit and for-profit facilities concerning the average number of stars awarded for nursing staff and quality measures. Non-profit homes receive an average of 3.5 stars compared to an average of 2.5 stars awarded to for-profit nursing homes for nursing staff ($p < 0.001$). For quality measures non-profit facilities were awarded an average of 3.7 stars compared to an average of 3.4 star awarded to for-profit nursing homes. Across the state of Ohio non-profit nursing homes were awarded significantly more stars than for-profit facilities for health inspection, nurse staff rating and quality measures. Non-profit nursing homes were awarded an average of 3.2 stars on health inspections compared to 2.7 awarded to for-profit facilities ($p < 0.001$). The average number of stars awarded for nursing staff was 3.5 for non-profit homes compared to 2.5 stars to the for-profit facilities ($p < 0.001$). For quality measures non-profit facilities were awarded an average of 3.5 stars compared to 3.2 stars to the for-profit nursing homes ($p < 0.001$).

**Residential Care Staffing – Licensed Nursing**

Table 3 shows the summary statistics for nursing homes that provide licensed nursing care at below and above the Ohio average number of nursing hours per resident day (HPRD). Nursing homes in Ohio provide an average of 1.6 hours of licensed nursing staff care per resident per day. In both the state of Ohio and in Southwest Ohio, there is a statistically
significant difference between nursing homes that provide staffing rates that are below and above the Ohio licensed for licensed nursing staff and by CNA staff (p < 0.001). In Southwest Ohio nursing homes that provide licensed nursing care hours above the Ohio average licensed nursing staff level provide 40 minutes of additional licensed nursing staff care per patient per day than facilities that provide care below the Ohio average. Nursing homes that provide licensed nursing care hours above the state average provide 23 minutes more of CNA care per patient per day than do nursing homes that provide less than the state average. Nursing homes in Ohio that provide nursing care hours above the state average provide 36 minutes more licensed nursing staff care per resident day than facilities that provide nursing care below the state average. They also provide 18 minutes additional CNA care per resident day than facilities that provide nursing care at below the state average.
Table 3  
**Summary Statistics by Below and Above Ohio Average Lic* Nursing Hours per Resident Day**

<table>
<thead>
<tr>
<th>Measure</th>
<th>Below OH Avg</th>
<th>Above OH Avg</th>
<th>T-Test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean  SD</td>
<td>N</td>
<td>Mean  SD</td>
</tr>
<tr>
<td>Residential Care HPRD* (Avg)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RN</td>
<td>0.57 0.16</td>
<td>132</td>
<td>0.77 0.224</td>
</tr>
<tr>
<td>LPN</td>
<td>0.81 0.18</td>
<td>132</td>
<td>1.20 0.323</td>
</tr>
<tr>
<td>Licensed Nurse</td>
<td>1.37 0.17</td>
<td>132</td>
<td>1.97 0.375</td>
</tr>
<tr>
<td>CNA</td>
<td>2.16 0.43</td>
<td>132</td>
<td>2.55 0.596</td>
</tr>
</tbody>
</table>

| Quality of Care (%)            |             |              |          |        |       |        |
| Pressure Ulcer                 | 6.24 3.57   | 133          | 5.48 3.607 | 74 | 0.145 | 0.76   |
| Falls w/ Injury                | 3.12 2.28   | 133          | 4.05 2.036 | 74 | 0.003 | -0.93  |

| Five-star Rating               |             |              |          |        |       |        |
| Health Inspection              | 2.80 1.25   | 133          | 3.37 1.100 | 75 | 0.001 | -0.57  |
| Nurse Staffing                 | 1.98 1.00   | 132          | 3.64 0.816 | 75 | 0.001 | -1.66  |
| Quality Measures               | 3.49 1.13   | 133          | 3.43 1.136 | 75 | 0.733 | 0.06   |

