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The Relationship Between the Acute Care for Elders Unit in a Mississippi Critical Access Hospital, and Length of Stay, and Readmission Rates

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This is to certify that the doctoral study by

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has been found to be complete and satisfactory in all respects,
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Abstract

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DNP, Walden University, 2019

MSN, University of Missouri, 2011

BSN, University of Missouri, 2006

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Doctoral Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Healthcare Administration

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Abstract

Hospitals with high readmission rates face financial penalties due to the Medicare Hospital Readmissions Reduction Program (HRRP). The purpose of this quantitative, retrospective, quasi-experimental study was to determine the relationship between pre- and post-implementation of an Acute Care for Elders (ACE) Unit in a critical access hospital (CAH) and length of stay (LOS) and readmission rates within 30 days. The theoretical framework used for this study was Donabedian's theory of evaluating the quality of medical care delivered. Donabedian's theory of quality care delivery is composed of three elements, structure, process, and outcome. For the purpose of this study, structure consists of the CAH, the process is represented by the implementation of the ACE unit, and the outcomes are the LOS and readmission rates within 30 days. The relationship between pre- and post-implementation of ACE unit in a CAH and LOS with controls for age and gender was analyzed using a multiple linear regression, which showed a statistically significant difference between pre- and post-implementation groups and LOS ($p < .001$). The study revealed that the implementation of the ACE unit decreased LOS by 0.48 days (B = -0.48, 95% CI [-0.76, -0.21]). The relationship between pre- and post-implementation of ACE unit in a CAH and readmission rates within 30 days with controls for age and gender was analyzed using a binomial logistic regression with findings that showed no statistically significant difference between the pre- and post-implementation groups ($p = .166$). This study has the potential to contribute to positive social change by adding to the existing body of knowledge regarding ACE units and patient outcomes.

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Dedication

This work is dedicated to my family for their unconditional love, to my husband who supported me through the entire process, and to my son, Brennen, who never stopped believing in me and the knowledge that comes from research.

Acknowledgments

I would like to acknowledge and give my sincere thanks to my committee chairperson, Dr. Donna Clews, who guided and supported me through this process. I know that without her, this truly would not have been possible. I would also like to thank my committee member, Dr. Michael Furukawa, for his direction and feedback.

Table of Contents

List of Tables

List of Figures

Section 1: Foundation of the Study and Literature Review

Introduction

Hospitals with high readmission rates face financial penalties due to the Medicare Hospital Readmissions Reduction Program (HRRP; Shashikumar et al., 2022). The changes made by HRRP impact hospitals in rural communities that care for vulnerable populations with poor access to healthcare resulting from social injustices related to race, ethnicity, socioeconomic status, and age (Gai & Pachamanova, 2019). Congress has acknowledged the financial challenges critical access hospitals (CAHs) face with a limited volume of patients in the inpatient settings by allocating payment adjustments in an attempt to maintain emergency access in rural areas (Iglehart, 2018). Unfortunately, more than one third of rural hospitals in Mississippi are at risk of closing due to financial crisis even with the adjusted reimbursements (Cross, 2023). Healthcare organizations are attempting to address these issues by decreasing the length of stay (LOS) and readmission rates. Acute Care for Elders (ACE) units have been shown to decrease the LOS and readmission rates within 30 days (Surkan & Gibson, 2018). Although the literature reveals that ACE units have been successful in addressing these issues (Brennan et al., 2019; Lynch et al, 2023; Norman & Sinha, 2022), there was a gap in knowledge regarding the impact that ACE units in CAHs have on LOS and readmission rates within 30 days. Determining the effect of ACE units in CAHs on LOS and readmission rates within 30 days is critical based on the influence these factors have on healthcare costs and reimbursements. CAHs face unique financial issues due to fewer inpatient admissions, declining reimbursements, and increased healthcare costs. Addressing this

gap in knowledge will provide a better understanding of the potential impact that ACE units in CAHs have on LOS and readmission rates within 30 days, which is known to impact healthcare costs and reimbursements. With the known unique financial issues faced by CAHs and the looming risk of closures of rural hospitals in Mississippi, this study has the potential to contribute to positive social change by adding to the existing body of knowledge regarding ACE units and patient outcomes.

In Section 1, the background information will provide a brief summary of the research related to CAHs, the ACE unit care model, and the financial impact on LOS and readmission rates related to the scope of this study. The problem statement and purpose of the study will build upon previous research and describe the intent of this study to address the research questions and hypothesis. The theoretical framework will be introduced and an explanation of how it relates to this study. The nature of the study will provide a summary of the key variables and methodology. After presenting this information, I will provide an extensive literature review, along with the definitions, assumptions, scope and delimitations, limitations, and the significance of the study with the protentional contributions that will build on the current body of knowledge.

Background

As a result of the HRRP, hospitals with higher-than-average readmission rates will face a reduction in reimbursement payments on all of their Medicate admission (Shashikumar et al., 2022). Although older adults aged 65 and older made up only 15% of the population in 2016, this age group accounted for over 50% of the hospital stays and over 43% of the healthcare expenditures (Mitchell, 2019). The healthcare utilization

rate by the elderly consumer is expected to continue to increase with the aging population of baby boomers and the increase in complex comorbidities (Fulmer et al., 2021; McDermott et al., 2017). It is projected that, by 2030, all baby boomers will be over the age of 65 and outnumber the number of children under the age of 5 for the first time in American history (Vespa et al., 2018). This disproportionate representation of population-to-consumer utilization of healthcare resources is feared to be a threat to both the Centers for Medicare and Medicaid Services (CMS) and the U.S. healthcare system if changes cannot be made in the hospital environment to consistently deliver evidenced-based medicine to elders with complex multiple chronic comorbidities, which was made evident by the COVID-19 pandemic (Fulmer et al., 2021; McDermott et al., 2017). There is an increased LOS and increased readmission rates in the acute inpatient setting within the population of adults aged 65 and older in rural and critical access hospitals (Loccoh et al., 2022). Increased LOS and readmission rates decrease access to care and pose a barrier to healthcare for Mississippians living in poverty-stricken rural areas (Collen et al., 2019).

If the solution to the access to care and utilization were simple, hospitals would create more hospital beds and hire additional staff. Unfortunately, the solution is not that straightforward since it is not a basic mathematical challenge. Hospitals are faced with reduced reimbursement due to LOS and readmission rates. Therefore, hospitals must become creative in finding ways to reduce these two elements and decrease the financial strains faced by CAHs. The care provided by vulnerable populations must be specialized to meet the needs of that population. For example, over 71% of older adults are

diagnosed with multimorbidity (i.e., two or more chronic conditions) and account for 96% of the Medicare budget (Maciejewski & Hammill, 2019). A report published by the Institutes of Medicine concluded that the current healthcare system is not equipped to provide consistent quality care to elderly patients with complex multimorbidities (McDermott et al., 2017). The report recommended that hospitals adjust to the ever-growing population of elders by adapting assessment models and individualized care plans to the geriatric population while at the same time containing cost through monitoring utilization (McDermott et al., 2017).

In an attempt to counteract the deficits found in caring for older adults, many hospitals have created interdisciplinary team models, such as an ACE unit, that are patient-centered and account for the patient's functional, cognitive, and psychosocial condition and goals (Barnes et al., 2012). Patients cared for in ACE units have been shown to have decreased LOS and decreased readmission rates (Surkan & Gibson, 2018).

Research studies completed in large academic hospitals found that the implementation of ACE units improved outcomes such as LOS, readmission rates within 30 days, healthcare costs, hospital-related injuries, and mortality (Abdalla et al., 2018; Brennan, et al., 2019; Flood et al., 2013; Lynch et al., 2023; Norman & Sinha, 2022; Rogers et al., 2021). Although the current research has shown that specialized care provided by ACE units in large academic hospitals improve outcomes, there is no literature on the impact that specialized care provided in ACE units in CAHs has on the length of hospital stay and readmission rates within 30 days. This study addressed the

problem of determining whether the specialized care received by patients in ACE units in CAHs impacts the LOS and readmission rates within 30 days.

Problem Statement

Readmission rates within 30 days represent a significant issue among older adults due to health outcomes and financial concerns. Readmission rates within 30 days are often used as a clinical indicator of the quality of hospital care that is received by patients. With the financial penalties due to the HRRP, healthcare organizations face two critical challenges: the control of healthcare costs and the efficiency of care (Shashikumar et al., 2022). Healthcare organizations are attempting to address the cost and efficiency of healthcare by decreasing the LOS and readmission rates (Ayabakan et al., 2021).

Advances in the treatment of chronic diseases have led to an increase in life expectancy (World Health Organization, 2023). This advancement translates into an increase in the population of older adults with multiple comorbidities. The healthcare utilization rate by older adults is expected to continue to rise (McDermott et al., 2017). The current healthcare system is not prepared to provide the quality of care needed by elderly patients with complex chronic diseases (McDermott et al., 2017). Hospitals must adapt to addressing the complex factors involved in the aging process, socioeconomic status, and access to care within rural communities by providing specialized care to older adults (McDermott et al., 2017).

The current model of care provided by most healthcare organizations has been found to be lacking in the care provided to older adults (Heydari et al., 2019). The current models of healthcare have been shown to be inadequate in overcoming obstacles to care

due to inappropriate care environments, lack of adequate resources, lack of knowledge and skills in caring for older patients, and an absence of a specialized model of care delivery (Heydari et al., 2019).

Purpose of the Study

The purpose of this quantitative, retrospective, quasi-experimental study was to determine the relationship between pre- and post-implementation of an ACE unit in a CAH and LOS and readmission rates within 30 days. The ACE model of care was developed to provide specialized care to older adults to decrease the risk of functional debility that occurs during hospitalization (Palmer, 2018). Although ACE units have been shown to decrease the LOS and readmission rates in urban hospitals, there was no research that analyzed the impact that ACE Units in CAHs had on LOS and readmission rates within 30 days.

Research Questions and Hypotheses

RQ1: What is the relationship between pre- and post-implementation of ACE unit in a CAH and LOS with controls for age and gender?

H_o1: There is no statistically significant relationship between pre- and post-implementation of an ACE unit in a CAH and LOS with controls for age and gender.

H_a1: There is a statistically significant relationship between pre- and post-implementation of an ACE unit in a CAH and LOS with controls for age and gender.

RQ2: What is the relationship between pre- and post-implementation of ACE unit in a CAH and readmission rates within 30 days with controls for age and gender?

H_o2: There is no statistically significant relationship between pre- and post-implementation of an ACE unit in a CAH and readmission rates within 30 days with controls for age and gender.

H_a2: There is a statistically significant relationship between pre- and post-implementation of an ACE unit in a CAH and readmission rates within 30 days with controls for age and gender.

Theoretical Framework

Donabedian was a physician and faculty member at the University of Michigan, who published "Evaluating the Quality of Medical Care" (Donabedian, 1966). Donabedian (1988) further investigated his conceptual works through the comprehensive approach of utilizing a structure, process, outcome methodology for assessing clinical quality, which acknowledged the equal importance of evaluating multiple components within the care delivery model for establishing and evaluating the quality of patient care delivery model. For the purpose of this study, the structure is the CAH, the process is represented by the implementation of the ACE unit, and the outcomes are the LOS and readmission rates.

