

2020

## Association between Certificate-of-Need Laws and the Health Outcomes of Home Health Patients

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# Walden University

College of Health Sciences

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Peter A. Atemnkeng

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2020

Abstract

Association between Certificate-of-Need Laws and the Health Outcomes  
of Home Health Patients

by

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MS, George Mason University, 2008

BS, University of Buea, 1998

Dissertation Submitted in Partial Fulfillment  
of the Requirement for the Degree of  
Doctor of Philosophy  
Public Health – Epidemiology Specialization

Walden University

May 2020

## Abstract

The Certificate of Need (CON) law on home health limits start-ups and expansions by providers. Seventeen states and the District of Columbia maintained CON restrictions in 2015. The regulation was intended to control health care cost and expenditure, and to promote quality public health outcomes, as postulated in the public interest theory. The purpose of the study was to assess the association between the CON laws by the states and the health outcomes of the Medicare patients that used home health services in 2015. The provider ratings data from Home Health Compare were analyzed using multiple linear regression models and *t*-tests. Findings indicated that the CON significantly contributed to the health outcomes of the patients who used home health services. It was found that the hospitalization rates and the proportion of the patients who used the emergency rooms services were significantly higher in CON states than in the non-CON states. Also, the providers in the CON states had higher improvements on walking, wound healing, breathing, bathing, taking oral medication, pain, and getting in and out of bed. The study adds to the information available to the stakeholders on how the CON affects public health outcomes in the home health sector.

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## Dedication

To Sheila Atemnkeng (my lovely wife) and our four children for undertaking this long journey to earn a Ph.D. with me, and for their continuous support to me. They took on extra tasks at home and were incredibly supportive during these studies, and I could not wish for a better family.

This degree is dedicated to my father, Michael Acha, who believed in the power of education, even though it could only be imaginary to him. He gave up several of his dreams so that his children could get descent education. I am grateful for the sacrifices that he made, and for the opportunities that he has afforded me. His fatherly love has been unwavering, and he remains my mentor.

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## Chapter 1: Introduction to the Study

### **Introduction**

In this study, I assessed of the relationship between state certificate-of-need (CON) laws on home health agencies and the provider ratings based on patient outcome measures using data from the CMS Home Health Compare data in 2015. There have been multiple studies conducted on the effects of CON on cost, expenditure, and on the health outcomes in the hospital and outpatient sectors, but less focus on how the regulation affects the treatment outcomes of patients who use home health services. The “baby boomers” are becoming older and are exerting influence on the growing need for home health services, thereby necessitating the facilitation of the provision of the services, elimination of unwarranted barriers to improve service quality, and promotion of practices that will improve the health outcomes of the patients. In this study, I sought to determine if the CON laws improved public health in the home health sector during the study period. The findings of the investigation will add to existing knowledge and possibly awake interest in the phenomenon in this growing sector of the health care industry.

The CON laws have been implemented in the United States for half a century, yet little research has focused on how the health quality of home care patients is affected by the regulation. The bundle of evidence produced so far is from investigations that focused on how the CON affected cost, expenditures, and health outcomes in hospitals, outpatient facilities, and nursing homes has been inconclusive. The variations in the findings are make it necessary to conduct more investigations. In this study, I sought to determine

how home health providers' ratings on measurable health outcomes in CON states differ from those in non-CON states.

### **Background**

The CON laws in the United States date back to half a century when the federal government required that states screen providers and control the expansion of health care facilities to limit the growth of cost and expenditure and improve care outcomes.

Numerous studies have focused on ascertaining whether the regulation has been effective in curtailing cost in hospitals and outpatient services. Recently there has been growing interest in how home health costs and expenditures are also affected. A major tenet of the intended influence of the regulation was to improve the health outcomes of Americans, and in this study, I sought to determine how measurable health outcomes were associated with CON laws.

Polsky et al. (2014) assessed home health measures such as resource utilization, rehospitalization, and expenditures as a function of the CON status of the states in an attempt to assess the effectiveness of the law in reducing cost and improving health quality. The author found no significant differences between the CON and the non-CON states in improving the quality of care and in curbing expenditure. Rahman et al. (2016) researched the effects of CON laws on containing the growth of Medicare expenditures in the CON states, and their findings were contrary to the studies by Conover and Sloan (1998) and Mitchell (2016). Rahman et al. found that the growth in the expenditure was slower in the home health sector in CON states compared with non-CON states.

There have been multiple investigations on the effects of CON laws on the health outcomes of patients in various sectors of the health care industry (Cabin, Himmelstein,

Siman, & Woolhandler, 2014; Cosby, 2011; Duffy, 2002; Stratmann & Wille, 2016; Vaughan-Sarrazin, Hannan, Gormley, & Rosenthal, 2002). The investigation of the CON and home health agency quality ratings revealed that the ratings of home health agencies in states CON laws were less likely to have better ratings than those in non-CON states (Ohsfeldt & Li, 2018). The analysis conducted by Ohsfeldt and Li used the Home Health Compared star raking compiled by the CMS that assessed the providers' combined process and outcome measures. Because the process measures are not necessarily reflective of the patient outcomes, a combination of both measures by the authors did not allow for the assessment of how each group of the variables contributed to their analysis and the results of the study. Beyond analyzing provider ratings using the aggregation of internal agency process measures and outcome variables contained in the OASIS assessment, as was conducted by Ohsfeldt and Li, there is a need to focus an investigation on the measurable home health outcomes when assessing the effects of the CON on home health services. The health outcomes of the patients reflect how the policy influences public health. The culmination of the results of several studies has brought to question the association between CON laws and the quality of health services in the United States as they found either no significant associations or dissuasion from the arguments that support the continued implementation of the laws.

Bailey (2018) evaluated the effect of the CON laws on all-cause mortality and found no evidence that the laws reduced all-cause mortality between 1992 and 2011 in the United States. Although some studies had found lower mortality rates and/or improvement in quality outcomes in states with CON laws (Ho, 2006; Popescu, Vaughan-Sarrazin, & Rosenthal, 2006; Vaughan-Sarrazin et al., 2002), others have

demonstrated the opposite (Cutler, Huckman, & Kolstad, 2010; Ho, Ku-Goto, & Jollis, 2009). There are studies that have found no difference in health outcomes between CON and non-CON states (DiSesa et al., 2006; Robinson, Nash, Moxey, & O'Connor, 2001). There is limited available empirical data and published research on how home health patient outcomes are affected by the CON laws.

Pigou (1938) developed the public interest theory that posited that the institution of regulatory controls by the government could curb costs and ensure a higher quality of services. The continued use of CON laws by the states is partly because the proponents argue that the process, although it contains cost, also promotes the quality of medical care and reduces mortality (Bailey, 2018). The assertion that interventions such as CON laws that are used by the states to scrutinize potential providers as well as limit the expansion of current providers could be linked to quality public health outcomes forms the basis of this inquiry. Therefore, whether states that impose CON requirements on potential home health providers have improved quality of care for their Medicare beneficiaries that use home health services will provide a guide to understanding the public interest theory. The study will analyze data for Medicare patients who used home health services in the United States in 2015. The study results can inform policymakers of the effects of the rule on public health outcomes in the home health sector, and can empower citizens to hold their policymakers and politicians accountable.

### **Problem Statement**

The health care industry in the United States is heavily regulated by the federal and state governments with the goals of cost containment, safeguarding the quality of the services, and promoting public health. Thirty-six states and the District of Columbia used

CON laws in 2015 to guard provider enrollment and facility expansions (M. Mitchell & Koopman, 2014), and several of the states' CON laws affected home health agencies. The CON approval is needed when adding a new wing to an existing hospital, when starting a home health agency, or when opening a new office that offers MRI, X-Ray, outpatient surgical procedures, dialysis center, and other medical services (Cordato, 2005). The Health Planning and Development Agency in the state's Department of Health uses the CON process to screen potential providers as well as limit the expansion of the existing providers. The states, therefore, seek to control the proliferation of health care facilities and services with a review process. The need for the providers to demonstrate and justify how the expansion of the existing facility or a new entity will fulfill a public health need in the locality is indicative of the intent of the CON requirement to promote public health and eliminate unnecessary or ineffective health services. Therefore, the states have used CON laws to align the provider facilities and services with the public needs for health care services as well as control the expenditures on health services (Cohen & Cohodes, 1980; Correia, 1975).

The persistent use of CON laws is posited on improvements in the quality of care to the patients, and thus the promotion of public health (American Health Planning Association [AHPA], 2005). The claims of improvement in quality used as evidence to maintain CON laws are predicated on the principle that the restrictive practice to health care providers serves the public interest by eliminating "potential ineffective providers," thereby enhancing the quality of services and improving the health outcomes of the population based on efficiencies gained from increased procedure volumes by the existing providers (Stratmann & Wille, 2016). Ohsfeldt and Li (2018) demonstrated that



the shield of CON laws on providers did not contribute to higher agency quality ratings for the providers based on a combination of process and outcome measures of OASIS data from Home Health Compare (quarterly star ratings).

The higher rate of hospitalization being associated with more available hospital beds (Delamater, Shortridge, & Messina, 2013) was suggestive that limiting the providers through the CON and other regulatory means could prevent the provision and use of unnecessary services. The CON, therefore, served as a check on providers to ensure that only medically necessary services were rendered to the public and that there was no excess capacity that would lead to waste and abuse. Also, a review of the use of radiation therapy by patients with prostate or breast cancer revealed that the treatment had a higher utilization rate in CON states compared to non-CON states (Falchook & Chen, 2015). However, Ho (2007) found that hospitals in CON states were more likely to operate on patients even though they did not have lower mortality rates than the non-CON states. Restrictive provider enrollment requirements such as CON laws have been associated with higher mortality in hospitalized patients (Shortell & Hughes, 1988), lower quality of care in hospitals (Stratmann & Wille, 2016), and limited access to health services (Harrington, Anzaldo, Burdin, Kitchener, & Miller, 2004). Furthermore, Conover and Sloan (1998) asserted that the removal of the requirement would not lead to an increase in health care expenditures in the states with previous CON laws. In the hospital and outpatient sectors, there have been mixed results about the effects of CON laws on health outcomes, access to services, and cost control (Duffy, 2002; Matthew D Mitchell, 2016; Ohsfeldt & Li, 2018; D. Polsky, G. David, J. Yang, B. Kinosian, & R. Werner, 2014; Rahman, Galarraga, Zinn, Grabowski, & Mor, 2016; Stratmann & Baker, 2016).

There is a lack of empirical evidence or a consensus supporting the assertion that the CON regulations improve measurable public health outcomes such as mortality, hospital length of stay, and re-hospitalization (D. Polsky, G. David, J. Yang, B. Kinosian, & R. M. Werner, 2014). Some researchers have found no differences in the mortality rates following cardiac surgery in the CON and non-CON states (DiSesa et al., 2006; Robinson et al., 2001). Even with a 25% increase in the number of providers in the three years after the repeal of the regulation in Pennsylvania, Robinson et al. reported no change mortality. There is evidence suggesting that CON laws have not succeeded in curbing health care expenditures in hospitals, nursing homes, outpatient surgery, and possibly home care. The conclusion by Polsky et al. (2014) that lifting the law in all the states in the United States would have a negligible effects on both cost and quality of care in the home care sector reiterated the need to investigate how quality is influenced by the CON laws.

Although other studies have investigated how the CON laws relate to health care spending, cost, and quality, they did not focus on the health outcomes peculiar to the home health sector such as improvements in walking, breathing, wound healing and self-care; as well as avoidance of hospitalization, emergency room visits, and bedsores. The quality measures in home health are somewhat different from surgical and hospital care. Nevertheless, and like other sectors of the health care industry, there has been limited research on how the CON laws have led to an amelioration of the quality of services rendered, and thus, improved public health. Home care agency reimbursement for Medicare beneficiaries is determined by the Centers for Medicare and Medicaid Services (CMS), thereby limiting the agencies' ability to compete with the price and thus making

it possible for the providers to distinguish themselves through the quality of care rendered to the patients. The quality outcomes of patients who use home health services are measured using the Outcome Assessment and Information Set (OASIS) data (Keepnews, Capitman, & Rosati, 2004). I assessed the association between the CON laws and the patient outcomes in the home health sector, and tested the hypothesis that providers in the CON states were ranked higher on outcomes, as espoused by Pigou in the public interest theory. A comparison of the health outcome ratings was made between the providers in the CON and the non-CON states.

### **Purpose of the Study**

In this quantitative study, I focused on discerning the association between CON requirements by the states on the home health agencies and the health outcomes of the Medicare beneficiaries that used home health services in 2015 in the United States. In this study, I sought to determine how states with this barrier to entry and expansion on home health providers compared with those without such restriction by evaluating home health quality outcome measures such as improvement in walking, improvement in self-care, improvement in wound healing, improvement in breathing, avoidance of hospitalization, and avoidance of bedsores. Summarily, I investigated if the home health agencies in the states with the CON requirements had higher rankings on the measured outcomes than those in the states without the laws.

### **Research Questions**

This was a quantitative study, and the comparisons were made between the health outcome ratings of home health providers in states with no CON laws to those in the states with CON laws. The research questions (RQs) were:

RQ1: Among the Medicare patients who used home health services in the United States in 2015, was the frequency of hospitalization lower for home health providers in the CON states than those in the non-CON states?

*H*<sub>01</sub>: The frequency of hospitalization of the patients rating was the same for the home health providers in the CON and non-CON states.

*H*<sub>A1</sub>: The frequency of hospitalization of the patients rating was lower for the home health providers in the CON than the non-CON states.

RQ2: Among the Medicare patients who used home health services in the United States in 2015, were the ratings of home health providers on improvement in walking higher in the CON states than those in non-CON states?

*H*<sub>02</sub>: The home health provider rating on improvement in walking was not higher in the CON states than in the non-CON states.

*H*<sub>A2</sub>: The home health provider rating on improvement in walking was higher in the CON states than in the non-CON states.

RQ3: Were there differences in the ratings of providers in the CON and non-CON states based on wound improvement or healing amongst the Medicare patients who used home health services in the United States in 2015?

*H*<sub>03</sub>: The home health provider rating on wound improvement or healing was the same in the CON and non-CON states.

*H*<sub>A3</sub>: The home health provider rating on wound improvement or healing was different in the CON and non-CON states.

RQ4: What were the differences in the improvement in breathing ratings between the home health agencies in the CON states and those in the non-CON states among the Medicare patients who used home health services in the United States in 2015?

*H<sub>04</sub>*: The improvement in breathing rating was the same in providers in CON and non-CON states.

*H<sub>A4</sub>*: The improvement in breathing rating was not different in providers in CON and non-CON states.

RQ5: Were the improvements in self-care ratings higher in the home health agencies in the CON states than in the non-CON states among the Medicare patients who used home health services in the United States in 2015?

*H<sub>05</sub>*: The improvement in self-care rating was the same in the home health providers in CON and non-CON states.

*H<sub>A5</sub>*: The improvement in self-care rating was higher in the home health providers in CON than in non-CON states.

RQ6: Among the Medicare patients who used home health services in the United States in 2015, were there differences in the frequency of the emergency room use without hospitalization between home health providers in the CON and non-CON states?

*H<sub>06</sub>*: The frequency of emergency room use without hospitalization by patients was the same in the CON and non-CON states.

*H<sub>A6</sub>*: The frequency of emergency room use without hospitalization by patients was different between the CON and non-CON states.

RQ7: Did the home health agencies in the CON states have a greater comprehensive improvement in health outcomes compared with those in non-CON states?

*H<sub>07</sub>*: The average rating on all outcomes were the same on the CON and non-CON states.

*H<sub>A7</sub>*: The average rating on all outcomes were higher in CON states than in non-CON states.

RQ8: How did the CON while controlling other variables predict the health outcomes of the Medicare patients who used home health services in the United States in 2015?

*H<sub>08</sub>*: The CON did not predict the health outcomes of the Medicare patients who used home health services.

*H<sub>A8</sub>*: The CON predicted the health outcomes of the Medicare patients who used home health services.

### **Theoretical Framework**

The theoretical framework for the study was Pigou's public interest theory. It postulates that governments guard against externalities from market failures using regulations. Externalities in the context of home health services included cost and health outcomes. Therefore, the government engages in the screening of new home health providers with CON laws to promote quality outcomes of the services offered to the public (Djankov, La Porta, Lopez-De-Silanes, & Shleifer, 2002). To safeguard the public interest, the government sets out to alleviate the exploitation of the citizens by the fly-by-night providers and to ensure that the providers meet minimum standards. Furthermore,

the public interest theory predicts that the higher volume by fewer providers will result in superior outcomes (Djankov et al., 2002; Pigou, 1938).

