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The Correlation Between Nurse Staffing and Quality of Care Outcomes Within Nursing Homes in Mississippi

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This is to certify that the doctoral study by

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Walden University
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Abstract

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MHA, Belhaven University, 2019

BSN, University of Southern Mississippi, 2014

Doctoral Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Healthcare Administration

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Abstract

The U.S. population aged 65 years old and older is steadily increasing. Some of this population resides in nursing homes; thus, the necessity for quality care provided in nursing homes has increased. Consistent, quality care remains a constant challenge for the government, nursing home administrators, health care consumers, and researchers. Nurse staffing has been identified as a critical structural measure that affects the quality of care and outcomes in nursing homes. The purpose of this quantitative study was to examine the relationship between nurse staffing and quality of care outcomes in Mississippi's nursing homes. Donabedian's structure, process, and outcome (SPO) model served as the conceptual framework for the study. Nurse staffing levels reflect the structure of nursing homes and quality measures outcomes, such as the occurrence of pressure ulcers and urinary tract infections. Secondary data from 204 Mississippi nursing homes obtained from the Medicare Nursing Home Compare data set were analyzed for this study. The linear analysis did not reveal a statistically significant relationship between quality of care and nurse staffing levels. The relationship between the prevalence of pressure ulcers and urinary tract infections and nurse staffing levels did not reveal a significant correlation. Nevertheless, nursing home administrators may utilize the results of this study to improve quality care measures in Mississippi nursing homes, which would lead to positive social change. These findings may also help inform and guide health care policymakers in Mississippi to develop and implement Medicaid and Medicare staffing support programs and regulations to improve the quality of care for this vulnerable population.

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Section 1: Foundation of the Study and Literature Review

Introduction

The U.S. geriatric population of individuals greater than 65 years of age continues to steadily increase at a rapid rate. A 2016 census report projected that by the year 2030, the number of individuals older than 65 worldwide will be approximately 1 billion (He et al., 2016). With this increase in longevity, people aged 65 and older are living various lifestyles and distinct groups, some remaining in their households, while others move to care communities. Nursing homes play a significant role in the long-term care sector, and as the population of people over the age of 65 continues to grow, the number of individuals in nursing homes will inevitably increase as well. According to Harris-Kojetin et al. (2018), the number of individuals older than 65 years old anticipated to be residing in nursing homes by 2050 is approximately 87.9 million. The number of individuals over the age of 85 is projected to be over 18.9 million in 2050 (Harris-Kojetin et al., 2018). Individuals of various ages may require long-term care services, such as nursing homes; however, older individuals are at higher risk of needing long-term care services as they continue to age (Harris-Kojetin et al., 2019). In addition to the increase in costs, there is a significant concern for the quality of care in nursing homes with this increased need and insufficient staffing (Harrington et al., 2020).

Nurse staffing in nursing homes significantly influences residents' quality of care (Cho et al., 2020). The Centers for Medicare & Medicaid Services (CMS) should implement more efficient strategies to ensure that nursing homes are operating with proper staffing levels (Bowblis & Roberts, 2020). Increased health care costs and

demands for improved quality of care provided in nursing homes are forcing nursing homes to plan for better care. Appropriate collaboration with local entities, state and federal government agencies, residents, and their families is critical to improve the quality of care in nursing homes (Office of Inspector General, 2021). In the United States, the average nurse staff hour per resident day (HPRD) is 4.11; Mississippi's average nurse staff HPRD is below the country's average (CMS, 2022c). According to Harrington et al. (2021), any number below 4.10 hours of total care staff HPRD is insufficient to ensure that residents receive the quality care needed. HPRD is calculated by dividing the nursing homes' daily staff hours by its census as the Minimum Data Set (MDS) reflects.

According to Cho et al. (2020), higher nurse staffing is significantly associated with improved resident outcomes in areas such as pressure ulcers and mortality rates. Donabedian (1988) proposed that the structure of care (e.g., staffing) may impact the processes of health care facilities (e.g., deficiencies) and the outcomes of care (e.g., pressure ulcers and urinary tract infections (UTIs)). There are contradictory findings regarding nurse staffing and efficient quality of care. While Shin (2018) and Harrington et al. (2020) found higher nurse staffing associated with better quality of care, Bachkhaus et al. (2017) noted less favorable results regarding registered nurse (RN) staffing and pressure ulcers.

The purpose of this quantitative study was to examine the relationship between nurse staffing and quality of care outcomes in Mississippi's nursing homes. Data on these measures were available in the CMS (2021) Nursing Home Compare (NHC) database.

Previous research studies offered strong evidence that a plethora of nursing homes do not provide sufficient staffing levels, especially with RNs, to meet the needs of their residents (Harrington et al., 2020). The current study's findings may provide evidence for nursing homes, administrators, and policymakers, especially in Mississippi, to ensure adequate nurse staffing is provided to protect the residents' safety, health, and well-being. According to Bowblis and Roberts (2020), nursing home providers often encounter funding constraints, such as fixed reimbursement rates from government sources, and these limited resources lead to insufficient quality of care because administrators must adjust staffing strategically to attempt to achieve the highest quality of care within a restricted cost structure. The correlation between financial constraints and quality of care in the health care industry, specifically nursing homes, remains an ongoing concern for policymakers, health care organizations, administrators, residents, and families. The results of this study may provide insight into and an understanding of the direct relationship between sufficient nurse staffing levels and quality care in Mississippi nursing homes. The results may also help Mississippi administrators make more efficient and informed decisions about implementing programs, such as Medicaid Managed Long Term Services and Supports, to increase nurse staffing and improve the quality of care.

In this section, I provide a comprehensive overview of the background of nursing homes, nurse staffing in nursing homes, and residents' quality of care outcomes. The noted gap in knowledge addressed in the study, along with its significance, are described as are the problem statement, the purpose of the study, research questions and hypotheses, conceptual framework, and the research methods used. This section also

includes a literature review on the topic, definitions related to key concepts, and an explanation of assumptions meaningful to the study. I also discuss the scope, delimitations, and potential contributions of the study before concluding with a synopsis of the major themes in the literature related to the topic.

Background

According to Miller and Hamler (2019) and Pitman and Metzger (2018), neglect and abuse have plagued nursing homes for decades, and the quality of nursing home care has been a long-standing public challenge and predominant legislative focus since the 1980s. Likewise, Harrington et al. (2020) stated that the apparent dangers of insufficient nurse staffing in U.S. nursing homes have been common knowledge since the 1980s, and the risks of understaffing in nursing homes culminated in a 2001 study of the appropriateness of minimum nurse staffing ratios published by CMS (2001).

Nursing homes are residential facilities that offer services to provide care to individuals with various impairments who require around-the-clock care. Most of the residents in nursing home settings are 65 years or older and/or experiencing a cognitive or physical disability and require assistance with their activities of daily living (ADLs). Nursing home residents are vulnerable to neglect, abuse, and exploitation due to various limitations that inhibit them from caring for themselves (Bowblis & Roberts, 2020). According to Pitman and Metzger (2018), hundreds of thousands of nursing home residents are abused or neglected each year, and a large number of these incidences go unreported. In recognition of the significant risk and an effort to address these issues with this vulnerable population and potential quality concerns, the Nursing Home Reform Act

(NHRA), also known as the Omnibus Budget Reconciliation Act of 1987, was developed. The NHRA established regulations to ensure quality of life, safety, and quality of care of grave importance for nursing home residents (Pitman & Metzger, 2018). An essential component of the law directly addressed nurse staffing.

Through NHRA, the federal government mandates nursing homes to have minimum nurse staffing level of 0.3 HPRD for licensed practical nurses (LPNs) and 0.08 for RNs (Shin & Shin, 2019). Thus, a LPN must be on duty 24 hours a day, and an RN for a minimum of 8 hours each day along with an RN director and other staff to assist the residents (Harrington et al., 2021). The NHRA lacks meticulousness regarding the number of HPRD required for each level (i.e., LPN or RN) and also lacks specificity regarding the required number of HPRD for certified nursing assistants (CNAs). Researchers have voiced concerns about the levels of nursing staffing, measured by the numbers of nursing HPRD, in relation to quality (Shin et al., 2021). According to Harrington et al. (2021), the federal staffing regulations are vague and inadequate. Although changes were made in 2016 by the Obama administration to adjust staffing to acuity needs, a minimum staffing standard was not established (Harrington et al., 2021). Consumers, legislators, and researchers continue to advocate for optimal minimum standards; thus, numerous state legislatures require higher minimum staffing levels (Brauner et al., 2018).

Another significant component of the NHRA is the unambiguous measures for quality of care. Since the passage of the NHRA in 1987, it appeared that the mandates were not being enforced, which led to additional reforms. To continue advances in the

quality of care in nursing homes, the CMS began to publicly report the quality of nursing homes in the United States through the NHC website in 2002 (Weech-Maldonado et al., 2019). On this website, the CMS reports data on staffing, quality measures, and state inspections from each Medicare/Medicaid certified nursing home to promote public awareness. The two online databases that host these data are the Certification and Survey Provider Enhanced Reports (CASPER) and the MDS 3.0. CASPER entails data related to inspection surveys, deficiencies, and staffing, while MDS provides data on residents' outcomes. The data from these sources are facility reported by the nursing home and submitted quarterly to CMS. The NHC website allows consumers to make an informed decision when choosing nursing homes by providing a five-star rating system for each nursing home based on nurse staffing, quality of care, and survey results (CMS, 2022a).

Problem Statement

Harrington et al. (2021) and Miller and Hamler (2019) agreed that despite the enactment of the NHRA in 1987 and the increase in nursing home utilization, the federal nursing home staffing standards are flawed, with quality indicators (e.g., structural, process and outcome measures) and the regulation of care practice not being updated in over 30 years and remaining relatively unchanged. Nursing home residents continue to receive poor quality of care due to insufficient nurse staffing (Harrington & Edelman, 2018).

Although staffing levels vary state by state, the majority of nursing homes in the United States do not offer sufficient nurse staffing to ensure basic quality of care; state minimum nurse staffing levels are typically significantly below the levels recommended

by experts and researchers to meet the care needs of each resident consistently and adequately (Harrington et al., 2020). Among all the states, Mississippi ranks low in nurse staffing levels and other quality of care measures, scoring a C on a scale of A to F (Families for Better Care, 2019). Out of 50 states, only 15 currently have nurse staffing regulations, and out of those 15, only one state, California, stipulates a required minimum nurse staffing level (American Nurses Association, 2019). Multiple studies have revealed that nursing homes that have adhered to regulations to have an increased number of nurses have improved their quality of care because their minimum staffing levels were directly correlated with an increase in quality of care (Harrington et al., 2020). Policymakers should cautiously contemplate mandating mandatory nurse staffing in all nursing homes (Harrington et al., 2018).

Despite the immense amount of research, effort, and initiatives aimed at improving quality of care in nursing homes, serious challenges still exist. Furthermore, the state-established staffing requirements regarding minimum HPRD for CNAs need to be more specific. The presence of poor quality of care in nursing homes when the staffing levels are low prompted this study. Mississippi consists of 204 certified Medicare and Medicaid nursing homes. According to Propublica (2021), 41 of the nursing homes in Mississippi were reported to have serious deficiencies and 162 of the nursing homes were reported to have infection-related deficiencies, with over $3 million in penalties and nine payment suspensions. The following year, in 2022, 45 of those nursing homes were reported to have serious deficiencies and 161 had infection-related deficiencies, with $4.55 million in penalties and eight payment suspensions (Propublica, 2022). Eight of the

nursing homes had a severity score L, which reflects serious quality issues. The current study may benefit nursing home administrators in Mississippi who seek to improve quality in their organizations.

According to Agency for Healthcare Research and Quality (AHRQ; n.d.), Mississippi had many quality measures categorized as "far away from benchmark." From 2013 to 2018, Mississippi ranked significantly higher for pressure ulcers in nursing home residents than other states (AHRQ, n.d.). A nonprofit advocacy group dedicated to promoting public awareness of nursing home conditions, Families for Better Care (2019) provides a report card for each nursing home, analyzing and comparing the nursing home's quality. The group obtains their data from the NHC, offices of state long-term care ombudsman complaint reports, and the Kaiser Family Foundation. Families for Better Care gave Mississippi a grade of a C in 2019, which had improved from a D since their last report card.