Nature of the Study

A quantitative, retrospective, quasi-experimental research design utilized secondary data collected from the ACE unit and compiled by the Patient Outcomes and Healthcare Quality Department. The ACE unit was implemented in January 2019. The secondary data were collected from the inpatient unit from January 2018 through December 2019. The pre-implementation of the ACE unit data were collected for the

timeframe 1 year prior to the opening of the ACE unit, or January 2018 through December 2018. The post-implementation of the ACE unit data were collected from January 2019 through December 2019, which was the first year of the ACE unit's opening. This research compares the means of both LOS and readmission rates within 30 days pre- and post-implementation of the ACE unit.

A multiple linear regression and binomial logistic regression were used for the analyses of the research questions. A multiple linear regression is a statistical model that predicts the linear relationship and outcome of the dependent variable given two or more independent variables. Using a multiple linear regression allowed for the identification of relationships between the independent variable (the ACE unit implementation) and dependent variable (LOS), while controlling for age and gender (Estrada et al., 2019; Frankfort-Nachmias et al., 2020). A binomial logistic regression was used to prediction readmission rates within 30 days, while also controlling for the confounding factors of age and gender as control variables. The two cohorts for the regression analyses were the pre-implementation group from 1 year prior to the opening of the ACE unit, and the post-implementation group from the first year the ACE unit's opening.

Literature Search Strategy

Although researchers had completed investigations and found that specialized care provided by ACE units had been shown to decrease the LOS and readmission rates, there was no literature on the impact that specialized care provided in ACE units in CAHs had on the length of hospital stay and readmission rates within 30 days. This research study intended to demonstrate whether a clinically significant relationship

existed between the specialized care provided in ACE units in CAHs and the impact on LOS and readmission rates within 30 days. Strategies used to conduct the literature review included searching historical and recently published scholarly articles in online peer-reviewed journals, government journals, PubMed/Medline, CINHAL, RefWorks, Web of Science, Up to Date, Google Scholar, AHRQ, a Sage full-text database, Medline Plus databases, and statistics obtained from the CMS. The scope of the literature review aimed at literature published from 2017 to the present. Due to the limited information available, research articles greater than 5 years old that were deemed relevant to the foundation of the research were included in the literature review. The foundation for this research study was based on the Donabedian's quality framework, which is well-known for assessing the quality of care. The Boolean string search terms used to obtain relevant literature included acute care of the elders unit AND length of stay, ACE unit AND geriatric patients, geriatric patients AND length of stay, adults aged 65 plus AND length of stay, ACE unit AND readmission rate, ACE unit AND critical access hospital.

Literature Review Related to Key Variables and/or Concepts

This literature review focused on research studies that evaluated the LOS and readmission rates within 30 days for patients who were admitted to ACE units while addressing the literature gap that focused on LOS and readmission rates within 30 days in CAHs. This literature review also investigated CAHs' LOS and readmission rates within 30 days. This study aimed to bridge the gap in the literature through a quantitative study focusing on LOS and readmission rates within 30 days by patients admitted to ACE units

at a CAH. As hospitals aim to reduce readmission rates and LOS due to financial implications, the results of this study may be of interest to other CAHs.

With financial penalties being implemented against hospitals with high readmission rates, efforts have intensified to find ways to reduce LOS and readmissions (Kripalani et al., 2014; Mose & Kumar, 2020). Several interventions have shown improvement in LOS or readmission rates, with the most promising involving multiple components that address patient-centered care, polypharmacy, patient education, and discharge planning (Chakraborty et al., 2021; Kripalani et al., 2014). Kripalani et al. (2014) found that single-component interventions were less successful in reducing readmissions. Chakraborty et al. (2021) found that single-component interventions were also not as successful in reducing LOS.

In an effort to incentivize providers and hospitals to implement programs that would reduce healthcare costs, value-based purchasing programs were put into place. Value-based care ties the amount of reimbursement for healthcare providers to the quality of care given to the patients (CMS, 2023). The Hospital Quality Initiative was implemented to improve the quality of care provided by hospitals by evaluating hospital performance in areas such as quality, equity, and cost of care (CMS, 2023). A variety of incentives, both financial and non-financial, were put into place to hold providers and organizations accountable for the delivery of quality care that improves patient outcomes while reducing healthcare costs (CMS, 2023). The CMS use quality measures such as emergency room use, readmission rates, preventable complications, and LOS to examine patient outcomes and healthcare organizations' performance trends (CMS, 2023).

Unfortunately, recent evidence suggests that this has resulted in disproportionate financial burdens for providers in rural areas that care for vulnerable populations with reduced access to care, such as those patients who are treated in CAHs (Chatterjee & Werner, 2019).

Critical Access Hospitals

CAHs are located in rural areas where the patients tend to be older, have lower socioeconomic status, are underinsured, and have more comorbidities (Bai et al., 2020). Due to the lack of access to care in rural areas, residents are often diagnosed at a later stage of an illness or disease, impacting patient outcomes and healthcare costs (Cyr et al., 2019). Research shows that CAHs are essential in providing emergency care to rural areas and an efficient way to provide healthcare to rural communities (Bai et al., 2020). But with over 400 rural hospitals closing in the 1980s and 1990s, over 150 closing between 2005 and 2019, and 12 closing in 2020, CAHs are facing double financial concerns of declining reimbursements and rising costs compared to non-CAHs, which has made it even more crucial for CAHs to provide efficient care, promote financial savings, and develop strategies based on the unique strengths of the CAHs in the rural communities (Pai et al., 2023).

For example, Malik et al. (2021) completed a retrospective comparative study using the 2005 to 2014 Medicare 100% Standard Analytical files to compare 90-day complications, readmissions, mortality, and Medicare payments between patients undergoing surgery for hip fractures in United States CAHs and those undergoing surgery at non-CAHs. The study included 1,467,482 patients with hip fractures and 29,058 of

those patients were undergoing surgery in a CAH between the years of 2005 to 2014. The researchers gathered the data using a search for ICD 9 diagnosis codes. The data were analyzed using a multivariate logistic regression analysis to determine the differences between the cohorts for 90-day complications, readmissions, and mortality. The researchers also used a generalized linear regression model to assess the 90-day Medicare reimbursements for patients that received surgery in a CAH based on differences in demographics, such as age and gender, and hospital demographics. Malik et al. (2019) found that the patients undergoing surgery at CAHs were less likely to experience serious side effects ($p < .001$), which decreased LOS. The researchers also found that CAH hospitals had better patient outcomes even though Medicare reimbursements were less than for patients who received surgery in non-CAHs. The researchers noted the limitations of the study included the possibility of billing and coding errors and administrative claims of clinically significant diagnoses. Although the propensity score method was used in an attempt to produce two comparable study groups, the authors noted that unmeasured variables may have impacted the outcomes. Even with these limitations, the researchers concluded CAHs provide high-value care to rural communities, which should be considered by policymakers in regard to funding CAHs.

Baernholdt et al. (2023) completed a cross-sectional study using data collected from the National Database of Nursing Quality Indicator to compare quality indicators of 103 CAHs, 63 rural hospitals, and 91 urban hospitals in the United States. The researchers included CAHs, rural and urban hospitals with 50 beds or less. The researchers looked at 16 total indicators, six indicators were related to patient outcomes

and included total fall rates, injury fall rates, pressure injuries, hospital acquired infections, missed care, and quality of care, which are known to effect LOS. Baernholdt et al. analyzed the differences between groups using a bias corrected bootstrapped confidence intervals (95%) to compare the differences between CAHs and other hospitals. The researchers found that there were no differences between 15 of the 16 quality indicators between the CAHs and other hospitals. The researchers concluded that quality indicators that are currently being used nationwide in 2,000 hospitals are also applicable for benchmarking CAHs. This study shows that the care received in CAHs would be comparable to urban hospitals within their capabilities. The authors noted several limitations. The data were collected from a convenience sample from one database and the data were not adjusted for acuity or patient characteristics. Even with the limitations, the researchers concluded that the quality indicators selected worked well for the evaluation of CAHs and other hospitals and added to the base of knowledge to guide process improvements and future policies.

Chatterjee et al. (2021) completed a linear regression analysis using data from the Healthcare Provider Cost Reporting Information System from the CMS from 2011-2018. The researchers collected data from 1,158 CAHs in the United States (648 in Medicaid expansion states and 510 in non-expansion states) to examine two questions in an effort to provide a better understanding as to whether the Medicaid expansion was associated with an improvement in patient outcomes. The first question was to examine the characteristics of CAHs in states that expanded Medicaid compared to those states that did not expand Medicaid. The second question was to determine the relationship between

Medicaid expansion and changes in CAHs' finances, staffing ratios, and quality of care. The researchers found that the CAHs were similar in characteristics based on the number of inpatient Medicaid admission days and were located in areas that had higher-than-average unemployment rates. The CAHs that were located in Medicaid expansion states differed in characteristics from non-expansion states as those hospitals were mostly located in the West, were not government owned, and were less often located in large rural towns. The researchers completed a linear regression with the results revealing that Medicaid expansion did not show a statistically significant difference in characteristics such as finances ($p < .017$), staffing ($p < .008$), or patient outcomes ($p < .004$) based on Medicaid expansion. The authors did note that the data may have been biased as many CAHs in non-expansion states had closed and were, therefore, excluded from the study. Based on the study, it was also argued that CAHs must find new strategies to overcome the challenges faced by CAHs with these underserved communities facing a population that has limited socioeconomic resources, a growing burden of comorbidities, and limited access to care. It was concluded that Medicaid expansion alone would not be enough to improve patient outcomes and ensure the financial stability of CAHs. The researchers noted several limitations. The data were limited to only quality factors that were reported to the Healthcare Provider Cost Reporting Information System from the CMS. Therefore, the authors were unable to account for patient characteristics or demographics that may have impacted the quality factors based on expansion versus non expansion states. There was no data available to determine whether all employees at each CAH had been trained in the same manner and able to provide the same level of care. Also, only three quality

factors were examined, and the researchers were unable to identify whether CAHs in expansion states had invested resources to improve patient care in other ways. Regardless of the limitations, the others noted that the quality measures that were evaluated are the most measured and reported by CAHs and are considered patient centered and relevant to patient outcomes. The authors also argued that the outcomes of this research leaned towards current reflections that CAHs must become creative in the use of new care models to improve patient care. It was also stated that the findings of this study may influence policies in the future.