Contrary to Pigou's public interest argument, economic theories stipulate that improved quality of goods and services is achieved through the free entry of providers and competition between the providers (Stratmann & Baker, 2016). Therefore, more competition should foster a higher quality of care, other things being equal. However, due to the inability of the providers to compete with the price in the delivery of home care services as the result of pre-determined reimbursement rates by the Centers of Medicare and Medicaid Services (CMS), it is plausible to consider that the CON regulatory tool is needed to maintain the quality of the services to the public. The study dwelled on how the CON regulation associated with the quality of care rendered to Medicare patients who received the services in 2015. This study tested a tenet of Pigou's public interest theory that relates to the quality of care outcomes in the home care sector.

### **Nature of the Study**

In this study, I used the quantitative method to compare the health outcomes ratings of the home health providers in the CON states with those in the states without the requirement. The cross-sectional design used retrospective data compiled by CMS on the home health agency ratings of the Medicare patients' outcomes for the home health services rendered in 2015. The outcome variables were the improvement in self-care; improvement in walking; improvement in breathing; improvement in wound healing; prevention of bedsores; prevention of hospitalization; and the use of any urgent, unplanned care in the emergency room (Centers for Medicaid and Medicare Services (CMS), n. d.). The CMS rates each home health agency on all the variables using the

information submitted at different points of care as captured in the OASIS. The data are presented as a percentage of patients who met the criterion of interest. Therefore, the data for the outcome variables were continuous. The CON status was either current at the end of the calendar year or inactive and, thus, the level of measurement of the variable was nominal.

The independent *t*-test was used to test if the health outcomes of the home health providers in the CON-states were different from those in non-CON states. Because the home health agency ratings are reported by CMS as percentages for each criterion measured, the use of the *t*-test to determine if there were differences between the groups using the ratio level of measurement was appropriate (Bettany-Saltikov & Whittaker, 2014). Multiple linear regression analyses were used to test for associations between the predictor variables (CON status of the state, regulatory environment in the states (moratoria), the prevalence of obesity in the states, the portion of the population that is above 65 years of age, the rural-urban classification of the county, the proprietary status of the provider, the unemployment rate of the county, and the per capita income of the county) and the dependent variables (health outcomes). In similar studies, the regression analyses had been used to test associations between the variables while accounting for the confounding and control variables (Duffy, 2002; Stratmann & Wille, 2016).

### **Definitions**

*The CON:* The state-issued legal document that allows potential and current home health providers to establish new facilities or services.

*State CON status:* The certificate-of-need status of the state for home health during the study period (January 1, 2015 – December 31, 2015).



*Home health agency:* A Medicare-certified and state-licensed facility that provided home physical therapy, occupational therapy, skilled nursing, or other professional services between January 1, 2015, and December 31, 2015.

*Ownership:* The proprietary status of the home health provider (for-profit or not-for-profit).

*Hospitalization:* The percentage of patients served by the home health provider that was admitted to the hospital.

*State:* The two-character postal code for the state or territory.

*Emergency room visit:* The percentage of patients receiving home health care that used any urgent, unplanned care in the hospital emergency room - without being admitted to the hospital.

*Medication management:* The ability of the patient to take oral medications correctly.

*Wound:* Breakdown or cut in the skin.

*Breathing:* The process of inhaling and exhaling air by the patient.

*Pain:* The discomfort or suffering that is caused by an injury or illness.

*Bed transfer:* Ability to get in and out of bed.

*Walking:* The ability of the patient to move from one place to another with or without the use of ambulatory aids.

*Bathing:* The washing of the body for the purpose of personal hygiene.

### **Assumptions**

I used the Home Health Compare data compiled by the CMS. The economic principle that the government exerts control on providers by enacting and enforcing

regulations is central to the research questions that this study sought to answer.

Therefore, the study assumed that CON laws restrict home health provider enrollment and limit competition.

### **Scope and Delimitations**

In this study, I focused on the association between the CON status of the state and provider ratings based on measurable health outcomes of patients who used home health services in 2015 in the United States. The specific health outcomes of concern included hospitalization, emergency room visits, bathing, wound healing, transferring in and out of bed, walking, medication management, and pain. These qualities of care variables reflect on the public health benefits of home health and highlight the effects of CON laws on the population.

While states with decades of CON laws on home health may have a somewhat different implication on public health outcomes than those that had just implemented the regulation, the study did not investigate the effect of the duration of the laws. Furthermore, the study determined the association between the variables and could not ascertain a causal relationship.

### **Limitations**

The OASIS data is collected by providers and submitted to CMS at different points of care delivery. The aggregation of the data and then a compilation of scores that serve as ratings for providers depends on the accuracy of the information collected by the clinicians. Because the clinicians do not receive the same training on data collection and the data cannot be corrected with analysis, there is the possibility that the quality of the

data gathered could be different, thereby skewing the ratings of the providers and the results of the investigations.

I also used aggregate data that were compiled on a quarterly basis to rank providers. There is a need to assess if provider rating based on OASIS data corroborates with the patient rating of the same providers using data collected from the CAHPS surveys. There have been no studies that ascertain that both ratings are not significantly different. The use of OASIS data to attempt to assess patient outcomes was, therefore, limited in that the data were collected and reported by the same providers that were being rated with the information.

The limitations of missing data in this cross-sectional study was also apparent. The secondary data used were collected and compiled outside of this study's control. Therefore, the data that were missing in the Home Health Compare database for whatever reason represented a bias to this study and its findings.

### **Significance of the Study**

The proponents of the certificate-of-need laws have espoused that the requirement prevents uncontrolled health care expenses and improves the quality of care that the patients receive while the opponents of the requirement insist that their benefits are nonexistent (Conover & Sloan, 1998; Finn, 2007; Vaughan-Sarrazin et al., 2002). The research to substantiate either position remained inconclusive, and there was a need to evaluate the association between the CON laws and the health outcomes of home care patients. The dissertation sought to determine the relationship between the state's CON status and the health outcomes of patients who received home health services in 2015 in the United States by comparing the ratings of the quality measures of the home health

providers in the states with CON laws against the non-CON states. CMS reported that a total of 3,488,582 Medicare beneficiaries used home care services in the United States in 2014 (Centers for Medicare and Medicaid Services [CMS], 2016). Certificate-of-need laws on home health services affected several states in 2015 and remained active in 17 states and the District of Columbia as of January 2018 (National Conference of State Legislatures [NCSL], 2018b).

The relationship between the laws and the quality of care to home health patients is of importance to the citizens that use the services. The social change implication is that all the states in the United States should consider using the requirement, at least in the home care sector, if there is evidence suggesting that it leads to improved outcomes for the patients. However, if there is no significant direct association between the variables, then the costly and demanding process should be eliminated by the states. Therefore, the test of the hypotheses to determine whether the CON regulation is associated with quality health outcomes has the potential to foster an understanding of the effects of the laws on providers' ratings by CMS, as well as provide empirical evidence on the controversial law and its continued use. The hypothesis aligns with Pigou's public interest theory, often cited to support provider restriction as a means to promote quality. Although the improved health outcomes argument is only one of the two pillars of cost and quality that promote the continued use of this law, the study will provide information about its relationship with the citizens' health outcomes.

### **Summary**

Certificate-of-need laws restrict home health providers from starting and expanding services in the states where the requirements are in place. The study sought to

determine the association between the CON laws and the rating of the providers based on measurable health outcomes of patients. If the statute improved the health outcomes of the patients who used home health services, the providers in the states with the restriction should have higher ratings on the quality measures than those in non-CON states. The results of the study give the public, policymakers, and legislative bodies empirical information that can potentially encourage the enactment of the law in non-CON states or facilitate its repeal in the states that currently enforce it.

## Chapter 2: Literature Review

### **Introduction**

Several states maintain CON laws for home health agencies, although there have been mixed findings on the effects of CON laws on health outcomes in hospitals, outpatient services, and nursing homes. There is limited research on how CON laws relate to the home health sector and particularly how health outcomes in the industry are affected by the laws. It is worth investigating how home health providers rankings on measurable health outcomes are associated with the regulation.

The review of relevant available literature on CON and health outcomes recounts the history of the legislation at the federal and state levels in the United States, the effects of the laws on health care costs and expenditures, and how quality measures in the hospital, nursing homes, outpatient services, and home health services have been affected by the CON. The reliability and validity of the OASIS assessment as a tool are also examined.

### **Literature Search Strategy**

I conducted a comprehensive search of available literature on CON and outcomes on multiple search engines on the internet. The key search words were *certificate-of-need (CON)*, *cost and expenditure*, *home health outcomes*, and *home health quality measures*. I searched the following websites and databases: ProQuest Journals, SAGE Research Methods, Google Scholar, Walden University Online Library, and PubMed. The search for the key words was for the period from 1974 to 2019.

## Theoretical and Conceptual Framework

Pigou's public interest theory postulates that governments use regulations to guard against externalities from market failures. Medicare beneficiaries do not negotiate the cost of home health services that they receive and they are not financially responsible for the care rendered. Proponents of government intervention in the health care sector argue that the health care market cannot self-regulate in part because of the third-party payments for services provided. Therefore, the government uses regulations to ensure quality while controlling expenditures through the CON. The government engages in the screening of new home health providers using CON laws to promote quality outcomes of the services offered to the public (Djankov et al., 2002). To safeguard the public interest, the government sets out to protect its citizens by preventing the enrollment of the fly-by-night providers and ensuring that the providers meet minimum standards. Furthermore, by restricting providers, the public interest theory predicts that the higher volume by fewer providers will result in superior outcomes (Djankov et al., 2002; Pigou, 1938).

Contrary to Pigou's public interest argument, economic theories stipulate that improved quality of goods and services is achieved through the free entry of providers and competition between the providers (Stratmann & Baker, 2016). Therefore, more competition should foster a higher quality of care, other things being equal. However, due to the inability of the providers to compete with the price in the delivery of home care services as the result of pre-determined reimbursement rates by the CMS, it is plausible to consider that the CON regulatory tool is needed to maintain the quality of the services to the public. The study will dwell on how the CON regulation associated with the quality of care rendered to Medicare patients who received the services in 2015. In this study, I

tested a tenet of Pigou's public interest theory that relates to the quality of care outcomes in the home care sector.

### **History of Certificate-of-Need Laws**

The CON is the approval that providers are required to obtain from the appropriate government entities in the states with CON laws in the United States to acquire, expand, or create health care facilities. The requirement dated back several decades and was initiated in the United States by the federal government. The National Health Planning and Resources Development Act of 1974 was passed by the United States Congress and signed by President Ford to restrain health care costs, promote health care access, and improve health care quality (American Health Planning Association [AHPA], 2018a; US Congress, 1974). The act required all the states to put in place CON laws that screened and controlled the expansion of the health care providers at the time as well as the prospective health care providers envisioning to provide health care services.

The federal government enforced the institution of the CON laws by withholding funds from the states that did not enact and enforce the laws (Matthew D. Mitchell, 2017). The regulations prohibited facilities and potential providers from offering new services, purchasing specific equipment, and expanding without permission from the responsible government agency. Louisiana was the lone state that did not enact CON laws to comply with the federal requirement at the time, although it now requires the CON in some of its health services, whereas other states with previous CON have retired the law.

In 1986, the U.S. Congress repealed the CON law, but several states continued to use the regulation. After New Hampshire appealed the law in 2016, and Indiana enacted



it into law in 2018, a total of 35 states and the District of Columbia had some form of CON regulation in 2018 (National Conference of State Legislatures [NCSL], 2018a). In the 50 years of the CON, it has been repealed by 15 states. The health care services and activities that are subjected to the CON laws include long-term acute care hospitals and bed; rehabilitation services and beds; substance abuse services; psychiatric beds; subacute care; intermediary care facilities for individuals with intellectual disabilities (ICF/IID) beds; home health care; hospice care; swing beds; residential care, assisted living and adult care; nursing homes and beds; radiation therapy, linear accelerators and gamma knife; lithotripsy; pet services and scanners; computer tomography (CT) services and scanners; magnetic resonance imaging (MRI) services and scanners; renal dialysis services and stations; organ transplant; open heart surgery; cardiac catheterization; ambulatory surgery centers; obstetric services and beds; acute care and inpatient hospital beds; and burn care services.

There has been increased attention to the continued implementation of CON laws, and there has equally been a reconsideration by the states in the last 5 years. In 2015, there were 36 states and the District of Columbia with CON laws in the United States. With the repeal of the legislation by New Hampshire in 2016, a total of 35 states and the District of Columbia applied some variation of the law in the health care sector (American Health Planning Association [AHPA], 2018b). The enactment of the statute in Indiana in 2018 brought the number of states with the legislation to 36.

The CON laws are administered by the Health Planning Committee and seek to control the proliferation of health care facilities and services with a review process. The expectation that the providers should demonstrate and justify how the expansion of the

existing facility or a new entity will fulfill a public health need in the locality is indicative of the intent of CONs to promote public health and eliminate unnecessary or ineffective health services while curbing costs. Therefore, the states use CON laws to align the providers and facilities with the public's health care services need while aiming at controlling the expenditures on health services (Cohen & Cohodes, 1980; Correia, 1975).

Certificate of need laws affect hospitals, nursing homes, ambulatory outpatient centers, and home health agencies. The requirements are tailored to affect each sector of the health care industry differently. In 2016, a total of 18 states in the United States and the District of Columbia had the certificate of need laws that affected home health agency start-up or expansion (American Health Planning Association [AHPA], 2018c). The states were Alabama, Arizona, Florida, Georgia, Hawaii, Kentucky, Maryland, Mississippi, Montana, New Jersey, North Carolina, Rhode Island, South Carolina, Tennessee, Vermont, Washington, and West Virginia. Prior to 2016, home health services were not subjected to CON laws in Florida. Even with the growing evidence substantiating that CON regulations were not reducing health care expenditures, as well as meeting other objectives of the law, the legislators in Florida chose to implement the restriction. The federal government in the 70s and later the states that maintained CON laws have argued that the regulation helps to curb the growth of health expenditures and promote public health. There is still a need for a consensus on the effects of CONs on the intended outcomes. The arguments in supporting the use of, and against CON laws have been the focus of interdisciplinary research.

### **Strengths of the Certificate-of-Need Laws**

The relationship between the CON regulation and health care expenditure has received enormous attention from health economists and public health researchers. By requiring that hospitals, for instance, apply for and receive the certificate-of-need approval from the state agency before expanding or starting new construction, there is the salient assertion that costs are reduced by avoiding the building of underutilized facilities or ensuring that there is a public need for the services (Correia, 1975). Correia emphasized the uniqueness of the health care sector to demonstrate the inability of the market to self-regulate by reiterating that the patients did not actively have full control on which hospital they sought care from based on some “readily” available information, but often were treated at the facility that could serve their somewhat urgent medical need. The analysis which was favorable to the CON laws that were being implemented nationwide by the states was not based on empirical data, but on the presumption that providers needed to be vetted to correct the health care marketplace imperfections.

Rahman et al. (2016) investigated CON and how expenditures in nursing homes and home health were affected by the regulation. The authors reported the finding that the growth in both sectors was slower in CON states compared to the states without CON. The study examined 44 states in contiguous USA that had not made changes in their CON status from 1992 to 2009 (34 CON states and 10 non-CON states) using data from three sources: Area Resource File; CMS data on annual health care expenditures by states; and state policy data collected by Harrington et al. and researchers from Brown University. The large-scale study echoed the rising spending in both the CON and the

non-CON states over the study period, although it found slower growth in CON states compared to the other states.

With no data to support, Baldwin, Cave, and Lodge (2012) posited that the use of regulatory barriers such as CON laws was necessary when there were market failures, and the absence of the government regulations would lead to excessive consumption of the good or service because the price would not reflect the actual cost to produce the good. Therefore, the reimbursement of the home health services by the third party (Medicare insurance) and not the patients, would likely cause unnecessary services to be provided and billed to the government if the expansion of providers and start-ups are not checked through regulatory controls such as CON laws. The CON laws, proponents have argued, guard against such externalities or spillovers.

In a review of the CON process in Maryland and the controversy that surrounded the legislation at the time, Maguire (2007) argued that the peculiarity of home health sector where an increase in the number of providers may not necessarily lead to a proportionate and correlative increase in the home health workers implied that the CON restrictive practice might not be the cause of any poor outcomes in-home care within the state. Contrary to the assertion that the free market approach may increase productivity from a finite set of workers, there is the argument that the quality of care rendered to the patient may instead decline, and be reflected in shorter visit times (Maguire, 2007). Therefore, the failure of the market to regulate itself in the health industry, and specifically in the home health care sector, makes it imminent for the government to intervene through regulations and restrictions to contain the providers.

There are multiple studies that provide empirical evidence on the need to maintain CON laws. Paul et al. (2014) in a national study that compared the emergency department (ED) length of stay of patients in CON and non-CON states in all 50 states found a statistically significant relationship between CON legislation and ED length of stay. Patients who used the ED in CON states had a shorter length of stay compared to those that used the same services in non-CON states (95% CI, -61.3 to -10.3). The large-scale study that included emergency departments in all 50 states in the United States provided an understanding of how CON laws affected ED care and patient outcomes.

