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Hospital-Acquired Condition Ranking Score Among Types of Safety-Net Hospitals

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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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Walden University
2020

Abstract

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MPA, Clark Atlanta University, 2017

BBA, Kennesaw State University 2011

Doctoral Study Submitted in Partial Fulfillment

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Doctor of Healthcare Administration

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Abstract

The Center for Medicare and Medicaid Services has been shifting from paying hospitals for the volume of services they delivered to paying them for the quality of those services, known as pay-for-performance, to incentivize hospitals to offer improved care at a lower cost. When a patient goes to the hospital to receive care for one condition and develops another condition during that hospital stay, the second condition is referred to as a hospital-acquired condition. It is anticipated that 1.7 million infections are acquired at some point in-hospital stay in the United States annually, resulting in nearly 100,000 deaths in addition to $20 billion in cost. The present study investigated the association between the Central-Line-Associated Bloodstream Infection, Catheter-Associated Urinary Tract Infection, and Methicillin-Resistant Staphylococcus Aureus total ranking scores and hospital ownership in safety-net hospitals. The theoretical framework for this study comprised the Donabedian model. The study employed a quantitative cross-sectional research design using multiple linear regression analyses. The main finding of this study suggested no association between hospital-acquired condition rate and safety-net hospitals, except for types of safety-net hospital's influence on total hospital-acquired condition score. A decrease in Hospital Acquired Infections could not only help with the economic efficiency of hospitals but also its corporate social responsibility. Identification and study of strategies to decrease hospital-acquired infections might increase awareness of the influences of infection on the safety of patients, healthcare workers, and visitors leading to positive social change.

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Dedication

First and foremost, praises and thanks to God, the Almighty, for His mercy and shower of blessing upon my life. Many times, when I felt down and helpless, Psalm. 25:1-5 and Isaiah. 41:10,13 was and still is, my scripture of comfort. This dissertation is dedicated to my wife, Mrs. Veronica C. Iruka for her love, understanding, prayer, continuing formidable support, as well as words of encouragement. To my children, Ferguson, Jude Jr, Queenette, and Sydney Iruka, this is for you. I also dedicate this work to my late grandmother, Margine (Ahudiya) Iruka. I would not be where I am today if not for your sacrifices and your unconditional imprint of love in my life. You encouraged me to work hard to establish a foundation of independence to better myself and to take advantage of every opportunity that God bless me with. You were always my first and my number one supporter, no matter my shortcomings. Nne, you will always be in my heart.

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Section 1: Foundation of the Study and Literature Review

Healthcare has experienced remarkable changes in the years since the passing of the Affordable Care Act (ACA) in 2010. The Center for Medicare and Medicaid Services (CMS) has been shifting from paying hospitals for the volume of services to the quality of those services know as pay-for-performance to incentivize hospitals to offer improved care at a lower cost (Brooks, 2017). According to Brooks (2017), the CMS initiated three pay-for-performance programs centered on enhancing care quality in acute care hospitals known as Hospital Value-Based Purchasing Program (HVBPP), Hospital Readmission Reduction Program (HRRP), and Hospital-Acquired Conditions Reduction Program (HACRP). HACRP was a national pay-for-performance program that comprises a measure of Surgical Site Infection (SSI) following hysterectomy as well as colectomy (Morganwge et al., 2018).

A decrease in mortality and morbidity from hospital-acquired conditions (HAC) was the main concern for the US health system (Sankaran, et al., 2019). The HACRP was established by the ACA to offer effective inducements for hospitals to decrease HACs. Hospital-Acquired Infections (HAIs) can exacerbate the patient's condition, hamper clinical treatment, lengthen hospitalization time, increase treatment expenditures and re-admission rate within 30 days, and lead to serious disability and death (Wang, et al., 2019). Consequently, Wang, et al. (2019) argued that it triggers medical instabilities and intensifies the economic burden on society and the individual. HAIs, escalate length of stay, mortality, as well as the cost of care (Johnson, 2018). These preventable costs with prospective legal liability (Johnson, 2018) may compromise the organization's financial

health and reputation for delivering safe, high-quality care. HAIs affect patient safety, and ethical, regulatory, financial, and legal risk (Johnson, 2018). Several studies have established that interventions using evidence-based approaches can avert the incidence of HAI, suggesting that prevention and control of infection was the foundation of patient safety practice, and HAI was a significant threat to patient safety (Wang, et al., 2019).