<table>
<thead>
<tr>
<th>Measure</th>
<th>Below OH Avg</th>
<th>Above OH Avg</th>
<th>T-Test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean  SD</td>
<td>N</td>
<td>Mean  SD</td>
</tr>
<tr>
<td>Residential Care HPRD (Avg)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RN</td>
<td>0.60 0.17</td>
<td>592</td>
<td>0.88 0.424</td>
</tr>
<tr>
<td>LPN</td>
<td>0.77 0.18</td>
<td>591</td>
<td>1.08 0.32</td>
</tr>
<tr>
<td>Licensed Nurse</td>
<td>1.37 0.18</td>
<td>592</td>
<td>1.97 0.476</td>
</tr>
<tr>
<td>CNA</td>
<td>2.22 0.44</td>
<td>591</td>
<td>2.50 0.539</td>
</tr>
</tbody>
</table>

| Quality of Care (%)            |             |              |          |        |       |        |
| Pressure Ulcer                 | 6.22 3.65   | 596          | 6.44 4.528 | 291 | 0.463 | -0.22  |
| Falls w/ Injury                | 3.38 2.33   | 600          | 3.61 2.388 | 294 | 0.178 | -0.23  |

| Five-star Rating               |             |              |          |        |       |        |
| Health Inspection              | 2.75 1.27   | 600          | 2.94 1.308 | 299 | 0.033 | -0.19  |
| Nurse Staffing                 | 2.45 0.725  | 1.19         | 3.58 0.891 | 299 | 0.001 | -1.13  |
| Quality Measures               | 3.24 0.727  | 1.16         | 3.19 1.14  | 298 | 0.099 | 0.05   |

* Lic: Licensed Nurse; Dif-M: Mean differences; HPRD: Hours per Resident Day
Source: CMS, n.d. b

**Quality of Care – Licensed Nursing.**

In Southwest Ohio there was a statistically significant difference between nursing homes that provide care above and below the state average of licensed nursing staff care for the prevalence rate of falls with major injury (p < 0.003). There was no difference for the pressure ulcer prevalence rates between licensed nursing staff levels. In the Southwest Ohio area the falls with major injury prevalence rate measures 77% higher in facilities that provide licensed nursing staff care at above the state average (4.1%) than those that provide care below the state average.
QUALITY OF LONG TERM CARE

(3.1%) (p < 0.001). In the state of Ohio there was no difference in the quality of care measures, pressure ulcer and falls with injury between licensed nursing staff levels.

**Five-star Rating – Licensed Nursing**

In Southwest Ohio star ratings for health inspections of nursing homes that provide licensed nursing care hours at above the state average received an average of 3.4 stars compared to an average of 2.8 for facilities that provide license nursing care hours below the state average (p < 0.001). Star ratings for nurse staffing for nursing homes that provide licensed nursing care hours above the state average received 3.6 stars compared to 2.0 stars for facilities that provide nursing care hours below the state average (p < 0.001). At the state of Ohio nursing homes that provide licensed nursing care hours above the state average demonstrated a trend similar to Southwest Ohio. These facilities were awarded 3.0 stars on health inspection ratings compared to an average of 2.8 stars awarded to nursing homes that provide licensed nursing care hours levels below the state average (p < 0.033). Nursing homes that provide licensed nursing care hours above the state average received 3.6 stars on nursing staffing ratings compared to 2.5 stars for facilities that provide nursing care hours below the state average (p < 0.001).

**Residential Care Staffing – Certified Nursing Assistant**

Table 4 shows results for CNAs for Care Hours Per Resident Day (HPRD) comparing nursing homes that provide CNA care at above or below the Ohio average HPRD level. Nursing homes in Ohio provide an average of 2.31 hours of CNA care per resident per day. In Southwest Ohio facilities that provide CNA care hours at above the state average provide 16 minutes more of licensed nursing staff care per patient per day than those that provide care at below the state average (p < 0.001). Nursing homes that provide CNA care at above average levels provide 49 minutes additional CNA care per patient per day than do nursing homes that provide less than the
average CNA care per patient per day. Ohio nursing homes that provide above average CNA care hours provide 13 minutes more licensed nursing staff care hours per resident day than facilities that provide CNA care hours below the state average (p < 0.001). Facilities that provide more than the average number of CNA care hours provide 44 minutes additional of CNA care than facilities that provide less than the average care hours (p < 0.001).