Strong clinical evidence on the positive association between CON states and health outcomes came from the study conducted by Vaughan-Sarrazin et al. (2002) that focused on comparing the mortality rate of patients who underwent coronary artery bypass graft (CABG) surgery in 1063 hospitals in the United States between 1994 and 1999. The retrospective cohort that analyzed data on almost a million Medicare patients who underwent the procedure found that states without CON laws had a 5.1% unadjusted mortality rate, whereas the rate was lower in the states with continuous CON laws. The adjustment for predictable factors for death following CABG surgery (a total of 14 demographic and clinical factors) and the stepwise regression analysis still affirmed that mortality rate for the Medicare patients who underwent CABG surgery was higher in non-CON states compared to states with continuous CON laws on the procedure (odds ratio [OR], 1.22; 95% confidence interval [CI], 1.15 - 1.28;  $P < .001$ ). The researchers also found that the volume of CABG surgery declined in the states following the repeal of CON laws (Vaughan-Sarrazin et al., 2002). The study reaffirmed the argument that advocates of the CON have postulated: the regulations improved the quality of care and

increased access to services. However, the reduction in the volume of CABG surgery after the repeal of the CON laws could also be a contrast to the argument that government intervention limits excessive and unnecessary use or provision of services that are paid by a third party insurer.

The association between the volume of a procedure and improvement in outcomes has also received some attention in the CON debate. There is the contention that, providers are more efficient if they perform the same procedure often, thus insinuating that the CON limits the number of providers and ensures there is a higher volume for the few that are approved. The supposed intent of limiting providers to increase the volume of the procedure is to enhance outcome and quality. In an investigation that focused on how CON laws affected cardiac outcomes and cost in hospitals that conducted open-heart surgeries or coronary angioplasty using AHRQ HCUP Nationwide Inpatient Sample data from 1988 through 2000, Ho (2006) found that the regulation was associated with higher volumes and lower cost, although apparently more surgeries than necessary could have been performed by the hospitals.

The comparison of the volume-outcome relationship of percutaneous transluminal coronary angioplasty between 1988 and 1998 in a CON state (Florida) and a non-CON state (California) by Ho (2004) found that moderately better outcomes (mortality from the procedure and need for urgent bypass grafting) were associated with higher volumes of the procedure. Because Florida was the CON states and had average higher volumes of the procedure (724) in its hospitals compared with the average of 369 procedures in the California hospitals, the researchers concluded that the CON was effective in improving the outcomes of percutaneous transluminal coronary angioplasty.

The arguments have been advanced to support the continued use of CON regulations in the health care sector to align with the evidence from research on how the practice improves quality and lowers cost. However, there is also a plethora of empirical evidence accumulated over the years suggesting that CON laws have not advanced the cause by improving health outcomes, reducing health care expenditures, and improving the health of the population.

### **Weaknesses of the Certificate-of-Need Laws**

One of the rationales for the 1974 CON laws by the federal government was that it would control inflationary health care expenditures. The tenet that CONs were put in place to reduce the cost of health care or decrease the spending on health care was central to the enactment of CON laws by the federal government and later the institution of the regulation by the states. However, half a century of research on the phenomenon has not been able to support the assertion. In 2014 and 2016, the United States spent 17.1 % and 18% of its gross national product (GNP) on health care respectively (Central Intelligence Agency [CIA], 2018), and the cost per capita in 2018 was \$10,348 (Centers for Medicare and Medicaid Services [CMS], 2018). Although the regulation had been implemented in several states for almost 50 years, the contrary findings to the premise that the law should be saving cost could not be starker. In a systemic review conducted by Mitchell (2016), the author concluded that CON laws did not significantly reduce expenditures on health care, but tended to be associated with both higher per capital cost and total health care expenditures in the United States.

The time-series cross-sectional analysis of hospital data by Conover & Sloan (1998) found that there was no association between CON and health care expenditures in

the hospital sector. In the large-scale study that analyzed data collected from 1981 to 1998 in 49 states, Grabowski, Ohsfeldt, & Morrissey (2003) found that Medicaid nursing home expenditures were not statistically different in CON states compared to non-CON states, and concluded that the repeal of the law would have no effect on the Medicaid long-term care expenditures. Other studies have suggested that CON laws had been associated with increased health expenditures or cost. Rivers, Fottler, & Younis (2007) analyzed data from 1957 hospitals collected in 1991 by the American Hospital Association's Annual Survey of Hospitals and found that CON regulations significantly increased hospital expenditures per adjusted admission. Similarly, Mitchell (2016) concluded in a systematic review that the repeal of CON laws did not result in increased spending in the home care sector.

Conover and Sloan (1998) noted that the removal of the requirement did not lead to an increase in health care expenditures in the states with previous CON laws. The study did not find evidence that following the elimination of the regulation, the number of providers surged or that the cost increased. Lanning et al. (1991) corroborated previous assertions on how CON laws influenced health care expenditures by affirming that total health care expenditures were higher not just in absolute amounts, but in both hospital and non-hospital sectors (Lanning, Morrissey, & Ohsfeldt, 1991; Ohlhausen, 2015). Similar findings of the effects of CONs on health care expenditure were reported in subsequent studies in community-based facilities (Miller, Harrington, & Goldstein, 2002), the hospital sector (Kirkner, 2016; Rivers, Fottler, & Frimpong, 2010), and in nursing homes (Rahman et al., 2016). The effect of CON in slowing growth in home health expenditures by Rahman et al. suggested that there is a need to investigate the



peculiarity of the sector. Corroborating previous findings, Bailey (2016) in a Mercatus Working Paper, concluded that CON laws were associated with higher per capita health care expenditures.

Access to services may also be swayed by CON laws. Polsky et al. (2014a) found that the utilization of home health services was less in CON states compared to non-CON states. They also concluded that no significant differences existed in overall Medicare expenditures, re-hospitalization rates, and the home care practice patterns in the two groups.

In a dissertation study, Cosby (2011) focused on how CON laws associated with heart and kidney transplantation volume and quality indicators in the United States. The study found no significant differences in quantity and quality in both CON and non-CON states. In a similar study that evaluated the effects of CON regulation on all-cause mortality in all counties in the U.S., Bailey (2018) did not find any statistically significant relationship between the variables. In a comparison of primary total knee arthroplasty procedure volume, charges, reimbursement, and distribution using Medicare Analytical Files from 2004 to 2014, Browne et al. (2018) could not find statistically significant evidence that the laws positively contributed to the quality of care of the patients.

In a study that took into consideration regional hospitals that possibly crossed state boundaries, Vaughan et al. (2010) analyzed data from 1993 to 2004 for patients with myocardial infarction to determine the differences between the CON and non-CON states. The authors suggested that the benefits of CON regulation on coronary artery bypass graft (CABG) could have been outweighed by the increased use of percutaneous coronary interventions. Ohlhausen (2015) argued that, although initially construed to

prevent an increase in the cost of health care as well as expenditures, the CON laws have served the contrary. According to Ohlhausen, the CON laws had failed because they inhibited competition and encouraged less effective and efficient providers to continue to reap from the limited competition while the indigenes were left with sub-standard health services.

There is lack of empirical evidence to ascertain that regulatory barriers to provider entry and expansion such as CON laws curtail cost and expenditures in hospitals (Conover & Sloan, 1998), nursing homes and long-term care facilities (Grabowski, Ohsfeldt, & Morrissey, 2003), home care (Mitchell, 2016), and even at the level of countries (Djankov et al., 2002). While controlling the growth of expenditure formed the basis for initiating and later maintaining CON laws by the federal and state governments, the tenet of improving quality care to the citizens has also been used to justify the regulation. Certificate-of-need laws were also intended to promote quality care and should be improving the health outcomes of the citizens. There is, therefore, a need to exploit how the laws have related to measurable health outcomes.

### **CON and Quality of Health**

The effects of CON laws on public health can, in part, be viewed through its association with measurable health outcomes such as re-hospitalization following treatment, mortality rates after a procedure or due to a condition, recovery times following a procedure, access to the needed services, and improvement in health outcomes. In the review of the status of CON programs in 1985, Simpson (1985) emphasized that the purpose of the laws included “*preserving the quality of medical care.*” Quality care for a population is assessed through measurable outcomes, and

several researchers have focused on determining how the CON laws have been associated with applicable variables in the respective health sectors.

Vaughan-Sarrazin et al. (2002) were interested in determining if there were differences in mortality based on the status of the certificate-of-need regulation for coronary artery bypass graft (CABG) surgery in the 911,407 Medicare patients who had undergone the procedure in 1,063 hospitals in the United States between 1994 and 1999. After accounting for the individual patient risk factors, a comparison using analysis of the variance revealed that death during hospitalization or within 30 days of CABG surgery was lower in the states with continuous CON regulation. Also, the states with intermittent CON requirements that had the laws at the beginning of the study period but terminated before the end of the study period had a downward trend in the utilization of the procedure. This was one of the first large-scale studies that provided empirical evidence that the CON requirement was an effective regulatory mechanism to improve patient outcomes, although the authors used the cross-sectional design that could not prove causality.

The data on CABG surgery that the Society for Thoracic Surgeons aggregated from 2000 to 2003 was analyzed by Disesa et al. (2006), and the authors concluded that the CON laws alone had a marginal effect on CABG mortality and morbidity. The findings of the study by Disesa et al. were affirmed by Browne et al. (2018) who found that CON states had an improvement in some health outcomes such as revision within a year, ER visits within 30 days, and infection within a year, although mortality rate and readmission to the hospital within 30 days were not significantly different between CON and non-CON states. The mixed findings on how CON legislation associated with

multiple health outcomes were determined after analyzing Medicare Standard Analytical Files from 2005 through 2014 of all patients who underwent total knee replacement in the United States (N = 1,247,485 in CON states and N = 1,182,708 in non-CON states). The large sample size commanded authority on the strength of the results, although it remains unclear if similar studies are replicable in other health sectors.

Shortell and Hughes (1988) investigated the effect of regulation and other factors on Medicare patients who received care in 941 hospitals in 45 states in the United States from 1983 to 1984, and the authors found a significant association between the stringent CON laws and higher mortality rate. Duffy (2002) established that CON laws were not associated with decreased mortality from CABG surgery after analyzing data from the National Inpatient Sample (NIS) on 201 hospitals that performed over 700,000 CABG procedures in 1997. Unlike the findings reported earlier on how the CON led to higher mortality in patients who underwent CABG surgery (Duffy, 2002; Shortell & Hughes, 1988), the association between the CON and health outcomes was somewhat different (Ho, 2004). Contrary to the above findings, Ho (2004) determined that there was a positive association between CON and procedure volumes as well as outcomes when a comparison of percutaneous transluminal coronary angioplasty (PTCA) performed between 1988 and 1998 was made by the author in Florida (CON state) and California (non-CON state). A few years later, Ho (2006) analyzed data from the Nationwide Inpatient Sample (NIS) on PTCA or CABG procedures performed between 1988 and 2000 in the United States and concluded that the contribution of CON to hospital mortality was little, yet positive. Another study by Ho et al. (2009) analyzed data from the CMS for patients aged at least 65 years who had undergone coronary artery bypass

graft surgery (CABG) or percutaneous coronary interventions (PCI) between 1989 and 2002, and the authors found that the mortality rates were lower in the states that had repealed CON laws compared to the states that continued to maintain the statute.

In an evaluation of the mortality rate, as well as volume in Pennsylvania in the 3-year period prior to, as well as the 3-year after, the termination of the CON program for CABG surgeries, Robinson et al. (2001) found that although the number of providers increased by 25% when the law was repealed, there was no significant change in quality as measured by mortality rates or volume of the procedure. The researchers were interested in determining how the repeal of the law would affect the mortality rate from CABG surgery. Because no significant association was found from the analysis of the state-wide data that compared volume and mortality in the 3-year period before, to the 3-year period immediately after the 1996 repeal of the law in the state, the recommendation was made to conduct additional research on the subject.

In a robust analysis of CMS's Hospital Compare data compiled from 2011 to 2015, Stratmann & Wille (2016) examined the effects of CON laws on nine hospital quality of care measures: death among surgical inpatients with serious treatable complications; postoperative pulmonary embolism or deep vein thrombosis; percentage of patients giving their hospital a 9 or 10 overall rating; pneumonia readmission rate; pneumonia mortality rate; heart failure readmission rate; heart failure mortality rate; heart attack readmission rate; and heart attack mortality rate. The comparison of the performance of the hospitals in CON and non-CON states revealed no significant evidence to support a higher quality of care in the hospitals in the CON states. Instead, the authors concluded that CON laws had no effect on the outcomes measured at best,

and led to lower-quality for some of the measures. An analysis of the sample that contained hospitals from CON and non-CON states revealed that the average 30-day mortality rate for patients discharged with pneumonia, heart failure, or heart attack from hospitals in CON states was between 2.5 and 5 percent higher. The study of the effects of the law on the hospital sector, where much research attention on the subject has been focused, suggested the need to conduct further inquiry into the phenomenon.

The empirical evidence suggests that CON laws may relate positively, negatively, or not at all, to health outcomes. If a consensus could be reached, it would point to a lack of agreement on how the CON has contributed to quality care in the United States and how the laws have affected the health outcomes of the citizens over the years. In the outpatient and hospital sectors that have benefited from in-depth research attention, the research remains unsettled. The implication of the limited studies in the home health sector on the phenomenon is that multiple questions still linger about the benefits of the CON on applicable outcomes to the population health.

### **Health Outcomes in the Home Health Sector**

The ability of the services rendered by a provider to improve the quality of life of the patients is central to determining the effects of the care on the health of the population. The discussion of health outcomes in the home health sector is not recent (Elias, Ferry, & Treland, 2000; Krulish, 1999), although the implementation of the Outcome and Assessment Information Set (OASIS) mandated by CMS has harmonized the focus on specific, measurable outcomes. The accurate assessment of the patient determines the successful outcome (Dyeson, 2004), and the OASIS is the required tool

used by all home health agencies to assess Medicare and Medicaid patients who use the services in the United States. Quality health care to consumers is defined as:

*“Doing the right thing, at the right time, in the right way, for the right person and having the best possible results”* (Agency for Healthcare Research and Quality (AHRQ), 2001) page 1.

The OASIS is the CMS required assessment that all providers have to complete at specific points of care when rendering home health services to a patient covered by Medicare or Medicaid. During the two decades of the use of the tool, there have been studies inquiring on the reliability and validity of the assessment, as well as comparisons with other instruments.

The OASIS, since its inception in 1999 by the Centers of Medicare and Medicaid Services has been a standardized assessment tool that a nurse or a therapist collects pertinent information on patient observation or interview, and the assessment also serves as a mechanism for the CMS to monitor the quality of care rendered by the provider to the patient (Keepnews et al., 2004; O'Connor & Davitt, 2012). All home health agencies in the United States are required by CMS to complete the OASIS on admission, transfer, discharge, change in patient's condition, and the following hospitalization during an episode. The data collected at the various points of care provide an indication of the agency's process and outcome measures.

There is little research that has focused on how the CON as well as other state or federal entry regulations on home health agencies relate to the health outcomes of the patients who use the services. Recently, Ohsfeldt and Li (2018) assessed the home health agency quality ratings in states with CON and those without the regulation. The results of

the analysis revealed a 58% less likelihood of home health agencies in CON states to be rated as High quality than those in non-CON states ( $p < .01$ ). Furthermore, the authors found that home health agencies in states with nursing home CON were also more likely to have lower-quality ratings. The authors used the “Star ratings” data from CMS’ Home Health Compare database which is computed from the combination of the provider’s process measures (timely initiation of care, drug education to patients/caregivers, influenza immunization received during the current flu season) and the patients’ outcome measures (improvement in dyspnea, hospitalization, improvement in pain, improvement in ambulation, improvement in bathing, and improvement in bed transferring). A score is computed that uses the provider’s decile rank based on all providers nationally on each of the nine quality measures, and it eventually translates into “stars” for the agency whereby each provider is rank from 0.5 to 5 in increments of 0.5, with more stars indicating higher-quality providers. The analysis used data that combined three process measures and six outcome measures to assess the providers, thereby making it possible for computed rating to neither reflects just the provider’s internal processes nor the patient’s health outcomes from the care delivered. While the study brought more attention to the provider’s ratings, it also allows room for an analysis that focuses on the CON and patients’ health outcomes. This study focused on the providers’ ratings on health outcomes and assessed the effect of the CON on health quality that is not diluted by provider process measures in the study conducted by Ohsfeldt and Li (2018). The process measures assess the timely delivery of the services, whereas the outcome measures determine the change in the health conditions of the patients following treatment: decline,



improvement, and no change in vital functional areas. The outcomes are indicative of how home health quality measures foster public health.