Nevertheless, state legislators have the autonomy to initiate staffing regulations, which necessitates state-specific examinations of the relationship between quality of care and staffing in nursing homes. There is currently a gap in knowledge regarding the correlation between the two factors in Mississippi's nursing homes. This study is the first to examine the relationship between nurse staffing levels and residents' quality care and quality of care outcomes in Mississippi. This study augments the current body of knowledge related to nurse staffing and quality of care outcomes in individual states.

Mississippi state regulations mandate a minimum nurse staffing level in nursing homes based on the ratio of 2.80 hours per resident per 24 hours (Mississippi State

Department of Health, 2019). Mississippi's nursing home staffing requirements are based on the resident census. Some facilities fail the state's mandate; however, they pass staffing requirements according to the health department. Although the nursing facilities pass this staffing requirement mandate, they still rank poorly in quality outcomes because when staffing is low, care is compromised. Since Mississippi is below the national average on several resident outcomes, there is a clear indication for improvement in the delivery of quality care in Mississippi nursing homes. The results of this study have the potential to directly inform national and state nurse staffing legislation and propel social change if the results favor higher nurse staffing levels.

Purpose of the Study

The purpose of this quantitative study was to examine the relationship between nurse staffing and quality of care outcomes in Mississippi's nursing homes. I used simple linear regression analysis to explore whether the independent variables were predictive of the dependent variables. The independent variable was nurse staffing levels, measured in terms of HPRD for RNs, LPNs, and CNAs. The dependent variables were the nursing home quality measures, specifically pressure ulcers and UTIs. Several quality measures are nurse sensitive, such as mortality, falls, pressure ulcers, infections, medication administration errors, and patient satisfaction (Oner et al., 2021); thus, nurses have a direct effect on the residents' outcomes. Nurse-sensitive measures are included on the website by the CMS to assess the quality of care in nursing homes. These nurse-sensitive measures apply to residents at high risk for pressure ulcers, UTIs, and/or those requiring help with ADLs (Oner et al., 2021). According to Oner et al. (2021), these quality

measures are reliable and valid and are fully endorsed by the National Quality Forum. This study can help administrators improve the staffing requirement and quality of care provided.

Research Questions and Hypotheses

The following research questions guided the study:

RQ1: What is the relationship between RN staffing levels (i.e., HPRD) and the occurrence of pressure ulcers in Mississippi nursing homes?

$H_0$1: There is no statistically significant relationship between RN staffing levels and the occurrence of pressure ulcers in Mississippi's nursing homes.

H_a1: There is a statistically significant relationship between RN staffing levels and the occurrence of pressure ulcers in Mississippi's nursing homes.

RQ2: What is the relationship between LPN staffing levels (i.e., HPRD) and the occurrence of pressure ulcers in Mississippi nursing homes?

$H_0$2: There is no statistically significant relationship between LPN staffing levels and the occurrence of pressure ulcers in Mississippi's nursing homes.

H_a2: There is a statistically significant relationship between LPN staffing levels and the occurrence of pressure ulcers in Mississippi's nursing homes.

RQ3: What is the relationship between CNA staffing levels (i.e., HPRD) and the occurrence of pressure ulcers in Mississippi nursing homes?

$H_0$3: There is no statistically significant relationship between CNA staffing levels and the occurrence of pressure ulcers in Mississippi's nursing homes.

H_a3: There is a statisti

cally significant relationship between CNA staffing levels and the occurrence of pressure ulcers in Mississippi's nursing homes.

RQ4: What is the relationship between RN staffing levels (i.e., HPRD) and the occurrence of urinary tract infections in Mississippi nursing homes?

$H_0$4: There is no statistically significant relationship between RN staffing levels and the occurrence of urinary tract infections in Mississippi's nursing homes.

H_a4: There is a statistically significant relationship between RN staffing levels and the occurrence of urinary tract infections in Mississippi's nursing homes.

RQ5: What is the relationship between LPN staffing levels (i.e., HPRD) and the occurrence of urinary tract infections in Mississippi nursing homes?

$H_0$5: There is no statistically significant relationship between LPN staffing levels and the occurrence of urinary tract infections in Mississippi's nursing homes.

H_a5: There is a statistically significant relationship between LPN staffing levels and the occurrence of urinary tract infections in Mississippi's nursing homes.

RQ6: What is the relationship between CNA staffing levels (i.e., HPRD) and the occurrence of urinary tract infections in Mississippi nursing homes?

H_06: There is no statistically significant relationship between CNA staffing levels and the occurrence of urinary tract infections in Mississippi's nursing homes.

H_a6: There is a statistically significant relationship between CNA staffing levels and the occurrence of urinary tract infections in Mississippi's nursing homes.

Conceptual Framework

Donabedian's structure, process, and outcome (SPO) model served as the conceptual framework for this study. According to Oner et al. (2021), numerous researchers have utilized Donabedian's SPO model to explore quality of care in the health care industry. Quality of care is classified into three categories in Donabedian's (1988) model: structure, process, and outcome.

The first of Donabedian's three elements is structure. Structure is frequently used to evaluate the setting where the care is provided, which includes both external and internal factors associated with a facility (Donabedian, 1988). More precisely, the structural characteristics of a health care organization include its physical environment

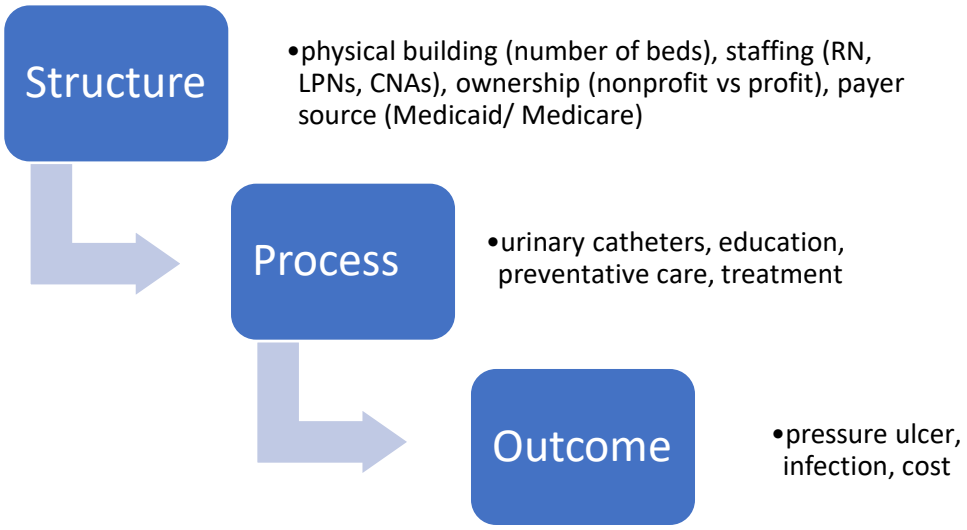
and organizational resources (e.g., HPRD, number of residents per licensed nurse, number of beds, and qualifications of nursing staff; Donabedian, 1997).

The second element, process, is used to signify the actions taken by the organization and professionals to ensure proper mechanisms to deliver efficient care (e.g., education, treatment, preventative care, and the promotion of favorable outcomes). According to Oner et al. (2021, as cited in Sidani et al., 2004), process is the interaction between staff and residents with how care is delivered within an organization. Quality care is measured by indicators of the processes the facility offers or fails to offer (Brauner et al., 2018). Health surveys are completed at least annually to examine the processes of care within nursing facilities.

Finally, the third element, outcome, is the impact of the structure and processes on the residents' health status (Donabedian, 1988). Examples of outcomes are the occurrence of pressure ulcers or the rate of infections. Outcome is considered the end result of care processes. Donabedian (1988) implied that structural characteristics affect care processes, which consequentially affect care outcomes (see Figure 1). The Donabedian model suggests that an organization that provides an adequate environment where protocols are implemented to provide safe and efficient care will result in outcomes that align with the standards of care.

Figure 1

Donabedian's Model



The SPO model is suitable to assess for quality because each element is linked to the other (Donabedian, 1997); they are interdependent (Donabedian, 1988). Thus, good structure generates good process; in turn, good processes result in desirable outcomes (Donabedian, 1997). For example, staffing could influence the processes of a health care facility (e.g., preventative measures for pressure ulcers) and the outcome of care (e.g., occurrence of pressure ulcers). The structure of a health service organization and the delivery of care processes affect the health outcomes of the residents.

Since Donabedian's (1988) SPO model elements are interconnected, it is essential that changes are made to the structure to improve the processes and outcome; nursing-sensitive indicators influence the outcomes of nursing care by shaping the structure and processes of nursing care (Oner et al., 2020). According to Donabedian, an adequate environment and care aligned with practice standards lead to desired outcomes. The

Donabedian model reflects a framework that is applicable to a plethora of situations in health care. The use of Donabedian's model as the conceptual framework for this study is consistent with nationwide approaches regarding measuring quality of care in nursing homes. Health insurance companies and state and federal agencies (e.g., CMS and American Nurses Association) utilize this approach to assess quality in health organizations. Nursing home professionals provide information to CMS regarding staffing levels, residents' health status, and the number of beds and private rooms. The quality measures computed by the CMS are nurse sensitive; thus, the outcomes are impacted by the nurses' practices (Oner et al., 2021).

The report card and audit indicated the processes and outcomes in Mississippi need improvement (Families for Better Care, 2019; Propublica, 2021). Quality is a prominent issue in health care and is defined as the extent to which health services are aligned with professional health care knowledge and increase optimal outcomes; thus, examining quality through SPO is imperative (Oner et al., 2021). Donabedian's SPO model aligned with my approach to evaluating if a relationship existed between nurse staffing HPRD (i.e., the structure) and deficiencies (i.e., the outcome) in Mississippi.

Several researchers have used this conceptual framework to study quality of care within nursing homes. The CMS (2021) requires each Medicaid and Medicare-certified nursing home to submit data regarding their organization's structure, processes, and outcomes. This model serves as a conceptual guide to those evaluating the quality of care in health care organizations across the country; therefore, it was the most applicable conceptual framework for this study.

Nature of Study

In this study, I used a quantitative cross-sectional design to examine the relationship between nurse staffing levels and quality of care outcomes in Mississippi nursing homes. Secondary data were obtained via a public database on CMS NHC website. I analyzed these data using simple linear regression. According to Frankfort-Nachmias et al. (2020), simple linear regression is appropriate to examine the relationship between two or more variables and provide insight as to whether the dependent variables can be predicted by the independent variables. Analysis with simple linear regression was essential to help determine if there was statistical significance in the relationships between the independent and dependent variables of nurse staffing levels (i.e., HPRD for RNs, LPNs, and CNAs) and pressure ulcers in RQ1–RQ3 and nurse staffing levels and UTIs in RQ4–RQ6.

Literature Search Strategy

I accessed multiple academic databases, including Google Scholar, ProQuest, Medline, CINAHL Plus, and PubMed, to search for peer-reviewed articles, books, journals, and dissertations for the literature review. The following keyword search terms were used: *quality of care, nursing home, nurse staffing, pressure ulcers, Mississippi nursing homes,* and *quality care outcomes*. I focused my search on literature published between 2017 and 2022, which yielded thousands of articles; however, some references included in the study were greater than 5 years old due to the inaccessibility of more recent information. A combined search of the terms *quality of care* and *nurse staffing* in CINAHL Plus yielded 3,785 results, and after being filtered down to more recent years,

still resulted in 1,064 articles. I found no articles specifically examining Mississippi nursing homes regarding nurse staffing and pressure ulcers or UTIs. The Mississippi data were obtained from government websites or advocacy group reports that reflected all states.