According to Al Mohajer et al. (2018), it was anticipated that 1.7 million infections are acquired in hospital stays in the United States annually, resulting in nearly 100,000 deaths and $20 billion in cost. Consequently, the CMS took steps to reduce HAIs as well as decrease the related financial cost. Brooks (2017) observed five HAIs (central-line-associated bloodstream infection [CLABSI], catheter-associated urinary tract infection [CAUTI], SSI abdominal hysterectomy and colon, methicillin-resistant *Staphylococcus aureus* [MRSA] bacteremia, and C. *difficile* in Domain 2 fo the HAC reduction program.) All hospitals are required to report these infections to the NHSH.

Research on hospital characteristics associated with penalization in the HAC program observed that hospitals were more probable to be reprimanded if they were accredited by The Joint Commission or were teaching hospitals. In general, hospitals that were penalized in fiscal year (FY) 2015 had more quality accreditation, offered superior services, were major teaching hospitals, and had a better operation on other processes and outcome measures (Brooks, 2017). It was a known fact that types of ownership, as well as financing systems, are significant factors in describing how hospitals operate, which services they offer, and to whom these services are available (Bjorvatn, 2018).

Health Information Exchange (HIE) was meant to enable coordinated transitions of care as well as avoid medical errors by permitting healthcare providers to retrieve their patients' most recent health records (Malhani, et al., 2019). Several health policies comprising the Meaningful Use Incentive Program are urging healthcare providers to electronically exchange major clinical information during patient care transition (Malhani et al., 2019). Hospitals owned by government entities (Malhani et al., 2019) can participate in less HIE use upon emergency department visits compared to not-for-profit hospitals. The gap in HIE use among various hospital types could be due to the capability of not-for-profit hospitals to receive tax exemption as well as donations, which offer them better access to capital for the HIE investment (Malhani, et al., 2019).

Studies have shown that larger facilities regularly have lower staff to resident ratios and more frequently focus on profit maximization rather than the quality of outcomes for residents (Frey, et al., 2019). Although some researchers suggest a lower quality of care at private hospitals, Bjorvatn (2018) argued that others find no variation in quality by ownership type. Hospital ownership ranges from the public (government-owned), to quasi-public (not-for-profit), to private (for-profit-hospitals).

An increasing amount of research has explored the influence of the ownership model (for-profit and not-for-profit) on economic performance or outcome for residential aged care residents (Frey et al., 2019). Evidence (Frey et al., 2019) indicates that residents in nonprofit facilities have superior health outcomes than those in for-profit facilities, even though financial performance tends to encourage the for-profit sector. Furthermore, quality-of-care problems seem to be more noticeable in for-profit facilities

owned by a corporate chain (Frey, et al, 2019). Although Bjorvatn (2018) concluded that the evidence on quality of care concerning hospital ownership is inconclusive. This study aimed to investigate the association between CLABSI, CAUTI, and MRSA to ranking score and hospital ownership in safety-net hospitals in the United States.

Problem Statement

When a patient goes to the hospital to receive care for one condition and develops another condition during that hospital stay, the second condition is referred to as a hospital-acquired condition. Examples of hospital-acquired conditions comprise pressure ulcers, adverse drug events, infections at the site of surgery, conditions related to the use of a catheter, and falls during the hospital stay. As part of its endeavor to become a more prudent payor of health care services, Medicare has established inducement for hospitals to prevent making patients sicker instead of healthier through their stay. These hospital-acquired conditions can lead to inadequate patient outcomes as well as higher payout on health care (Cassidy, 2015).

HAIs come with significant morbidity and mortality. About 1.7 million infections are acquired at some point during an in-hospital stay in the United States annually, resulting in nearly 100,000 deaths in addition to $20 billion of cost (Mohajer et al.2018). Decreasing mortality and morbidity from hospital-acquired conditions was a national priority in the United States (Sankaran et al., 2019). The ACA instituted (HACRP), a pay-for-performance program intended to promote the reduction of adverse events in hospitals (Morgan et al., 2018).