One of the most studied home health outcome variables is the hospitalization rate. The OASIS assessment collects data on hospitalization of the patient when under the care of a provider (Centers for Medicaid and Medicare Services (CMS), n. d.; Dyeson, 2004; O'Connor, 2012). When a patient is admitted to the hospital, which in most cases implies that the patient needs a higher level of care, it denotes a negative outcome for the patient. There have been several studies of the rate of hospitalization as a quality of care measure for patients in home health, nursing homes, and other outpatient facilities. In the home care sector, the rate of hospitalization has not been on a decline (Fortinsky, Madigan, Sheehan, Tullai-McGuinness, & Kleppinger, 2014; Jencks, Williams, & Coleman, 2009; O'Connor, 2012). In a systematic review of 25 studies conducted between 2002 and 2011 on hospitalization of home health patients, O'Connor noted that culminated empirical findings were indicative of the risk factors for emergency room use or hospitalization brought about by the sociodemographic, clinical and functional status of the patients. The risk factors could be identified when the patients were assessed during admission, and appropriate steps could have been taken to alleviate the potential for hospitalization (O'Connor, 2012). The implication that the providers could limit hospitalization of home health patients through accurate assessments and care delivery implied that an increase in the indicator was a reflection of the lower quality of care possibly caused by multiple factors, some of which were within the control of the provider. There have been suggestions to complement the OASIS with other assessment tools (Rochelle, 2004).

Wound care is another variable that the OASIS assessment captures at the initial evaluation. The subsequent assessments provide data that shows the changes in the status of the wound, signaling improvement, or decline as a result of the care being rendered by the provider. The OASIS collects data on surgical wounds, pressure ulcers, stasis ulcers, and other wounds at the various points that the data are collected by the health professional. Based on the data collected during admission and later when the patient is transferred or discharged from the agency, a determination can be made to ascertain improvement or worsening of the wound.

Furthermore, the patient's ability to walk, perform activities of daily living (ADL) and instrumental activities of daily living (IADL), as well as the breathing status is captured by the OASIS assessments. The assertion that CON laws promote quality care should be evident through positive outcomes in home health patients in the states with CON laws. Therefore, CON states should be expected to have lower hospitalization rates, improvement in wound healing, improvement in walking, improvement in ADL and IADL, and improvement in breathing.

### **Summary and Conclusions**

The association between the CON and home health outcomes has received little research attention over the half-century since the United States Congress initially required the states enact and enforce the law to contain health care expenditure and promote quality care. The empirical evidence has failed to support the expectation that CON laws reduced health care costs and spending in hospitals, nursing homes, and outpatient services. While there has been some association between the CON and quality care in the health care sectors that have benefited from extensive investigations, the

majority of the studies found significant associations with the decline in the quality of care. Yet, research in the home care sector remained limited, and the focus on health outcomes almost non-existent.

The recent analysis of Home Health Compared data by Ohsfeldt and Li (2018) to establish the association between CON and the provider star ratings represented one of the most focused investigations on the CON and home health outcomes. The star ratings combined process measures of the providers with selected patient outcome measures, thereby diluting the influence of the outcome variables in the study. In this study, I analyzed the 2015 data from Home Health Compare to determine the association between CON and provider ratings based on measurable patient outcome variables.

## Chapter 3: Methodology

### **Introduction**

In this study, I assessed the association between the CON laws and provider ratings based on measurable health outcomes for Medicare patients who used home health services in the United States in 2015. There were analyses of the 2015 data from Home Health Compare using multiple linear regression models and *t*-test. I sought the following information to complete the study:

- Nationwide data on the ratings of all home health providers in the United States in 2015 from Home Health Compare.
- County-level data from Area Health Resource Files on the unemployment rate, the percentage of the population greater than 65 years of age, the percentage of the population in poverty, and the per capita income from the Health Resources and Services Administration website.
- State-level data on the CON status of the state, obesity rate of the population of age 65 years and above, and the home health or nursing home moratorium in the state.

### **Research Design and Rationale**

I used the quantitative research method to assess the association between certificate-of-need laws by the states and the provider ranking based on the health outcomes of Medicare patients who used home health services in 2015. The quantitative method was appropriate for the cross-sectional design (Creswell, 2014). The cross-sectional design allowed the use of quarterly provider data as well as state-level data on home care outcomes that were compiled by the CMS.

To determine the existence and the strength of associations between variables, regression models were useful (Bettany-Saltikov & Whittaker, 2014; Frankfort-Nachmias & Nachmias, 2008). The multiple linear regression analysis was conducted to test for associations between the predictor variables (CON status, moratoria, the prevalence of obesity in the states, the portion of the population that is above 65 years of age, the rural-urban classification of the county, the proprietary status of the provider, the unemployment rate of the county, and the per capita income of the county) and the outcome variables (provider ratings on the health outcomes). The provider and state ratings were reported by CMS as percentages. Therefore, the use of the student *t*-test to determine if there were differences between the groups (CON and non-CON States) with the ratio level of measurement was appropriate (Bettany-Saltikov & Whittaker, 2014). In similar studies, the same statistical tests were used to test associations between the variables (Duffy, 2002; Stratmann & Wille, 2016).

## **Methodology**

### **Study Population**

The home health agencies that were certified by the CMS to serve Medicare beneficiaries were the target population. The number of home health providers that were licensed in one of the 50 states or the District of Columbia in 2015 was 12,393 (Centers for Medicare and Medicaid Services [CMS], n.d.). The analyses were made on the providers that had been rated for the outcome(s) being considered. It is not uncommon for a home health provider to treat a patient using one discipline, and so the rating of the provider would be based on that discipline only.

## **Selection of Participants**

The home health providers that reported data to CMS in 2015 and were rated for an outcome variable were included in the study. Because the number of providers changes throughout the year, the state-level ratings were based on the providers that were licensed and reported data during the study period. At the state-level analysis, agencies that were included in the aggregate state-level Home Health Compare data for each of the years were included in the study.

## **Access to the Home Health Compare and Other Data Sets**

The data on the rating of home health providers that were used in the study were downloaded from the CMS website that is available to the public online at <https://data.medicare.gov/data/archives/home-health-compare>. The American Health Planning Association (AHPA) website (<http://www.ahpanet.org>) was the data source for the CON status of the states. The Area Health Resource Files (AHRF) had county-level data on the unemployment rate, the percentage of the population that was 65 years of age and older, the per capita income, and the percentage of the population in poverty. The AHRF were retrieved from <https://data.hrsa.gov/topics/health-workforce/ahrf>. The data on state obesity rates were retrieved from various annual issues of "State of Obesity" reports (<https://stateofchildhoodobesity.org/adult-obesity/>) produced by the Trust for America's Health. The data on state moratorium on home health agencies assisted living facilities, and nursing homes were obtained from the National Council of State Legislators' website (<http://www.ncsl.org/research/health/con-certificate-of-need-state-laws.aspx#Program>).

## **The OASIS Tool and Its Operationalization**

The OASIS collects information on the home health providers (the state of operation, the ownership status, and demographic information about the provider) as well as the patient's health status and functional abilities. The providers are required to get certification from each state of operation, and thus, the outcome variables are reported to CMS for review and then compiled and made available to the public online after identifiable patient data have been removed. The OASIS was developed by CMS for home health claim processing and for monitoring quality measures at multiple levels: provider, ZIP code, state, and national.

The OASIS has received multiple evaluations to ascertain its reliability and validity as an assessment tool for home health services. Studies that were conducted prior to the implementation of the OASIS as the assessment instrument for home health demonstrated both reliability and validity (Madigan, 2002). Such studies justified and facilitated the implementation of the assessment tool. DePalma (2002) reiterated that the OASIS functional domains had good internal consistency ratings at admission (0.86) and discharge (0.91). Later, other studies have confirmed the instrument's reliability. Hittle et al. (2004) evaluated the inter-rater reliability of OASIS assessments that were conducted by registered nurses and found the tool to be excellent for several OASIS items (Kappa > .80) and substantial for most of the items (kappa > .60).

However, the OASIS can be completed by one of three clinicians: registered nurse, physical therapist, and occupational therapist. There have been inconsistencies in the measurement of multiple items in the OASIS between inter-disciplinary assessors: registered nurses, physical therapists, and occupational therapists (Morgan & Madigan,

2018) as well as the assessments that were conducted by registered nurses (Kinatukara, Rosati, & Huang, 2005). When patients were assessed by a registered nurse and a physical therapy using the OASIS within a 24-hour timeframe, a comparison of the outcomes between the disciplines on the pairs revealed that only 54% were identical (Shew, Sanders, Arthur, & Bush, 2010). The reliability of the OASIS tool as an assessment instrument remains inconclusive.

Investigations about the validity of the OASIS have had similar findings as to the reliability of the tool. Kinatukara et al. (2005) pondered on the ability of the OASIS to truly reflect the condition of the patient in the home setting. However, Tullai-McGuinness et al. (2009) found that the tool was sufficiently valid in measuring activities of daily living (ADLs) and cognitive status of the patients, although it was not sensitive in the depression assessment items.

In a systematic review of 12 articles that evaluated the validity and reliability of the OASIS items and scales in studies conducted in the 10-year period following the implementation of the OASIS in 1999, O'Connor and Davitt found that the functional measure had the potential to underestimate the differences in disability and the functional domains had high function validity. A comparison of the OASIS and the nursing outcome classification (NOC) in a quasi-experimental study of 106 home health agencies on the treatment of a primary cardiac condition between September 2002 and July 2003 revealed that the NOC was more responsive to activities of daily living, cardiopulmonary status, coping, and illness management behavior whereas the OASIS was not sensitive to clinical changes.



The variations on both reliability and validity in the OASIS items and scales identified in the studies that covered the decade after the implementation of the OASIS (Kinatukara et al., 2005) were indicative of some of the fundamental challenges that the tool faced, yet home health providers have been mandated to use the assessment for care planning, reimbursement, and measurement of quality. The need to ensure that the OASIS data are accurate is the responsibility of both the home health providers and the government (Flynn, 2001). Conclusively, researchers have recommended the need to research the validity and reliability of the OASIS further (Hittle et al., 2004; Kinatukara et al., 2005; O'Connor & Davitt, 2012; Tullai-McGuinness, Madigan, & Fortinsky, 2009).

### **Evaluation of the Home Health Compare Data**

The CMS compiles data and reports on several areas including process and outcome measures, from data collected by clinicians during assessments or surveys, conducted periodically. The Consumer Assessment of Health care Providers and Systems (CAHPS) conducts surveys to measure the performance of the provider and then make comparisons with the national, state, zip-code performance (Centers for Medicare and Medicaid Services [CMS], n.d.). The CAHPS survey rates the provider based on the patient's perception of the care received from the agency. While the data may be useful when examining patient satisfaction and perception of care, this study found that the data compiled by CMS based on OASIS assessments completed by clinicians will be credible in determining how health outcomes during the study period were influenced by the CON status of the state.

Home Health Compare also has data that provide the rating of providers based on some of the questionnaire items that the CAHPS survey covers, but the responses are

computed based on the information reported by the clinician as collected at different points of the care rendered to the patients. The ratings are more reflective of both process and outcome measures captured during an assessment by a clinician.

The focus of the study is on the outcome measures: how often home health patients had to be admitted to the hospital; how often patients receiving home health care needed any urgent, unplanned care in the hospital emergency room - without being admitted to the hospital; how often patients got better at taking their drugs correctly by mouth; how often patients' wounds improved or healed after an operation; how often patients' breathing improved; how often patients had less pain when moving around; how often patients got better at bathing; how often patients got better at getting in and out of bed; and how often patients got better at walking or moving around.

### **Study Variables**

To assess the association between CON laws and health outcomes, the independent variable was the CON status of the state, and the dependent variables were the health outcomes: how often home health patients had to be admitted to the hospital; how often patients receiving home health care needed any urgent, unplanned care in the hospital emergency room - without being admitted to the hospital; how often patients got better at taking their drugs correctly by mouth; how often patients' wounds improved or healed after an operation; how often patients' breathing improved; how often patients had less pain when moving around; how often patients got better at bathing; how often patients got better at getting in and out of bed; and how often patients got better at walking or moving around.

## **Operationalization of Variables**

A summary of all the study variables, their coding, and data types are presented in Appendix B.

### **Independent variables.**

The independent variable was the certificate-of-need status of the state in which the provider was licensed as a home health agency during the study period. The American Health Planning Association (AHPA) website (<http://www.ahpanet.org>) was the data source for the CON status of the states. The CON status of the state was a categorical variable, with each state classified as a CON state or a non-CON state.

### **Dependent variables.**

The home health outcome variables were how often patients were hospitalized (HospAdm); how often patients used of any urgent, unplanned care in the hospital emergency room - without being admitted to the hospital (ERAdm); how often patients had improvement in taking their drugs correctly by mouth (ImpMed); how often there were improvements in patients' wounds after an operation (ImpWnd); how often patients got better at breathing (ImpBreath); how often patients pain got better when moving around (ImpPain); how often patients got better in bathing (ImpBath); how often patients got better in getting in and out of bed (ImpIOB); and how often patients got better in walking or moving around (ImpWalk). The outcome variables are reported by Home Care Compare in percentages (numerical data). The individual provider data is compiled by CMS as well as the state data on these outcome variables.

**Control variables.**

The analyses of data to assess the level of association between the CON status of the states and the health outcomes of the patients who used home health services based on the provider ratings took into account the regulatory environment in the states (moratoria), the prevalence of obesity in the states, the portion of the population that is above 65 years of age, the rural-urban classification of the county, the proprietary status of the provider, the unemployment rate of the county, and the per capita income of the county. The CON status of the provider's state, the rural-urban classification of the county, the provider's proprietary status, and the moratorium status of the state on home health agencies, nursing homes and assisted living facilities were measured using the nominal scale. The unemployment rate, per capita income, percentage of the population above 65 years old in the county and the obesity rate in the state were measured at the interval scale.

States with any form of a moratorium on home health agencies in 2015 were considered to have had a more restrictive regulatory environment and coded as "1", whereas states without the regulation were be coded as "0". Obesity is measured by the body mass index (BMI), and its variation between the states in the U.S. can affect the comparison of the aggregate state-level outcomes of treatment rendered to the patients, and thus the provider rankings on the various measures. The variable (obesity) is coded as "1" for BMI>30 and "0" for BMI = or < 30. The state with a higher prevalence of obesity is less likely to have better outcomes than one with a lower prevalence of the condition, and the providers in the state would likely be ranked lower on the health outcomes. Other characteristics of the population that the models will take into account

include the percentage of the seniors in the state that was considered poor and the proportion of the population above 65 years of age.

The proprietary status (PropStat) of the provider is the type of ownership. The value of the categorical data is coded as proprietary or not-for-profit. The ownership type may drive the process measures, and compromise care as the providers with the for-profit goals focus on the financial gains and undermine the quality of the care rendered to the patients. The states with a higher prevalence of for-profit providers may have outcome measures that are different from the other states. The proprietary status of the provider data was contained in the Home Health Compare database. The voluntary non-profit providers (religious and private) and government-run home health agencies (local, county, state, and combined government and voluntary) were classified as a not-for-profit. The rest of the home health providers were classified as proprietary.

### **Data Analysis**

Data analysis was completed using the IBM SPSS statistical software (version 25). The data were recoded and aggregated from quarterly ratings to annual. The home health provider ratings were computed by CMS on a quarterly basis, and the arithmetic averages were calculated to determine the yearly ratings on the various outcomes for the state-level data. The individual provider data were computed for each year using the arithmetic averages for the quarterly reported data.

The CMS rated each home health agency on all the variables using the information submitted at different points of care as captured in the Outcome and Assessment Information Set (OASIS). The data were presented as a percentage of patients who met the criterion of interest. Therefore, the data for the outcome variables

were continuous. The CON status was either current at the end of the calendar year or inactive, and thus the level of measurement of the variable was nominal.

The following research questions (RQ) were investigated to ascertain if the health outcomes of patients who used home health services in the United States in 2014 and 2015 were better in the CON states than in the non-CON states. The research questions were:

RQ1: Among the Medicare patients who used home health services in the United States in 2015, was the frequency of hospitalization lower for home health providers in the CON states than those in the non-CON states?

$H_{01}$ : The frequency of hospitalization of the patients rating was the same for the home health providers in the CON and non-CON states.

$H_{A1}$ : The frequency of hospitalization of the patients rating was lower for the home health providers in the CON than the non-CON states.

RQ2: Among the Medicare patients who used home health services in the United States in 2015, were the ratings of home health providers on improvement in walking higher in the CON states than those in non-CON states?

$H_{02}$ : The home health provider rating on improvement in walking was not higher in the CON states than in the non-CON states.

$H_{A2}$ : The home health provider rating on improvement in walking was higher in the CON states than in the non-CON states.

RQ3: Were there differences in the ratings of providers in the CON and non-CON states based on wound improvement or healing amongst the Medicare patients who used home health services in the United States in 2015?

*H<sub>03</sub>*: The home health provider rating on wound improvement or healing was the same in the CON and non-CON states.