Tanumihardjo et al. (2023) completed a process improvement cohort study at an Idaho CAH evaluating the association of a new care model and improved hemoglobin A1c levels in the less than well-controlled diabetic patient population from 2017 to 2021. The sample size included 1,764 patients with diabetes with a mean age of 68.3 years and the majority of the sample population, 98.2%, identifying as white. The sample population was 56.5% men and 53.9% identified their insurance as Medicare. The intervention included the development of a population health team (PHT) that assessed the medical, behavioral, and social needs of the study participants. Based on the assessment, the PHT provided education, chronic diabetes care management, behavioral health services, nutritional services, and community care services information. The participants were divided into three groups based on the number of PHT encounters: no encounters, one encounter, and two or more encounters. The researchers performed chi-square tests to compare characteristics such as sex, race, comorbidities, at-risk conditions, and social needs among the groups and Kruskal Wallis test was used to compare the age

of the participants. The researchers also performed linear mixed models to identify a time trend effect. The researchers found that the PHT model was associated with improvement in hemoglobin A1c levels and had sustained results for up to 36 months ($p < .05$). The researchers reported that the findings of the study validated the need for CAHs to develop creative strategies in the delivery of healthcare in rural communities. It was also noted that funding for the implementation of the PHT was from blended funding sources due to the limited resources of the CAH and future policies should be implemented to incentivize the transformation care models needed to meet the socioeconomic and medical needs of vulnerable populations with limited access to care in rural communities. The authors did note limitations to the study of difficulty in accounting for the impact of COVID-19 and the referral process, noting that the referral process to PHT was not regulated and were risk-based referrals based on the nurses' assessments of comorbidities and social needs. The study was limited to one CAH and was comprised of a majority of white male participants. Nonetheless, the authors stated that the study reinforced the current base of knowledge that there is a new for CAHs to develop innovative strategies and care models that serve the unique needs of the community.

Acute Care of Elders Units

CAHs have faced financial challenges, creating the need for new strategies to improve the efficiency in the utilization of resources. CAHs search for ways to reduce the financial burden. One promising strategy has been the exploration of the ACE unit care model. The ACE unit team model focuses on the identification and management of geriatric syndromes, frequent interdisciplinary team rounds that are focused on patient-

centered care, discharge planning or care transition planning that begins on admission, open communication of the team recommendations to the patient and caregiver, and usually a more home-like environment with modifications for safe mobility and cognitive stimulation (Barnes et al., 2012).

Several studies have demonstrated the financial benefits of implementing ACE units in hospitals. A retrospective cohort study completed by Flood et al. (2013) compared variable direct costs of an ACE unit compared with a multidisciplinary usual care (UC) unit. The study took place at the University of Alabama hospital, which is a 1,146-bed academic medical center. The study included 818 patients (428 ACE unit and 390 UC unit) aged 70 years and older admitted in 2010. The researchers used t-tests with bootstrap resampling to test means of LOS and readmission rates. Generalized linear models were used to analyze the adjusted cost ratios. The study revealed a significant reduction in direct cost and reduced readmission rate within 30 days (7.9% vs. 12.8%, p = .02) for older adult patients admitted to the inpatient ACE unit versus the UC unit. It was also found to have a decrease in hospital-acquired injuries, which is known to contribute to increased LOS and reduced readmission rates. The authors noted that one limitation of the study was that due to the hospital being an academic medical center, beds were not able to be held in the ACE unit for a randomized control study. Therefore, this study was not considered a randomized controlled trial, and bed availability was determined by patient assignment to the ACE or UC units. The authors argued that this study reinforced earlier research by demonstrating that ACE units can significantly reduce healthcare costs, LOS, and readmission rates. It was also concluded that reducing the 30-day

readmission rate also lowered the risk of reduced reimbursement through the Medicare program.

Brennan et al. (2019) conducted a cross-sectional quality improvement study to further investigate the differences in the hospital-level outcomes between the ACE unit and routine care unit patients. The study took place in a 716-bed academic hospital in Springfield, Massachusetts, from 2014-2017. The sample population consisted of 1,429 ACE and 10,159 non-ACE patients aged 70 years and above. The researchers used a quantile regression to analyze the total LOS, while 30-day readmission was estimated using a generalized estimating equation model. The researchers noted that the ACE unit patients had higher comorbidity rates and higher rates of acuity based on diagnosis of dementia, anemia, hypertension, and pulmonary disease. The researchers evaluated the total cost (direct and indirect), LOS, and 30-day readmission rates. The researchers found that ACE unit patients had lower costs associated with care, ranging from $171 to $3,687, and a lower LOS. Their findings indicated that the most significant cost savings were among the higher acuity patients with greater comorbidities scores. The authors noted that the study began as an observation study that evolved over time to determine future research needs and, therefore, many factors that may have an effect on LOS and readmission may not have been collected during the admission. However, the researchers stated that the study demonstrated that ACE units are an effective team model for discharge planning with a significant impact on LOS and healthcare costs.

Adding to these findings, Norman and Sinha (2022) conducted a retrospective cohort study at Mount Sinai Hospital in Toronto, Canada, that analyzed 3,046 ACE-

designated patient admissions (1,499 ACE unit and 1,547 bed-spaced) in regard to LOS, discharge outcome, and death. ACE-designated patient admissions were categorized by those patients admitted to the ACE unit and those that were bed-spaced to other units based on capacity while having met admission criteria to the ACE. Both the ACE unit admission group and bed-spaced admission group were equally comprised of 39.3% of men and 60.7% of women. An ACE protocol order set was implemented to provide several services that were offered based on the ACE unit model of care to determine if the care provided would be equally effective when applied in a non-ACE unit setting. Retrospective data spanned from 2013-2018. The researchers used paired *t* tests to analyze the data and found that patients admitted to a dedicated ACE unit were more likely to be discharged home ($p = .003$) and were also less likely to die during the admission ($p = .02$) in comparison to bed-spaced patients that used an ACE order set. The researchers concluded that care provided in the ACE unit had a greater impact on patient outcomes and LOS than care provided in the general medical unit with an ACE order set. The researchers noted that the study taking place in only one facility may have limited the study since the results may differ in other facilities. The data set was also dependent on administrative data, with the researchers stating that future research should be completed in a randomized, prospective cohort study for confirmation. This research was considered significant as it implied that even with the same order set, the specialized training received by the ACE unit staff impacted the care that was given to the patients and, ultimately, patient outcomes and LOS.

In a national context, Rogers et al. (2022) completed a cross-sectional study to determine the number of ACE units within the United States that adhered to the five key components (environment, patient-centered care, interdisciplinary team discharge planning, and medical care review) of the care provided on ACE units. The researchers identified 2,055 hospitals within the United States by using the Definitive Healthcare Database. A study-specific survey was developed and sent to the 2,055 hospitals, with only forty-three hospitals that responded having ACE units within the organization. Descriptive statistics were used to summarize the quantitative data from the surveys, while essay questions were analyzed by the researchers to identify and categorize the data using open coding. All respondents reported variable levels of compliance with the key protocols set forth for the standard of care in ACE units, with all reporting following the five key elements to some degree. The researchers identified that future research was needed to determine if adherence to the five key elements at any level impacted patient outcomes and LOS. The researchers noted several limitations to the study that included the limited number of responses, with only 56% of the hospitals contracted responding to the questionnaire, the timing of the study being conducted in 2020 during the COVID-19 pandemic, and the study not placing a requirement on who was required to complete the questionnaire. The researchers argued that contacting every hospital in the United States gave strength to the study and found it interesting that the number of ACE units was low based on the documented positive impact that ACE units are known to have on patient outcomes. The researchers stated that this study was significant since it was the first

study completed to assess the prevalence of ACE units within the United States while noting that 63% of ACE units are located in academic settings.

Patient falls pose a challenge for hospitals due to poor patient outcomes, increased LOS, increased costs, and even death (Najafpour et al., 2019). Abdalla et al. (2018) completed a nonconcurrent prospective study on patient falls at a community-based teaching hospital from 2013-2015. There were 7,069 admissions, which corresponded to 28,401 patient days, with 149 falls reported. The researchers used the zero-inflated Poisson model to control for confounders in the analysis. An incidence rate ratio of 0.18 (95% CI [0.09, 0.37]; $p < .001$) was found for patient falls in the ACE unit compared to non-ACE unit patients, which correlated to an 82% fall reduction for all ACE unit patients. When the data were categorized by age, it was determined that there was a 73% reduction in falls within the adult population of patients aged 65 and older cared for in ACE units compared to those cared for in regular inpatient units. The researchers noted that one of the study limitations was the limited study size and the fact that the ACE unit had only been established three months prior to the start of the study. The researchers also had to rely on administrative data that was only retrievable if the nurse had entered an adverse event notification when a fall had occurred. Even with the limited sample size, the researchers found that specialized care may reduce the risk of hospital-related injuries, which may impact the LOS and patient outcomes. The researchers also found that the use of psychotropic medications and high patient-to-nurse ratios seemed to impact patient falls, which are addressed by the ACE unit's key components.

With the knowledge that ACE units are well known to reduce hospital-associated injuries, LOS, and readmission, Lynch et al. (2023) measured the impact of the implementation and sustainability of an ACE unit care model in an academic hospital at the University of North Carolina. Quality metrics of readmission rates, mortality rates, LOS index, hospital-acquired infections, and pressure injuries were followed over a 6-year time period from 2018 through 2023. The mean age of patients was 81.3 years with 62% female, 78% White, 18% Black, and 34.7% of the cohort having a diagnosis of dementia. Prior to the 2018 when the ACE unit was implemented, the annual 30-day readmission rate average was 19%. Following the implementation of the ACE unit, the yearly 30-day readmission rate fluctuated between 13.6% and 9.3%. There was a dramatic decline in all areas, with the exception of LOS from 2021 through 2023, which was attributed to the COVID-19 pandemic. Overall, the researchers concluded that the ACE unit care model had a positive impact on all of the quality metrics and was sustainable. The authors also agreed that the ACE unit care model was underutilized nationwide.

Readmission Rates

High admission rates within the first 30 days of hospital discharge are often associated with suboptimal care, lack of care transitions, and inadequate interprofessional collaboration among healthcare teams (Sheikh et al., 2018). Lower readmission rates have been associated with improved patient outcomes, which reinforces the notion that reducing readmissions is associated with quality healthcare (Pugh et al., 2021). High readmission rates create significant financial challenges for healthcare organizations.

Hospitals are not only impacted by the additional costs associated with follow-up care and treatments for readmitted patients but also face potential penalties imposed by private and government insurance, especially under value-based reimbursement models (Kocakulah et al., 2021).