Literature Review Related to Key Variables

Nurse Staffing in Nursing Homes

Over numerous decades, there have been hundreds of nursing home nurse staffing studies nationally comparing the ratio of RNs to LPNs and CNAs in regards to outcomes, and these studies portrayed the most vital factors in resident outcomes (Shin & Shin, 2019). Federal and state regulations influence nursing homes' nurse staffing levels; however, according to Harrington and Edelman (2018), the enforcement of federal and state regulations is considered insufficient in protecting residents. The NHRA of 1987 established staffing standards for each U.S. certified Medicare and Medicaid nursing home, requiring nursing homes to have 0.30 HPRD LPN staffing and 0.08 HPRD RN staffing (Shin & Shin, 2019). In addition to federal staffing requirements, 41 states have implemented higher staffing standards (Harrington & Edelman, 2018). According to American Nurses Association (2019), 15 states have nurse staffing regulations, and only one state, California, specifies a required minimum nurse staffing level. Although the NHRA requires an RN on duty for a minimum of 8 hours a day for day shift, 7 days a week, it does not consider the facility's size or residents' acuity. According to Shin and Shin (2019), several experts have criticized the NHRA of 1987, saying that it is inadequate to meet the specific needs of residents.

Staffing is an integral quality measure utilized to profile nursing homes on the NHC website (Geng et al., 2019; U.S. Department of Health & Human Services, 2020). Although there has been a number of studies conducted on nursing home staffing and the retention of nurse staffing is critical, there has been little observed research on it according to Berridge et al. (2018, as cited by Castel et al., 2020). Subsequently, the findings of these studies have consistently reflected that higher nurse staffing levels are related to a higher quality of care (Boscart et al., 2019; Harrington & Edelman, 2018; Harrington et al., 2020; Sharma et al., 2019; Weech-Maldonado et al., 2019). There are various nursing roles, and each is essential to residents' care regarding the nurses' skills, knowledge, and education. The nursing levels consist of RNs, LPNs, and CNAs. RNs working in nursing home settings typically operate in administrative roles and have minimal direct care contact, while the LPNs and CNAs make up the bulk of the nurse staffing in nursing homes and provide most of the direct care to residents (Delgado, 2022). Nurse staffing levels have a significant impact on the delivery of care and quality outcomes; several experts have recommended a minimum staffing of 4.55 HPRD to improve quality of care (Harrington & Edelman, 2018). The higher the nurse staffing level, the better the quality outcomes and fewer violations of regulations (Harrington & Edelman, 2018; Sharma et al., 2019; Weech-Maldonado et al., 2019). Federal law warrants all nursing homes to provide sufficient staff to safely care for their residents.

RNs

Much research has been done examining the impact of RN staffing on the quality of care in nursing homes, and each study has found a positive association between RN

staffing and quality of care (Shin & Shin, 2019). A significant body of literature has suggested the importance of RN staffing as a key marker for improved quality of care (Cohen & Spector, 1996; Konetzka et al., 2008; Weech-Maldonado et al., 2004, as cited by Sharm et al., 2019). RNs typically have a bachelor's degree in nursing and are licensed by the state in which they work. Federal minimum staffing specifies that the director of nursing should be an RN and a full-time employee for 40 hours weekly, and another RN should be employed for 16 hours weekly to ensure proper coverage 7 days a week (Harrington & Edelman, 2018). Each resident must have a comprehensive resident reassessment (e.g., the MDS) completed by an RN on admission and annually or whenever there is a significant change in the residents' status (Harrington & Edelman, 2018).

According to Harrington and Edelman (2018), studies consistently found that RN and CNA staffing levels are associated with improved quality indicators. The presence of RNs improves residents' outcomes and quality of care (U.S. Department of Health & Human Services, 2020). Likewise, Weech-Maldonado et al. (2019) and Shin and Shin (2019) stated research shows a positive relationship between nurse staffing, specifically RNs, and resident outcomes in nursing homes. Other studies, such as Bostick et al., as cited in Weech-Maldonadeo et al. (2019), suggested higher total nurse staffing levels are potentially efficacious in improved quality of care.

Weech-Maldonado et al. (2019) suggested that increased RN staffing reduces costs by positively affecting resident outcomes. Although they found a positive correlation between RN staffing and resident outcomes, there were limitations to their

study. The first limitation was that the staffing data were self-reported via OSCAR/CASPER data. The study was also limited to nursing homes with Medicare residents, and the outcomes were not risk-adjusted. Contrary to the other findings, Boscart et al. (2018) found little to no association between increased RN or LPN staffing and quality of care in their study.

LPNs

Although LPNs play a critical role in providing care in nursing homes, there are no required staffing hours specified by the NHRA (Pitman & Metzger, 2018). Boscart et al. (2018) found that increased RN and LPN staffing hours resulted in decreased pressure ulcers. In contrast to RNs, LPNs typically have lower level of education (Bowblis & Ghattas, 2017). LPNs are under the supervision of RNs and provide basic needs of the residents, such as supervising CNAs and administering medication (Weech-Maldonado et al., 2019). LPNs and CNAs are less autonomous than RNs (Weech-Maldonado et al.) For several decades, literature has supported improving nurse staffing levels; however, the preponderance of prior studies is associated with positive findings between RNs and CNAs and improved quality, not necessarily LPNs (Castele, 2021).

CNAs

The NHRA does not address specifications regarding CNA staffing; nevertheless, CNAs play an integral part in nurse staffing in nursing homes, providing approximately 76.5% of the direct care in nursing homes (Boscart et al., 2018). CNAs have less education than both RNs and LPNs, but they provide direct care to the residents (Castel et al., 2020).

Inconsistencies exist among prior study findings regarding the impact that CNAs have on the quality of care; however, according to Boscart et al. (2018), increased nurse assistant hours are associated with decreased pressure ulcers, infections, physical restraint use, and ADL decline. CNA retention is a significant challenge in the nursing home setting and impacts quality (Castle et al., 2020). Nurse staffing in nursing homes is directly linked to the quality of care a resident receives (Weech-Maldonado et al., 2019). Previous study findings have been inconsistent due primarily to sample sizes, study variables, and methodology; nonetheless, researchers have concurred that further research is necessary in this area.

Nursing Home Quality Measures

Quality of care in nursing homes has been a concern for stakeholders, policymakers, and researchers for decades (Miller & Hamler, 2019; Pitman & Metzger, 2018). According to Pitman and Metzger (2018) and Shin et al. (2021), with the implementation of the NHRA of 1987, policymakers mandated minimum nurse staffing hours in nursing homes with the goal of improving the quality of care provided to the residents. Although the initiatives in the NHRA did generate change, concerns with quality of care still exist (Harrington et al., 2021; Shin, 2018).

Data shows that Mississippi has several problems regarding quality of care in nursing homes despite complying with the state's minimum nurse staffing level (CMS, 2022c). Researchers have studied topics regarding nursing homes, nurse staffing, and quality of care for several years, and while the results vary from each study and state, there is a consensus among researchers and experts that nurse staffing is associated with

quality of care (Harrington et al., 2020; Harrington et al., 2021). Although various states have been the focus of these studies, I found no studies of Mississippi nursing homes during my thorough review of the literature. Mississippi has quality measures categorized as "far away from benchmark," lower nurse staffing levels than other states, and several deficiencies (AHRQ, n.d.). Studies have shown that inadequate nurse staffing HPRD suggests potential problems in quality of care (Harrington et al., 2021).

Quality is multidimensional (Bowlis & Roberts, 2020). According to Donabedian (1988), quality is influenced by various factors that can be classified as structure, process, or outcome. The CMS established tools (i.e., the MDS 3.0) to measure the quality of care delivered in nursing homes based on residents' assessment data (Harrington et al., 2017). One method developed by the CMS is the NHC five-star rating system, which is used to determine the nurse staffing level necessary for each nursing home based on the residents' acuity (Harrington & Edelman, 2018). The data provides critical information to family members and consumers to allow for the comparison of quality of care between various nursing homes, nursing homes to improve quality care processes, and federal and state agencies to establish or amend health policies. Deficiencies reflect defects in the care processes.

The CMS measures 15 areas of quality of care specific to long-stay residents. The data are obtained by an RN during the resident's assessments. Although there are 15 quality of care measures, the only measures focused on in the current study were pressure ulcers and UTIs. These are two measures that are directly affected by staffing levels and can typically be prevented. Pressure ulcers have been an ongoing national concern for

residents of nursing homes because they are preventable and linked to the quality of care in a facility (Brauner et al., 2018). UTIs can also be reduced by decreasing the utilization of urinary catheters (Brauner et al., 2018).

Pressure Ulcers

Pressure ulcers are also known as pressure injuries. The National Pressure Ulcer Advisory Panel opted to use the term pressure injury to replace pressure ulcer; however, CMS still uses the latter term (Pitman & Metzger, 2018). According to Pitman and Metzger (2018), a pressure ulcer refers to skin integrity and is caused by unrelieved pressure on the skin or underlying soft tissue, typically over a bony prominence (e.g., heels, hip or trochanter, ischium, sacrum, buttocks). Pressure ulcers result from prolonged or intense pressure, which impairs blood and oxygen circulation to the area (Pitman & Metzger, 2018).

After a pressure ulcer is identified, it must be classified as a Stage 1–4IV wound (Pitman and Metzger, 2018). Stage 1 refers to intact skin with an area of nonblanchable redness; Stage 2 is partial-thickness loss with the dermis exposed, which typically pink or red and moist; Stage 3 is described as a full-thickness loss of skin with visible adipose and granulation tissue with rolled edges (slough and eschar may also be present); and Stage 4 is full-thickness skin and tissue loss with exposed fascia, tendon, muscle, ligament, cartilage or bone in the ulcer (Pitman & Metzger, 2018). Pressure ulcers can also be classified as deep tissue when they are purple or maroon due to the damage to underlying soft tissue.

Pressure ulcers affect 2.5 million residents annually, and approximately 60,000 residents die from the associated complications (Sethuraman et al., 2021). Pressure ulcers can be prevented in some cases, and according to Pitman and Metzger (2018), an avoidable pressure ulcer occurs when the nursing home fails to identify high-risk residents and provide necessary interventions. High-risk residents have impaired mobility, cognitive impairment, comorbid conditions, urinary incontinence, malnourishment with insufficient hydration, and a history of pressure ulcers (Pitman & Metzger, 2018). According to Sethuraman et al. (2021), the National Pressure Ulcer Advisory Panel advises performing formal risk assessments every 4 weeks and daily skin integrity checks. Prevention is critical in pressure ulcer management. Prevention strategies include monitoring the skin's condition, turning and repositioning, sufficient nutrition and hydration, positioning devices, specialty cushion or mattress, and heel boots (Pitman & Metzger, 2018). Frequent skin examinations and repositioning are the cornerstones of prevention (Sethuraman et al., 2021).

In addition to the negative impact on residents' health, pressure ulcers are incredibly costly. According to the AHRQ, as cited by Sethuraman et al. (2021), the annual expenditure on pressure ulcers is approximately $9.1 to $11.6 billion. Barry et al. (2005, as cited by Castel et at., 2020) found that high nurse staffing retention in nursing homes proved efficacious with reduced incidence of pressure ulcers. The associated cost per pressure ulcer ranges from $20,900 to $151,700 (Sethuraman et al., 2021). Thus, proper staffing and retaining employees is a more cost-effective prophylactic measure than treatment expenditures.

Urinary Tract Infections

UTIs are infections of the genitourinary tract. UTIs are the most common infection among nursing home residents and can lead to urosepsis (Pitman & Metzger, 2018). Urinary incontinence or urethral catheterization is exceptionally common in long-stay residents, which makes residents more dependent on nurse staffing for ADL assistance and perineal care. These residents are at high risk for UTIs, especially if their fluid intake is insufficient. Symptoms of a UTI consist of cloudy or foul-smelling urine, confusion, fever, lethargy, and pain with urination (Pitman & Metzger, 2018). Although UTIs are typically responsive to antibiotic treatment, if left untreated, it could result in serious health consequences such as sepsis or death. However, improper use of antibiotics can also lead to a UTI (Han et al., 2018). According to Brauncer et al. (2018), the occurrence of UTIs could be reduced by reducing the use of urinary catheters and ensuring optimal hygiene and proper use of urinary catheters. The percentage of UTIs is an essential measure under the quality measures domain and reflects the percentage of long-stay residents with a UTI within the past 30 days.