*H<sub>A3</sub>*: The home health provider rating on wound improvement or healing was different in the CON and non-CON states.

RQ4: What were the differences in the improvement in breathing ratings between the home health agencies in the CON states and those in the non-CON states among the Medicare patients who used home health services in the United States in 2015?

*H<sub>04</sub>*: The improvement in breathing rating was the same in providers in CON and non-CON states.

*H<sub>A4</sub>*: The improvement in breathing rating was not different in providers in CON and non-CON states.

RQ5: Were the improvements in self-care ratings higher in the home health agencies in the CON states than in the non-CON states among the Medicare patients who used home health services in the United States in 2015?

*H<sub>05</sub>*: The improvement in self-care rating was the same in the home health providers in CON and non-CON states.

*H<sub>A5</sub>*: The improvement in self-care rating was higher in the home health providers in CON than in non-CON states.

RQ6: Among the Medicare patients who used home health services in the United States in 2015, were there differences in the frequency of the emergency room use without hospitalization between home health providers in the CON and non-CON states?

*H<sub>06</sub>*: The frequency of emergency room use without hospitalization by patients was the same in the CON and non-CON states.

*H<sub>A6</sub>*: The frequency of emergency room use without hospitalization by patients was different between the CON and non-CON states.

RQ7: Did the home health agencies in the CON states have a greater comprehensive improvement in health outcomes compared with those in non-CON states?

*H<sub>07</sub>*: The average rating on all outcomes were the same on the CON and non-CON states.

*H<sub>A7</sub>*: The average rating on all outcomes were higher in CON states than in non-CON states.

RQ8: How did the CON while controlling other variables predict the health outcomes of the Medicare patients who used home health services in the United States in 2015?

*H<sub>08</sub>*: The CON did not predict the health outcomes of the Medicare patients who used home health services.

*H<sub>A8</sub>*: The CON predicted the health outcomes of the Medicare patients who used home health services.

The independent *t*-test was conducted to assess if the health outcomes of the home health providers in CON-states were different from those in non-CON states. Because the home health agency ratings were reported by CMS as percentages for each criterion measured, the use of the *t*-test to determine if there are differences between the groups with the ratio level of measurement was appropriate (Bettany-Saltikov & Whittaker, 2014). Multiple linear regression analyses were conducted to test how the predictor variable (CON status of the provider's state) explained the home health outcomes of the



patients while accounting for control variables. The regression models also provided information on the nature of the relationships. The parameter estimates were reported with 95% confidence interval. A  $p$ -value that was less than .05 indicated that the null hypothesis should be rejected, and the predictor would be a meaningful addition to the model as there was a significant effect. The computed regression coefficients indicated both the direction (positive or negative) and the strength of the association. In similar studies, regression analyses were used to test associations between the variables while accounting for the control variables (Duffy, 2002; Stratmann & Wille, 2016).

### **Threats to Validity**

In this study, I examine the association between CON laws and measurable health outcomes that are specific to home health. The dependent variables under consideration (improvements in walking, breathing, pain, medication management, and wound healing, and transferring in and out of bed) were specific to home health, and several tools including the OASIS, capture the data. The analysis of data compiled from the OASIS tool in this study, therefore, associated it with the validity concerns of the assessment and limited the application of the findings not just to the home health sector but specifically to skilled services. Other home health services such as personal care attendant services and companionship governed by similar government regulations of varying proportions in applicable states could also be affected by the CON. In addition to the external validity threats hereby expressed, there are concerns with OASIS data collection.

The OASIS assessment data were collected by clinicians employed by the home health providers. The providers were possibly aware of the use of the data for reimbursement of services rendered as well as monitoring of quality measures by the

CMS. Because the providers collected and reported the data to CMS, there was the potential for self-reporting bias. There was also the potential for the home health providers through their clinical staff to misrepresent patients' health status to ensure that the providers' ratings were not adversely affected. CMS conducts patient satisfaction surveys that are informative and corroborative to the providers' ratings, but the data used in the study did not include provider ratings based on patient satisfaction surveys.

### **Ethical Procedures**

The study used publicly available data compiled and archived by the CMS in the Home Health Compared database. The data had no patient-identifiable information and was available to the public. The approval of the study was done by the Walden University Institutional Review Board (IRB). This dissertation is open to the public.

### **Summary**

The quantitative design was used to analyze cross-sectional data collected between 2014 and 2015 by home health providers using the OASIS tool which were compiled and published on the Home Health Compared website by CMS. The arithmetic means of the quarterly provider rating data were computed, and the assessment of the associations between the CON and the provider ratings on key home health outcome measures. Regression models were used to assess the nature and strength of the associations. Although the OASIS data compiled by the CMS were collected by the same home health providers (and their staff) that were being rated, the ascertainment of how the CON laws influence measurable public health outcomes in the home care sector that had not benefited from such patient outcome related analysis in the past justified the endeavor.

## Chapter 4: Data Analysis and Results

### Introduction

The purpose of the study was to investigate the association between CON laws and the rating of home health providers based on the health outcomes of Medicare patients who used the services in 2015. The imposition of additional regulatory barriers by the states to limit providers from entering the market or expanding their operations should protect public health and manifest in better patient outcomes. In this study, the measurable home health outcomes that were considered included improvement in walking, improvement in self-care, improvement in wound healing, improvement in breathing, avoidance of hospitalization, avoidance of bedsores, and avoidance in emergency department use.

The research questions that were:

RQ1: Among the Medicare patients who used home health services in the United States in 2015, was the frequency of hospitalization lower for home health providers in the CON states than those in the non-CON states?

$H_{01}$ : The frequency of hospitalization of the patients rating was the same for the home health providers in the CON and non-CON states.

$H_{A1}$ : The frequency of hospitalization of the patients rating was lower for the home health providers in the CON than the non-CON states.

RQ2: Among the Medicare patients who used home health services in the United States in 2015, were the ratings of home health providers on improvement in walking higher in the CON states than those in non-CON states?

*H*<sub>02</sub>: The home health provider rating on improvement in walking was not higher in the CON states than in the non-CON states.

*H*<sub>A2</sub>: The home health provider rating on improvement in walking was higher in the CON states than in the non-CON states.

RQ3: Were there differences in the ratings of providers in the CON and non-CON states based on wound improvement or healing amongst the Medicare patients who used home health services in the United States in 2015?

*H*<sub>03</sub>: The home health provider rating on wound improvement or healing was the same in the CON and non-CON states.

*H*<sub>A3</sub>: The home health provider rating on wound improvement or healing was different in the CON and non-CON states.

RQ4: What were the differences in the improvement in breathing ratings between the home health agencies in the CON states and those in the non-CON states among the Medicare patients who used home health services in the United States in 2015?

*H*<sub>04</sub>: The improvement in breathing rating was the same in providers in CON and non-CON states.

*H*<sub>A4</sub>: The improvement in breathing rating was not different in providers in CON and non-CON states.

RQ5: Were the improvements in self-care ratings higher in the home health agencies in the CON states than in the non-CON states among the Medicare patients who used home health services in the United States in 2015?

*H*<sub>05</sub>: The improvement in self-care rating was the same in the home health providers in CON and non-CON states.

*H<sub>A5</sub>*: The improvement in self-care rating was higher in the home health providers in CON than in non-CON states.

RQ6: Among the Medicare patients who used home health services in the United States in 2015, were there differences in the frequency of the emergency room use without hospitalization between home health providers in the CON and non-CON states?

*H<sub>06</sub>*: The frequency of emergency room use without hospitalization by patients was the same in the CON and non-CON states.

*H<sub>A6</sub>*: The frequency of emergency room use without hospitalization by patients was different between the CON and non-CON states.

RQ7: Did the home health agencies in the CON states have a greater comprehensive improvement in health outcomes compared with those in non-CON states?

*H<sub>07</sub>*: The average rating on all outcomes were the same on the CON and non-CON states.

*H<sub>A7</sub>*: The average rating on all outcomes were higher in CON states than in non-CON states.

RQ8: How did the CON while controlling other variables predict the health outcomes of the Medicare patients who used home health services in the United States in 2015?

*H<sub>08</sub>*: The CON did not predict the health outcomes of the Medicare patients who used home health services.

*H<sub>A8</sub>*: The CON predicted the health outcomes of the Medicare patients who used home health services.

In this chapter, I presented the descriptive statistics on each of the variables: CON status of the state and provider ratings based on the outcome variables. There is also a tabular presentation of the results of the t-tests and the multiple linear regression models.

### **Data Collection**

The data on the provider ratings and the CON status of the states used in the study were retrieved from Home Health Compare and AHPA respectively. The data on the control variables were from AHRF, State of Obesity reports, and the National Council for State Legislators websites. The data on provider ratings were collected by home health agencies and compiled by CMS. Home Health Compare had data on the 50 continental states, the District of Columbia, the Virgin Islands, Puerto Rico, American Samoa, Guam, and Northern Mariana Islands. The data on the 50 continental states and the District of Columbia were merged using the county indicator of the provider.

### **Results**

#### **Descriptive statistics**

The 50 states in the continental USA and the District of Columbia were included in the study. A total of 17 states and the District of Columbia had continuous CON laws in 2015. The states with CON laws were Alabama, Arizona, Florida, Georgia, Hawaii, Kentucky, Maryland, Mississippi, Montana, New Jersey, North Carolina, Rhode Island, South Carolina, Tennessee, Vermont, Washington, and West Virginia. The rest of the 33 states did not have any CON laws in place during the period. None of the states repealed or added CON laws related to home health services. The total number of home health providers in the 50 states and the District of Columbia in 2015 was 12,393. Of these, the number that was included in the study were based on providers that were ranked on the

outcome and were as follows in 2015: 9,282 had a rating on how often home health patients had to be admitted to the hospital; 9,282 had a rating on how often patients receiving home health care needed any urgent, unplanned care in the hospital emergency room - without being admitted to the hospital; 9,358 had a rating on how often patients got better at taking their drugs correctly by mouth; 4,710 had a rating on how often patients' wounds improved or healed after an operation; 9,391 had a rating on how often patients' breathing improved; 9,576 had a rating on how often patients had less pain when moving around; 9,689 had a rating on how often patients got better at bathing; 9,482 had a rating on how often patients got better at getting in and out of bed, and 9,624 had a rating on how often patients got better at walking or moving around.

As illustrated on Table 1 below, the means were higher for providers in CON states than for those in the non-CON states on all the health outcome variables except for how often patients were hospitalized (13.91 percent compared to 12.71 percent) and how often they had to use the emergency department (15.62 percent versus 14.3 percent). The means of the providers' ratings that were higher in CON than the non-CON states are shown on Table 1 below.

Overall, the ratings of home health providers in non-CON states had a higher variability as supported by the standard deviations of the provider ratings on each of the outcome variables in both the CON and the non-CON states are shown on the table. The table illustrates that the variations from the means (SD) on all the variables were higher for non-CON states than for the CON states.

Table 1

*Descriptive Statistics of Measurable Home Health Patient Outcomes*

	CON States			Non-CON States			Total		
	<i>N</i>	Mean	<i>SD</i>	<i>N</i>	Mean	<i>SD</i>	<i>N</i>	Mean	<i>SD</i>
How often home health patients had to be admitted to the hospital	1,192	13.91	2.69	8,090	12.71	3.61	9,282	12.86	3.52
How often patients receiving home health care needed any urgent, unplanned care in the hospital emergency room - without being admitted to the hospital	1,191	15.62	2.53	8,090	14.30	3.51	9,282	14.47	3.43
How often patients got better at taking their drugs correctly by mouth	1,200	52.41	9.84	8,158	47.98	15.35	9,358	48.55	14.80
How often patients' wounds improved or healed after an operation	1,016	90.72	5.71	3,694	90.09	7.58	4,710	90.22	7.22
How often patients' breathing improved	1,191	67.56	10.49	8,200	59.34	19.39	9,391	60.38	18.70
How often patients had less pain when moving around	1,197	66.50	9.95	8,379	64.98	18.00	9,576	65.17	17.20
How often patients got better at bathing	1,210	66.24	9.92	8,479	64.55	15.17	9,689	64.76	14.60
How often patients got better at getting in and out of bed	1,203	58.98	9.39	8,279	54.26	14.91	9,482	54.86	14.40
How often patients got better at walking or moving around	1,210	63.01	8.33	8,414	59.93	13.35	9,624	60.32	12.90

Out of the 12,393 providers that were included in the study, varying numbers were rated on each of the outcome measures that were assessed, as depicted in Table 1 above. All but one outcome (how often patients' wounds improved or healed after an operation that had a rating for only 4,710 providers) had ratings for over 75 percent of the home health providers. The number of home health providers ranked for each of the outcomes was at least tripled for non-CON states compared to the CON-states. Table 2 below shows that 89.4 percent of the home health providers were in the non-CON states.

Similarly, in the non-CON states, the number of for-profit providers was more than 10 times and the number of not-for-profit providers was more than doubled, compared to the CON states. When there was a moratorium on nursing homes and assisted living facilities, the proportion of providers in the CON states to the non-CON



states was higher (21.46 percent) compared to when there was no moratorium (9.86 percent). The counties in non-CON states had higher mean on per capita income, whereas the counties in CON states had higher means on the unemployment rate, percent of the population 65 years and older, and percent of the population in poverty. Finally, large metro areas with more than 250,000 people were located mostly in non-CON states.

Table 2.

*Distribution of the Predictors*

	CON States		Non-CON States		CON & non-CON States	
	<i>N</i>	Mean	<i>N</i>	Mean	<i>N</i>	Mean
Home health providers	1,314		11,079		12,393	
Proprietary Status						
Not-for-profit or government-owned	370		944		1,314	
For-profit	944		9,838		11,079	
State Demographics						
Moratorium Status						
Moratorium on NH, Assisted Living Facilities	410		1,910		2,320	
No Moratorium on NH, Assisted Living Facilities	904		9,169		10,073	
Obesity rate		28.02		28.18		28.17
County demographics						
Unemployment rate, 16+		6.03		5.26		5.34
Per capita income		\$45,022		\$48,516		\$48,144
Percent of population estimate 65+		15.87		14.43		14.58
Percent of persons in poverty		17.23		15.63		15.79
Rural-Urban Continuum						
Completely rural (population less than 2,500)	57		187		244	
Small urban (population between 2,500 and 250,000)	343		1,341		1,684	
Large metro (population more than 250,000)	914		9,551		10,465	

## Inferential Statistics

**Assumptions.** Multiple linear regression models were used to assess the association between the predictor variables and the health outcomes of the patients, and independent

*t*-tests were conducted to determine if there were differences in the ratings of home health providers based on the outcome variables. The assumptions of both inferential statistics were evaluated.

The outcome (dependent) variables were measured on a continuous scale (percentages), and there were nine independent variables used in the multiple linear regression analysis. The independence of the observations was explained by the absence of related outcomes between providers as each provider had an outcome for each variable. Linearity was observed in the scatter plots and partial regression plots. The spread in the plots of standardized residuals against the unstandardized predicted values appeared to shrink somewhat at the predicted values for the outcome variables, and the patterns in the variance of the residuals meant there was evidence of heteroscedasticity. By inspection, the q-q plots depicted normal distributions of the dependent variables. Finally, the collinearity statistics (VIF values) were less than 10 for all the independent variables, therefore, satisfying the assumption of the absence of multicollinearity. In regards to the assumption required for the independent *t*-test, Levene's tests were statistically significant for all the outcome variables.

**Statistical Test Results.** Multiple linear regression models using the enter method were conducted to determine how each of the outcome variables was predicted by the CON status (Model 1), the state entry regulations (Model 2), agency ownership, and location (Model 3), and county-area characteristics (Model 4). The state entry regulations were made up of the CON status of the state and the existence of a moratorium on nursing homes or assisted living facilities. The agency ownership was whether the entity was either proprietary or not-for-profit. The county-area characteristics comprised of per

capita income, percentage of the population below poverty level, obesity rate, unemployment rate, and the proportion of the population of age 65 and above.

The independent-samples *t*-tests were conducted to determine if the means in the provider ratings based on each of the outcome variables were different. The *t*-test results reported were for the equal variances assumed in the outcome variables.

Research question 1: An independent *t*-test was conducted to assess the hypothesis that the patients in home health agencies in CON states had been admitted to the hospital more often than those in non-CON states. The data provided information on the hospitalization rate of the patients in the home health providers. The rate of admission was significantly different in the CON and non-CON states,  $t(9280) = -11.01$  and  $p < .01$ . The patients who received services from providers in CON states in 2015 were hospitalized at a higher rate ( $M = 13.91$ ,  $SD = 2.69$ ) than the patients who received home health services in non-CON states ( $M = 12.71$ ,  $SD = 3.61$ ).

Multiple linear regression analyses were conducted to assess if the frequency of hospitalization of home health patients was predicted by the CON status of the state of the home health provider, the presence of moratorium on nursing homes or assisted living facilities, the proprietary status of the home health provider, the rural-urban county classification and county area characteristic (per capita income, percentage of the population below poverty level, obesity rate, unemployment rate, and the proportion of the population of age 65 and above) as shown on Table 3.