HAIs remain a danger to patient safety as well as to the fiscal sustainability of healthcare facilities under the pay-for-performance (PFP) system (Vokes et al., 2018). Implementation of PFP system in healthcare, Vokes et al. (2018) argue, suggests opportunity as well as challenge for administrators and clinicians seeking to enhance healthcare delivery. Hospital administrators play a fundamental part in decreasing HAIs given their managerial duties to allocate resources as well as institute goals for their facilities (Vokes, et al., 2018). In a progressively multifaceted healthcare environment, hospital administrators must work closely with clinicians and epidemiologists to ensure the implementation of contemporary evidence-based guidelines in addition to sustaining robust infection control programming (Vokes et al., 2018).

The 2005 Deficit Reduction Act compelled the Secretary of Health and Human Services to exercise evidence-based medicine to identify avoidable ailments, as well as hospital-acquired conditions. On October 1, 2008, CMS began to deny payments to hospitals for the treatment of 10 of those HACs, as well as three HAIs know as CLABSIs, CAUTISs, and SSIs, which make up half of all reported hospital-acquired conditions and resulted in the program releasing financial penalties to hospitals in the worst 25% for HACRP scores in 2014 (Al Mohajer et al., 2018).

The HACRP necessitated the CMS withhold 1% of future payment for hospitals placed in the lowest quartile of scores. which resulted in 769 hospitals' shortfall of more than $400 million as a penalty for being in the worst quartile of HACRP scores (Morgan et al., 2018). The HACRP began in FY 2015 and engaged three measures: Patient Safety Indicators (PSI), CLABSIs, and CAUTIs. It then added SSI after colon surgeries and

abdominal hysterectomies in FY16 as well as methicillin-resistant *Staphylococcus* infection and *Clostridium difficile* infection in FY17 (Al Mohajer et al, 2018).

Purpose of the Study

The purpose of this study was to investigate the association between the CLABSI, CAUTI, MRSA, and TOTAL HAC scores and types of hospital ownership among safety-net hospitals in the United States. Although there are numerous studies on hospital-acquired condition reduction programs, this study contained three dependent variables that construct the HACRP, which comprises the CLABSI, CAUTI, and MRSA. The major independent variables in this study center on the types of hospital ownership and safety-net hospitals classified in the following main categories: government-owned, for-profit, and not-for-profit Federally Qualified Health Centers (FQHCs), Rural Health Centers (RHCs), and Community Health Centers (CHCs) (Hamadi et al., 2020).

HAC denotes critical reportable events in a hospital that comprises staid adverse events as well as a significant increase in expenses (Moghadamyeghaneh et al., 2019). This study analyzed both the nature and extent of the relationship between the HAC total ranking scores and ownership among safety-net hospitals. Analyzing the extent of the relationship implies analyzing whether the relationship was statistically significant or statistically insignificant. Recent studies suggest that hospitals caring for more underprivileged patients are more likely to be reprimanded under the HACRP. Another study found that among hospitals taking part in the HAC Reduction Program, those that were reprimanded more regularly had more quality accreditations offered superior services, were major teaching institutions, and had better performance on other

procedures and outcome measures. These absurd discoveries indicate that the method for measuring hospital penalties in the HAC Reduction Program warrants improvement to ensure it was achieving the expected goals (Rajaram, et al., 2015).

Research Question(s) and Hypothesis

RQ1: Is there an association between MRSA rates and type of hospital ownership?

$H_0$1: There is no association between MRSA rates and type of hospital ownership

H_a1: There is an association between MRSA rates and type of hospital ownership.

RQ2: Is there an association between CLABSI rates and type of hospital ownership?

$H_0$2: There is no association between CLABSI rates and type of hospital ownership.

H_a2: There is an association between CLABSI rates and type of hospital ownership.

RQ3: Is there an association between CAUTI rates and type of hospital ownership?

$H_0$3: There is no association between CAUTI rates and type of hospital ownership.

H_a3: There is an association between CAUTI rates and type of hospital ownership.

RQ4: Is there an association between MRSA rates and type of safety-net hospital?

$H_0$4: There is no association between MRSA rates and type of safety-net hospital.

H_a4: There is an association between MRSA rates and type of safety-net hospital.

RQ5: Is there an association between CLABSI rates and type of safety-net hospital?

$H_0 5$: There is no association between CLABSI rates and type of safety-net hospital.

$H_a 5$: There is an association between CLABSI rates and type of safety-net hospital.

RQ6: Is there an association between CAUTI rates and type of safety-net hospital?

$H_0 6$: There is no association between CAUTI rates and type of safety-net hospital.