As a strategy to reduce avoidable readmissions and promote healthcare quality, the HRRP was enacted as part of the Affordable Care Act in 2010 (U.S. Department of Health and Human Services, 2020). This pivotal policy initiative imposed financial penalties on hospitals with readmission rates that were higher than expected for certain conditions, such as heart failure (HF), pneumonia (PN), stroke, and acute myocardial infarction (AMI; Kocakulah et al., 2021). The implementation of HRRP served as a catalyst for the improvement in quality care initiatives and incentivized hospitals to improve the quality of care through the enhancement of interprofessional collaboration and care transitions (Khera & Krumholz, 2018). Research on the effectiveness of HRRP initiatives has yielded mixed results. Although there are studies that suggest a reduction in targeted readmission rates, concerns have been raised about unintended consequences that have impacted patient outcomes in an effort to avoid readmissions (Qiu et al., 2022; Samarghandi & Qayyum, 2019). Qiu et al. (2022) completed a pre- and post-analysis using the CMS Hospital Compare database to determine the impact HRRP had on HF, AMI, and PN readmission rates in the United States from 2010 through 2018. The data included 4,795 U.S. hospitals ranging from small hospitals (<200 beds) to large hospitals (>400 beds). The data included public (25.3%), for-profit (17.2%), and not-for-profit hospitals (57.5%). The researchers used a benchmark fixed effect model (Outcomeit = ci

+ β0 + β1PostLaunch$_t$ + β2t + ε_{it}, (1)) to compare the changes in readmission rates and mortality rates following the implementation of HRRP. The researchers found that larger hospitals had a more significant reduction in readmission rates than smaller hospitals after HRRP. The researchers found that after HRRP, larger hospitals had an increase in mortality rate. The researchers noted that a possible limitation of the study was process improvements that hospitals had put in place to reduce readmission rates and the effect this may have had on certain demographical groups such as African American or Hispanic patient population. The researchers also noted that since HRRP was a nationwide rollout, there was not a control group for comparison. The researchers stated that future research should concentrate on the impact of HRRP based on race, socioeconomic groups and education levels. The researchers indicated that an increase in mortality rate following the implementation of HRRP may be an unintended consequence and policymakers and administrators should take unintended consequences into consideration for future policy changes.

Similar results were found by Samarghandi and Quayyum (2019) in a pre- and post-test analysis for patients with COPD readmitted within 30 days from 2010 to 2017 using data from the CMS Hospital Compare website. There were 3,685 acute care hospitals analyzed. The researchers summarized the mean and standard deviation and used a mixed linear model with random intercept and slope that increased in complexity with each of the five analytical stages to determine the change in admission rates and mortality rates within 30 days of discharge. The researchers found a decrease of 1.1% in readmission rates when comparing the 2010–2013 pre-implementation of HRRP data and

the post-implementation of HRRP data in 2014–2017. The researchers also found an increase in mortality rates within the 30 days of discharge (95% CI [0.12, 0.14]; $p < .0001$), which was statistically significant for hospitals and showed a decrease in readmission rates. Samarghandi and Quayyum suggested that future healthcare policies should consider the possibility of unintended adverse outcomes. The authors noted a study limitation since hospital-level data and not patient-level data were used in the observational study. However, the researchers concluded that using the national dataset to examine readmission and mortality rates from the majority of U.S. hospitals gave a better representation and helped to establish causality.

Healthcare organizations have faced challenges in adapting to HRRP and striking a balance between ensuring that financial incentives align with patient-centered care goals (Vogus et al., 2020). In an effort to avoid financial penalties based on readmissions and healthcare utilization constraints, healthcare organizations are looking for opportunities to improve interprofessional collaboration through the development of best practices to improve patient outcomes and reduce financial strain, especially in rural hospitals (Martin et al., 2021). The current literature reveals the complex relationship between readmission rates, healthcare quality, and the financial viability of rural CAHs (Martin et al., 2021). The HRRP took significant steps towards aligning financial incentives with the goal of decreasing readmission rates and improving patient outcomes. With the rapid changes occurring across the healthcare landscape, ongoing efforts are being made to balance financial considerations with patient outcomes. CAHs' financial

sustainability is paramount, with rural CAHs adopting innovative ways to reduce readmission rates and LOS (Warchol et al., 2019).

Extensive research has been completed to investigate the association between readmission rates, the quality of healthcare, and the financial impact on healthcare organizations. Amritphale et al. (2023) completed a retrospective analysis to investigate all-cause with age-group specific unplanned readmissions within 30 days of a hospital inpatient stay. The researchers used the U.S. Nationwide Readmission Database to identify 28,942,224 inpatient encounters within the United States that resulted in 3,051,189 unplanned readmissions within 30 days of being discharge from the hospital from January 2017 through November 2017. The data were categorized into age groups 18–44 years, 45–64 years, 65–75 years and ≥75 years. The researchers used two-sided tests with a significance level of 0.05. The baseline characteristics of the data were tested for statistical differences using chi-square test. The researchers found that readmissions within the first 30 days were most commonly found in the age group of 45 years and over. This study used a large cross-sectional dataset, which lends strength to the findings. The authors did note limitations to the study. The data were only collected over an 11-month period of time, did not account for any regional or socioeconomic differences, and was not able to capture out-of-state admission. The authors concluded that strategies to improve the quality of care and higher-value care were needed to reduce unplanned readmissions.

A similar retrospective control study completed by Lo et al. (2021) examined readmission rates within 14 days of discharge that occurred between September 2018 and

August 2019 in a 1,103-bed university hospital in Taiwan. The sample study consisted of 600 patients aged 65 years or older. The researchers assessed the data using student *t* tests. Chi-squared test was used for categorical variables. The researchers found multiple factors that appeared to be significant ($p < .001$) and influenced unplanned readmissions: frequent prior hospitalizations, multimorbidity, malnutrition, and clinical instability. It was also found that 61% of the unplanned readmission occurred within the first 7 days of discharge. The researchers noted that the data collection method may have caused a limitation since extracting the information from the medical record may have caused inadequate identification of all risk factors. The researchers indicated that by identifying factors that may predict an increase in readmission, interventions could be initiated for transitional care prior to discharge to reduce the risk of readmission within 14 days. The study findings were considered significant whether the influencing factors caused readmission within 7 days, 14 days, or 30 days.

In comparison, Upadhyay et al. (2019) completed a longitudinal study using a fixed-effects regression model to analyze targeted readmission rates and the financial impact for patients treated for AMI, PN, and HF. The researchers collected data on patients admitted to 276 Washington Hospitals between the years of 2012 and 2014. The researchers looked at whether a reduction in readmission rates was associated with increased operation revenues per patient, an increase in operating revenues per patient, or an operating margin. The researchers noted that a fixed-effects regression model had not previously been used with this type of research. The authors concluded that quality improvement strategies decreased the targeted readmission rates with improvement in the

financial impact on PN and HF patient populations. However, the authors also found that the financial impact increased in the AMI patient population when looking at the initial cost of care. The authors stated that the small population size was a study limitation and that future studies should use a larger sample size to build upon this research. The authors recommended that administrators use the outcomes from this study to influence future policies and protocols regarding proper discharge planning to avoid unnecessary readmissions and inefficient expenditures.

Length of Stay

With a push to reduce costs and improve the utilization of healthcare, healthcare organizations have increased their focus on reducing the LOS for hospital admissions. Healthcare organizations are becoming creative with process improvements to determine how interdisciplinary team models impact LOS. Lagoe et al. (2021) completed a pre- and post-process improvement study that focused on the efforts to reduce inpatient LOS in Syracuse hospitals from 2015 to 2020 with a total sample size of 210,121 patient discharges. The initiatives put in place involved process improvements with a discharge team that included case management for discharge planning and the identification of patients that required home health, community services, and planning for post-discharge placement in skilled nursing facilities. The researchers identified mean LOSs for the combined hospitals by year between 2015 and 2020 and quantified the number of inpatient days saved during the two time periods. The authors found that LOS reduction saved 7,106–19,245 inpatient days for adult medicine and 10,605–25,926 inpatient days for adult surgery, which amounted to an estimated $4,263,600 cost elimination in adult

medicine and $6,363,000 in adult surgery. The study also revealed that patients with the highest severity of illness showed the greatest reduction of days. The study did not identify other patient characteristics that may have impacted LOS. The study was completed in one geographical location. The authors still considered the study significant in adding to the current knowledge and concluded that as populations continue to age, there will be a greater need for efficient care based on the limited number of resources.

Increased LOS has been correlated to an increased risk of hospital-associated complications of older adults (Mudge et al., 2019). Because of the risk of increased complications, there continues to be a push to provide timely surgical intervention for older adults with a femur fracture (Welford et al., 2021). Scala et al. (2021) completed a pre- and post-process improvement retrospective study to determine if the introduction of a diagnostic-therapeutic assistance pathway (DTAP) as a Lean Six Sigma process improvement would reduce the preoperative LOS in patients undergoing femur fracture repair. Secondary data were collected from a university hospital in Italy from 2010-2015 prior to the implementation of the DTAP and included 468 patients. The post-implementation data were collected from 2016-2020 and included 365 patients. The researchers used a chi-square test to evaluate predictive validity between DTAP and LOS, and DTAP and facility discharge, with $p < .05$ indicating statistical significance. The researchers found that the average LOS decreased from 5.62 days to 3.45 days or a 39% decrease in LOS. The researchers noted a study limitation that because it was a retrospective analysis, the DTAP alone may not have been the only impact on the reduction of LOS. Even with this limitation, the researchers concluded that the study

added to other research studies that showed that implementation of a DTAP may improve LOS.

Gleicher et al. (2021) completed a pre-and post- intervention design to determine if an enhanced recovery after surgery (ERAS) bundle reduced the LOS to less than 2 days for patients who underwent a total knee arthroplasty. The ERAS bundle consisted of four interventions that included a perioperative peripheral nerve block, antiemetics, avoidance of routine urinary catheters, and preoperative education. Pre-intervention data were collected between January and December 2017 and included 232 patients. Post-intervention data were collected between January 2018 and August 2019 and included 383 patients. The researchers used an interrupted time series analysis to model the LOS to estimate the expected value in the last month prior to the intervention and then compared the expected value to the final month of data collection with the estimated difference. Overall, the mean LOS decreased by 0.69 days per patient from an average of 2.82 to 2.13 ($p < .001$). The researchers identified a limitation of the study being the slow adoption of the implementation by the anesthesiologists with only 4 out of 21 reporting feeling comfortable with the ERAS bundle. However, even with the initial decreased buy-in, the implementation of the ERAS bundle did show a decrease in LOS and was found to decrease the need for inpatient rehabilitation by 50%. The authors stated that the study provided a framework for other organizations implementing patient-centered interventions to improve patient LOS.

Summary

As healthcare organizations look for ways to reduce healthcare cost, there is a heightened focus on examining factors that influence LOS and readmissions with 30 days. Retrospective studies completed by Amritphale et al. (2023) and Loe et al. (2021) identified factors that influenced readmission rates within 30 days. Amrtiphale et al. found increased readmission rates in patients that were over the age of 45, while Loe et al. found multiple factors influenced readmission such as frequent prior hospitalizations, multimorbidity, malnutrition, and clinical instability. Upadhyay et al.'s (2019) study focused on quality improvement strategies to target readmission rates based on known factors that influence readmission. Although Upadhyay et al. found that targeting readmission did decrease the readmission rates and had a financial impact in patient populations based on certain diagnosis, the study was considered small and should be repeated in the future with a larger sample size. Both studies by Amritphale et al. and Loe et al. had a large number of participants, which added strength to the findings. Amritphale et al., Loe et al., and Upadhyay et al. encouraged the use of discharge planning and process improvement strategies to focus on factors that influence readmission rates and cost of healthcare.