The amount of variance in how often home health patients had to be admitted to the hospital in 2015 was significantly explained by the predictors in Model 1 ( $F(1, 9245) = 121.99$ ,  $p < .01$ ,  $R^2 = .01$ ,  $R^2_{\text{Adjusted}} = .01$ ); Model 2 ( $F(2, 9244) = 137.36$ ,  $p < .01$ ,  $R^2 =$

.03,  $R^2_{\text{Adjusted}} = .03$ ); and Model 3 ( $F(4, 9242) = 188.32, p < .01, R^2 = .08, R^2_{\text{Adjusted}} = .08$ ).

In Model 4, state entry regulations, agency ownership and location, and county area characteristics explained a significant amount of the variance in how often home health patients had to be admitted to the hospital in 2015 ( $F(9, 9237) = 109.31, p < .01, R^2 = .10, R^2_{\text{Adjusted}} = .10$ ). In all the four models, the CON status of the state was significant in

Table 3

*Multiple Linear Regression Models for How Often Home Health Patients Had To Be Admitted to the Hospital in 2015 (N = 9,282)*

	Model 1		Model 2		Model 3		Model 4	
	B	p value	B	p value	B	p value	B	p value
Constant	12.705	.00	12.520	.00	15.848	.00	17.513	.00
State entry regulation								
CON status	1.202	.00	1.009	.00	0.686	.00	0.815	.00
Moratorium on NH & AL			1.171	.00	0.912	.00	0.796	.00
Agency ownership and location								
Proprietary status					-0.598	.00	-0.404	.00
Rural-urban county classification					-1.517	.00	-1.305	.00
County-area characteristics								
Per-Capita Income							.000	.00
Population < Poverty level (%)							-0.068	.00
Unemployment Rate (%)							-0.136	.00
Population Age 65+ (%)							0.007	.47
Obesity (State Population, %)							0.050	.00
<b>R<sup>2</sup></b>	.01		.03		.08		.10	

predicting how often home health patients had to be admitted to the hospital ( $p < .01$ ).

The home health patients were hospitalized at higher rates in the CON states than in the non-CON states: 1.2% in Model 1; 1% in Model 2; 0.69% on Model 3; and 0.82% in

Model 4. Furthermore, all other variables, except the proportion of the population aged 65 and above, were significant in predicting the outcome.

Research question 2: The independent *t*-test was conducted to evaluate the hypothesis that the home health agency ratings on improvement in walking were not higher in CON states than in non-CON states during the study period. The tests were significant for the average ratings of providers in the two groups ( $t[9622] = -7.8, p < .01$ ). The ratings of home health providers based on the patients' improvement in walking were different in the CON ( $M = 63.01, SD = 8.33$ ) and the non-CON states ( $M = 59.93, SD = 13.35$ ). Therefore, the ratings of providers in CON states were higher based on patients' improvement in walking than in non-CON states, as shown in Table 4 below.

To assess if home health patients got better at walking or moving around was explained by the predictors, multiple linear regression analyses were conducted using the enter method. The frequency of improvement in home health patients in walking or moving around was predicted significantly: Model 1 ( $F(1, 9586) = 60.53, p < .01, R^2 = .08, R^2_{\text{Adjusted}} = .01$ ); Model 2 ( $F(2, 9585) = 33.58, p < .01, R^2 = .08, R^2_{\text{Adjusted}} = .01$ ); and Model 3 ( $F(4, 9583) = 17.36, p < .01, R^2 = .09, R^2_{\text{Adjusted}} = .01$ ); and Model 4 ( $F(9, 9578) = 46.83, p < .01, R^2 = .21, R^2_{\text{Adjusted}} = .04$ ). The CON status of the state and the status of the moratorium were significant in predicting how home health patients got better at walking or moving around in all the four models. In each of the models, higher percentages of patients in the CON states that used home health services had improvement in walking or moving around: 3.1% more in Model 1; 3.2% more in Model 2; 3.3% more in Model 3; and 2.8% more in Model 4.

Table 4

*Multiple Linear Regression Models for How Often Home Health Patients Got Better at Walking or Moving Around in 2015 (N = 9,624)*

	Model 1		Model 2		Model 3		Model 4	
	B	p-value	B	p-value	B	p-value	B	p-value
Constant	59.936	.00	60.081	.00	59.527	.00	54.957	.00
State entry regulation								
CON status	03.072	.00	3.208	.00	3.285	.00	2.760	.00
Moratorium on NH & AL			-0.874	.01	-0.828	.02	-0.639	.06
Agency ownership and location								
Proprietary status					0.522	.16	0.899	.02
Rural-urban county classification					0.036	.91	1.471	.00
County-area characteristics								
Per-Capita Income							-0.000	.75
Population < Poverty level (%)							-0.150	.00
Unemployment Rate (%)							0.716	.00
Population Age 65+ (%)							0.473	.00
Obesity (State Population, %)							-0.237	.00
<b>R<sup>2</sup></b>	.001		.001		.01		.02	

Research question 3: The independent *t*-test was conducted to assess the hypothesis that the home health provider ratings based on how often patients' wounds improved or healed after an operation was the same in the CON and non-CON states. The null hypothesis was rejected. The tests results were significant ( $t[4708] = -2.473, p > .01$ ). The ratings of home health providers based on the improvement or healing of wounds were different in the CON (M = 90.72, SD = 5.71) and the non-CON states (M = 90.09, SD = 7.58). However, the multiple linear regression models, as shown in Table 5 below, indicated that the CON status of the home health providers' state was not significant in determining the improvement of the patients' wounds.

Multiple linear regression analyses were conducted to assess the relationship between the CON and other predictor variables on how often patients' wound improved or healed after an operation. The four models were significant: Model 1 ( $F(1, 4681) = 6.42, p < .05, R^2 = .001, R^2_{\text{Adjusted}} = .001$ ); Model 2 ( $F(2, 4680) = 3.30, p < .05, R^2 = .001, R^2_{\text{Adjusted}} = .001$ ); and Model 3 ( $F(4, 4678) = 6.44, p < .01, R^2 = .01, R^2_{\text{Adjusted}} = .01$ ); and Model 4 ( $F(9, 4673) = 13, p < .01, R^2 = .02, R^2_{\text{Adjusted}} = .02$ ). In all but fourth model, higher percentages of patients in the CON states that used home health services were reported to have had an improvement or healing of their wound after an operation: 0.65% more in Model 1; 0.66% more in Model 2; and 0.70% more in Model 3. The CON status of the state was significant in Models 1, 2, and 3.

Table 5

*Multiple Linear Regression Models for How Often Patients' Wounds Improved or Healed After an Operation in 2015 (N = 4,710)*

	Model 1		Model 2		Model 3		Model 4	
	B	p-value	B	p-value	B	p-value	B	p-value
Constant	90.071	.00	90.093	.00	89.519	.00	90.541	.00
State entry regulation								
CON status	0.649	.01	0.662	.01	0.703	.01	0.480	.07
Moratorium on NH & AL			-0.105	.68	-0.071	.78	0.281	.28
Agency ownership and location								
Proprietary status					1.154	.00	0.976	.00
Rural-urban county classification					-0.198	.39	0.107	.68
County-area characteristics								
Per-Capita Income							0.000	.53
Population < Poverty level (%)							0.020	.48
Unemployment Rate (%)							0.344	.00
Population Age 65+ (%)							0.103	.00
Obesity (State Population, %)							-0.200	.00
<b>R<sup>2</sup></b>	.02		.02		.03		.11	

Research question 4: To assess the hypothesis that the improvement in breathing ratings was the same in the providers in the CON and the non-CON states, the independent *t*-test was conducted and the results were significant ( $t[9389] = 14.34, p < .01$ ). The ratings of home health providers based on the improvement in the breathing of the patients were different in the CON states ( $M = 67.56, SD = 10.49$ ), and the non-CON states ( $M = 59.34, SD = 19.34$ ).

To determine how the CON and other predictors affected how often patients' breathing improved, four multiple linear regression models were computed, the results indicated that all the models were significant: Model 1 ( $F(1, 9356) = 206.19, p < .01, R^2 = .02, R^2_{\text{Adjusted}} = .02$ ); Model 2 ( $F(2, 9355) = 103.35, p < .01, R^2 = .02, R^2_{\text{Adjusted}} = .02$ ); and Model 3 ( $F(4, 9353) = 68.64, p < .01, R^2 = .03, R^2_{\text{Adjusted}} = .03$ ); and Model 4 ( $F(4, 9348) = 126.20, p < .01, R^2 = .11, R^2_{\text{Adjusted}} = .11$ ). The independent variables except moratorium status and per capita income were significant in predicting improvement in patients' breathing as shown on Table 6 below. In all the models, higher percentages of patients in the CON states that used home health services had improvement in walking or moving around: 8.25% more in Model 1; 8.3% more in Model 2; 8.1% more in Model 3; and 7.78% more in Model 4.



Table 6.

*Multiple Linear Regression Models for How Often Patients' Breathing Improved in 2015*  
(N =9,391)

Research question 5: The independent *t*-tests were also conducted to evaluate if the

	Model 1		Model 2		Model 3		Model 4	
	B	<i>p</i> -value	B	<i>p</i> -value	B	<i>p</i> -value	B	<i>p</i> -value
Constant	59.319	.00	59.378	.00	59.274	.00	69.314	.00
State entry regulation								
CON status	8.245	.00	8.300	.00	8.077	.00	7.784	.00
Moratorium on NH & AL			-0.356	.47	-0.386	.44	0.118	.81
Agency ownership and location								
Proprietary status					-4.437	.00	-0.292	.00
Rural-urban county classification					2.173	.00	2.671	.00
County-area characteristics								
Per-Capita Income							0.000	.48
Population < Poverty level (%)							-0.727	.00
Unemployment Rate (%)							1.369	.00
Population Age 65+ (%)							0.691	.00
Obesity (State Population, %)							-0.671	.00
<b>R<sup>2</sup></b>	.02		.02		.03		.11	

improvement in self-care ratings were the same between home health providers in CON and non-CON states. The results were for all the self-care variables investigated: how often patients got better at getting in and out of bed ( $t[9480] = -10.65, p < .01$ ); how often patients got better at bathing ( $t[9389] = 14.34, p < .01$ ); and how often patients got better at taking their drugs correctly by mouth ( $t[9356] = 13.34, p < .01$ ). Conclusively, the null hypothesis was rejected as the results of the test were statistically significant. There was a difference in the provider ratings in the CON and non-CON states based on the self-care variables.

The results of the multiple linear regression analysis of the three outcome variables that constitute self-care (how often patients got better at getting in and out of bed, how

often patients got better at bathing, and how often patients got better at taking their drugs correctly by mouth), shown on Tables 7, 8, and 9 below were reviewed to determine how the independent variables predicted patients' improvement in self-care. All the models were significant in predicting the self-care outcome variables ( $p < .01$ ).

Table 7.

*Multiple Linear Regression Models for How Often Patients Got Better at Getting In and Out of Bed in 2015 (N = 9,482)*

	Model 1		Model 2		Model 3		Model 4	
	B	<i>p</i> -value	B	<i>p</i> -value	B	<i>p</i> -value	B	<i>p</i> -value
Constant	54.249	.00	54.262	.00	57.530	.00	62.113	.00
State entry regulation								
CON status	4.727	.00	4.739	.00	4.305	.00	4.098	.00
Moratorium on NH & AL			-0.078	.84	-0.339	-.38	-0.181	.64
Agency ownership and location								
Proprietary status					-2.692	.00	-1.798	.00
Rural-urban county classification					-0.480	.18	1.172	.00
County-area characteristics								
Per-Capita Income							-0.000	.00
Population < Poverty level (%)							-0.370	.00
Unemployment Rate (%)							0.450	.00
Population Age 65+ (%)							0.591	.00
Obesity (State Population, %)							-0.374	.00
<b>R<sup>2</sup></b>	.01		.01		.02		.07	

Table 8

*Multiple Linear Regression Models for How Often Patients Got Better at Bathing in 2015 (N =9,689)*

	Model 1		Model 2		Model 3		Model 4	
	B	<i>p</i> -value	B	<i>p</i> -value	B	<i>p</i> -value	B	<i>p</i> -value
Constant	64.560	.00	65.014	.00	64.300	.00	65.002	.00
State entry regulation								
CON status	1.680	.00	2.094	.00	2.157	.00	1.595	.00
Moratorium on NH & AL			-2.709	.00	-2.656	.00	-2.328	.00
Agency ownership and location								
Proprietary status					-0.013	.98	0.566	.20
Rural-urban county classification					0.392	.27	2.003	.00
County-area characteristics								
Per-Capita Income							-0.000	.04
Population < Poverty level (%)							-0.287	.00
Unemployment Rate (%)							0.849	.00
Population Age 65+ (%)							0.569	.00
Obesity (State Population, %)							-0.398	.00
<b>R<sup>2</sup></b>	.00		.01		.01		.05	

Table 9

*Multiple Linear Regression Models for How Often Patients Had Less Pain When Moving Around (N = 9,576)*

	Model 1		Model 2		Model 3		Model 4	
	B	p-value	B	p-value	B	p-value	B	p-value
Constant	64.981	.00	65.621	.00	59.068	.00	60.556	.00
State entry regulation								
CON status	1.522	.00	2.112	.00	2.684	.00	1.548	.00
Moratorium on NH & AL			-3.835	.00	-3.360	.00	-2.274	.00
Agency ownership and location								
Proprietary status					-0.080	.88	-0.082	.87
Rural-urban county classification					3.581	.00	3.498	.00
County-area characteristics								
Per-Capita Income							0.000	.00
Population < Poverty level (%)							-0.338	.00
Unemployment Rate (%)							2.153	.00
Population Age 65+ (%)							0.519	.00
Obesity (State Population, %)							-0.798	.00
<b>R<sup>2</sup></b>	.00		.01		.02		.10	

Table 10

*Multiple Linear Regression Models for How Often Patients Got Better at Taking Their Drugs by Mouth (N = 9,358)*

The models showed that the CON status of the home health providers' state was

	Model 1		Model 2		Model 3		Model 4	
	B	p-value	B	p-value	B	p-value	B	p-value
Constant	47.997	.00	47.981	.00	49.282	.00	38.492	.00
State entry regulation								
CON status	4.436	.00	4.440	.00	4.287	.00	4.228	.00
Moratorium on NH & AL			-0.023	.95	-0.126	.75	-0.449	.21
Agency ownership and location								
Proprietary status					-0.736	.11	0.149	.74
Rural-urban county classification					-0.351	.34	0.863	.03
County-area characteristics								
Per-Capita Income							0.000	.48
Population < Poverty level (%)							-0.436	.00
Unemployment Rate (%)							0.840	.00
Population Age 65+ (%)							0.506	.00
Obesity (State Population, %)							0.114	.03
<b>R<sup>2</sup></b>	.01		.01		.01		.05	

significant ( $p < .01$ ) in predicting all the three self-care variables. The home health providers in CON states were more likely to have higher ratings than the providers in non-CON states. Overall, the self-care outcomes were predictable by the CON status of the provider's state.

Research question 6: An independent  $t$ -test was conducted to assess the hypothesis that the provider ratings on how often patients who were receiving home health care needed urgent, unplanned care in the ER without being admitted were different between CON and non-CON states. The test was significant,  $t(9280) = -12.55$  and  $p < .01$ . The percentage of patients who received home health services from providers and had

unplanned use of the emergency room without being hospitalized in the CON states ( $M = 15.62$ ,  $SD = 2.53$ ) was higher than those in non-CON states ( $M = 14.3$ ,  $SD = 3.51$ ), as shown on Table 10 below.

Table 11.

*Multiple Linear Regression Models for How Often Patients Receiving Home Health Care Needed Any Urgent, Unplanned Care in the Hospital Emergency Room - Without Being Admitted to the Hospital in 2015 (N = 9,282)*

Multiple linear regression analyses were conducted to determine if the need for

	Model 1		Model 2		Model 3		Model 4	
	B	p-value	B	p-value	B	p-value	B	p-value
Constant	14.286	.00	14.140	.00	17.051	.00	17.187	.00
State entry regulation								
CON status	1.334	.00	1.182	.00	0.885	.00	0.953	.00
Moratorium on NH & AL			0.923	.00	0.694	.00	0.577	.00
Agency ownership and location								
Proprietary status					-0.793	.00	-0.620	.00
Rural-urban county classification					-1.198	.00	-0.879	.00
County-area characteristics								
Per-Capita Income							0.000	.00
Population < Poverty level (%)							-0.061	.00
Unemployment Rate (%)							-0.057	.05
Population Age 65+ (%)							0.035	.00
Obesity (State Population, %)							0.056	.00
<b>R<sup>2</sup></b>	.02		.03		.07		.08	

unplanned use of the emergency room without the need to be hospitalized by patients who used home health services was predicted by the CON status of the state of the home health provider, the presence of moratorium on nursing homes or assisted living facilities, the proprietary status of the home health provider, the rural-urban county classification and county area characteristic (per capita income, percentage of the population below

poverty level, obesity rate, unemployment rate, and the proportion of the population of age 65 and above). Table 11 above shows the results of analyses.