$H_a 6$: There is an association between CAUTI rates and type of safety-net hospital.

Theoretical Foundation for the Study

The theoretical framework for this study comprised the Donabedian model, which was the most universal and comprehensive quality assessment framework (Mulnea et al., 2020). The Donabedian model is a theoretical model for quality measurement, integrating three key components: structure of care, the process of care, and outcomes of care (Sund et al., 2015). There was a connection between these key elements; that is, structure predicted both process and outcome of care, and better processes predicted better functional outcomes, as well as user gratification (Sund, Iwarsson, & Brandt, 2015).

Hospital ownership ranges from the public (government-owned), to quasi-public(nonprofit), to private(for-profit-hospital). While safety-net hospitals consist of FQHCs, RHCs, CHCs, and 340B hospitals -a program that afforded safety-net hospitals

that qualify as covered entities the opportunity to purchase outpatient medications at a highly discounted price (Thomas & Schulman, 2020).

For-profit (purely private) hospital ownership involves being owned by stakeholders, with profitability as the compelling force and less political oversight than nonprofit and government bodies (Gabriel et al., 2018). On the other hand, the government (purely public) hospitals are controlled by a government body and are motivated by survival and overseen by political regulation (Gabriel et al., 2018). Gabriel et al. (2018) conceptualize nonprofit (quasi-public) hospital ownership as a private hospital that chooses to follow government bylaws by choice rather than a requirement.

Many researchers agree that quality drives operational efficiency, competitive benefit, performance distinction, continued profitability, and value-added practices (Fuller, et al., 2019). While there are numerous studies of HACRP, this study examined the association between the independent variable and dependent variables. The dependent variables of interest were CLABSIs, CAUTIs, and MRSA, while the independent variables of interest were hospital ownership types (government, not-for-profit or profit and safety-net hospitals; Gabriel et al., 2018).

Applying the Donabedian model revealed that weakness in data gathering processes lead to challenges in quantitative outcome evaluation, excluding robust quantitative analysis, which underlines the importance of inquiring about the implementation of evaluation-oriented for routing data collection (Gentry et al., 2018). According to Gentry et al. (2018), workers have the propensity to explain their tasks carefully, but quality management necessitates employees to understand how their

performance influences the general system as well as customers' satisfaction. All works are a process, and only by understanding systems will we be able to apply a real change, i.e., be able to determine the true sources of a problem instead of merely improving its symptoms. The foundation of quality improvement in other businesses is system theory, which is the capability to view processes as a set of imputes, throughputs, outputs, and outcomes regulated by effective feedback that continually keeps in view the objectives of the system. It is not enough to emphasize how parts of a system are operating; all parts of a system must be organized to attain the desired outcome (Gentry et al., 2018).

Nature of the Study

The nature of the study employed a quantitative cross-sectional research design utilizing multiple linear regression analysis. The rationale for the study design was to examine the association between the independent and dependent variables. The dependent variables of interest were CLABSI, CAUTI, MRSA, and total HAC score; the independent variables of interest were types of hospital ownership and safety-net hospitals. This study analyzed secondary data for total hospital-acquired conditions scores for safety-net hospitals and 340B hospitals participating in the HACRP acquired from the CMS website for the fiscal year 2020.

Literature Review

When a patient goes to the hospital to receive care for one ailment and develops another condition such as pressure ulcers, diverse drug event, infections at the site of the surgery, or related to the use of a catheter, as well as falls during that hospital stay, the second condition is referred to as hospital-acquired condition (Cassidy, 2015). Hospital-

Acquired Conditions (HACs) were defined by the National Quality Forum and Centers for Medicare and Medicaid Services (CMS) as serious reportable events in hospitals that encompass serious adverse events and significantly increase expenses. These events are considered preventable and can be reliable measurements of the quality and safety of patient care in hospitals. The CMS adopted a no reimbursement policy for HACs in 2008 which limits the ability of hospitals to bill Medicare for this. Also, a new CMS payment reduction policy was adopted in 2018 with the name of the HAC Reduction Program of the CMS. The HAC Reduction Program was a program that links Medicare payment to healthcare quality with a PFP setting to adjust payment to hospitals that rank in the worst-performing 25 percent of all subsection hospitals concerning HAC quality measures (Moghadamyeghaneh, et al., 2020).