Increased LOS is also known to increase healthcare costs. Researchers Lagoe et al. (2021), Scala et al. (2021), and Gleicher et al. (2021) used pre- and post-implementation designs to determine the impact that process improvements had on decreasing LOS. Lagoe et al. process improvement focused on factors that caused an increase LOS due to difficultly with discharge planning. The authors found that by

forming a discharge team who started planning for discharge on admission, LOS and the cost of healthcare were reduced. This study had a large patient population, which gave strength to the findings. Scala et al. and Gleicher et al. researched how a DTAP and ERAs bundle decreased LOS by addressing factors that influence LOS such as a delay in treatment, unmanaged pain, or post operative nausea. Although Lagoe et al (2021), Scala et al. and Gleicher et al. found the process improvements to be effective, but that further process improvements would need to be implemented to address the future needs of the aging population based on the limited resources in healthcare.

The studies completed by Malik et al. (2021), Baernholdt et al. (2023), and Chatterjee et al. (2021) were all large studies that were completed at multiple locations, which lends strength to the findings that CAHs are capable of providing high-valued care to patient treated in rural community hospitals. The study conducted by Tanumihardjo et al. (2023) also found that process improvements implemented at CAHs were capable of being sustainable while improving patient outcomes. Although Tanumihardjo et al. had a large sample size of 1, 764 participants, the study was completed at one location and future research should be completed to determine if this process improvement could be successfully implemented at other CAHs with similar outcomes. Interestingly, both Malik et al. (2021) and Tanumihardjo et al. found that patient outcomes were not dependent on reimbursement amounts from Medicare or improved in areas with Medicaid expansion, implying that future strategies to decrease healthcare cost would need to be explored. These studies noted limitations related to data collection from administrative sources with the possibility in billing and coding errors related to included diagnosis.

Research completed by Brennan et al. (2019), Norman and Sinha (2022), Rogers et al. (2021), Abdalla et al. (2018) and Lynch et al. (2023) built on the knowledge by Flood et al. (2013) that ACE units improve outcomes such as LOS, readmission rate with 30 days, healthcare costs, hospital-related injuries, and mortality. The studies completed by Brennan et al., Norman and Sinha, Abdalla et al., Lynch et al., and Flood et al. were completed at large academic hospitals with large sample populations, which lends strength to the studies. Although most of the studies were deemed to have statistical significance related to healthcare outcomes, many of the researchers noted weaknesses. The study completed by Rogers et al. depended on participants to respond to surveys, with limited responses received. The limited responses were considered a weakness as this may lend bias to the study since responses may only have been received from hospitals that adhered to the ACE unit five key components. The study completed by Brennan et. al was also noted to have limitations due to the possibility that all dependent variables were not collected through the entire course of the study since the study developed over time. Additionally, the study completed by Abdalla et al. took place in an academic hospital where ACE unit beds could not be held for admissions. Abdalla et al. found that even though the healthcare outcomes improved by UC that followed ACE unit order sets, the healthcare outcomes were found to have a more significant improvement by patients cared for in designated ACE units. These findings lead to questions as to what caused the difference and were all key components of the ACE unit followed.

The literature reveals that CAHs face financial issues that are unique due to declining reimbursements and increased healthcare costs. While CAHs may face

financial hurdles, the literature does indicate that CAHs are capable of providing quality care to patients. Organizations are finding creative ways to decrease LOS and readmission through process improvements and implementation of patient-centered care models such as ACE units. However, there is a gap in knowledge regarding the impact that ACE units in CAHs have on LOS and readmission rates within 30 days. These critical factors influence healthcare costs and reimbursements. Addressing this gap in knowledge is important to understand the potential of the specialized care received in ACE units and how this aligns with efforts to enhance care in rural areas. This study was conducted to bridge the gap in knowledge to determine whether ACE Units in CAHs impact LOS and readmission rates in 30 days, which is known to impact healthcare costs and reimbursement.

Definitions

In this section, the key variables and concepts that are used throughout this study are defined.

Acute care of elders (ACE) unit: A closed unit in a hospital that is designed to manage the unique acute medical issues in the older patient population using interdisciplinary teams that are specialty trained in the care of older adults to prevent the decline that occurs in this population during hospitalization, while planning for the successful patient discharge (Palmer, 2018).

Critical access hospital (CAH): A term to describe a rural hospital that meets certain criteria as designated by the CMS: (a) has 24 or less acute care inpatient beds, (b) is located >35 miles from another hospital, (c) maintains an annual average patient LOS

≤ 96 hours for acute inpatient, and (d) provides 24/7 emergency care services (Rural Health Information Hub, 2021).

Length of stay (LOS): The measurement of the time of a single admission episode (National Center for Health Statistics, 2023).

Hospital readmission: The act of admitting someone to the hospital again following a discharge from the hospital (Healthcare.gov, n.d.).

Older adults: Adults ages 65 and older (National Institutes of Health, n.d.).

Assumptions

For this study, it was assumed that all healthcare staff in the ACE unit at the CAH were properly and equally trained in the care of older adults based on the use of the ACE model of care. It was further assumed that all data transcribed by the Patient Outcomes and Healthcare Quality Department were accurate.

Scope and Delimitations

The focus of this study was to examine the impact that specialized care provided in an ACE Unit in a CAH had on LOS and readmission rates. CAHs were chosen due to the disproportionate impact that financial penalties for readmission rates and LOS place on rural community hospitals that care for vulnerable populations with limited access to care. For the purpose of this research study, the specific research design included the utilization of secondary data collected from the ACE unit and compiled by the Patient Outcomes and Healthcare Quality Department for the years 2018 and 2019. The pre- and post-secondary data were collected from patients' records admitted to the CAH inpatient unit. Pre-ACE unit implementation data were selected from January through December

2018. Post-ACE unit implementation data were selected from January to December 2019. The data points included the LOS and the readmission rates within 30 days. This research compared the means of both LOS and readmission rates within 30 days pre- and post-implementation of the ACE unit. The target population for this study was patients aged 65 years and older who are admitted to the Mississippi CAH inpatient unit between January 2018 through December 2019. ACE units are known to reduce LOS and readmission rates within 30 days in older adults. The goal in completing this research study was to determine the impact of an ACE unit on LOS and readmission rates within 30 days in a CAH to further the knowledge that can be applied in other CAHs. The data for this study was collected in a CAH in rural Mississippi and may not be fully generalizable to other states or other sections of the United States. Results may not be generalizable to other healthcare organizations outside of rural Mississippi as other healthcare organizations may have a different composition of structures in terms of their provider staffing, patient population, and their overall demographical culture.

Limitations

There were no limitations related to collecting the data and there was no need to access the patient populations, as a secondary data set was used for this study. Patients who were admitted but had to be transferred to a higher acuity of care or died during the admission were excluded from the study. Patients under the age of 65 years were also excluded from the study.

Significance

This study is significant because increased LOS and readmission rates within 30 days decrease access to care and create a barrier to healthcare utilization for Mississippians living in poverty-stricken rural communities (Collen et al., 2019). This study has the potential to contribute to positive social change by adding to the existing body of knowledge regarding ACE units and patient outcomes.

Summary and Conclusions

This quantitative research study explored the relationship between an ACE unit in a CAH and the LOS and readmission rates within 30 days. The secondary data were acquired from the Patient Outcomes and Healthcare Quality Department with the pre- and post-data collected from patients admitted to the CAH inpatient unit. These data were used to analyze the independent and dependent variables to determine the association between the ACE Unit in a CAH and LOS and readmission rates within 30 days. The literature review revealed historical and recent research that concluded that ACE Units were known to reduce LOS and readmission rates. However, there remained a gap in knowledge as to whether ACE Units in CAHs would provide similar results. By addressing this gap in knowledge, this study provided a better understanding of the potential impact that ACE units in CAHs have on LOS and readmission rates within 30 days. The research questions were analyzed using multiple linear regression and binomial logistic regression.

In Section 2, the research design and rationale, methodology, and threats to validity will be discussed.

Section 2: Research Design and Data Collection

Introduction

The purpose of this quantitative, quasi experimental, retrospective, study was to see whether there was a statistically significant relationship between pre- and post-implementation of an ACE unit in a Mississippi CAH and LOS and readmission rates within 30 days. ACE units are known to decrease LOS and readmission rates. There was no research that assessed the impact that ACE units in CAHs and rural hospitals have on LOS and readmission rates.

In this section, I describe the research design and its connection to the research questions. The methodology with the description of the target population, sampling, sampling size and data analysis plan will be discussed, as well as any threats to validity and ethical procedures.

Research Design and Rationale

The purpose of this quantitative study was to determine the relationship between pre- and post-implementation of an ACE unit in a CAH and LOS and readmission rates within 30 days. The analysis used to answer RQ1 was a multiple linear regression. A multiple linear regression is a statistical model that predicts the linear relationship and outcome of the dependent variable given two or more independent variables. The analysis used to answer RQ2 was a binomial logistic regression. A binomial logistic regression predicts the probability of a binary dependent variable given the independent variables. The implementation of the ACE unit at the Mississippi CAH, age, and gender were the independent variables. The two dependent variables were the LOS and readmission rates

within 30 days. The ACE unit was implemented in January 2019. Therefore, the secondary data were collected for 1 year prior to the opening of the ACE for the pre-implementation group, January 2018 through December 2018, and during the first year of the ACE unit being opening for the post-implementation group, January 2019 through December 2019. A pre- and post-implementation design using a multiple linear regression for RQ1 and a binomial logistic regression for RQ2 allowed for the identification of relationships between the independent and dependent variables in two time periods, one before the ACE unit was implemented and one after its implementation. A *t* test from multiple linear regression was used to assess for statistical significance between the ACE unit implementation variable with LOS and readmission rates. This quantitative research design was an appropriate choice for this study. By analyzing the secondary data to identify the possibility of a statistically significant relationship between the variables, the gap in knowledge that existed regarding the potential impact that implementing an ACE unit in CAHs has on LOS and readmissions was addressed.

Methodology

Population

The target population for this study was patients aged 65 years and older admitted to the Mississippi CAH inpatient unit between January 2018 through December 2019. There was a total of 576 patients admitted between January 2018 and December 2019 with 292 patients over the age of 65 years. There were two outliers found in the sample population that were removed, leaving a total of 290 patients. There were 145 in the pre-implementation group and 145 patients in the post-implementation group.

Sampling and Sampling Procedures

This specific research design included the utilization of secondary data collected retrospectively from the Mississippi CAH electronic medical record (EMR) and transcribed and deidentified by the Patient Outcomes and Healthcare Quality Department for the years 2018 through 2019. Patients who were admitted but had to be transferred to a higher acuity of care or died during the admission were excluded from the study. Patients younger than 65 years were also excluded. These data represent the best and most reliable data for this study since they were extracted directly from the EMR for the defined population and deidentified by the Patient Outcomes and Healthcare Quality Department. I did not interact with patients or access any identifiable patient data; therefore, no consent forms from patients were necessary. Permission for the secondary data set was requested from the Mississippi CAH and Walden University.

A G*Power analysis was used to determine the needed sample size for this study. There were multiple factors that needed to be considered such as the effect size, the power of the test, the level of significance, and the analytical technique. For this study, using a linear multiple regression: fixed model, R^2 deviation from zero with an effect size of 0.15, alpha error probability of 0.05, and power of 80%, number of predictors of 2, the minimum sample size for this study was 68.