Table 4

<table>
<thead>
<tr>
<th>Measure</th>
<th>Below OH Avg</th>
<th>Above OH Avg</th>
<th>T-Test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>N</td>
</tr>
<tr>
<td>Residential Care HPRD (Avg)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RN</td>
<td>0.59</td>
<td>0.178</td>
<td>126</td>
</tr>
<tr>
<td>LPN</td>
<td>0.90</td>
<td>0.312</td>
<td>126</td>
</tr>
<tr>
<td>Licensed Nurses</td>
<td>1.49</td>
<td>0.353</td>
<td>126</td>
</tr>
<tr>
<td>CNA</td>
<td>1.98</td>
<td>0.238</td>
<td>126</td>
</tr>
<tr>
<td>Quality of Care (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pressure Ulcer</td>
<td>6.27</td>
<td>3.758</td>
<td>127</td>
</tr>
<tr>
<td>Falls w/ Injury</td>
<td>3.19</td>
<td>2.294</td>
<td>127</td>
</tr>
<tr>
<td>Five-star Rating</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health Inspection</td>
<td>2.77</td>
<td>1.242</td>
<td>127</td>
</tr>
<tr>
<td>Nurse Staffing</td>
<td>1.98</td>
<td>1.004</td>
<td>126</td>
</tr>
<tr>
<td>Quality Measures</td>
<td>3.54</td>
<td>1.207</td>
<td>127</td>
</tr>
</tbody>
</table>

|                                |              |              |        |            |              |        |       |        |
|                                 |              |              |        |            |              |        |       |        |
| State of Ohio                  |              |              |        |            |              |        |       |        |
| Residential Care HPRD (Avg)    |              |              |        |            |              |        |       |        |
| RN                             | 0.65         | 0.294        | 515    | 0.76       | 0.326        | 377    | 0.001 | -0.11  |
| LPN                            | 0.84         | 0.266        | 514    | 0.93       | 0.291        | 377    | 0.001 | -0.09  |
| Licensed Nurses                | 1.48         | 0.389        | 515    | 1.69       | 0.436        | 377    | 0.001 | -0.21  |
| CNA                            | 2.00         | 0.277        | 513    | 2.74       | 0.391        | 377    | 0.001 | -0.74  |
| Quality of Care (%)            |              |              |        |            |              |        |       |        |
| Pressure Ulcer                 | 6.48         | 3.767        | 517    | 6.03       | 4.201        | 370    | 0.102 | 0.45   |
| Falls w/ Injury                | 3.22         | 2.268        | 521    | 3.79       | 2.427        | 373    | 0.001 | -0.58  |
| Five-star Rating               |              |              |        |            |              |        |       |        |
| Health Inspection              | 2.65         | 1.257        | 523    | 3.04       | 1.295        | 376    | 0.001 | -0.39  |
| Nurse Staffing                 | 2.05         | 1.030        | 515    | 3.44       | 0.981        | 376    | 0.001 | -1.39  |
| Quality Measures               | 3.29         | 1.187        | 522    | 3.26       | 1.100        | 375    | 0.706 | 0.03   |

*CNA: Certified Nurse Assistant; Dif-M: Mean differences; HPRD: Hours per Resident Day
Source: CMS, n.d. b
Quality of Care – Certified Nursing Assistant

In Southwest Ohio the falls with major injury prevalence rate measure was 82% higher in nursing homes that provide CNA care hours above the average (3.9%) than those that provide care hours less than the state average (3.2%) (p < 0.027). Ohio, nursing homes that provide CNA care hours above the state average had 85% higher fall rates with a higher fall with major injury prevalence rate (3.79%) than nursing homes that provided care hours below the CNA average (3.22%) (p < 0.001).