Quality Measures and Nurse Staffing

Pressure Ulcers and Nurse Staffing

A plethora of researchers have widely studied the relationship between nursing care and pressure ulcers. According to Weech-Maldonado et al. (2019), the structure of a nursing home can have a direct impact on patient outcomes; nurse staffing is an essential structural indicator of quality. There are several studies throughout the literature that have identified risk factors for pressure ulcers and preventive strategies; however, there is little

information on the occurrence of pressure ulcers and nurse-to-resident interactions in nursing homes (Sethuraman et al., 2021). Pressure ulcers obtained in nursing homes are perceived as a result of abuse or neglect (Sethuraman et al., 2021).

Although prevention is crucial, and as previously noted, frequent repositioning is the cornerstone of prevention, studies have conflicting evidence. According to Sethuraman et al. (2021), Bergstrom et al. study and Cochrane found no difference in the occurrence of pressure ulcers with repositioning high-risk residents at various set intervals of 2, 3, or 4 hours. Thus, the results of these studies imply that it is challenging to prevent pressure ulcers and is significantly influenced by the residents' underlying factors (e.g., ADL impairment or urinary and stool incontinence). Sethuraman et al. and previous research suggest multifactorial causes of pressure ulcers, including unmodifiable resident factors; thus, pressure ulcers may not reflect the care provided at nursing homes. Sethuraman et al. (2021) reasoned that the occurrence of a PU should not be utilized as the sole criteria for quality of care.

Nevertheless, the linkage between nursing care and pressure ulcers led many researchers to study the correlation between PU prevalence and HPRD of nurse staffing. Most studies found an association between higher RN staffing and reduced pressure ulcers (Shin & Shin, 2019; Weech-Maldonado et al., 2019). Nurse staffing is a vital component of quality care in nursing homes.

UTIs and Nurse Staffing

According to Harris-Kojetin et al (2019), as cited by Delgado et al. (2022), with nearly 1,347,600 nursing home residents in the United States, UTIs are the most common

diagnoses with the residents and the most common reason for antibiotic use. Two chief risk factors for UTIs are resident risk factors (e.g., age) and facility risk factors (e.g., staffing levels); other risk factors include catheterization, incontinence, inappropriate microbial use, poor hygiene, physiological changes in the urinary tract, cognitive impairment, and functional impairment (Castle et al., 2017). UTIs are a common quality outcome that can pose a severe threat to nursing home residents in which nurse staffing is critical for prevention. Though UTIs are common in nursing homes, residents are often inaccurately diagnosed and inappropriately treated with antibiotics.

Although infection control practices concern all healthcare disciplines, nurse staff have more direct contact with the residents. Nurse staff spend a substantial amount of time with residents and are often the first to recognize signs and symptoms of UTIs (Delgado et al., 2022). While RNs typically direct and are in an administrative role, CNAs are generally accountable for perineal care and managing incontinent incidents. According to Delgado et al. (2022), although prescribing is beyond their scope of practice, nurse staffing are key stakeholders as “data collectors” in identifying signs and symptoms and the need for urine collection and testing and communicating and advocating for the need or lack thereof for antibiotic therapy since the prescribers are typically offsite when determining the treatment necessary.

Research examining the correlation between nurse staffing and UTI occurrence is scarce and inconsistent. Researchers have noted an increase in RN staffing hours is associated with a decrease in resident UTIs (Brauncer et al., 2018; Castle et al., 2017; Shin, 2019). According to Delgado et al. (2022), this decrease in UTI diagnosis is related

to increased UTI surveillance tracking and fewer positive urine cultures (Mody et al., 2017). However, the correlation is weak. Castle et al. (2017) found that RN staffing level; however, higher levels of LPNs were associated with an increased probability of UTIs. Castle et al. suspected that the LPNs were substituting RNs. As cited by Delgado et al. (2022), CNAs have a significant impact on both the prevention and identification of UTIs and communicate their observations to the nurses (Trautner et al., 2017). UTIs may be reduced by increasing staffing levels (Castle et al., 2017).

Deficiencies and Nurse Staffing

According to Harrington et al. (2020), citations and deficiencies given for violations of quality regulations display clear evidence of quality issues which are often directly correlated with understaffing. Many scholars (Bowblis & Roberts, 2018; Castle et al., 2021; Gandhi et al., 2021) have examined the association between deficiency citations, often referred to as F-tags, and staffing levels as a quality measure. These findings displayed that while higher staffing produced better quality, higher registered nurse staffing levels were linked with lower deficiencies (Bowblis & Roberts, 2018; Harrington et al., 2020). Nevertheless, Castle et al. (2021) found that higher nurse aids were associated with lower deficiencies.

According to Bowblis and Roberts (2018), a deficiency citation means that a facility is not meeting federal regulatory standards; likewise, Brauner et al. (2018) stated a deficiency means a facility is out of compliance. Nursing homes are inspected for health deficiencies every 12 to 15 months, and a deficiency score is obtained based on the number and severity of deficiencies. The staffing and quality ratings are calculated

separately and can increase or decrease the overall rating (Sharma et al., 2019). CMS five-star ratings are based on three domains of quality: health inspections of deficiencies, staffing, and quality measures (Harrington & Edelman, 2018).

Quality is multidimensional; thus, deficiency citations are directly associated with other nonmedical staff (Bowblis & Roberts, 2018). According to Harrington et al. (2021), CMS "mischaracterizes" staffing deficiencies as innocuous even if the deficiency is categorized as immediate jeopardy to the nursing home residents. According to Harrington et al. (2020, 2021) and Harrington and Edelman (2018), deficiencies for insufficient staffing levels are rarely issues.

Definition of Terms

For the purpose of this study, the following operational definitions were used.

Certified Nurse Assistant: Nurse assistants that typically have less education than both RNs and LPNs; they provide approximately 76.5% of the direct care in nursing homes (Boscart et al., 2018). Independent variable.

Licensed Practical Nurse: LPNs are typically under the supervision of RNs and have a lower level of education than RNs (Bowblis & Ghattas, 2017). LPNs provide the basic needs of the residents, such as supervising the CNAs and administering medication. Independent variable.

Long-stay residents: Residents who have resided in a nursing home for 100 cumulative days or more (Brauner et al., 2018).

Nursing home: Residential facility where skilled and non-skilled nursing services are provided for individuals that require around-the-clock care (Bowlis & Roberts, 2020).

Nursing home resident: An individual who is often cognitively or physically impaired (Bowlis & Roberts, 2020) that resides in and receives services in a nursing home.

Nurse staffing level: Nurse (RN, LPN, and CNA) staffing hours per resident day (Harrington et al., 2020).

Pressure ulcers: Also known as a pressure injury; is a preventable, negative outcome (Brauner et al., 2018) that refers to skin integrity caused by unrelieved pressure on the skin or underlying soft tissue, typically over a bony prominence, classified as Stage II-IV wounds (Pitman & Metzger, 2018). Dependent variable.

Quality measures: Mechanisms for examining the quality of care processes and outcomes; based on CMS Minimum Data Set, which consists of data on inclusive resident needs assessments (Harrington et al., 2017).

Quality of care: A desirable level of care based on quality measures of the structure, processes, and outcomes of care (Oner et al., 2021). A fundamental standard that applies to all services that enable residents to achieve or maintain their optimal physical, psychosocial, and mental well-being (Pitman & Metzger, 2018).

Quality of care outcomes: A desired state or level of well-being that results from structure and care processes (Donabedian, 1988; Weech- Maldonado et al., 2019).

Registered Nurse: RNs typically have a bachelor's degree in nursing and are licensed by the state in which they work. RNs working in nursing home settings typically operate in administrative roles and have minimal direct care contact (Delgado et al., 2022). Independent variable

Urinary tract infection: An infection of the genitourinary tract (Pitman & Metzger, 2018). Dependent variable.

Assumptions

Secondary data were obtained from the NHC website for this research. According to Harrington and Edelman (2018), the data are obtained via CMS quarterly and facility-reported and documented into MDS 3.0 by the nursing home personnel. Thus, a plethora of assumptions was inherent in this research endeavor. A comprehensive resident assessment on admission, annually, or when there is a substantial change in condition should be conducted by an RN (Harrington & Edelman, 2018). Therefore, I assumed that the data obtained during the resident assessments were done precisely by qualified professionals and entered into MDS 3.0 accurately, thus correctly loaded onto the NHC website. According to Nursing Home Compare (n.d.), there is no formal process to check the data for accuracy. CMS is responsible for ensuring that the data reflected on NHC are accurate and reliable.

Other assumptions of this study include that the quality measures in MDS 3.0 and the deficiencies and staffing level data from CASPER accurately reflected the nursing homes' quality measure outcomes in Mississippi. There is a significant risk of the staff's deliberate underreporting quality indicators to CMS. During Harrington and Edelman's (2018) study, several issues were identified in the medical records that were not accurately reported on the MDS assessments. A significant assumption of the research is that facility-reported data are valid measures of the study's variables.

Scope and Delimitations

In this study, I explored relationships between nurse staffing and quality of care outcomes in Mississippi nursing homes. I focused on pressure ulcers and UTIs affecting long-stay residents as the outcome measures that were examined in this study. As noted, long-term residents are individuals that have resided in nursing homes for 100 days or longer. Long-stay residents are typically more dependent on nursing services. According to Bowlis and Roberts (2020), several long-stay residents have cognitive and physical impairments. Pressure ulcers are associated with a significant decline in residents' health and well-being. Pressure ulcers are also nurse quality indicators (Oner et al., 2021). UTIs are common amongst long-stay residents. Short-stay residents were excluded from this study.

I examined data from 204 Mississippi nursing hmes reflected on the NHC website. The NHC website comprises nursing homes with more than 30 Medicare or Medicaid-certified beds. No data were identified that listed nursing homes with 30 or fewer certified beds, so I assumed that this sample from NHC captured data from each Mississippi nursing home.

Donabedian's quality model served as the conceptual model used for this study. For decades, Donabedian's (1988, 1997) model has provided a comprehensive method for evaluating quality in health care and has been widely used by a plethora of researchers. Another delimitation is the study's one quality measure; other health outcomes were excluded from this study.

A final delimitation to this study was the focus on Mississippi, which restricts the external validity of this study. The state of Mississippi was selected because of my personal experience working in a local nursing home as a unit manager, the low nurse staffing standards, and the relatively low national average on several quality care outcomes. Since nurse staffing standards differ in each state, the study's results cannot accurately generalize to various states with vastly different staffing stands. Nonetheless, the results of this study have the probability of influencing positive social change on a state level, which is where change begins locally. This study can have some significance in states with similar staffing standards.

Limitations

This study's approach was subject to various limitations. Simple linear regression analysis was used in this study. This type of analysis looks solely at linear relationships between independent and dependent variables; this straight-line relationship assumption is sometimes incorrect. This research did not study other potentially confounding variables. According to Donabedian (1988), multitudes of factors impact health outcomes; therefore, it is impossible to conclude to what extent an outcome is attributed to a precursor of the process of care provided. A plethora of factors can affect a nursing home's quality of care outcomes (e.g., retention and turnover, assignments, nurse training, or years of experience). Although these factors influence quality measures, I did not study them.

Another limitation is the staffing data are based on CASPER data, which, as previously mentioned, are facility-disclosed and are not regularly audited; it was

measured with potential error due to the 2-week look-back period (Geng et al., 2019; Weech-Maldonado et al., 2019). Nursing homes may overreport or underreport residents' health outcomes or staffing, accidentally or intentionally (Davila et al., 2021). CMS's Star Ratings are based on quarterly averages and do not convey the extent to which staffing differs day by day (U.S. Department of Health & Human Services, 2020). Nevertheless, future studies should obtain staffing data based on more accurate data (e.g., payroll).

Finally, it is possible that the NHC ratings are not a true reflection of quality. This study is limited to certified nursing homes for Medicare, Medicaid, or both in Mississippi. Notwithstanding the limitations, this study is a vital contribution to the existing literature on the relationship between quality of care and staffing, particularly in Mississippi. There were only 204 certified nursing homes on the NHC website; thus, a relatively small sum of nursing homes was reflected in this study, which may limit the generalizability of the findings to other states. Including other states would help mitigate potential differences in results.