Hospital-acquired conditions can significantly increase medical care costs, both in the hospital stay during which the HAC occurs know as index hospitalization, and in subsequent healthcare encounters that might have been triggered by the HAC or that might have been less resource-intensive in the absence of the HAC (Coomer & Kandilov, 2016). Although many analyses focus on the costs in the hospitalization where the HAC occurs Coomer & Kandilov (2016) argue, subsequent or downstream services caused by the HAC can result in additional costs to both insurance payers and patients as well as additional financial costs to the patients that can come in the form of additional deductibles or higher copayments and coinsurance. The 2005 Deficit Reduction Act modified reimbursement for acute hospitalization of Medicare fee for service beneficiaries if a preventable complication occurred in a patient (Attenello, et al., 2015).

Hospital Attenello, et al. (2015) opine, were required to identify conditions that were high cost and or high volume and could have been prevented through the practice of evidence-based guidelines.

The Center for Medicare and Medicaid Service (CMS) currently monitors five hospital-acquired infections (HAIs) (CLABSI, CAUTI, SSI abdominal hysterectomy and colon, MRSA bacteremia, and C. difficile) in domain 2 of the HAC reduction program, and all hospitals are required to report these infections to the NHSN (Brooks J. A., 2017). The data for these five HAIs according to Brooks J. A. (2017), are extracted from the NHSN database to determine hospitals' domain 2 scores. Prevention and control of infection was a cornerstone of patient safety procedures, and HAI was a serious threat to patient safety. Hospital-acquired infection always complicates the patients' hospital stay and, at least temporarily, impair their quality of life (Mynarikova, et al., 2020). In the United States alone Mynarikova, et al. (2020) argues, HAIs affect 5-10% of patients admitted to hospitals, that was, nearly 2 million people a year A large number of studies (Wang, et al., 2019) opine, have confirmed that interventions using evidence-based strategies can prevent the occurrence of HAI. Accurate identification of the risk factors associated with HAI and early prevention and control play important parts in reducing its incidence. (Wang, et al., 2019). Decreasing mortality and morbidity from hospital-acquired conditions was a national main concern in the United States (Sankaran, et al., 2019). As part of its endeavor to become a more prudent payor of health care service according to Sankaran, et al. (2019), CMS initiated a HACRP through the United States Patient Protection and ACA to incentivize hospitals to decrease hospital-acquired

conditions. The purpose of this study was to investigate the association between clabsi, cauti, and mrsa total ranking score and hospital ownership in safety-net hospitals in the United State. In the subsequent section then this study will provide a review of literature related to the hospital-acquired conditions reduction program issue.

Literature Search Strategy and Keywords

The articles reviewed were researched using Google search, CINAHL & MEDLINE Combined Search, CINAHL Plus with Full Text, MEDLINE with Full Text, and ProQuest Health & Medical Collection provided by Walden Library. The articles were located via the following key terms: hospital-acquired conditions reduction program health acquired infection, healthcare quality, hospital ownership, affordable care act, and safety-net-hospital. The literature search conducted was performed with an emphasis on peer-reviewed primary publications with a period spanning 5 years (2015-2020).

Literature Review Related to Key Variables and /or Concept

Hospital-Acquired Condition Reduction Program

Al Mohajer, et al. (2018) performed univariate analysis to detect variables linked with total hospital-acquired conditions reduction program scores and Center for Medicare and Medicaid Service penalties for the FY15-FY17, and Logarithmic value was used for several staffed beds, length of stay, the total number of discharges, and gross patient revenue. The study found that HACRP leads to considerable disparity as it was presently applied. The research further revealed that teaching hospitals that are in general large, as well as have high percent acuity were extensively more likely to receive the CMS penalty parallel with small and nonteaching hospitals. Hospitals in the Northern region 1 and 2

and West regions 8, 9, and 10 according to (Al Mohajer, Joiner, & Nix, 2018), were more likely to be given the CMS penalty parallel to hospitals in the South region 4 and 6. Equating large and teaching hospitals with small hospitals (< 100 staffed beds) and non-teaching hospitals, (Al Mohajer, Joiner, & Nix, 2018) found no enhancement in HACRP scores for the large hospitals as well as teaching hospitals even though the large and teaching hospitals were less aware of the HACRP than the small and nonteaching hospitals.