Five-star Rating – Certified Nursing Assistant

In Southwest Ohio, nursing homes that provide above average CNA care hours received an average of 3.4 stars on health inspection rating compared to an average of 2.8 stars received by the below average group (p < 0.001). Facilities that provide above average CNA care hours received an average of 3.5 stars on nursing staff rating compared to 2.0 stars for those that provide care at below the CNA care hour average (p < 0.001). State of Ohio facilities that provide CNA care hours above the state average demonstrated a trend similar to Southwest Ohio, 3.0 stars were awarded on health inspection ratings compared to an average 2.7 stars for those providing CNA care hours below the state average (p < 0.001). Nursing homes that provide CNA care hours above the state average received an average of 3.4 stars on nursing staffing rating on health inspection and 2.1 stars for facilities that provide CNA care hours below the state average (p < 0.001).

Discussion

This study examines the relationship between nursing home staff care hours and quality of care outcomes. The relationship between nursing staff, skill level, ownership and quality of care outcomes have been intensively studied for the past thirty years (Wunderlich & Kohler,
2001; DHHS, 2000; Spilsbury et al., 2011). Although the majority of published studies had indicated significant influences of nursing homes ownership and nursing staff care hours on nursing home quality of care, the results have been mixed.

**Influence of Nursing Home Ownership**

Nursing home ownership has an impact on nursing staff care hours (HPRD). Nursing homes in the state of Ohio have met or exceed the number of nursing staff care hours established by both the state of Ohio and the National minimum nursing staff requirement (OBRA 87). The effects of nursing staff HPRD were mixed on quality outcomes measures and five-star rating measures, but the numbers suggest that nursing homes that provide care hours above state of Ohio average for licensed nursing staff and Certified Nursing Assistants (CNA) tend to have better outcomes.

**Influence of Nursing Home Staff Care Hours**

Results from this study suggest that when nursing home staff care hours reach the state of Ohio nursing staff minimum HPRD requirement there is little difference in quality of care. There is a difference in the amount of staff care hours for nursing homes that provide care above the state average HPRD for either licensed nursing or CNA care. Results show that nursing homes that have higher than the state average HPRD licensed nursing staff and CNA care hours have higher falls with major injury prevalence rates. No difference in pressure ulcer prevalence rates was found related to the level of nursing home staff care hours. This finding does not concur with the majority of previous study results (Bostick et al., 2006; Harrington, 2001). One factor believed to have contributed to this disagreement is that previous studies are based on the analysis of a dynamic trend dataset (Wiener et al., 2007). Pressure ulcer occurs in only a small percentage of the nursing home resident population. It is a comorbid condition that can be
affected by other conditions and factors. It may be that when the nursing home staff level reaches the required state minimum standard level the pressure ulcer prevalence rate may not be a sensitive quality of care measure. It is likely that there is no linear relationship between the nursing staff component and quality of care outcomes. This is consistent with the conclusions of previous studies. “Nursing staffing levels alone are a necessary, but not a sufficient, condition for positive affecting care in nursing homes” (Wunderlich & Kohler, 2001, p. 182).

Quality of Care Measures

The quality of care measure “falls with major injury” prevalence rate was higher in non-profit nursing homes and facilities that provide staff care hours higher than the state requirement. One possible explanation is that a fall with major injury tends to occur to residents who are more fragile but have higher individual mobility. It may be that nursing home residents who have better general physical conditions and more individual independence may have more falls with major injury. This finding also raises questions related to current practice protocol of prevention of accident falls in nursing home settings. Further investigation is needed on how to balance between individual freedom and accidental falls prevention. There were no differences in the pressure ulcer prevalence rates or five star ratings on quality measures for either licensed nursing staff or CNA care hours. There was a reverse phenomenon on falls with major injury prevalence rates. Non-profit nursing homes receive higher five star rating than for for-profit nursing homes. These results are consistent with previous studies (Harrington, 2001; Strahan, 1997; Vicram et al., 2009). This suggests that for-profit nursing facilities tended to devote fewer resources to direct patient care. Those results can also be interpreted as the nature of for-profit organizations. For-profit nursing homes reduce labor costs by providing lower levels of nursing staff care to generate higher margin of profit.
The quality measures star ratings are based on performance of 9 of the 18 quality measures that are posted on the Nursing Home Compare website. The measures used in the star rating for quality include 7 long-stay measures and 2 short-stay measures which is listed as follows:

Long-Stay Residents:

- Percent of residents whose need for help with activities of daily living has increased
- Percent of high risk residents with pressure sores
- Percent of residents who have/had a catheter inserted and left in their bladder
- Percent of residents who were physically restrained
- Percent of residents with a urinary tract infection
- Percent of residents who self-report moderate to severe pain
- Percent of residents experiencing one or more falls with major injury

Short-stay residents:

- Percent of residents with pressure ulcers (sores) that are new or worsened
- Percent of residents who self-report moderate to severe pain (CMS, n.d. b).

It is possible that the inclusion of short-stay measures influences the quality ratings of nursing homes that focus primarily on long-term care.

**Public Health Implications**

The quality of long-term care in nursing home setting is an important public health issue that gained public attention during past thirty years, especially as the baby-booming population getting into elder aging, current unsustainable high cost practicing in long-term care services and continuously growing demand for higher quality long-term care. Previous public health
Researchers have revealed the impacts of nursing home ownership on national long-term care policies and practices (Harrington, 2001; Strahan, 1997; Vicram et al., 2009). Nursing home ownership has substantial power on nursing staff care hours and quality of long-term care outcomes. The state of Ohio has shared same trend with the rest of nation that more than 60% nursing homes are operated under for-profit organizations (Jones et al., 2009). On the one hand, this trend will continue growing as our national health care is defined as a commodity not a basic human right; on the other hand, Medicare and Medicaid accounted for 60% of spending for nursing home care (Wiener et al., 2007). Therefore, public health has a responsibility to advocate for Medicare and Medicaid funding on long-term care services to be used effectively and efficiently. It is also important to advocate for more incentive programs for long-term care services in non-profit nursing homes.

Nursing staff care hours are the foundation of adequate quality of care in nursing home settings (Harrington, 2001). As the current population in the United States ages it is necessary to ensure public funding of Medicare and Medicaid to providing adequate care in nursing home settings. Public health needs to advocate on the adequate nursing staff care hours with each specified nursing home population and use social media power to monitor whether nursing home care providers comply with the minimum mandates for nursing staff levels and to encourage care providers to improve nursing staff working environments and continuing professional education. By focusing on quality of care in nursing home settings, public health is also promoting the quality of life for nursing home residents and their families. Quality of long-term care in the nursing home setting is not only a health care professional issue, but also a critical issue that is related to every family’s daily life in our nation.
Study Limitations

This study was a cross-sectional descriptive study. All measures were lacking of a dynamic component to represent a dynamic relationship between nursing staff changing and quality outcomes. The dataset used is aggregated at the level of the nursing home facility. The data are based on a point-in-time survey. The data collected include an on-site survey and self-reported data from nursing homes that may be subject to reporting bias. Nursing home residents’ general demographic information and pre-existing medical and disability conditions were not included in this study. When using quality measures such as pressure ulcer prevalence rates, it is difficult to interpret true meaning of dataset without a common comparable baseline. For instance, since pressure ulcer only occurs in bed bounding conditions, there is no comparability between bed bounding and independent living resident. Future studies should consider using nursing home resident’s admission conditions as a baseline and using incident rates instead of prevalence rates as quality measures indicators in order to truly represent the dynamic changes while boarding in nursing homes.
References