Significance of the Study

Quality is multidimensional (Castle & Ferguson, 2010, as cited in Bowlis & Roberts, 2020). There are various factors that play a role in quality of care, thus, quality of life with residents. According to Roberts et al. (2018), the population greater than 65 years of age is projected to grow to approximately 1 billion worldwide by 2030. Over the past decades, there have been many improvements in quality care in nursing homes; however, there is still a lot to accomplish. There is a significant need to deliver more optimal health services to this vulnerable population. Continued efforts to improve

health, safety, well-being, and quality of life in nursing home residents depend on constantly examining quality and enhancing quality of care (Brauner et al., 2018; Bowlis & Roberts, 2020). As more and more individuals require placement into nursing homes, it is essential that state and nationwide research continues to guide laws and policies that will further improve quality of care. Understanding the relationship between quality and nurse staffing is critical to improving quality and reducing associated costs (Bowlis & Roberts, 2020). This study is vital to increasing understanding of the relationship between quality and nurse staffing levels in Mississippi nursing homes.

This study can impact positive social change by offering further insight into the correlation between nurse staffing levels and quality of care in Mississippi nursing homes. The findings from this study can be utilized in future policies, laws, and decision-making related to nursing homes' nurse staffing levels. According to Harrington et al. (2020), experts continue to challenge the minimum nurse staffing levels implemented by the government, reasoning the vague standards and how the levels are insufficient to meet the needs of nursing home residents; thus, necessitating further study. This study contributes to the current literature by evaluating and examining data on a state-level that exceeds federal minimums but still is below the national average in several areas. Although this study was limited to focusing on nursing homes in Mississippi, it can have a positive social impact both at a local level and in other states with similar staffing difficulties and structural aspects. Understanding the correlation between quality and nurse staffing is essential to guide and initiate policy interventions to enhance cost-

effective quality care, thus creating a positive social change for this vulnerable population.

Summary

As the country's vulnerable population continues to increase, so will the need for quality care services within nursing homes. Due to the demographic changes in the United States and the economic associations, policymakers are adjusting how health care services are delivered. Despite the sufficient amount of work on the state and federal levels, quality of care continues to be a significant concern for researchers, government agencies, and consumers (Brauner et al., 2018; Bowblis & Roberts, 2020). Although many studies have generated contradicting results, researchers continue to find a link between the quality of care and nurse staffing levels. To improve quality of care and gain more comprehensive insight into the relationship between quality of care and nurse staffing levels, it is essential for researchers to continue to investigate the topic.

This study focused on nursing homes in the state of Mississippi. I examined the relationship between nurse staffing levels and quality of care outcomes within Mississippi nursing homes. Although Mississippi legislators have implemented nurse staffing standards that exceed the federal standards, Mississippi nursing homes still rank low in nurse staffing levels. Mississippi also ranks below the national average and several quality measures. The purpose of this cross-sectional quantitative study was to examine the relationship between nurse staffing and quality of care outcomes in Mississippi's nursing homes. Policymakers can utilize the findings of this study to develop and implement Managed Long Term Services and Supports programs and new staffing

mandates; thus, Mississippi nursing home residents can experience a better quality of care, optimal health outcomes, and improved wellbeing. In the next section, I will present a comprehensive review of literature that consists of an introduction, research design and rationale, methodology, threats to validity, and summary.

Section 2: Research Design and Data Collection

Introduction

The purpose of this quantitative cross-sectional study was to examine the relationship between nurse staffing and quality of care outcomes in Mississippi's nursing homes, using the data sets from the CMS NHC website. Mississippi nursing homes have low quality of care (AHRQ, n.d.) and relatively low nurse staffing levels (Centers for Medicare & Medicaid Services, 2022). In my review of the extant literature, I found no studies regarding the association between nurse staffing levels and quality of care in Mississippi nursing homes; therefore, this study focused on determining the relationship between nurse staffing HPRD and pressure ulcers and UTIs in Mississippi nursing facilities.

In this section, I describe various components of this study's methodology, research design, and data analysis. Section 2 also includes a discussion of the population, sampling, and threats to validity.

Research Design and Rationale

In this quantitative, retrospective study of secondary data, I used the correlational design to examine whether associations exist between independent and dependent variables. The secondary data analyzed in this study were obtained from the CMS, a federal agency, and were state-specific for Mississippi nursing homes. Secondary data are data that have been previously collected by someone other than the researcher.

In this study, the variables symbolized the fundamental concepts of Donabedian's SPO model. The independent variable represented the structural component, with nurse

staffing being measured by the adjusted RN, LPN, and CNA staffing HPRD. These metrics are captured by the CMS (2022b) utilizing data from MDS and CASPER to adjust for differences in patients' functional status, health status, and care needs. The dependent variable represented the nursing homes' outcome measures, specifically the percentage of occurrence of pressure ulcers and UTIs. The data analyzed in this study are available to the public via NHC, which the CMS developed and maintains.

Research Method

The quantitative methodology was appropriate for this study because the data are numeric (i.e., HPRD, percent of residents with pressure ulcers, and percent of residents with UTIs). A qualitative design would not have been appropriate for this study because that method cannot be used to evaluate numeric data effectively. According to Frankfort-Nachmias and Nachmias (2008), unlike the qualitative approach, the quantitative method uses quantifiable data as inputs and various data points to determine if there is a correlation between variables. The research method chosen for this study was appropriate due to the nature of the research questions and the study's objectives, which were intended to examine the statistical linear correlation between nurse staffing levels and the quality care outcomes of pressure ulcers and UTIs in Mississippi nursing homes. The quantitative approach was also applicable to this study because several other researchers have utilized this method in their studies examining the relationship between nurse staffing and quality care outcomes (e.g., Brauner et al., 2018; Davila et al., 2021).

Research Design

The quasi-experimental design was not appropriate for this study because the goal of this study was to examine the relationships between variables. Quasi-experimental designs are intended to examine causality between interference and result. Likewise, an experimental design was inappropriate because no experimental comparison was made for this study. The simple linear regression design was the most suitable choice for the design of this study because it allows researchers to examine the relationship of one variable to another variable. Simple linear regression enables researchers to predict the value of the dependent variable based on the independent variable's value (Frankfort-Nachmias & Nachmias, 2008; Laerd Statistics, 2018).

I also employed a retrospective design in this study because the data used were secondary data collected in the past. Secondary data are beneficial when time and financial limitations exist. According to Frankfort-Nachmias and Nachmias (2008), researchers use the retrospective design to conduct comparisons between and within groups. There were no time or resource constraints with this design choice since, unlike with a prospective study, the data were readily available and did not have to be collected over a period of time. This design was appropriate because it would be unethical to manipulate residents as participants or use the nursing home setting for study purposes.

A cross-sectional design was also appropriate for this study because the examined variables were based on events that occur naturally, and there was no manipulation of the variables. Several researchers have utilized the quantitative methodology and cross-sectional design to examine the correlation between nurse staffing and care outcomes

(e.g., Boscart et al., 2018; Sethuraman et al., 2019; Shin, 2019; Shin & Shin, 2019). Thus, there was precedent for both the methodology and design.

The NHC database is accessible to the public via the CMS website. The NHC data were easily accessible because they did not contain any identifiable indicators on an individual level but rather on the facility level; therefore, they allowed for resident privacy and confidentiality. Although the CMS initially created the website with the intention of providing information to health care consumers, the website is also widely used for research.

Methodology

Population

Approximately 1.4 million people reside in over 15,500 Medicaid-and Medicare-certified nursing homes across the country (CMS, 2022c). The target population in this study were 204 Medicare and Medicaid-certified nursing homes in Mississippi. The target population, study population, and study sample are similar because the sample included every certified Medicaid/Medicare nursing home in Mississippi, which is inclusive of the target population.

Sampling and Sampling Procedures

I used the NHC database on the CMS website to obtain the sample of nursing homes in Mississippi. Sampling procedures were not warranted in this study because the study sample and population are the same. The NHC database includes information for all certified Medicaid and Medicare nursing homes (e.g., bed capacity, nurse staffing, resident care outcomes). The information obtained from all 204 nursing homes reflects

the reality of the quality of care in Mississippi nursing homes. I chose this database because it is all inclusive of the necessary information, and it was easily accessed from the public website that granted permission to use the data. The CMS website also displays a memorandum explicitly granting permission to use its published data (see Appendix A).The inclusion criteria consisted of each nursing home in Mississippi reflected in the NHC. The exclusion criteria were nursing homes that did not have long-stay residents and dates outside of 2022.

Power Analysis

Power analyses are conducted to determine the smallest sample that will yield a reasonable conclusion at the statistical confidence of 95%. For this study, the study population and the target population were the same as the sample population; thus, there was adequate power. GPower can be utilized to determine the necessary sample size to perform a correlation analysis adequately (Kang, 2021). I used a medium effect size (.4), error probability of .05, and a statistical power value of .95 to calculate the sample size for a vicariate correlation. According to Kang (2021), the GPower software automatically offers Cohen's suggested conventional effect size values that are standard for scientific research. Results of the power analysis using the GPower software indicated a total number of 71 respondents were necessary for this study. There were 204 nursing homes in Mississippi on the NHC website, so the minimum sample necessary was exceeded.

Procedures for Recruitment, Participation, and Data Collection

The NHC website groups the CMS data set into yearly quarters. I acquired the sample data for this study across a span of four quarters; the data ranges from Quarter 1

of 2019 to the Quarter 4 of 2019. This year was chosen because it is the last year that the CMS data set included the quality-of-care outcomes of pressure ulcers and UTIs. The nursing homes with dates outside of this time frame and that did not include long-stay residents were excluded from the analysis. The nursing homes with insufficient data regarding the variables were also excluded from this study.

The NHC website allows users to filter data by various states and data. I used this filter function to limit the data to Mississippi nursing homes from Quarters 1–4 of 2019. After sequestrating the data, the information was downloaded to Microsoft Excel and saved. The NHC database is accessible to the public with a memorandum permitting individuals to freely utilize the data it contains, so no further permission or fees were required. I used the following steps were used to access the data: (a) typed https://www.medicare.gov/nursinghomecompare into the address bar, (b) scrolled to the bottom of the page and clicked the link "visit the data catalog on CMS.gov" to explore and download provider data, (c) scrolled down and clicked on "nursing homes including rehab services," and (d) entered "MDS quality measures" and "staffing" in the search box.

Instrumentation and Operationalization of Constructs

All U.S. certified Medicare and Medicaid nursing home data are stored on the NHC, which is updated every 9–15 months (Bowblis & Ghattas, 2017). The NHC website consists of quality measures ratings, five-star ratings, survey results, and other structural characteristics. Quality measures are reflected on the website as undesirable outcomes; hence, the lower the percentage in this section exhibits better quality. The

quality measures of concern in this study were the total percentage of nursing home residents that experienced a pressure ulcer or UTI during the analysis period. The structural feature used in this study was nurse staffing levels, which was measured in terms of HPRD for RNs, LPNs, and CNAs. According to the CMS (2022b), the quality measures conveyed on the NHC website have been extensively tested and are directly derived from the MDS 3.0 assessments. Numerous scholars have utilized NHC data sets in previous studies. Brauncer et al. (2018) concluded that the measures from the NHC website are valid and reliable; however, according to Bougnol and Dula (2021), the NHC website is multifaceted, obscure, and contains discrepancies.

Operationalization

The independent variable in this study was nurse staffing levels, which were measured in terms of HPRD for each nursing level (i.e., total hours across all nursing levels across Mississippi). Time was reflected as a percentage of hours per day per nursing level; hence, 30% for an RN would represent that an RN worked an average of .30 hours per 100 residents a day, 7 days a week. The dependent variables, the occurrence of pressure ulcers and UTIs, were also measured in percentages, reflecting the percent of residents who experienced the outcome (e.g., .15 for pressure ulcers means that 15% of nursing home residents experienced pressure ulcers during the analysis period).

Data Analysis Plan

To address the research questions, I performed simple regression analysis of the study variables to assess the relationships between nurse staffing and the outcome measures. Each of the 204 nursing facilities in Mississippi met the inclusion criteria. I

obtained the data sets from the CMS NHC website and exported the data to a Microsoft Excel document that was later uploaded to IBM Statistical Package for the Social Sciences (SPSS), Version 28 to analyze the data. Prior to the analysis, the data were assessed for missing data elements and errors utilizing the frequencies procedures. I attempted to correct missing data or data containing errors; those that could not be fixed were excluded from the analysis.