Rajaram, et al. (2015) aimed to investigate the characteristics of hospitals penalized by the HAC Reduction Program, as well as appraise the relationship of a summary score of hospital characteristics connected to quality with penalization in the HAC program. The study used data for hospitals that partook in the FY2015 HAC Reduction Program acquired from CMS's hospital compare and combined with the 2014 American Hospital Association Annual Survey as well as FY2015 Medicare Impact File, established logistic regression models to study the relationship between hospital characteristics and HAC program penalization. An 8-point hospital quality summary score was initiated applying hospital characteristics linked to volume, accreditation, as well as proffering of advanced care services. The association between the hospital quality summary scores and HAC program penalization was analyzed and widely reported process-of-care and outcome measure were studied from 4 clinical areas (surgery, acute myocardial infarction, heart failure, pneumonia), as well as their correlation with the hospital quality summary score were evaluated (Rajaram, et al., 2015).

Of the 3284 hospitals that took part in the HAC program according to Rajaram, et al. (2015) 721 (11.0%) were penalzed. Hospitals were more prone to be reprmanded if they were accredited by the Joint Commission (24.0% accredited, 14.4% not accredited; odds ration [OR], 1.33; 95% CI, 1.04- 1.70); they were major teachng hospitals (42.3%; OR, 1.58; 95% CI, 1.09- 2.29) or very major teaching hospital (62.2%; OR 2.61; 95% CI, 1.55- 4.39 vs nonteaching hospital, 17.0%); they cared for more comlicated patients population based on the case mix index (quartile 4 vs quartile 1.32 8% vs 12.1%; OR 1.98%; 95% CI, 1.44- 2.71), or they were safety-net hospital vs non non-safety-net hospitals (28.3% vs 19.39%; OR, 1.36, 95% CI, 1.11- 1.68).

Hospitals with higher hospital quality summary scores had notably a superior performance on 9 of 10 publicly reported process and outcomes measure paralleled with a hospital that had lower quality scores (all $p \leq 0.1$ for trend. However, hospitals with the highest quality scores of 0 (67.3% [37/55] vs 12.6% [53/422]; $p < .001$ for trend). Centered on the above findings, Rajaram, et al. (2015) concluded that among hospitals partaking in the HAC Reduction Program, hospitals that were reprimanded more regularly accreditated, proffered advanced services, were major teaching institutions, as well as had better performance on other process and outcome measure. These puzzling result Rajaram, et al. (2015) opine, indicated that the methodology for evaluating hospital penalties in the HAC Reduction Program call for reassessment to ensure it was attaining the anticipated goals.

Sankaran, et al, (2019) applied a regression discontinuity study design to evaluate the relationship between hospital penalization in the United States Hospital-Acquired

Condition Reduction Program (HACRP) and preceding changes in clinical outcomes. This design influences the fact that hospitals directly above and below the financial penalty threshold are implausible to vary in ways that affect study outcomes (Sankaran, et al., 2019). The study found that penalization under the program was more prone to lard, academic medical centers as well as hospitals that are for a higher percentage of the underprivileged patient. Penalization Sankaran, et al. (2019) opine, was not connected with considerable general changes in the rate of hospital-acquired conditions and was not related to a noteworthy overall change in significant clinical outcomes with 30-day mortality, suggesting that financial penalties imposed against hospitals performing poorly un CMS's HACRP have not significantly enhanced patient safety.

Quality and Safety

O'Hara, et al. (2018) was a mixed-method study commenced July 2014 to February 2015, engaging professional discussion, consensus as well as statistical modeling to recognize indicators of quality and safety, institute a set of standards to appraise decision about which indicators were strong and positive measure as well as whether these can be used to classify positive deviants. The study found that several pointers used for exploring the quality and safety of healthcare services did not permit recognition of disparity at the level of the services or ward, which was crucial for quality and safety enhancement since large deviation was anticipated across services within a hospital, e.g fall in elderly medical wards are more common than on a maternity or pediatric ward (O'Hara, et al., 2018).