Instrumentation and Operationalization of Constructs

Operationalization

The independent variable was the implementation of the ACE unit at the Mississippi CAH. The independent variable is a binary variable (=0, pre-implementation

of the ACE unit; =1, post-implementation of the ACE unit) with two control variables, age and gender. A CAH is a rural hospital that meets a certain criterion as designated by the CMS: has 24 or less acute care inpatient beds, located >35 miles from another hospital, maintains an annual average patient LOS ≤ 96 hours for acute inpatient, and provides 24/7 emergency care services (Rural Health Information Hub, 2021). There are two dependent variables. The first dependent variable, the LOS, is defined as the measurement of the time of a single admission episode (National Center for Health Statistics, 2023). For this study, the LOS was the time measured in days from the first day of admission to the CAH until the day of discharge. The LOS is a continuous, integer variable. The second dependent variable was readmission rates within 30 days, which is the act of admitting someone to the hospital again following a discharge from the hospital (Healthcare.gov, n.d.). For this study, the readmission rate within 30 days was defined as any unplanned readmission to the CAH that occurs within 30 days from the date of discharge. The readmission rate within 30 days is a binary variable (=0, patient is not readmitted within 30 days; =1, patient is readmitted within 30 days). The research location was a rural CAH in northern Mississippi. The timeframe for this study included January 2018 through December 2019, aimed at discovering the before and after implementation findings on LOS and readmission rates within 30 days.

Data Analysis Plan

The Statistical Package for the Social Sciences (SPSS; Version 25) was used to analyze the statistical data for the two research questions addressed by this study. Patients were excluded from the study if they were under the age of 65 years, had missing data,

died during the admission, were transferred to another facility prior to discharge, required surgery during the admission, or were transferred to the CAH from another facility 24 hours after admission. Patients were also excluded if they were admitted to the CAH during both time periods.

RQ1: What is the relationship between pre- and post-implementation of ACE unit in a CAH and LOS with controls for age and gender?

H_o1: There is no statistically significant relationship between pre- and post-implementation of an ACE unit in a CAH and LOS with controls for age and gender.

H_a1: There is a statistically significant relationship between pre- and post-implementation of an ACE unit in a CAH and LOS with controls for age and gender.

RQ2: What is the relationship between pre- and post-implementation of ACE unit in a CAH and readmission rates within 30 days with controls for age and gender?

H_o2: There is no statistically significant relationship between pre- and post-implementation of an ACE unit in a CAH and readmission rates within 30 days with controls for age and gender.

H_a2: There is a statistically significant relationship between pre- and post-implementation of an ACE unit in a CAH and readmission rates within 30 days with controls for age and gender.

The secondary data were received from the Patient Outcomes and Healthcare Quality Department. A multiple linear regression was utilized to assess for statistical significance between the ACE unit implementation variable with LOS. Prior to

performing the multiple linear regression, the following assumptions were tested to ensure they were met:

1. There were at least 2 independent variables.
2. Multivariable normality was present.
3. Homoscedasticity was present.
4. There was an absence of multicollinearity between the independent variables.
5. There was a linear relationship between the independent and dependent variables.

A p-value less than 0.05 was considered statistically significant for the multiple linear regression. A binomial logistic regression was used to test for significance between the ACE unit implementation and readmission rates. Before performing the binomial logistic regression, there were six assumptions tested to ensure they were satisfied:

1. There was a binomial dependent variable.
2. There was at least one independent variable that was continuous or categorical.
3. There was an absence of outliers.
4. There was independence of observations.
5. There was an absence of multicollinearity between the independent variables.
6. There was a linear relationship between the independent and dependent variable.

A p-value less than 0.05 was considered statistically significant for the binomial linear regression.

Threats to Validity

An external validity concern for this study was the generalizability of population validity. This study was based in a rural Mississippi CAH, which may impact the generalizability of the study outcomes.

Ethical Procedures

Compliance with ethical standards is a critical aspect of research with accurate reporting of all research outcomes. Walden and the Mississippi CAH IRBs' approval was obtained prior to obtaining the secondary data set. No identifiable information appeared on the data to protect the privacy of the participants. The secondary data were deidentified and encrypted by the Patient Outcomes and Healthcare Quality Department. With all identifiable patient data removed, the patients' names were replaced with "pre" or "post" followed by a sequenced number. The secondary data were on a USB flash drive that has been securely stored in a locked cabinet and only accessible by me, ensuring the integrity of the information. After seven years, the USB Flash drive and the files will be destroyed.

Summary

The purpose of this quantitative study was to determine the relationship between pre- and post-implementation of an ACE unit in a CAH and LOS and readmission rates. The analyses used to answer the research questions were a multiple linear regression for RQ1 and a binomial logistic regression for RQ2. The target population for this study was patients aged 65 years and older admitted to the Mississippi CAH inpatient unit between January 2018 through December 2019 with a minimum sample size of 68 participants

based on a G*Power analysis. The protentional threats to external and internal validity were identified with anticipated measures that were put into place to decrease the generalizability of the study's results. Ethical standards are critical and measures to secure secondary data were addressed.

In Section 3, the data collection of secondary data set, results, and summary will be presented.

Section 3: Presentation of the Results and Findings

Introduction

The purpose of this study was to determine the relationship between pre- and post-implementation of an ACE unit in a CAH and LOS and readmission rates within 30 days. The two research questions and hypotheses for this study were:

RQ1: What is the relationship between pre- and post-implementation of ACE unit in a CAH and LOS with controls for age and gender?

H_o1: There is no statistically significant relationship between pre- and post-implementation of an ACE unit in a CAH and LOS with controls for age and gender.

H_a1: There is a statistically significant relationship between pre- and post-implementation of an ACE unit in a CAH and LOS with controls for age and gender.

RQ2: What is the relationship between pre- and post-implementation of ACE unit in a CAH and readmission rates within 30 days with controls for age and gender?

H_o2: There is no statistically significant relationship between pre- and post-implementation of an ACE unit in a CAH and readmission rates within 30 days with controls for age and gender.

H_a2: There is a statistically significant relationship between pre- and post-implementation of an ACE unit in a CAH and readmission rates within 30 days with controls for age and gender.

In this section, I provide a description of the time frame for the data collection and a description of the data set. The results for the study will be explained with the statistical

analysis findings that are organized by research questions and hypotheses to include tables and figures to illustrate the findings.

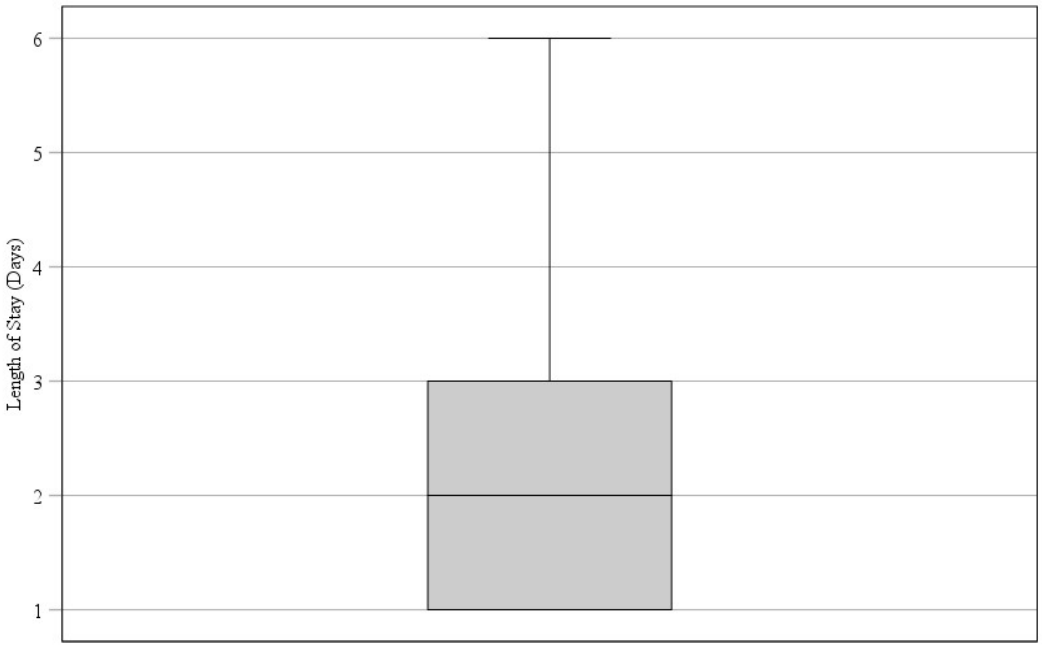
Data Collection of Secondary Data Set

The data for this study were collected through secondary data obtained from the ACE unit and compiled by the Patient Outcomes and Healthcare Quality Department from January 2018 through December 2019 for the independent and dependent variables. The pre-implementation of the ACE unit data were collected for the timeframe 1 year prior to the opening of the ACE unit or January 2018 through December 2018. The post-implementation of the ACE unit data were collected from January 2019 through December 2019. There were no discrepancies from the set plan in the use of the secondary data.

There were 292 patients aged 65 years and older admitted to the CAH from January 2018 through December 2019. There were two outliers found in the sample for LOS that were removed (see Figure 1). Outliers were also examined for readmission within 30 days; however, all patients readmitted within 30 days were flagged as outliers. These patients were flagged as outliers in the analysis due to the small number of patients readmitted within 30 days to the CAH. As these were crucial to evaluate the hypotheses proposed, these patients were not excluded from the study, leaving a remaining sample size of 290 patients.

Figure 1

Boxplot for Length of Stay After Removal of Outliers



There were 145 patients in the pre-implementation group and 145 patients in the post-implementation group. This sample was representative of the entire population as all patients aged 65 and older admitted during the designated timeframe were included in the study, January to December of 2018 for pre-implementation and January to December of 2019 for post-implementation. This sample was representative of the characteristics of the entire population. For the covariate gender, there were 200 (69%) females and 90 (31%) males. For age, the median age was 80, mean was 80.09, and mode was 68 (see Table 1).

Table 1

Descriptive Statistics

Variable	Sample size	Frequency	*M*	*Mdn*	*SD*
Implementation	290	-	-	-	-
Pre-implementation	145	50.0%	-	-	-
Post-implementation	145	50.0%	-	-	-
Gender	-	-	-	-	-
Male	90	31.0%	-	-	-
Female	200	69.0%	-	-	-
Age	-	-	80.09	80.00	8.88
Length of stay	-	-	2.38	2.00	1.21
Readmitted within 30 days	20	6.9%	-	-	-

Results

The 290 patients included in the study were aged 65 years and older and were admitted to the CAH from January 2018 through December 2019. There were 145 patients in the pre-implementation group and 145 in the post-implementation group. The sample was comprised of 31% males and 69% females with a mean age of 80 years.

For RQ1, the question was set to determine the relationship between pre- and post-implementation of ACE unit in a CAH and LOS with controls for age and gender. This was analyzed with a multiple linear regression. There were six main assumptions that had to be satisfied before completing the multiple regression model:

1. There were at least 2 independent variables.
2. Multivariable normality was present.
3. There was an absence of outliers.
4. Homoscedasticity is present, that is there is similar variances among the different groups being compared.