## Appendix A - Table of Variables of Interest

<table>
<thead>
<tr>
<th>Variables</th>
<th>Constitutive Definition</th>
<th>Operational Definition</th>
<th>Level of Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Registered Nurse (RN)</td>
<td>A registered nurse (RN) is a nurse who has graduated from a nursing program at a college or university and has passed a national licensing exam</td>
<td>Means an individual licensed to practice nursing as a registered nurse under Chapter 4723. Of the Revised Code Ohio.</td>
<td>The number of RN hours each resident receives per day. 1= above USA average level; 2= below USA average level</td>
</tr>
<tr>
<td>Licensed Practical Nurse (LPN)</td>
<td>A nurse who has completed a practical nursing program and is licensed by a state to provide routine patient care under the direction of a registered nurse or a physician.</td>
<td>A person licensed under Chapter 4723 Ohio. of the Revised Code to practice nursing as a licensed practical nurse</td>
<td>The number of LPN hours each resident receives per day. 1= above USA average level; 2= below USA average level</td>
</tr>
<tr>
<td>Certified Nursing Assistants (CNAs)</td>
<td>A person trained in basic nursing techniques and direct patient care who practices under the supervision of a registered nurse</td>
<td>Means an individual as defined in paragraph (A)(3) of rule 3701-17-07.1 of the Administrative Code Ohio.</td>
<td>The number of CNAs hours each resident receives per day. 1= above USA average level; 2= below USA average level</td>
</tr>
<tr>
<td>Nursing Home Ownership</td>
<td>Nursing homes can be run by private for-profit corporations, non-profit corporations, religious affiliated organizations or government entities.</td>
<td>For-profit, Non-profit, and Government entities</td>
<td>1= For-profit; 2= Non-profit; 3= Government.</td>
</tr>
<tr>
<td>Pressure Ulcer</td>
<td>Pressure ulcers are open wounds that form whenever prolonged pressure is applied to skin covering bony outcrops of the body</td>
<td>The ratio of nursing home resident has pressure ulcer diagnosis</td>
<td>Reported ratio of pressure ulcer 1= above USA average level; 2= below USA average level</td>
</tr>
<tr>
<td>Falls w/ Major Injury</td>
<td>Experiencing one or more falls with major injury</td>
<td>The ratio of nursing home resident has diagnosis of injury due to falls</td>
<td>Percentage of falls with major injury</td>
</tr>
<tr>
<td>Five-star Rating: Health Inspection Rating</td>
<td>Measures based on outcomes from state health inspections</td>
<td>A health inspection score is calculated based on points assigned to deficiencies identified in each active provider’s current health inspection survey and the two prior surveys, as well as deficiency findings from the most recent three years of complaints information and survey revisits.</td>
<td>The top 10 percent in each state receive a five-star rating. The middle 70 percent of facilities receive a rating of two, three, or four stars, with an equal number (approximately 23.33 percent) in each rating category. The bottom 20 percent receive a one-star rating.</td>
</tr>
<tr>
<td>Five-star Rating: Nursing Staffing</td>
<td>RN+LPN+CNA Facility ratings on the staffing domain are based on two measures: 1) RN hours per resident day; and 2) total staffing hours (RN+ LPN+ nurse aide hours) per resident day.</td>
<td>Facility ratings on the staffing domain are based on two measures: 1) RN hours per resident day; and 2) total staffing hours (RN+ LPN+ nurse aide hours) per resident day.</td>
<td>A 1 to 5 rating is assigned based on a percentile-based method. For each facility, a total staffing score is assigned based on the combination of the two staffing ratings.</td>
</tr>
<tr>
<td>Five-star Rating: Quality Measures</td>
<td>Measures based on MDS quality measures</td>
<td>Based on performance on 9 of the 18 QMs that are currently posted on the Nursing Home Compare web site, and that are based on MDS 3.0 resident assessments. These include 7 long-stay measures and 2 short-stay measures.</td>
<td>Ratings for the QM domain are calculated using the three most recent quarters for which data are available.</td>
</tr>
</tbody>
</table>

Source: CMS, n.d. b
Appendix B - IRB Exempt Status Approval Letter

DATE: April 15, 2013

TO: Chengwu Zhang, PI, MPH Student
    Community Health
    Bill Spears, PhD, Fac. Adv.
    Community Health

FROM: B. Laurel Elder, Chair
       WSU Institutional Review Board

SUBJECT: SC# 5149

'Quality of Long-Term Care in Medicare & Medicaid Certified Nursing Homes in the Greater Dayton Area'

At the recommendation of the IRB Chair, your study referenced above has been recommended for exemption. Please note that any change in the protocol must be approved by the IRB; otherwise approval is terminated.