A study by Olley, et al. (2019), attempted to evaluate and summarize available research on nurse staffing method and relates these to outcomes under three overarching themes of (1) management of clinical risk, quality, and safety (2) development of a new or innovative staffing methodology and (3) equity of nursing workload. Using the PRISMA method, the study of searching relevant articles via the Griffith University Library electronic catalog, including articles on PubMed, cumulative Index to Nursing and Allied Health Literature (CINAHL), and Medline between 1st January 2010 and 30th April 2016 focusing on methodologies in an acute hospital inpatient units. Olley, et al. (2019) did not find enough evidence to conclude that either supply as well as demand models of nurse staffing or a statting ration method enhances the management of risk or increases the quality and safety of patient care. The study suggested a need to advance evidence-based nurse-sensitive outcome measures upon which staffing for safety, quality, and workplace equity, and an instrument that consistency and rationality projects nurse staffing requirement in a variety of clinical settings.

Risk Adjustment

Fuller, et al. (2019) compared the current cases with high-intensity codes to the circulation of cases by APR-DRG severity level. The study performed parallel stratification for mortality rates as well as the length of stay to reaffirm that the use of APR-DRG severity leveling offers risk adjustment of ICU to adjust for variation in patient acuity. Fuller, et al. (2019) reaffirmed concern that large and teaching hospitals with a difficult patient mix are the worst performers in terms of infection as well as complications. The scores according to Fuller, et al. (2019) was not illustrative of the

whole hospital since it was centered on a very small figure of complication and infection as well as the risk adjustment used in HACRP was insufficient. Fuller, et al. (2019) observed HACRP penalties to be sensitive to little changes in uncommon events, badly structured as well as proposing poor direction for both patients and hospitals.

Safety-net Hospital

According to Matlin Gilman, et al. (2015), Affordable Care Act has authorized that as the figure of people with health insurance coverage increase, and a crucial source of revenue for a safety-net hospital will be decreased: the disproportionate-share hospital (DSH) payment that hospital obtains from Medicare and Medicaid for serving excessively high numbers of poor patients covered by those insurance programs as well as offering uncompensated care to the poor. After observing the percentage of hospitals being subjected to Value-Based Purchasing. Matlin Gilman, et al. (2015) found that safety-net hospitals were more prone than other hospitals to be reprimanded under value-based-purchasing in 2014 as a consequence of their worse performance on process and patient experience score, which collectively accounted for 75 percent of a hospital's VBP payment adjustment in 2014. Even though safety-net hospitals were more probable to be reprimanded under VBP Matlin Gilman, et al. (2015) opine, the program 's use of mortality measure in 2014 did not have a disparate bearing on this hospital, whose actual performance on mortality for three conditions was marginally better than that of other hospitals. While safety-net hospitals were performing worse than other hospitals under VBP, the effect of the revenue program forfeited or gained in 2014 was expected to be small for most hospitals (Matlin Gilman, et al. (2015) Taken together, these findings

signify that safety-net hospitals are delivering better health outcomes than other hospitals, up till now are more probable to be reprimanded under a program that aims to improve and reward high performance (Matlin Gilman, et al., 2015).

A study by Bazzoli, et al. (2018), investigates the relationship between penalties assessed by Medicare's Hospital Readmission Reduction Program and Value-Based Purchasing Program and hospital financial condition. The study conducted a bivariate and multivariate analysis of pooled cross-sectional data of the Center for Medicare and Medicaid Service, American Hospital Association, and Area Health Resource File data for 4,824 hospital year examination. Bazzoli, et al. (2018) resolved that safety-net hospitals seemed to depend on nonpatient care revenues to compensate for higher penalization for the year studied. Bazzoli, et al. (2018), re-echoed that hospitals that take care of a large share of economically disadvantaged patients have suffered bigger HRRP or VBP penalties when associated with other hospitals. This higher penalization burden Bazzoli et al., (2018) complained, has elevated concern that risk adjustment methods exercised by the HRRP and VRP may not effectively account for the difficulty as well as costs of treating socioeconomically vulnerable patients and consequently, lead to disproportionate financial penalties for 340B hospitals.

Definitions

While there are numerous researches on hospital-acquired conditions reduction program (HACRP), this study review 3 dependent variables that construct the HACRP which comprises the Central-Line Associated Bloodstream Infection (CLABSI), Central-Associated Urinary Tract Infection (CAUTI), and Methicillin-Resistant Staphylococcus

Aureus (MRSA). The major independent variable in this study centers on hospital ownership and 340B safety-net hospitals. Hospital ownership was classified into the following three main categories: government-owned, for-profit, and not-for-profit hospitals (Hamadi, et al., 2020). 340B safety-net hospitals were classified in the following two categories: 340b and others. Other terms used in this study hospital-acquired infection, hospital-acquired conditions, and quality of health. The purpose of this study was to examine the association between the CLABSI, CAUTI, and MRSA ranking score, and types of hospital ownership and safety-net hospitals.