5. There was an absence of multicollinearity between the independent variables.
6. There was a linear relationship between the independent and dependent variables.

This study met the assumptions for the use of the multiple linear regression. These assumptions were evaluated prior to the use of multiple linear regression to evaluate the stated hypotheses:

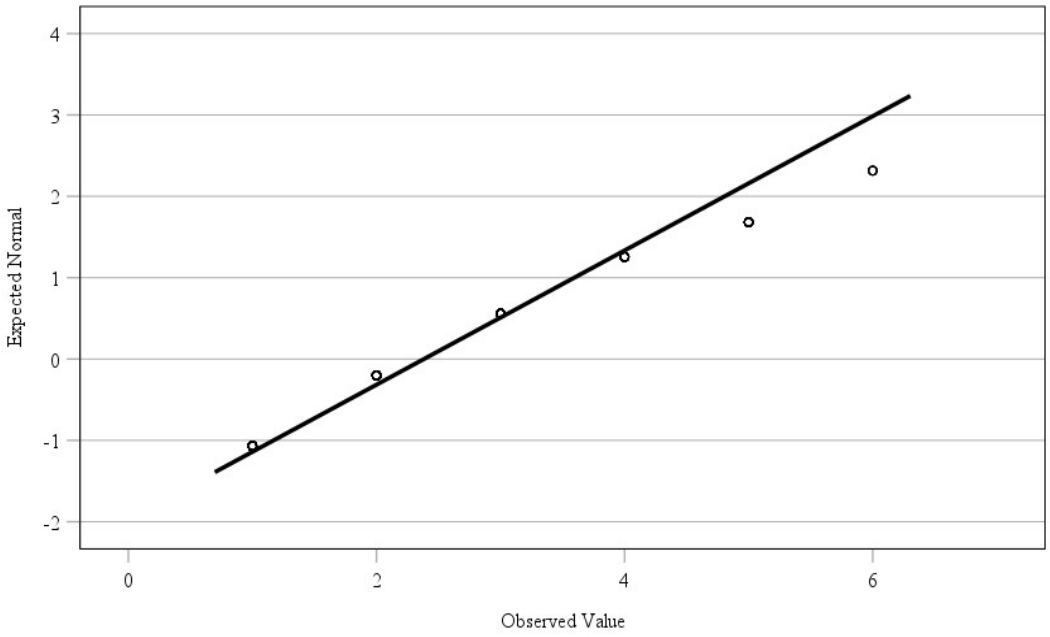
Assumption 1: There were at least two independent variables. The independent variables were implementation of ACE in a CAH, gender, and age. This assumption was met.

Assumption 2: There was an absence of outliers. All outliers were removed from the dataset prior to statistical testing (see Figure 1). Therefore, this assumption was met.

Assumption 3: Multivariable normality was present. To test this assumption, a quantile-quantile (Q-Q) plot was constructed for the dependent variable, LOS. Q-Q plot for LOS (see Figure 2) showed a linear relationship between the between the quantiles and standardized normality line. This verified the assumption.

Figure 2

Q-Q Plot for Length of Stay



Assumption 4: There was an absence of multicollinearity. Multicollinearity exists when there two or more independent variables are linearly dependent or highly correlated. This was evaluated by calculating the variance inflation factor (VIF) for the independent variables (see Table 2). As the VIF is less than five for all independent variables, this assumption was met.

Table 2

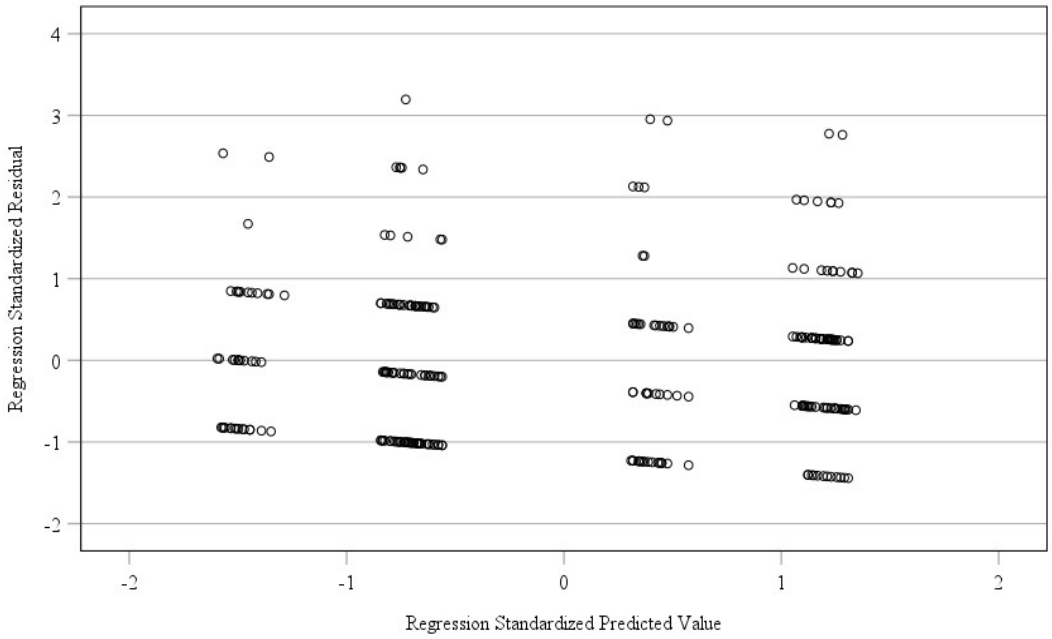
Multicollinearity Analysis

Variable	Tolerance	VIF
Implementation	0.989	1.011
Gender	0.971	1.029
Age	0.969	1.032

Assumption 5: Homoscedasticity was present. Homoscedasticity is the statistical assumption of similar variances among the different groups being compared. To test this assumption, standardized residual vs predicted value scatterplots were constructed for LOS (see Figure 3). Residuals and predicted values are standardized in SPSS by dividing the unstandardized residuals and predicted values by the standard deviation of the data. This allows the data to be compared to the regression line, and thus determine the distribution of variance of the data in terms of number of standard deviations from the linear regression line. A scatterplot for LOS showed an even distribution of the residuals, with no cone-like pattern of the distribution of the residuals on the scatterplot typically seen when this assumption is violated. This verified the presence of homoscedasticity and the assumption was met.

Figure 3

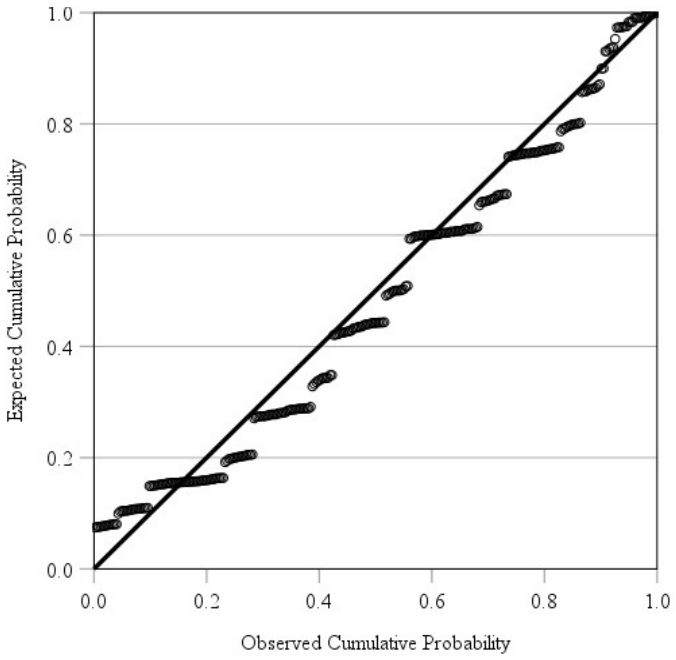
Standardized Residual vs. Predicted Value Scatterplot for Length of Stay



Assumption 6: There was a linear relationship between the independent and dependent variables. To test this assumption, a predicted probability (P-P) plot was constructed for the dependent variable, LOS. P-P plot for LOS, Figure 4, showed a linear relationship between the between the probabilities and standardized normality line. This verified the assumption for LOS.

Figure 4

P-P Plot for Length of Stay



After the assumptions were tested, the multiple linear regression analysis was performed in SPSS. The LOS was identified as the dependent variable. The implementation of ACE in a CAH was identified as the independent variable. Gender and age were identified as the covariates.

Multiple linear regression analysis with LOS as the dependent variable, Tables 3–5, showed the model was statistically significant ($p = .004$). Additionally, there was a statistically significant difference between implementation of ACE in a CAH and LOS ($p < .001$). The standardized coefficient (standardized beta = -0.20) showed the multiple linear regression slope between implementation and LOS had a negative relationship. This means the LOS decreased after implementation of the ACE unit. The regression shows that implementation of the ACE unit decreased the LOS by 0.48 days (B = -0.48, 95% CI [-0.76, -0.21]). Since the 95% CI did not include zero, this allowed for the rejection of the null hypothesis and to accept the alternative hypothesis that there was a statistically significant relationship between pre- and post- implementation of an ACE unit in a CAH and LOS with controls for age and gender.

Table 3

Model Summary for Implementation vs. Length of Stay

R	R^2	Adjusted R^2	*SE* of the estimate
0.212	0.045	0.035	1.191

Table 4

Analysis of Variance for Implementation vs. Length of Stay

Model	*SS*	*df*	*MS*	*F*	Significance
Regression	18.997	3	6.332	4.466	.004
Residual	405.517	286	1.418		
Total	424.514	289			

Table 5

Coefficients for Implementation vs. Length of Stay

Variable	Unstandardized B	95% CI	Standardized Beta	*t*	*p*
Implementation	-0.48	[-0.76, -0.21]	-.20	-3.438	< .001
Gender	0.19	[-0.11, 0.50]	.07	1.258	.210
Age	0.00	[-0.01, 0.02]	.02	0.282	.778

For RQ2, the research question was set to determine the relationship between pre- and post-implementation of ACE unit in a CAH and readmission rates within 30 days with controls for age and gender. This was analyzed with a binomial logistic regression. There were six main assumptions that had to be satisfied prior to completing the binomial logistic regression model:

1. There was a binomial dependent variable.
2. There was at least one independent variable that was continuous or categorical.
3. There was an absence of outliers.
4. There was independence of observations.
5. There was an absence of multicollinearity between the independent variables.
6. There was a linear relationship between the independent variables and log odds.

This study met the assumptions for the use of the binomial logistic regression. These assumptions were evaluated prior to the use of binomial logistic regression to evaluate the stated hypotheses:

Assumption 1: There was a binomial dependent variable. The dependent variable was the readmission within 30 days. This was defined as (0 = not readmitted within 30 days, 1 = readmitted within 30 days) a binomial variable. Thus, this assumption was met.

Assumption 2: There was at least one independent variable that was continuous or categorical. The independent variables were implementation of ACE in a CAH, gender, and age. Implementation of ACE in a CAH (0 = pre-implementation, 1 = post-implementation) and gender (0 = male, 1 = female) were both categorical variables. Age was a continuous variable. This assumption was met.