I tested the assumptions of statistical tests (i.e., linearity, homoscedasticity, and normality) and checked the reliability scales. I composed a scatterplot of the standardized predicted values and the standardized residual to assess the assumption of linearity. According to Flatt and Jacobs (2019), there is no violation of linearity if the findings of the scatterplot were not curvilinear. Heteroscedasticity was also tested utilizing a scatterplot of the standardized predicted values and residual. There is no violation in the assumption of homoscedasticity if the shape is rectangular. To test normality, a Shapiro-Wilk/Kolmogorov-Smirnov test was conducted. According to Flatt and Jacobs (2019), there is no violation in the assumption of normality if the *p* value is greater than or equal to .05.

The final phase of this process was to conduct simple linear regression analyses to answer the following six research questions:

RQ1: What is the relationship between RN staffing levels (i.e., HPRD) and the occurrence of pressure ulcers in Mississippi nursing homes?

$H_0$1: There is no statistically significant relationship between RN staffing levels (i.e., HPRD) and the occurrence of pressure ulcers in Mississippi's nursing homes.

H_a1: There is a statistically significant relationship between RN staffing levels (i.e., HPRD) and the occurrence of pressure ulcers in Mississippi's nursing homes.

RQ2: What is the relationship between LPN staffing levels (i.e., HPRD) and the occurrence of pressure ulcers in Mississippi nursing homes?

$H_0$2: There is no statistically significant relationship between LPN staffing levels (i.e., HPRD) and the occurrence of pressure ulcers in Mississippi's nursing homes.

H_a2: There is a statistically significant relationship between LPN staffing levels (i.e., HPRD) and the occurrence of pressure ulcers in Mississippi's nursing homes.

RQ3: What is the relationship between CNA staffing levels (i.e., HPRD) and the occurrence of pressure ulcers in Mississippi nursing homes?

$H_0$3: There is no statistically significant relationship between CNA staffing levels (i.e., HPRD) and the occurrence of pressure ulcers in Mississippi's nursing homes.

H_a3: There is a statistically significant relationship between CNA staffing levels (i.e., HPRD) and the occurrence of pressure ulcers in Mississippi's nursing homes.

RQ4: What is the relationship between RN staffing levels (i.e., HPRD) and the occurrence of UTIs in Mississippi nursing homes?

$H_0$4: There is no statistically significant relationship between RN staffing levels (i.e., HPRD) and the occurrence of UTIs in Mississippi's nursing homes.

H_a4: There is a statistically significant relationship between RN staffing levels (i.e., HPRD) and the occurrence of UTIs in Mississippi's nursing homes.

RQ5: What is the relationship between LPN staffing levels (i.e., HPRD) and the occurrence of UTIs in Mississippi nursing homes?

$H_0$5: There is no statistically significant relationship between LPN staffing levels (i.e., HPRD) and the occurrence of UTIs in Mississippi's nursing homes.

H_a5: There is a statistically significant relationship between LPN staffing levels (i.e., HPRD) and the occurrence of UTIs in Mississippi's nursing homes.

RQ6: What is the relationship between CNA staffing levels (i.e., HPRD) and the occurrence of UTIs in Mississippi nursing homes?

$H_0$6: There is no statistically significant relationship between CAN staffing levels (i.e., HPRD) and the occurrence of UTIs in Mississippi's nursing homes.

H_a6: There is a statistically significant relationship between CNA staffing levels (i.e., HPRD) and the occurrence of UTIs in Mississippi's nursing homes.

Simple linear regression analyses were significant if the *p* value was less than .05, indicating a predictive relationship between variables.

Threats to Validity

The term validity is defined as the extent to which an instrument measures what it is supposed to measure (Boateng et al., 2018). According to Messick, there are essentially two threats to validity: underrepresentation and irrelevant variance (Hawkins et al., 2020). The primary threat to validity in this study is the use of the NHC data set, which is self-reported by the nursing facility staff (Davila et al., 2021). Thus, the data may be deliberately or inadvertently inaccurate; for this reason, the system remains controversial regarding validity. Staffing data is integral. According to Perraillion et al. (2019), the staffing data reflected on the NHC website only incorporates the staffing count 2 weeks prior to the annual certification survey. This short time frame allows the nursing home facility to potentially increase staffing when they suspect an upcoming survey. However, a plethora of quantitative studies found that nursing homes respond to public reporting strategically (Perraillion et al., 2019).

Additionally, a significant weakness of retrospective studies is the potential for omitted or curtailed data (Talari & Goyal, 2020). Consequently, a major threat to this study is the possibility of condensed or missing data due to residents' transfers, discharges, or death. Another potential threat is the threat to external validity since this

study focused on Mississippi nursing homes only. Thus, the results are not generalized for other states. During the study, attempts were made to reduce the threats to validity and improve the reliability of results by utilizing a reliable data set, statistical testing methodology, and results interpretation.

Ethical Procedures

The data reflected on the NHC website are public information. Utilizing this secondary, facility-level data, the information reflected does not disclose the residents' privacy or confidentiality. The data obtained from the NHC website contains nonidentifiable data at the facility level instead of the resident level (Brauner et al., 2018). CMS removes data that may endanger the residents' privacy and confidentiality; therefore, protected health information, such as residents' personal information or individual outcomes, is excluded. Public data does not warrant a data use agreement or a privacy board review; nonetheless, Walden University's Institutional Review Board reviewed the dissertation proposal (Approval Number: 01-03-23-1031231).

Summary

In section 2, I discussed the quantitative research design, methodology, and threats to the validity study. This study used a quantitative, correlational design to examine the relationship between nurse staffing and quality of care outcomes in Mississippi nursing homes. The independent variable is the nurse staffing level HPRD for RN, LPN, and CNA. The dependent variables were pressure ulcers and UTIs.

The target population is Medicare or Medicaid-certified nursing homes in Mississippi between quarter 1 through quarter 4 of 2019. Strategic considerations to

ensure ethical aspects were also discussed; public files from the Nursing Home Compare datasets were utilized to obtain data. Section 2 also consisted of a discussion regarding data collection and analysis methods. Section 3 consists of the statistical results of the study.

Section 3: Presentation of the Results and Findings

Introduction

The purpose of this quantitative cross-sectional study was to examine the relationship between nurse staffing and quality of care outcomes in Mississippi's nursing homes. I used simple linear regression analyses to explore whether nurse staffing levels predicted outcome measures (i.e., PUs and UTIs). The six research questions addressed the relationship between staffing levels and outcome measures. Nurse staffing levels were the predictor variable and were measured in terms of HPRD for RNs, LPNs, and CNAs. The percentage of residents that experience pressure ulcers or UTIs were the dependent variables.

In this section, I describe the sample and provide a detailed summary of the results. This section also includes a restatement of the research questions and hypotheses and the results of detailed statistical analyses for each research question. The six research questions that guided the statistical analyses were:

RQ1: What is the relationship between RN staffing levels (i.e., HPRD) and the occurrence of pressure ulcers in Mississippi nursing homes?

$H_0$1: There is no statistically significant relationship between RN staffing levels and the occurrence of pressure ulcers in Mississippi's nursing homes.

H_a1: There is a statistically significant relationship between RN staffing levels and the occurrence of pressure ulcers in Mississippi's nursing homes.

RQ2: What is the relationship between LPN staffing levels (i.e., HPRD) and the occurrence of pressure ulcers in Mississippi nursing homes?

$H_0$2: There is no statistically significant relationship between LPN staffing levels and the occurrence of pressure ulcers in Mississippi's nursing homes.

H_a2: There is a statistically significant relationship between LPN staffing levels and the occurrence of pressure ulcers in Mississippi's nursing homes.

RQ3: What is the relationship between CNA staffing levels (i.e., HPRD) and the occurrence of pressure ulcers in Mississippi nursing homes?

$H_0$3: There is no statistically significant relationship between CNA staffing levels and the occurrence of pressure ulcers in Mississippi's nursing homes.

H_a3: There is a statistically significant relationship between CNA staffing levels and the occurrence of pressure ulcers in Mississippi's nursing homes.

RQ4: What is the relationship between RN staffing levels (i.e., HPRD) and the occurrence of UTIs in Mississippi’s nursing homes?

$H_0$4: There is no statistically significant relationship between RN staffing levels and the occurrence of UTIs in Mississippi's nursing homes.

H_a4: There is a statistically significant relationship between RN staffing levels and the occurrence of UTIs in Mississippi's nursing homes.

RQ5: What is the relationship between LPN staffing levels (i.e., HPRD) and the occurrence of UTIs in Mississippi nursing homes?

$H_0$5: There is no statistically significant relationship between LPN staffing levels and the occurrence of UTIs in Mississippi's nursing homes.

H_a5: There is a statistically significant relationship between LPN staffing levels and the occurrence of UTIs in Mississippi's nursing homes.

RQ6: What is the relationship between CNA staffing levels (i.e., HPRD) and the occurrence of UTIs in Mississippi nursing homes?

$H_0$6: There is no statistically significant relationship between CNA staffing levels and the occurrence of UTIs in Mississippi's nursing homes.

H_a6: There is a statistically significant relationship between CNA staffing levels and the occurrence of UTIs in Mississippi's nursing homes.

Data Collection of Secondary Data Set

I obtained the sample of Mississippi nursing homes from the CMS NHC (n.d.) data set. Sampling procedures were unnecessary in this study because the study population and sample were the same. I chose the NHC database because all the necessary data for this study were aggregated and displayed on the website. The inclusion criteria for the study consisted of only Mississippi nursing homes that were reflected on NHC. Nursing homes that did not have long-stay residents during the review period were excluded. The NHC website publishes all the data used to determine the star ratings within two files: *providerinfo* and *qualityMsr_* (Bougnol & Dula, 2021). These two files

contained all the data necessary for this study. The time frame to collect the data was less than 4 hours and no participant recruitment was necessary.

As discussed in Section 2, I used simple linear regression analysis to evaluate the relationship between the variables in this study. There were a few nursing homes with missing data, so the total nursing homes included in the study changed to 199. The average number of staffing HPRD for RNs, LPNs, and CNAs for each nursing home and the average percentage of residents who experienced pressure ulcers or UTIs are listed in Table 1.

Table 1

Mean Nurse Staffing Levels and Percentages of Residents who Have Experienced Pressure Ulcers or Urinary Tract Infections

	M	*SD*
Average percentage pressure ulcers	9.27	5.05
Average percentage urinary tract infections	3.06	3.05
CNA HPRD	2.38	.45
LPN HPRD	1.04	.24
RN HPRD	.62	.49

Note. CNA= certified nurse assistant, HPRD = hours per resident per day, LPN= licensed practical nurse, RN= registered nurse

Results

I entered the collected secondary data into SPSS, Version 28 and checked for missing values and errors using the frequencies procedure. There was a total of 204 nursing homes included in the data; however, five were missing data and were excluded from the analysis, so the sample size was 199.

I then examined the parametric assumptions of linearity, normality of standardized residuals, homoscedasticity, and no multicollinearity. Homoscedasticity and linearity were examined using the plot of the standardized predicted values and residuals. In the assumption of linearity, there is no violation if the plot pattern is not curvilinear. If the plot pattern exhibits a rectangular shape, then there is no violation in the assumption of homoscedasticity. I measured multiple collinearity was measured utilizing the variable inflation factor (VIF), which reflects no violation in the assumption of multicollinearity if the value is less than 10. Scatterplots of the standard residuals and the standardized projected values were generated for RNs, LPNs, CNAs, and pressure ulcers and UTIs. The results of these scatterplots indicated that there was no violation of linearity since none of the plots were curvilinear. There was also no violation of homoscedasticity because the plots were comparatively rectangular in shape. The test of normality of the standardized residuals for the RN, LPN, and CNA and pressure ulcers and UTIs revealed that each of the histograms had relatively normal distributions.

To address the first research question, I conducted a simple linear regression analysis. RN staffing HPRD was entered as the predictor variable, and the average percentage of residents experiencing pressure ulcers was the outcome variable. The results of the regression revealed that the findings were not statistically significant (p = 0.34). Thus, I failed to reject the null hypothesis. Table 2 contains information about how well the variables are correlated. An R value of 0.07 indicates a low degree of correlation between RN HPRD and pressure ulcers, and the R^2 value of .005 indicates that less than 1% of the variance in the percentage of residents experiencing a pressure ulcer can be explained by RN HPRD (see Table 2).