This action will be referred to the Full Institutional Review Board for ratification at their next scheduled meeting.

NOTE: This approval will automatically terminate two (2) years after the above date unless you submit a "continuing review" request (see http://www.wright.edu/rsp/IRB/CR_sc.doc) to RSP. You will not receive a notice from the IRB Office.

If you have any questions or require additional information, please call Robyn Wilks, IRB Coordinator at 775-4462.

Thank you!

Enclosure
RESEARCH INVOLVING HUMAN SUBJECTS

ACTION OF THE WRIGHT STATE UNIVERSITY
EXPEDITED REVIEW
Assurance Number: FWA00002427

Title: 'Quality of Long-Term Care in Medicare & Medicaid Certified Nursing Homes in the Greater Dayton Area'

Principal Investigator: Chengwu Zhang, PI, MPH Student
Community Health
Bill Spears, PhD, Fac. Adv.
Community Health

The Institutional Review Board Chair has approved an exemption with regard to the use of human subjects on this proposed project.

REMinDer: Federal regulations require prompt reporting to the IRB of any changes in research activity [changes in approved research during the approval period may not be initiated without IRB review (submission of an amendment), except where necessary to eliminate apparent immediate hazards to subjects] and prompt reporting of any serious or on-going problems, including unanticipated adverse reactions to biologicals, drugs, radioisotope labeled drugs or medical devices.

Signed Chair, WSU-IRB
Approval Date: April 15, 2013
IRB Mtg. Date: May 20, 2013
## Appendix C - List of Tier 1 Core Public Health Competencies Met

### Domain #1: Analytic/Assessment
- Use variables that measure public health conditions
- Use methods and instruments for collecting valid and reliable quantitative and qualitative data
- Recognize the integrity and comparability of data
- Identify gaps in data sources
- Adhere to ethical principles in the collection, maintenance, use, and dissemination of data and information
- Describe the public health applications of quantitative and qualitative data
- Use information technology to collect, store, and retrieve data
- Describe how data are used to address scientific, political, ethical, and social public health issues

### Domain #2: Policy Development and Program Planning
- Gather information relevant to specific public health policy issues
- Describe how policy options can influence public health programs
- Explain the expected outcomes of policy options (e.g., health, fiscal, administrative, legal, ethical, social, political)
- Gather information that will inform policy decisions (e.g., health, fiscal, administrative, legal, ethical, social, political)
- Describe the public health laws and regulations governing public health programs
- Identify mechanisms to monitor and evaluate programs for their effectiveness and quality
- Apply strategies for continuous quality improvement

### Domain #3: Communication
- Participate in the development of demographic, statistical, programmatic, and scientific presentations

### Domain #4: Cultural Competency
- Describe the dynamic forces that contribute to cultural diversity

### Domain #5: Community Dimensions of Practice
- Recognize community linkages and relationships among multiple factors (or determinants) affecting health (e.g., The Socio-Ecological Model)
- Describe the role of governmental and non-governmental organizations in the delivery of community health services
- Inform the public about policies, programs, and resources

### Domain #6: Public Health Sciences
- Describe the scientific foundation of the field of public health
- Describe the scientific evidence related to a public health issue, concern, or intervention
- Retrieve scientific evidence from a variety of text and electronic sources
- Discuss the limitations of research findings (e.g., limitations of data sources, importance of observations and interrelationships)

### Domain #7: Financial Planning and Management
- Describe the local, state, and federal public health and health care systems
- Describe the organizational structures, functions, and authorities of local, state, and federal public health agencies
- Adhere to the organization’s policies and procedures
- Report program performance
- Demonstrate public health informatics skills to improve program and business operations (e.g., performance management and improvement)

### Domain #8: Leadership and Systems Thinking – N/A