Assumption 3: There was an absence of outliers. An outlier analysis for readmission within 30 days was completed, which resulted as all patient readmitted to be denoted as outliers (see Figure 2). As these patients were crucial for the testing of the hypotheses, these patients remained in the study. This assumption was violated with cause.

Assumption 4: There was independence of observations. This was evaluated by determining the Spearman's correlation coefficient between the independent variables. All values between -0.7 and 0.7 meet the assumption of independence of observations, while all values less than -0.7 and greater than 0.7 mean the independent variables are highly correlated and, thus, violate this assumption. Spearman's correlation coefficients were calculated between each independent variable (see Table 6). All Spearman's correlation coefficients were between -0.7 and 0.7. This assumption was met.

Table 6

Spearman's Correlation Coefficients

Variable	Spearman's Rho
Implementation vs. Gender	0.060
Implementation vs. Age	-0.076
Gender vs. Age	0.154

Assumption 5: There was absence of multicollinearity between the independent variables. This was evaluated by calculating the VIF for the independent variables (see Table 2). As the VIF is less than five for all independent variables, this assumption was met.

Assumption 6: There was a linear relationship between the independent variables and log odds. To complete this, interaction terms for all continuous independent variables were created. The continuous independent variables in this study were age. The natural log (Ln) of age was first computed. A binary logistic regression was then completed with readmission within 30 days as the dependent variable, implementation and gender as categorical independent variables, age as a continuous independent variable, and an interaction term of the Ln(age) by age as the interaction term to be evaluated. The significance level of the interaction term was then evaluated, with a nonsignificant value ($p > .05$) denoting the assumption of linearity between the independent variables and log odds was verified. The interaction term, Ln(age) by age, was non-significant ($p = .633$). This assumption was met.

The binomial logistic regression analysis with readmission within 30 days as the dependent variable, Tables 7–10, showed the model demonstrated acceptable fit for the

data, as the Hosmer and Lemeshow Test was non-statistically significant (p = .251). However, the model had a sensitivity of 0% and specificity of 100%, meaning the model was able to accurately predict whether patients were not readmitted to the hospital, but could not accurately predict whether a patient would be readmitted to the hospital within 30 days. Additionally, a non-statistically significant difference between implementation of ACE in the CAH and readmission within 30 days (p = .1666) was shown. While the analysis did show a negative trend for the regression (B = -0.676), meaning there was a trend shown of less readmissions within 30 days after implementation of the ACE unit, there was not a statistically significant decrease on readmission within 30 days with implementation of ACE in a CAH (Exp(B) = -0.509, 95% CI [0.195, 1.325]). As the 95% CI included one, the null hypothesis was unable to be rejected.

Table 7

Model Summary for Implementation vs. Readmission Within 30 Days

-2 log likelihood	Cox & Snell R^2	Nagelkerke R^2
141.81	0.013	0.032

Table 8

Hosmer and Lemeshow Test for Implementation vs. Readmission Within 30 Days

Chi-square	*df*	Significance
10.206	8	0.251

Table 9

Classification Table for Implementation vs. Readmission Within 30 Days

Observed		Predicted		
		Readmitted within 30 days		
		Not readmitted	Readmitted	Percentage correct
Readmitted within 30 days	Not readmitted	270	0	100.0
	Readmitted	20	0	0.0
Overall percentage				93.1

Table 10

Coefficients for Implementation vs. Readmission Within 30 Days

Variable	B	*SE*	Wald	*df*	*p*	Exp(B)	95% CI of Exp(B)
Implementation	-0.676	0.488	1.915	1	.166	0.509	[0.195, 1.325]
Gender	0.626	0.584	1.150	1	.284	1.871	[0.595, 5.876]
Age	0.014	0.027	0.257	1	.612	0.021	[0.962, 1.068]

Summary

The purpose of this quantitative study was to determine the relationship between pre- and post-implementation of an ACE unit in a CAH and LOS and readmission rates. Secondary data collected by the ACE and compiled by the Patient Outcomes and Healthcare Quality Department from January 2018 through December 2019 were analyzed with multiple linear regression and binomial logistic regression analyses to evaluate these relationships. The results of the multiple linear regression analysis indicated a statistically significant difference between pre- and post-implementation groups and LOS ($p < .001$). However, the results of the binomial logistic regression

analysis for readmission within 30 days was found to be not statistically significant between the pre- and post-implementation groups ($p = .166$).

In Section 4, the introduction, interpretation of findings, limitations of the study, recommendations, implications for professional practice and social change, and conclusion will be discussed.

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

Introduction

This quantitative study was conducted to determine the relationship between pre- and post-implementation of an ACE unit in a CAH and LOS and readmission rates while controlling for age and gender. The results of the multiple linear regression and binomial logistic regression analyses indicated a statistically significant relationship between pre- and post-implementation groups and LOS ($p < .001$). The relationship between pre- and post-implementation of the ACE unit and readmission within 30 days was found to be not statistically significant ($p = .166$). This section will discuss the interpretation of the findings, limitations of the study, recommendations, and implications for professional practice and social change.

Interpretation of the Findings

RQ1: What is the relationship between pre- and post-implementation of ACE unit in a CAH and LOS with controls for age and gender?

H_o1: There is no statistically significant relationship between pre- and post-implementation of an ACE unit in a CAH and LOS with controls for age and gender.

H_a1: There is a statistically significant relationship between pre- and post-implementation of an ACE unit in a CAH and LOS with controls for age and gender.

RQ2: What is the relationship between pre- and post-implementation of ACE unit in a CAH and readmission rates within 30 days with controls for age and gender?

H_o2: There is no statistically significant relationship between pre- and post-implementation of an ACE unit in a CAH and readmission rates within 30 days with controls for age and gender.

H_a2: There is a statistically significant relationship between pre- and post-implementation of an ACE unit in a CAH and readmission rates within 30 days with controls for age and gender.

A multiple linear regression and binomial logistic regression were used to determine if there was a statistically significant relationship between the pre- and post-implementation of ACE unit in a CAH and LOS and readmission within 30 days with controls for age and gender. The results of the multiple linear regression did show a statistically significant relationship between implementation of ACE in a CAH and LOS ($p < .001$). The study revealed that the implementation of the ACE unit decreased LOS by 0.48 days (B = -0.48, 95% CI [-0.76, -0.21]). Readmission within 30 days was found to be not statistically significant between the pre- and post-implementation groups ($p = .166$) in the binomial logistic regression.

The findings of this study in regards to the relationship between the implementation of the ACE unit and LOS aligns with previous findings in the peer-reviewed literature by Brennan et al. (2019) and Norman and Sinha (2022). A cross-sectional quality improvement study with a sample size of 11,588 completed by Brennan et al. found that ACE unit patients had a lower cost of care during the admission and a decreased LOS. Norman and Sinha conducted a retrospective cohort study that analyzed 3,046 ACE-designated patient admissions and concluded that the care provided in the

ACE unit had a greater impact on patient outcomes and LOS than care provided in the general medical unit with an ACE order set. Although this study did not align with the literature showing a statistically significant relationship between the implementation of the ACE unit and readmission rates, it did extend the current knowledge by revealing a downward trend in readmission rates following the implementation of the ACE unit. The results were not statically significant and the null hypothesis that there is not a significant difference for readmission was upheld. As outlined by Donabedian's theory of quality care delivery, the results emphasize how the implementation of the ACE unit at the CAH may impact patient outcomes through LOS.

Limitations of the Study

Although a trend was found that there was a decrease in readmission rates following the implementation of the ACE unit, the results were not significant due to the small number of readmissions. Although the sample size was large enough for this study, data with more readmissions within 30 days would be required to form definitive assumptions between readmission and ACE unit implementation, as there were too few patients readmitted over the course of this 2-year study. This study was based in a rural Mississippi CAH, which may impact the generalizability of the study outcomes.

Recommendations

This quantitative as completed to determine the relationship between pre- and post-implementation of an ACE unit in a CAH and LOS and readmission rates while controlling for age and gender. A larger retrospective study is needed in the future with implementation of an ACE at multiple CAH hospitals and/or studied over a longer period

of time to increase the sample size and the power of the study. It is also recommended that other confounding variables be expanded on in future studies, such as race, primary provider (physician, NP, PA), index for severity of disease, socioeconomic status of the patient, etc.

Implications for Professional Practice and Social Change

This study revealed a statistically significant relationship between implementation of ACE in a CAH and LOS ($p < .001$), which aligns with the literature found in larger urban facilities. Although this study did not show a statically significant relationship between the implementation of the ACE unit and readmission rates, it did reveal a downward trend following implementation. Specialized care for adults over the age of 65 has been shown to decrease LOS, readmission rates, and patient outcomes in larger urban and academic hospitals (Brennan et al., 2019; Lynch et al, 2023; Norman & Sinha, 2022). Further research is needed on the impact of specialized units in CAH. Hospitals are faced with reduced reimbursement due to LOS and readmission rates; therefore, hospitals must adapt to address the complex healthcare needs of the aging population and the decreased access to care found in rural communities. Rural and underserved socioeconomic communities deserve the same access to care that is allowed to patients being treated in larger urban and academic hospitals. With the known unique financial issues faced by CAHs and the looming risk of closures of rural hospitals in Mississippi and other rural areas, this study has the potential to contribute to positive social change by adding to the existing body of knowledge regarding ACE units and patient outcomes. The findings of this study add to the body of literature that demonstrates quality of patient care and cost

benefits of an ACE unit by decreasing LOS and readmissions within 30 days when controlled for age and gender. This study has the potential to contribute to positive social change by highlighting how specialized care units impact healthcare costs and improve the efficiency of care in CAH by decreasing LOS and readmission rates. Readmission rates within 30 days and LOS are often used as clinical indicators of the quality of care that is received by patients. The ACE unit model of care has been shown to reduce LOS and readmissions rates within 30 days, while also decreasing healthcare costs in large hospitals and academic settings. This study showed similar results in a rural CAH. Given the projection for the aging population and healthcare expenditures to rise exponentially over the next 20 years, healthcare administrators must look into the future and adopt specialized models of care, such as the ACE unit, that take full advantage of evidence-based interventions that focus on the unique needs of older adults.

Conclusion

This retrospective, quantitative study was conducted to determine if there was a statistically significant relationship between pre- and post-implementation of an ACE unit in a Mississippi CAH and LOS and readmission rates within 30 days. Although ACE units are known to decrease LOS and readmission rates in large urban and academic hospitals, there was no research that assessed the impact that ACE units in CAHs and rural hospitals have on LOS and readmission rates. This study addressed that gap in knowledge by the completion of multiple linear regression and binomial logistic regression that showed a statically significant relationship between pre- and post-implementation of an ACE unit in a Mississippi CAH and LOS. Although there was no

statically significant relationship found between pre- and post-implementation of an ACE unit in a Mississippi CAH and readmission rates within 30 days, there was a noted downward trend in readmission rates during the post-implementation period. Although the sample size was large enough for this study, a larger sample size with more readmissions would be required to form a decisive relationship between readmission and ACE unit implementation.

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