Table 2

Model Summary Table: Average Number of Pressure Ulcers Acquired on RN Staffing HPRD

Model	*R*	*R* Square	Adjusted *R* Square	Std. Error of the Estimate
1	.070	.005	.000	4.970723996

[a.] Predictors: (Constant), RN HPRD.
[b.] Dependent variable: PU.

As seen Table 3, the regression model did not statistically significantly predict the outcome variable (p = 0.336), as indicated by a p value greater than 0.05. This means that the model was not a good fit for the data (see Table 3).

Table 3

ANOVA Table: Average Number of Pressure Ulcers Acquired on RN Staffing HPRD

Model	Sum of Squares	*df*	Mean Square	*F*	Sig.
1 Regression	22.98	1	22.98	.93	.34

Residual	4,719.25	191	24.71	
Total	4,742.23	192		

[a.] Dependent Variable: PU
[b.] Predictors: (Constant), RN HPRD

As shown in Table 4, the *p* value was 0.336, indicating that RN HPRD was not a statistically significant predictor of the percentage of patients having pressure ulcers. Therefore, I failed to reject the null hypothesis.

Table 4

Coefficients Table: Average Number of Pressure Ulcers Acquired on RN Staffing HPRD

	Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for *B*	
Model	*B*	Std. Error	Beta	*t*	Sig.	Lower Bound	Upper Bound
1 (Constant)	10.19	1.04		9.78	<.001	8.13	12.25
RN HPRD	-1.68	1.74	-.07	-.96	.36	-5.10	1.75

[a.] Dependent variable: PU.

For RQ2, I entered the average percentage of residents experiencing pressure ulcers as the outcome variable and LPN staffing HPRD as the predictor variable. The results of the regression revealed that the findings were not statistically significant. Thus, I failed to reject the null hypothesis. Table 5 reflects how well the variables are correlated. An *R* value of 0.05 indicates a low degree of correlation between LPN Staffing HPRD and pressure ulcers, and the R^2 value of .002 indicates that less than 1%

of the variance in the percentage of residents experiencing a pressure ulcer can be explained by LPN HPRD (see Table 5).

Table 5

Model Summary Table: Average Number of Pressure Ulcers Acquired on LPN Staffing HPRD

Model	*R*	*R* Square	Adjusted *R* Square	Std. Error of the Estimate
1	.049[a]	.00	-.00	4.98

[a.] Predictors: (Constant), LPN HPRD.
[b.] Dependent variable: PU.

As noted in Table 6, the regression model did not statistically significantly predict the outcome variable ($p = 0.499$), as indicated by a p value greater than 0.05. Thus, the model was not a good fit for the data (see Table 6).

Table 6

ANOVA Table: Average Number of Pressure Ulcers Acquired on LPN HPRD

Model	Sum of Squares	*df*	Mean Square	*F*	Sig.
1 Regression	11.35	1	11.35	.46	.50
Residual	4,730.88	191	24.77		
Total	4,742.23	192			

[a.] Dependent variable: PU.
[b.] Predictors: (Constant), LPN HPRD.

As displayed in Table 7, the p value was .049, indicating that LPN HPRD was not a statistically significant predictor of residents acquiring pressure ulcers. Therefore, I failed to reject the null hypothesis.

Table 7

Coefficient Table: Average Number of Pressure Ulcers Acquired on LPN HPRD

Model	Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for *B*	
	B	Std. Error	Beta	*t*	Sig.	Lower Bound	Upper Bound
1(Constant)	10.37	1.70		6.12	<.001	7.02	13.72
LPN HPRD	-1.08	1.60	-.049	-.68	.50	-4.24	2.07

[a.] Dependent variable: PU.

For RQ3, CNA staffing HPRD was the predictor variable, and the average percentage of residents experiencing pressure ulcers was the dependent variable. The results of the regression revealed that the findings were not statistically significant. Therefore, the I failed to reject the null hypothesis. Table 8 contains information about how well the variables are correlated. The *R* value of 0.06 indicates a low degree of correlation between CNA HPRD and pressure ulcers. The R^2 value of .004 indicates that less than 1% of the variance in the percentage of residents acquiring pressure ulcers can be explained by CNA HPRD (see Table 8).

Table 8

Model Summary Table: Average Number of Pressure Ulcers Acquired on CNA HPRD

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.063[a]	.00	-.00	4.97

[a.] Predictors: (Constant), CNA HPRD.
[b.] Dependent variable: PU.

Table 9 shows the regression model did not statistically significantly predict the outcome variable ($p = 0.385$), as indicated by a p value greater than 0.05. This indicates that the model was not a good fit for the data.

Table 9

ANOVA Table: Average Number of Pressure Ulcers Acquired on CNA HPRD

Model	Sum of Squares	*df*	Mean Square	*F*	Sig.
1 Regression	18.78	1	18.79	.76	.39[b]
Residual	4723.44	191	24.73		
Total	4742.23	192			

[a.] Dependent variable: PU.
[b.] Predictors: (Constant), CNA HPRD.

As shown in Table 10, the p value is 0.385, indicating that CNA HPRD was not a statistically significant predictor of the percentage of residents acquiring pressure ulcers. Consequently, the null hypothesis was not rejected.

Table 10

Coefficients Table: Average Number of Pressure Ulcers Acquired on CNA HPRD

	Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for *B*	
Model	*B*	Std. Error	Beta	*t*	Sig.	Lower Bound	Upper Bound
1 (Constant)	11.06	2.12		5.24	<.001	6.90	15.22
CNA HPRD	-.76	.87	-.06	-.87	.39	-2.48	.96

[a.] Dependent variable: PU.

Simple linear regression was used to address the fourth research question. RN staffing HPRD was entered as the predictor variable, and the average percentage of residents experiencing UTIs was the outcome variable. The results of the regression revealed that the findings were not statistically significant. Thus, I failed to reject the null hypothesis was retained. Table 11 contains information regarding how well the variables are correlated. The *R* value of 0.13 indicates a low degree of correlation between RN HPRD and UTIs. An R^2 value of 0.02 indicates that less than 1% of the variance in the percentage of residents acquiring UTIs can be explained by RN HPRD.

Table 11

Model Summary Table: Average Number of Urinary Tract Infections Acquired on RN HPRD

Model	*R*	*R* Square	Adjusted *R* Square	Std. Error of the Estimate
1	.13	.02	.01	2.97

[a.] Predictors: (Constant), RN HPRD.

[b.] Dependent variable: UTI.

As noted in Table 12, the regression model did not statistically significantly predict the outcome variable ($p = 0.07$), as indicated by a *p*-value greater than 0.05. This finding means that the model was not a good fit for the data.

Table 12

ANOVA Table: Average Number of Urinary Tract Infections Acquired on RN Staffing HPRD

Model	Sum of Squares	*df*	Mean Square	*F*	Sig.
1 Regression	28.55	1	28.55	3.24	.074[b]
Residual	1702.22	193	8.82		
Total	1730.77	194			

[a.] Dependent Variable: UTI
[b.] Predictors: (Constant), RN HPRD

As seen in the Coefficient Table, the *p*-value was 0.07, indicating RN HPRD was not a statistically significant predictor of the percentage of residents acquiring UTIs. Therefore, I failed to reject the null hypothesis was retained (Table 13).

Table 13

Coefficient Table: Average Number of Urinary Tract Infections Acquired on RN Staffing HPRD

	Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for *B*	
Model	*B*	Std. Error	Beta	*t*	Sig.	Lower Bound	Upper Bound

1 (Constant)	1.95	.62		3.14	.00	.73	3.18
RN HPRD	1.86	1.04	.13	1.80	.07	-.18	3.90

[a.] Dependent Variable: UTI

For the fifth research question, LPN staffing hours per resident reflected the predictor variable, and the average percentage of residents experiencing UTIs was the outcome variable. Results of the regression indicated that the findings were not statistically significant. Thus, I failed to reject the null hypothesis was retained. The model summary shown in Table 14 reflects how well the variables correlated. The *R* value of 0.07 indicates a low degree of correlation between LPN HRPD and UTIs. The R^2 value of 0.004 indicates that less than 1% of the variance in the percentage of residents experiencing UTIs can be explained by LPN HPRD.

Table 14

Model Summary Table: Average Number of Urinary Tract Infections Acquired on LPN Staffing HPRD

Model	*R*	*R* Square	Adjusted *R* Square	Std. Error of the Estimate
1	.07[a]	.00	-.00	2.99

[a.] Predictors: (Constant), LPN HPRD.
[b.] Dependent variable: UTI.

As seen in Table 15, the regression model did not statistically significantly predict the outcome variable ($p = 0.363$), as indicated by a *p*-value greater than 0.05. This means that the model was not a good fit for the data (Table 15).

Table 15

ANOVA Table: Average Number of Urinary Tract Infections Acquired on LPN Staffing HPRD

Model	Sum of Squares	*df*	Mean Square	*F*	Sig.
1 Regression	7.42	1	7.42	.83	.36[b]
Residual	1723.35	193	8.93		
Total	1730.77	194			

[a.] Dependent variable: UTI.
[b.] Predictors: (Constant), LPN HPRD.

As shown in the Table 16, the *p* -value of 0.363 indicates that LPN HPRD was not a statistically significant predictor of the percentage of residents acquiring UTIs. For that reason, I failed to reject the null hypothesis was retained.

Table 16

Coefficient Table: Average Number of Urinary Tract Infections Acquired on LPN HPRD

	Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for *B*	
Model	*B*	Std. Error	Beta	*t*	Sig.	Lower Bound	Upper Bound
1 (Constant)	2.12	.99		2.15	.03	.17	4.08
LPN HPRD	.84	.93	.07	.91	.36	-.98	2.67

[a.] Dependent variable: UTI.

For RQ6, CNA is depicted as the predictor variable, and the average percentage of residents experiencing UTIs was the outcome variable. The results of the regression indicated that the findings were not statistically significant. Thus, I failed to reject the

null hypothesis was retained. Table 17 shows information about how well the variables are correlated. The *R* value of 0.211 indicates a degree of correlation between CNA HPRD and UTIs. An R^2 value of 0.045 indicates that less than 1% of the variance in the percentage of residents acquiring UTIs can be explained by CNA HPRD (Table 17).

Table 17

Model Summary Table: Average Number of Urinary Tract Infections Acquired on CNA Staffing HPRD

Model	*R*	*R* Square	Adjusted *R* Square	Std. Error of the Estimate
1	.21[a]	.05	.04	2.93

[a.] Predictors: (Constant), CNA HPRD.
[b.] Dependent variable: UTI.

As seen in Table 18, the regression model did statistically significantly predict the outcome variable ($p = 0.003$), as indicated by a *p* -value less than 0.05. This finding shows evidence against the null hypothesis, the null hypothesis was rejected (Table 18).

Table 18

ANOVA Table: Average Number of Urinary Tract Infections Acquired on CNA Staffing HPRD

Model	Sum of Squares	*df*	Mean Square	*F*	Sig.
1 Regression	77.04	1	77.04	8.99	.00[b]
Residual	1653.73	193	8.57		
Total	1730.77	194			

[a.] Dependent variable: UTI.
[b]. Predictors: (Constant), CNA HPRD.

As shown in Table 19, the *p* -value was 0.003, indicating that CNA HPRD was not a statistically significant predictor of the percentage of UTIs acquired. Thus, I failed to reject the null hypothesis.

Table 19

Coefficient Table: Average Number of Urinary Tract Infections Acquired on CNA Staffing HPRD

	Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for *B*	
Model	*B*	Std. Error	Beta	*t*	Sig.	Lower Bound	Upper Bound
1 (Constant)	-.65	1.24		-.52	.60	-3.08	1.79
CNA HPRD	1.53	.51	.21	2.99	.00	.52	2.53

[a.] Dependent variable: UTI.

Summary

The purpose of this cross-sectional quantitative study was to examine the predictive relationship between nurse staffing and quality of care outcomes in Mississippi's nursing homes. In this section, the results of the statistical analysis were presented. There was a total of 199 Mississippi nursing homes included in this analysis. There were six research questions addressed in this study. A cross-sectional design was used, and the reason why this design was chosen was explained. The relationships between nurse staffing and outcome measures were tested, and the findings of each research question were also described in this section.