Using the enter method, it was found in Model 1 that the amount of variance in how often home health patients needed to use the emergency room without being hospitalized was significantly explained by the predictors in all the models: Model 1 ( $F(1, 9245) = 160, p < .01, R^2 = .02, R^2_{\text{Adjusted}} = .02$ ); Model 2 ( $F(2, 9244) = 130.47, p < .01, R^2 = .03, R^2_{\text{Adjusted}} = .03$ ); Model 3 ( $F(4, 9242) = 162.09, p < .01, R^2 = .07, R^2_{\text{Adjusted}} = .07$ ), and Model 4 ( $F(9, 9237) = 93.15, p < .01, R^2 = .08, R^2_{\text{Adjusted}} = .08$ ). The home health patients had unplanned visits to the emergency room at higher rates in the CON states than in the non-CON states: 1.33% in Model 1; 1.18% in Model 2; 0.89% on Model 3; and 0.95% in Model 4. All the predictors but unemployment rate in the county contributed significantly to the models.

Research question 7: The hypothesis that the average ratings on all outcomes were same on the CON and non-CON states was also evaluated and based on the results of each of the outcome variables studied, it was evident that the average ratings of all the outcomes were different between the CON and non-CON states. In the CON and non-CON states, significant differences were noted in the rate of hospitalization ( $t[9280] = -11.01$  and  $p < .01$ ); improvement in walking ( $t[9622] = -7.8, p < .01$ ); improvement or healing of wounds after an operation ( $t[4708] = -2.473, p > .01$ ); improvement in breathing ( $t[9389] = 14.34, p < .01$ ); improvement in getting in and out of bed ( $t[9480] = -10.65, p < .01$ ); improvement in bathing ( $t[9,389] = 14.34, p < .01$ ); improvement in taking drugs by mouth ( $t[9,356] = 13.34, p < .01$ ); and the rate of unplanned emergency room

visits ( $t[9,280] = -12.55$  and  $p < .01$ ). Each of the variables studied yielded that the ratings were significantly different between the two groups.

Research question 8: The hypothesis that the CON predicted the health outcomes of the Medicare patients who used home health services in the United States in 2015 was tested using multiple linear logistic regression analysis. In all the models, the CON significantly predicted the health outcomes of all the patients as shown on Tables 3 through 10 above.

### **Summary**

The means of the home health provider ratings for all the health outcomes assessed were higher in the CON states than in the non-CON states. The results of the multiple linear regressions showed that the CON and other independent variables significantly predicted all the outcome variables for patients who used home health services in 2015. The  $t$ -test results showed significant differences in the means between CON and non-CON states on all the outcome variables assessed.



## Chapter 5: Findings and Recommendations

### **Introduction**

In the United States, 17 states and the District of Columbia maintained CON laws in 2015 that affected home health provider entry or expansion. The purpose of the study was to assess the association between the CON laws and the provider ratings using measurable health outcomes of Medicare patients who benefited from home health services during that period and to evaluate if patients in the states with the regulation had better outcomes than those in non-CON states. The provider ratings were significantly different between the CON and the non-CON states for all the outcome variables. Both the percentage of Medicare patients who used home health services in 2015 that had to be hospitalized and the portion of the patients who had to use emergency room services were lower in the non-CON states than in the CON states. However, a significant percentage of the patients in the CON states had more improvement in walking and moving around, taking their drugs by mouth, bathing, breathing, wound healing after an operation, and pain management. Therefore, the enforcement of the CON laws led to mixed findings in the health outcome of the Medicare patients who used home health services in 2015.

### **Interpretation of the Findings**

The results of the study were indicative of several findings: the CON-status of the providers' state was significant in predicting all the health outcomes studied; the home health providers in CON states had higher ratings on some health outcome variables; and the home health providers in non-CON states had better ratings on unplanned emergency room use as well as hospitalization of Medicare patients who used home health patients.

These findings aligned with several prior studies and added to the realm of information on the subject.

The multiple linear regression models demonstrated that the CON status of the providers' states was significant in predicting all the health outcomes that were covered in this study. Several other previous researchers had found some association between the CON and mortality (Disesa et al., 2006; Duffy, 2002; Ho, 2006; Ho et al., 2009; and Shortell and Hughes, 1988) and the CON and other health outcomes (Browne et al., 2018; and Stratmann & Wille, 2016). Although the direction and strengths of the associations varied from one outcome variable to another, it remained evident that the CON regulations affected the variables.

Pigou's public interest theory could not be more at odds with the cumulative results of the study. The purpose of public policy should be to influence the lives of the population positively, and in this study, it would have meant quality health outcomes for patients who used home health services in 2015. The variations in the results of this study; thus, neither support nor negate the effectiveness of the regulation in promoting public health. There were higher percentages of patients in CON than in non-CON states that were hospitalized or that used the emergency room for unanticipated health reasons. On the other hand, higher rates of patients in CON states had improvements in other health outcome measures. In the hospitalization and emergency room visit variables, whose measures were objective and could be verified through the reporting of non-home health providers, the patients who used home health services in CON states had worse outcomes compared to the non-CON states. The culmination of the results does not unequivocally align with the public interest theory.

The result of the study indicated that the presence or absence of CON laws in the state affected all the ratings of the providers of home health agencies in 2015. In several ratings, the home health providers in CON states were rated higher compared to those in non-CON states. The improvements in walking (RQ 2), wound healing (RQ 3), bathing (RQ 4), and self-care (RQ 5) were significantly higher in CON states than in non-CON states. Each of these outcome variables was more favorable in CON states, with the most and least improvements noted in wound healing (90.12 percent) and taking medications by mouth (52.41 percent) in the providers in the CON states, respectively.

The findings on how the CON laws affected these measurable home health outcomes are especially important in a sector that is bound to grow, yet had not been given as much research attention. Although there has been limited focus on how the CON affects these outcomes, other investigators had reported improvements in health quality measures: Vaughan-Sarrazin et al. (2002) had noted lower mortality in Medicare patients following CABG, and Ho (2014) had found more improvement in percutaneous transluminal coronary angioplasty in CON states. Also, Paul et al. (2014) found that the length of stay of patients in the ER of the patients in CON states was shorter compared to those in non-CON states. This study, like other previous research, showed a positive relationship between the CON regulations and some health outcomes but also depicted a negative correlation with other outcome variables.

The comprehensive assessment of the results of this study (RQ 7) did not ascertain that the CON contributed to improvement in all the health outcomes of the Medicare patients who used home health services in 2015. In Model 1 of all the regression analysis models, with the CON being evaluated as the independent variable

before the other predictors were added, the CON explained 2 percent or less of all the outcomes ( $R^2 \leq .02$ ). Stratmann and Wille (2016) noted that the imposition or the repeal of the CON laws would have a negligible effects on the health outcomes of the patients, thereby emphasizing the marginal effects of the regulation on the health outcomes of the patients.

The home health providers in CON states were more likely than non-CON states to have worse ratings on how often patients had unplanned emergency room visits and also being admitted to the hospital. These findings corroborated the determinations that were made by Ohsfeldt and Li (2018) and Paul et al. (2014). The conclusion by Ohsfeldt and Li that the providers in the CON states were less likely than those in non-CON states to have higher than average rankings affirmed the negative effects of the regulation on the health outcomes of the patients.

In the CON states, Medicare patients who used home health services in 2015 were hospitalized at a higher rate than those that were in non-CON states (RQ 1). The proportions of the patients who were hospitalized in the CON and the non-CON states were 13.91% and 12.71%, respectively. Similarly, there was a higher proportion of patients in CON states that used the emergency room in 2015 (RQ 6). Several previous studies have concluded that CON laws either did not improve health quality outcomes or had led to worse outcomes (Bailey, 2018; Browne, Cancienne, Casp, Novicoff, & Werner, 2018; Cosby, 2011; DiSesa et al., 2006; Duffy, 2002; Ho et al., 2009). Although the studies neither investigated home health patients nor focused on hospitalization or emergency room use, there was consistency in attributing a lack of improvement in health outcomes to the CON laws.

### **Limitations of the Study**

Some limitations were attributed to the data collection tool (OASIS), the use of secondary data, and how providers were rated using self-reported data. The data compiled by CMS were collected by clinicians using the OASIS at multiple points of care, such as admission, transfer, recertification, and discharge. The challenges posed by OASIS, together with the above-listed concerns, made up the limitations of this study.

The OASIS has remained the required assessment tool for Medicare patients who use home health services in the United States for over two decades, even as there have been documented concerns about its reliability and validity. The variations in the assessments between clinicians using the same tool bring into question the accuracy of the data collected by all the clinicians that worked in more than 12 thousand home health provider agencies in 2015. The results of the study could be affected by this shortcoming. Furthermore, assessments were conducted, and the data were reported to CMS by the respective provider agencies themselves.

The data used in the study were reported by each of the home health agencies to CMS as mandated. The bias of self-reported data remained possible, mainly because the individual providers were aware that the information was being used to rate them and to measure their performance. Also, there was missing data for some providers on the variables that were studied. Therefore, the ratings could have been different, if collected and reported by a third party other than the providers themselves, and if primary data were analyzed. The use of secondary data for this study limited its findings.

Finally, the study's findings showed an association between the CON status of the state of the home health provider and the health outcomes of the patients who used the

services in 2015. There was no investigation of a causal relationship, and so the findings of the study were limited to the presence of a connection between the independent and dependent variables.

### **Recommendations**

The study had significant findings with some limitations and provided opportunities for further investigations on the subject. A comparison of the health outcomes captured in the OASIS that the providers reported themselves with patients' ratings of their outcomes, satisfaction, or perceived improvement will provide empirical evidence on how well the Home Health Compare data effectively reflects patients' outcomes. It is of essence that the data from Home Health Compare is corroborated with other objective data to ascertain that patient's health outcomes are measurable changes in health, void of the assessors' skills, experiences, and biases. Another recommendation would be to conduct an investigation of the causal relationship between CON regulation and public health outcomes.

### **Implications**

There has been a strong push to reduce patient care in the hospital settings and to promote home care services in an effort to reduce cost, promote healing, and to alleviate nosocomial infections amongst other reasons. Seventeen states and the District of Columbia had CON statutes in 2015, and over 3 million Medicare patients used home health services in the same year. As the baby boomers age, it is expected that the number of citizens with Medicare coverage will increase, and the home health industry will grow. The importance of ensuring that public health is positively influenced by CON laws cannot be over-emphasized.

As individuals age and become eligible for Medicare insurance coverage, it may be helpful for them to consider living in either a CON or non-CON state based on their past as well as anticipated medical needs. While CON states had worse ratings on unplanned emergency room visits and hospitalizations, they had better outcomes in the other home health outcome variables. The information is an additional criterion for seniors and their loved ones to consider when deciding on where to live after retirement.

At the policy level, the contribution of the CON regulation to health outcomes of the patients who used home health services could help policymakers evaluate whether there is enough justification for the state to intervene in-home health provider enrollment and facility expansion. It is of utmost importance for the citizens, current and prospective home health providers, and lawmakers to evaluate and debate using empirical data on the relationship between the CON laws and public health. The findings presented in this study, together with other previous investigations, will empower all the parties with more information to have informed debates and make decisions that promote public health when they consider maintaining or appealing CON laws. Policymakers are cognizant of the wishes of their constituents and tend to make decisions that will not jeopardize their own political careers (Becker, 1986), as the CON decisions were often influenced by politics (Gillingham & Galbraith, 2007), and the public interest would be better served if the regulation could be rendered capture-proof (Etzioni, 2009). This study made a unique contribution to the assessment of how the CON was associated with the health outcomes of patients who used home health services in 2015 nationwide.

## **Conclusion**

In this study, I made an assessment of the association between the CON regulations and the health outcomes of Medicare Patients who used home health services in 2015. It was determined that the CON laws were significant in predicting the health outcomes of the Medicare patients who used home health services in the United States in 2015. Unplanned emergency room use and hospitalizations rates were lower in the providers in the non-CON states, and other health outcomes had higher provider ratings in the CON states. The contribution of the CON status of the providers' states to the health outcomes of the Medicare patients who used home health services in 2015 varied depending on the health outcome in question. So the continued use of the law in several states may not directly improve the overall public health outcomes of Medicare patients who use home health services.



## References

- Agency for Healthcare Research and Quality (AHRQ). (2001). *Your Guide to Choosing Quality Health Care, A Quick Look at Quality*. Retrieved from <http://www.ahrq.gov/consumer/qnt/qntqlook.htm>.
- American Health Planning Association [AHPA]. (2005). *The Federal Trade Commission & certificate of need regulation: An AHPA critique*. Retrieved from <http://www.ahpanet.org/files/AHPAcritiqueFTC.pdf>.
- American Health Planning Association [AHPA]. (2018a). CON overview. Retrieved from <http://www.ahpanet.org/copnahpa.html>
- American Health Planning Association [AHPA]. (2018b). Mapbook: Certificate of need coverage. Selected Services, 2016. Retrieved from <http://www.ahpanet.org/Certificate%20of%20Need%20Covered%20Services%20Map%20Book%202016%20.pdf>
- American Health Planning Association [AHPA]. (2018c). Summary of certificate of need coverage: Selected services, 2016. Retrieved from <http://www.ahpanet.org/2016conmatix.jpg>
- Bailey, J. (2018). The effect of certificate of need laws on all-cause mortality. *Health Serv Res*, 53(1), 49-62. doi: 10.1111/1475-6773.12619
- Becker, G. (1986). The public interest hypothesis revisited: A new test of Peltzman's theory of regulation. *Public Choice*, 49(3), 223-234. doi: 10.1007/BF00127340
- Bettany-Saltikov, J., & Whittaker, V. J. (2014). Selecting the most appropriate inferential statistical test for your quantitative research study. *Journal of Clinical Nursing*, 23(11-12), 1520-1531. doi:10.1111/jocn.12343

- Browne, J. A., Cancienne, J. M., Casp, A. J., Novicoff, W. M., & Werner, B. C. (2018). Certificate-of-need state laws and total knee arthroplasty. *The Journal of Arthroplasty*. doi:10.1016/j.arth.2018.01.063
- Cabin, W., Himmelstein, D. U., Siman, M. L., & Woolhandler, S. (2014). For-profit Medicare home health agencies' costs appear higher and quality appears lower compared to nonprofit agencies. *Health Affairs*, 33(8), 1460-1465. doi:10.1377/hlthaff.2014.0307
- Centers for Medicaid and Medicare Services (CMS). (n. d.). Medicare.gov: Home care compare. Retrieved from <https://www.medicare.gov/homehealthcompare/Data/About.html>
- Centers for Medicare and Medicaid Services [CMS]. (2016). Medicare provider utilization and payment data: Home health agencies data 2014. Retrieved from <https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Medicare-Provider-Charge-Data/HHA2014.html>
- Centers for Medicare and Medicaid Services [CMS]. (2018). National health expenditure data: Historical. Retrieved from <https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/NationalHealthAccountsHistorical.html>
- Centers for Medicare and Medicaid Services [CMS]. (n.d.). Home Health Compare data archive. Retrieved from <https://data.medicare.gov/data/archives/home-health-compare>
- Central Intelligence Agency [CIA]. (2018). The World Factbook - Cameroon. Retrieved from <https://www.cia.gov/library/publications/the-world-factbook/geos/us.html>

- Cohen, A. B., & Cohodes, D. R. (1980). Certificate-of-need programs, mechanisms. *American Journal of Public Health, 70*(3), 290-290. doi:10.2105/AJPH.70.3.290
- Conover, C. J., & Sloan, F. A. (1998). Does removing certificate-of-need regulations lead to a surge in health care spending? *Journal of Health Politics, Policy and Law, 23*(3), 455-481. doi: 10.1215/03616878-23-3-455
- Cordato, R. (2005). *Certificate-of-need laws. It's time to repeal*. The John Locke Foundation. Retrieved from <https://www.johnlocke.org/>
- Correia, E. (1975). Public certification of need for health facilities. *American Journal of Public Health, 65*(3), 254-265. doi:10.2105/AJPH.65.3.260
- Cosby, C. (2011). *Analyzing the association of Certificate of Need regulations on volume and quality indicators for heart and kidney transplantation*. (3454463 Ph.D.), Virginia Commonwealth University, Ann Arbor. Retrieved from <http://search.proquest.com/docview/870036359> ProQuest Dissertations & Theses Global database.
- Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches*. Thousand Oaks, CA: Sage Publications Ltd.
- Cutler, D. M., Huckman, R. S., & Kolstad, J. T. (2010). Input constraints and the efficiency of entry: Lessons from cardiac surgery. *American Economic Journal: Economic Policy, 2*(1), 51-76. doi:10.1257/pol.2.1.51
- Delamater, P. L., Shortridge, A. M., & Messina, J. P. (2013). Regional health care planning: a methodology to cluster facilities using community utilization patterns. *BMC Health Serv Res, 13*, 333. doi:10.1186/1472-6963-13-333

- DePalma, J. A. (2002). Reliability and validity of OASIS. *Home Health Care Management & Practice*, 241-242. doi:10.1177/108482230201400317
- DiSesa, V. J., O'Brien, S. M., Welke, K. F., Beland, S. M., Haan, C. K., Vaughan-Sarrazin, M. S., & Peterson, E. D. (2006). Contemporary Impact of State Certificate-of-Need Regulations for Cardiac Surgery. *Circulation*, 114(20), 2122-2129. doi:10.1161/CIRCULATIONAHA.105.591214
- Djankov, S., La Porta, R., Lopez-De-Silanes, F., & Shleifer, A. (2002). The regulation of entry. *Quarterly Journal of Economics*, 117(1), 1-37. doi:10.1162/003355302753399436
- Duffy, K. H. (2002). *Certificate of need and its association with quality of healthcare*. (3059434 Ph.D.), University of South Carolina, Ann Arbor. ProQuest Dissertations & Theses Global database. doi:10.1177/1077558713519167
- Dyeson, T. B. (2004). Home Health Outcomes: A Systems Perspective. *Home Health Care Management & Practice*, 16(3), 225-227. doi:10.1177/1084822303260714
- Elias, W., Ferry, R., & Treland, J. J. (2000). When world views collide: A commentary on home health care case-mix and patient outcomes. *Experimental Aging Research*, 26(3), 181-188. doi:10.1080/036107300404840
- Etzioni, A. (2009). The capture theory of regulations—Revisited. *Society*, 46(4), 319-323. doi:10.1007/s12115-009-9228-3
- Falchook, A. D., & Chen, R. C. (2015). Association between certificate of need legislation and radiation therapy use among elderly patients with early cancers.

*International Journal of Radiation Oncology*, 91(2), 448-450.

doi:10.1016/j.ijrobp.2014.10.033.

- Finn, M. J. (2007). *Health care demand in Michigan: An examination of the Michigan Certificate of Need acute care bed need methodology*: Michigan State University. Department of Geography.
- Flynn, J. B. (2001). Commentary. OASIS - The silent partner: Have we missed the point? *Home Healthcare Nurse*, 19(10), 664-664. doi:10.1097/00004045-200110000-00022
- Fortinsky, R. H., Madigan, E. A., Sheehan, T. J., Tullai-McGuinness, S., & Kleppinger, A. (2014). Risk factors for hospitalization in a national sample of medicare home health care patients. *Journal of Applied Gerontology*, 33(4), 474-493. doi:10.1177/0733464812454007
- Frankfort-Nachmias, C., & Nachmias, D. (2008). *Research methods in the social sciences (Seventh Edition)*. New York, NY: Worth Publishers.
- Gillingham, M., & Galbraith, K. (2007). The role of certificate of need legislation: a survey. *Journal of Public Budgeting, Accounting & Financial Management*(3), 372. doi:10.1108/JPBAFM-19-03-2007-B006
- Grabowski, D. C., Ohsfeldt, R. L., & Morrissey, M. A. (2003). The Effects of CON Repeal on Medicaid Nursing Home and Long-Term Care Expenditures. *The Journal of Health Care Organization, Provision, and Financing*, 40(2), 146-157. doi:10.5034/inquiryjrnl\_40.2.146

- Harrington, C., Anzaldo, S., Burdin, A., Kitchener, M., & Miller, N. (2004). Trends in state certificate of need and moratoria programs for long term care providers. *Journal Of Health & Social Policy, 19*(2), 31-58. doi:10.1300/J045v19n02\_02
- Hittle, D. F., Shaughnessy, P. W., Crisler, K. S., Powell, M. C., Richard, A. A., Conway, K. S., . . . Engle, K. (2004). A study of reliability and burden of home health assessment using OASIS. *Home Health Care Services Quarterly, 22*(4), 43-63. doi:10.1300/J027v22n04\_03
- Ho, V. (2004). Certificate of need, volume, and percutaneous transluminal coronary angioplasty outcomes. *American Heart Journal, 147*(3), 442-448. doi:10.1016/j.ahj.2003.05.002
- Ho, V. (2006). Does certificate of need affect cardiac outcomes and costs? *Int J Health Care Finance Econ, 6*(4), 300-324. doi:10.1007/s10754-007-9008-9
- Ho, V., Ku-Goto, M. H., & Jollis, J. G. (2009). Certificate of need (CON) for cardiac care: controversy over the contributions of CON. *Health Serv Res, 44*(2p1), 483-500. doi:10.1111/j.1475-6773.2008.00933.x
- Jencks, S. F., Williams, M. V., & Coleman, E. A. (2009). Rehospitalizations among patients in the Medicare fee-for-service program. *New England Journal of Medicine, 360*(14), 1418-1428. doi:10.1056/NEJMsa0803563.
- Keepnews, D., Capitman, J. A., & Rosati, R. J. (2004). Measuring Patient-Level Clinical Outcomes of Home Health Care. *Journal of Nursing Scholarship, 36*(1), 79-85. doi:10.1111/j.1547-5069.2004.04017.x

- Kinatukara, S., Rosati, R. J., & Huang, L. (2005). Assessment of OASIS reliability and validity using several methodological approaches. *Home Health Care Services Quarterly*, 24(3), 23-38. doi:10.1300/J027v24n03\_02
- Kirkner, R. M. (2016). Certificate of need: '70s remnant shows its age. *Manag Care*, 25(3), 11-12. Retrieved from <https://www.managedcaremag.com/archives/2016/3/certificate-need-70s-remnant-shows-its-age>
- Krulish, L. H. (1999). Optimizing clinical and financial outcomes in home care: A Niche program approach. *Topics in Geriatric Rehabilitation*, 14(4), 68-81. Retrieved from <https://journals.lww.com/topicsingeriatricrehabilitation/pages/articleviewer.aspx?year=1999&issue=06000&article=00006&type=abstract>
- Lanning, J. A., Morrissey, M. A., & Ohsfeldt, R. L. (1991). Endogenous hospital regulation and its effects on hospital and non-hospital expenditures. *Journal of Regulatory Economics*, 3(2), 137-154. doi:10.1007/BF00140955.
- Madigan, E. A. (2002). The scientific dimensions of OASIS for home care outcome measurement. *Home Healthcare Now*, 20(9), 579-583. doi:10.1097/00004045-200209000-00007
- Maguire, P. (2007). The future of certificate of need for home health care and hospice in Maryland. *Home Health Care Management & Practice*, 19(2), 126-128. doi:10.1177/1084822306294480

- Miller, N. A., Harrington, C., & Goldstein, E. (2002). Access to community-based long-term care: Medicaid's role. *Journal of Aging and Health, 14*(1), 138-159.  
doi:10.1177/089826430201400108
- Mitchell, M., & Koopman, C. (2014). 40 years of Certificate-of-Need laws across America. Retrieved from <http://mercatus.org/publication/40-years-certificate-of-need-laws-across-america>
- Mitchell, M. D. (2016). *Do certificate-of-need laws limit spending?* Retrieved from Mercatus Working Paper, Mercatus Center at George Mason University, Arlington, VA. Available at SSRN: <https://ssrn.com/abstract=2871325>:
- Mitchell, M. D. (2017). Certificate-of-need laws: Are they achieving their goals? : Mercatus Center. George Mason University. Retrieved from <https://www.mercatus.org/system/files/mitchell-con-qa-mop-mercatus-v2.pdf>
- Morgan, R., & Madigan, E. A. (2018). Comparing Functional Status Oasis Ratings Between Occupational Therapists, Physical Therapists, and Registered Nurses in Home Healthcare. *Home Healthcare Now, 36*(4), 247-251.  
doi:10.1097/NHH.0000000000000694
- National Conference of State Legislatures [NCSL]. (2018a). CON - Certificate of need state laws. Retrieved from <http://www.ncsl.org/research/health/con-certificate-of-need-state-laws.aspx>
- National Conference of State Legislatures [NCSL]. (2018b). CON - Certificate of need state laws. Retrieved from <http://www.ncsl.org/research/health/con-certificate-of-need-state-laws.aspx>



- O'Connor, M., & Davitt, J. K. (2012). The Outcome and Assessment Information Set (OASIS): A review of validity and reliability. *Home Health Care Services Quarterly*, 31(4), 267-301. doi:10.1080/01621424.2012.703908
- O'Connor, M. (2012). Hospitalization among Medicare-reimbursed skilled home health recipients. *Home Health Care Management & Practice*, 24(1), 27-37. doi:10.1177/1084822311419498
- Ohlhausen, M. K. (2015). Certificate of need laws: A prescription for higher costs. *Antitrust Magazine*, 30(1), 50-54. Retrieved from [https://www.ftc.gov/system/files/documents/public\\_statements/896453/1512fall15-ohlhausenc.pdf](https://www.ftc.gov/system/files/documents/public_statements/896453/1512fall15-ohlhausenc.pdf)
- Ohsfeldt, R. L., & Li, P. (2018). State entry regulation and home health agency quality ratings. *Journal of Regulatory Economics*, 53(1), 1-19. doi:10.1007/s11149-018-9351-4.
- Pigou, A. C. (1938). *The economics of welfare*: London: Macmillan & Co.
- Polsky, D., David, G., Yang, J., Kinoshian, B., & Werner, R. (2014). The effect of entry regulation in the health care sector: The case of home health. *Journal of Public Economics*, 110, 1-14. doi:10.1016/j.jpubeco.2013.11.003
- Polsky, D., David, G., Yang, J., Kinoshian, B., & Werner, R. M. (2014). The effect of entry regulation in the health care sector: the case of home health. *Journal of Public Economics*, 110, 1-14. doi:10.1016/j.jpubeco.2013.11.003
- Popescu, I., Vaughan-Sarrazin, M. S., & Rosenthal, G. E. (2006). Certificate of need regulations and use of coronary revascularization after acute myocardial

infarction. *The Journal of the American Medical Association*, 295(18), 2141-2147. doi:10.1001/jama.295.18.2141

Rahman, M., Galarraga, O., Zinn, J. S., Grabowski, D. C., & Mor, V. (2016). The impact of certificate-of-need laws on nursing home and home health care expenditures. *Medical Care Research and Review : MCRR*, 73(1), 85-105.

doi:10.1177/1077558715597161

Rivers, P. A., Fottler, M. D., & Frimpong, J. A. (2010). The effect of certificate-of-need regulation on Hospital Costs. *Journal of Health Care Finance*, 36(4), 16.

Retrieved from <https://www.ftc.gov/sites/default/files/documents/reports/effect-state-certificate-need-laws-hospital-costs-economic-policy-analysis/232120.pdf>

Rivers, P. A., Fottler, M. D., & Younis, M. Z. (2007). Does certificate of need really contain hospital costs in the United States? *Health Education Journal*, 66(3), 229-244. doi:10.1177/0017896907080127

Robinson, J. L., Nash, D. B., Moxey, E., & O'Connor, J. P. (2001). Certificate of need and the quality of cardiac surgery. *American Journal of Medical Quality*, 16(5), 155-160. doi:10.1177/106286060101600502

Rochelle, M. N. (2004). Measuring outcomes in home health care: Beyond the OASIS data set. *Home Health Care Management & Practice*, 16(3), 200.

doi:10.1177/1084822303259900

Shew, P. A., Sanders, S. L., Arthur, N. C., & Bush, K. W. (2010). OASIS inter-rater reliability and reimbursement: a study of inter-rater reliability of the Outcome and Assessment Information Set (OASIS): its effects on the Home Health Resource

Group (HHRG) and reimbursement. *Home Healthcare Now*, 28(1), 31-36.

doi:10.1097/01.NHH.0000366795.71528.ac

Shortell, S. M., & Hughes, E. F. (1988). The effects of regulation, competition, and ownership on mortality rates among hospital inpatients. *The New England Journal of Medicine*, 318(17), 1100-1107. doi:10.1056/NEJM198804283181705

Stratmann, T., & Baker, M. C. (2016). *Are certificate-of-need laws barriers to entry? How they affect access to MRI, CT, and PET scans*. Retrieved from Mercatus Center at George Mason University, Arlington, VA: Retrieved from <https://www.mercatus.org/publications/corporate-welfare/are-certificate-need-laws-barriers-entry-how-they-affect-access-mri>

Stratmann, T., & Wille, D. (2016). Certificate-of-need laws and hospital quality.

*Mercatus Working Paper*. Retrieved from

<https://www.mercatus.org/publications/corporate-welfare/certificate-need-laws-and-hospital-quality>

Tullai-McGuinness, S., Madigan, E. A., & Fortinsky, R. H. (2009). Validity testing the outcomes and assessment information set (OASIS). *Home Health Care Services Quarterly*, 28(1), 45-57. doi:10.1080/01621420802716206

US Congress. (1974). *National Health Planning and Resources Development Act of 1974*. Public Law. Retrieved from <https://www.congress.gov/bill/93rd-congress/senate-bill/2994>

Vaughan-Sarrazin, M. S., Hannan, E. L., Gormley, C. J., & Rosenthal, G. E. (2002).

Mortality in Medicare beneficiaries following coronary artery bypass graft

surgery in states with and without certificate of need regulation. *JAMA*, 288(15), 1859-1866. doi:10.1001/jama.288.15.1859

## Appendix A: Two-Letter State Abbreviations

Alabama	AL	Missouri	MO
Alaska	AK	Montana	MT
Arizona	AZ	Nebraska	NE
Arkansas	AR	Nevada	NV
California	CA	New Hampshire	NH
Colorado	CO	New Jersey	NJ
Connecticut	CT	New Mexico	NM
Delaware	DE	New York	NY
District of Columbia	DC	North Carolina	NC
Florida	FL	North Dakota	ND
Georgia	GA	Ohio	OH
Hawaii	HI	Oklahoma	OK
Idaho	ID	Oregon	OR
Illinois	IL	Pennsylvania	PA
Indiana	IN	Rhode Island	RI
Iowa	IA	South Carolina	SC
Kansas	KS	South Dakota	SD
Kentucky	KY	Tennessee	TN
Louisiana	LA	Texas	TX
Maine	ME	Utah	UT
Maryland	MD	Vermont	VT
Massachusetts	MA	Virginia	VA
Michigan	MI	Washington	WA
Minnesota	MN	West Virginia	WV
Mississippi	MS	Wisconsin	WI
		Wyoming	WY

## Appendix B: Survey Variables and Descriptions

<b>Variable</b>	<b>Description</b>	<b>Type of variable</b>	<b>Measurement scale</b>	<b>Codes</b>
<b>CONStat</b>	<b>The certificate-of-need status of the state.</b>	<b>Independent</b>	<b>Categorical variable</b>	<b>0 = Non-CON state 1 = CON state</b>
<b>PropStat</b>	<b>The proprietary status of the provider</b>	<b>Independent</b>	<b>Categorical</b>	<b>0 = Not-for-profit 1 = For profit</b>
<b>HospAdm</b>	How often home health patients had to be admitted to the hospital	<b>Dependent</b>	<b>Numerical</b>	<b>The measured percentage reported by Home Health Compare</b>
<b>ERAdm</b>	How often patients receiving home health care needed any urgent, unplanned care in the hospital emergency room - without being admitted to the hospital	<b>Dependent</b>	<b>Numerical</b>	<b>The measured percentage reported by Home Health Compare</b>
<b>ImpMed</b>	How often patients got better at taking their drugs correctly by mouth	<b>Dependent</b>	<b>Numerical</b>	<b>The measured percentage reported by Home Health Compare</b>
<b>ImpWnd</b>	How often patients' wounds improved or healed after an operation	<b>Dependent</b>	<b>Numerical</b>	<b>The measured percentage reported by Home Health Compare</b>
<b>ImpBreath</b>	How often patients' breathing improved	<b>Dependent</b>	<b>Numerical</b>	<b>The measured percentage reported by Home Health Compare</b>

<b>ImpPain</b>	How often patients had less pain when moving around	<b>Dependent</b>	<b>Numerical</b>	<b>The measured percentage reported by Home Health Compare</b>
<b>ImpBath</b>	How often patients got better at bathing	<b>Dependent</b>	<b>Numerical</b>	<b>The measured percentage reported by Home Health Compare</b>
<b>ImpIOB</b>	How often patients got better at getting in and out of bed	<b>Dependent</b>	<b>Numerical</b>	<b>The measured percentage reported by Home Health Compare</b>
<b>ImpWalk</b>	How often patients got better at walking or moving around	<b>Dependent</b>	<b>Numerical</b>	<b>The measured percentage reported by Home Health Compare</b>