The first, second, and third research questions asked *what was the relationship between nurse staffing levels*, as measured by hours per resident day of registered nurses, licensed practical nurses, and certified nursing assistants and the occurrence of pressure ulcers in Mississippi nursing homes. The results indicated that there was no significant relationship between the staffing hours of RNs, LPNs, or CNAs and the percentage of residents experiencing pressure ulcers. Thus, the null hypothesis was not rejected.

Research questions four through six asked *what was the relationship between nurse staffing levels*, as measured by hours per resident per day of registered nurses, licensed practical nurses, and certified nursing assistants and the occurrence of UTIs in Mississippi nursing homes. The results indicated that there was no significant relationship between the percentage of residents experiencing UTIs and the staffing hours of RNs, LPNs, and CNAs. Thus, the null hypothesis for each research question was not rejected.

In the following section, the study's findings will be discussed, analyzed, and interpreted based on Donabedian's SPO model. The limitation of this study is also discussed. Additionally, recommendations for future research and the impact on positive social change will be described.

Section 4: Application to Professional Practice and Implications for Social Change

Introduction

The purpose of this quantitative cross-sectional study was to examine the relationship between nurse staffing and quality of care outcomes in Mississippi's nursing homes. I used simple linear regression analyses to investigate whether there was a predictive relationship between the variable of nurse staffing levels, measured by HPRD of RNs, LPNs, and CNAs, and the outcome measures of the percentages of residents with pressure ulcers or UTIs. This study was conducted to add to the current scholarly knowledge on nurse staffing and quality of care in U.S. nursing homes.

It was imperative to conduct this study to address the quality of care in nursing homes in Mississippi because quality of care within nursing homes continues to be a significant concern to consumers, nursing home administrators, government agencies, and researchers (see Bowblis & Roberts, 2020; Brauner et al., 2018). Numerous researchers have conducted studies around the United States aimed at understanding and improving the quality of care delivered in nursing homes. Although their results have been inconsistent, each study adds to literature and the overall understanding of improved quality of care in nursing homes. In this study, I focused exclusively on Mississippi nursing homes. Although Mississippi was noted to be below standards, no other studies were identified focusing on the relationship between nursing staffing levels and quality of care in Mississippi nursing homes. The results the current study increase the knowledge of the relationship between nurse staffing levels and quality of care in Mississippi nursing

facilities. This study has the potential to influence cost-efficient quality care and create positive social change for this vulnerable population.

The main findings of this study, as detailed in Section 3, indicated that there are no statistically significant relationships between nurse staffing levels and quality care outcomes represented in this study. In this section, I offer an interpretation of the findings and present the study's limitations. This section also consists of my recommendations for future studies and a discussion of the implications of this study for positive social change.

Interpretation of the Findings

Literature on the relationship between nurse staffing and quality of care in nursing homes is generally inconsistent. The results of the current study confirm the findings of some previous studies (i.e., Backhaus et al., 2017; Boscart et al., 2018) while invalidating the findings of other studies (i.e., Brauncer et al., 2018; Castle et al., 2017; Cho et al., 2020; Harrington et al., 2020; Oner et al., 2020; Shin et al., 2018). In the following subsections, I provide an overview of the similarities and dissimilarities of findings in this study.

Nurse Staffing and Pressure Ulcers

The findings of this study revealed there was no statistically significant relationship between nurse staffing (of RNs, LPNs, and CNAs) and the incidence of pressure ulcers in Mississippi nursing homes. The results of this study do not support the findings of Cho et al. (2020) that an increased number of RNs is significantly associated with reduced pressure ulcers. Boscart et al. (2018) also found no statistically significant association between quality-of-care outcomes, such as reduced pressure ulcers, and LPNs

or RNs, which was supported by the results of this study. Likewise, Backhaus et al. (2017) reported no significance among the incidence of pressure ulcers and RNs.

Nurse Staffing and UTIs

The findings of this study revealed there was no statistically significant relationship between nurse staffing (of RNs, LPNs, and CNAs) and the occurrence of UTIs in Mississippi nursing homes. The results of this study do not support the findings of Shin et al. (2018), Castle et al. (2017), Brauncer et al. (2018), or Harrington et al. (2020) who reported that increased nurse staffing levels were associated with improved quality-of-care outcomes, such as reduced UTIs. Although they found no statistically significant association between quality-of-care outcomes, such as reduced UTIs, and increased RNs or LPNs, Boscart et al. (2018) found the association between increased nurse assistants and quality-of-care outcomes, reduced UTIs, statistically significant. Oner et al. (2020) reported an increase in the number of RNs HPRD is associated with a decrease in the UTI rate, which was not supported by the findings in the current study. Shin (2019) found that having a nurse as a director for greater than 1 year related adversely to the occurrence of UTIs.

Donabedian's Quality Model

Donabedian's (1988) SPO quality model was the conceptual framework that guided this study. This model incorporates three interrelated scopes of quality: structure, process, and outcome. In this study, I specifically examined two parts of the model: nurse staffing levels as the structure and pressure ulcers and UTIs as the outcomes. Donabedian reasoned that each of these scopes influenced the other; nevertheless, the results of this

study did not support Donabedian's model since the structure component reflected in the study was not found to be correlated with the outcome.

Limitations of the Study

I identified a few limitations in this study. The research design presented limitations. The cross-sectional design chosen posed a limitation on the data collection to a specific point in time instead of over a more extended period. The data examined for this study consisted of a review period ranging from the first quarter of 2010 through the fourth quarter of 2019. Thus, the results of this study cannot be generalized for any other time period separate from those dates.

Furthermore, the results are not generalizable to other populations in U.S. nursing homes. Since this study was focused solely on Mississippi nursing homes, the results are not generalizable to other states.

Another major limitation was that I do not know the accuracy of the secondary data used in this study. The data were obtained from an electronic database on the CMS website. The data reflected were self-reported from the facilities. Although each nursing facility has routine onsite surveys, there is no current system in place to consistently monitor the accuracy of the data reflected (NHC, n.d.).

The final limitation identified was the use of simple linear regression without controlling for other potentially confounding variables. For example, if I controlled for nursing home size or the average resident's age, the results might have changed.

Recommendations

Nursing home quality of care remains a controversial topic in literature because researchers have achieved mixed results when studying it. The current study results indicated that there was no relationship between the independent variable of nurse staffing levels and outcome variables of pressure ulcers and UTIs. However, a key limitation of this study was the use of a simple linear regression. Use of the cross-sectional research design links results to a precise point in time, limiting results to a relatively small sample from a constantly evolving nursing home industry. This study focused on four quarters (i.e., a 1-year sample of time) of Mississippi nursing home data. Future researchers may use a longitudinal design to extend the review period. A longitudinal analysis may also more precisely depict the statistical significance of relationships between the study's variables over time.

Another major limitation of this study was the use of secondary data. Future researchers may utilize a mixed-methods approach of both quantitative and qualitative data to enhance results. Future researchers could combine direct observation in nursing homes with the information reflected on the NHC website.

Implications for Professional Practice and Social Change

Although the study results revealed that there were no relationships between nurse staffing levels and the quality care outcomes of pressure ulcers and UTIs, there is still much to be considered. While related studies have reported varying results regarding the correlation between nurse staffing and quality of care, a plethora of research evidence has

associated poor quality of care with nurse staffing levels. Due to these conflicting results, further research is warranted using various study designs.

This study adds to the existing literature and offers grounds for expanding and improving future research. The current study findings also influence positive social change. Results that are not statistically significant affect positive social change by acting as building blocks and being used as a foundation for nursing home administrators, policymakers, and future researchers interested in studying similar topics related to nursing home quality of care. This study may improve quality care and cost-effectiveness in nursing home facilities and consequently create a positive social change for this vulnerable population.

Conclusion

In this study, I examined the relationship between nurse staffing levels (of RNs, LPNs, and CNAs) and quality care outcomes (i.e., pressure ulcers and UTIs) in Mississippi nursing homes. A quantitative cross-sectional design was used to analyze the relationship between variables. The analysis assessed 1 year of data from Quarters 1–4 of 2019. No statistically significant relationships were found between the predictor variables and dependent variables.

Nursing home residents are generally 65 years or older, experiencing cognitive or physical disability, and requiring assistance with their ADLs. This population is extremely vulnerable due to their ailments and dependence on nursing home staff for toileting, eating, dressing, and mobility. Thus, sufficient nurse staffing and quality care in this setting is essential, and improving and understanding sufficient nurse staffing and

quality care in nursing homes has remained a constant challenge over numerous decades for nursing home administrators, the government, and researchers. Although regulations for nurse staffing in nursing homes have been implemented, further improvement is warranted.

This study was essential because it focused solely on 199 Medicare or Medicaid-certified Mississippi nursing homes. In comparison to other states, Mississippi has lower staffing standards and ranks low in numerous quality care outcomes measures. Although researchers have explored similar variables, I found no extant studies focusing solely on this topic in Mississippi. Therefore, despite the nonsignificant relationship found between the variables, this study offered insight for future studies.

As the population continues to grow and experience various ailments, more individuals aged 65 and older will need the around-the-clock services that nursing homes offer. Consequently, it is essential that studies designed to improve the quality of care in nursing home settings continue to be conducted. This study provided awareness of issues in Mississippi nursing homes and a foundation along with recommendations for enhancing further studies. The findings of this study could increase the quality of care for nursing home residents in Mississippi by increasing the nurse staffing levels.

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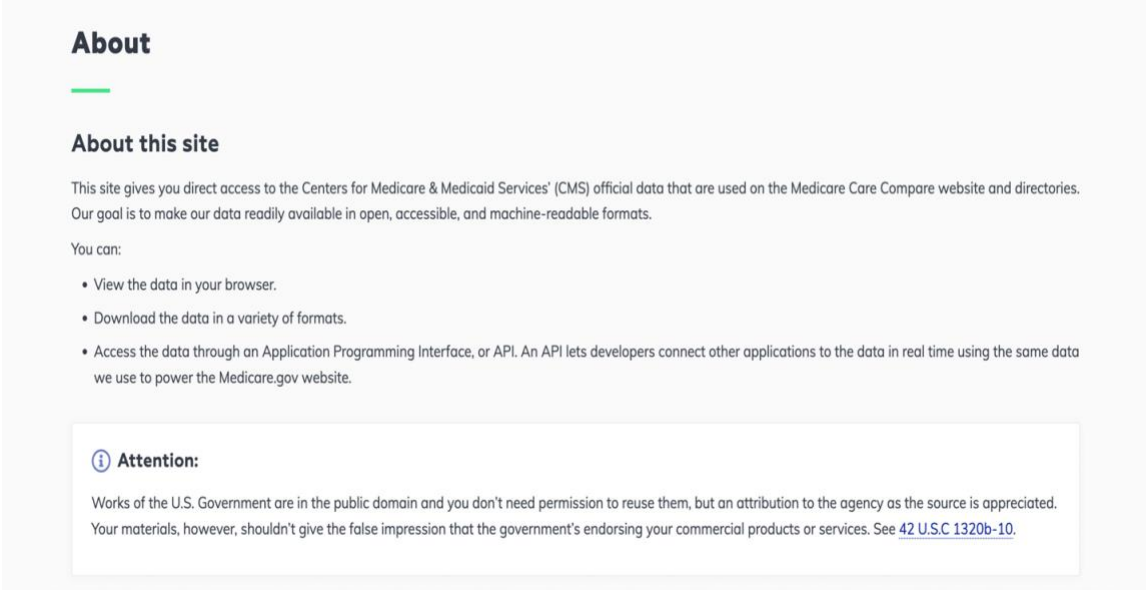
Appendix: CMS Statement/Permission for the Use of Data



About

About this site

This site gives you direct access to the Centers for Medicare & Medicaid Services' (CMS) official data that are used on the Medicare Care Compare website and directories. Our goal is to make our data readily available in open, accessible, and machine-readable formats.

You can:

- View the data in your browser.
- Download the data in a variety of formats.
- Access the data through an Application Programming Interface, or API. An API lets developers connect other applications to the data in real time using the same data we use to power the Medicare.gov website.

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