For-profit hospital: hospital owned by stakeholders with profitability as the compelling force with less political oversight than nonprofit and government bodies (Gabriel, et al., 2018).

Government-owned hospital: hospitals controlled by a government body motivated by survival as well as overseen by political regulation (Gabriel, et al., 2018).

Not-for-profit hospital: hospital ownership as a private hospital that chooses to follow government bylaws by choice rather than a requirement (Gabriel, et al., 2018).

Hospital-Acquired Infection: An infection acquired in a hospital or infection that begins in a hospital, however, it exhibits symptoms after discharge (Zhan, et al., 2018).

Hospital-Acquired conditions: A severe reportable events in a hospital incorporate life-threatening adverse events and significantly increase expenses that are deemed avoidable and can be a dependable measure of the quality and safety of patient care in hospitals (Moghadamyeghaneh, et al., 2019)

Safety-net hospital: A legally authorized or an adopted mission to uphold an open-door policy for all patients, irrespective of their competence to pay, or having a considerable share or their patient mix consist of uninsured, Medicaid, as well as other vulnerable patients (Hoehn, et al., 2016).

340b hospitals: A program that afforded safety-net hospitals that qualify as covered entities the opportunity to purchase outpatient medications at a highly discounted price (Thomas & Schulman, 2020).

Federally Qualified Health Centers (FQHCs): Independent, nonprofit organizations that assisted low-income populations in which 78% of patients live at or below 100% of the federal poverty level (Sanders, et al., 2018).

Community Health Centers (CHCs): Are nonprofit, community-focused primary care providers that treat all patients irrespective of the capability to pay as well as are well situated to attend to their patients' social needs (Kranz, et al., 2020).

Assumptions

I acknowledged that the size of the population involved in the data would be large. the major advantage of this study is that the data was accessible from CMS as well as comprised all the hospitals in the United States that reported hospital-acquired reduction program ranking scores. Another advantage was that the data was collected by NHSN. Finally, the data used was most recent, FY 2020, which provided the HAC total score.

Scope and Delimitations

Enhancements in the quality and safety of patient care in hospitals are the vital objective of the National Quality Forum (NQF) in the United States of America. National Quality Forum and Center for Medicare and Medicaid Services have published reports of severe reportable events in hospitals which include critical adverse events that are unease to both the public as well as to healthcare providers (Moghadamyeghaneh, et al., 2019). Prevention and control for infection are the basis of patient safety methods, and hospital-acquired infections (HAIs) according to (Wang, et al., 2019), are a significant danger to patient safety.

HAIs can worsen the patient's condition, critically meddle with clinical treatment, delay the patient's hospitalization time, multiply their treatment costs, and re-admission rate in 30 days, as well as advance to serious disability and death (Wang, et al., 2019). Earlier researches on risk factors as well as interventions for HAI have reflected the outlook of nurses. Nursing staff exemplifies the clinical front line in terms of staff connection with patients, coupled with they have a crucial part to play in hospital infection control. Consequently, this analysis deliberates HAI from the perception of the nursing staff care quality in the safety-net hospitals in the United States as a significant element influencing the advancement of hospital-acquired infections (Wang, et al., 2019).

An important consideration influencing the advancement of hospital-acquired infections (HAIs) was nursing care quality, referred to as nursing care needed by patients that are skipped, either in part or whole or deferred, which was regularly perceived as a lack-of-time issue that causes a process of implicit rationing in clinical priorities set by

nurses and nursing staff (Mynarikova, et al., 2020). The reason for overlooked nursing care Mynarikova, et al. (2020) argue, are labor resources, material resources. Communication as well as the work environment.

Cirrhosis-associated immune dysfunction syndrome (CAIDS) has been discovered in patients with liver cirrhosis (Mynarikova, et al., 2020). Nutritional status was regularly reduced among patients with liver cirrhosis, along with this result in malnutrition in more than 50% of the cases (Ciocirian, et al., 2019). Understanding the significance of nutrition in the management of cirrhosis is essential to help enhance clinical outcomes in this frequently fragile patient population (Raman, et al., 2020). Nurses play a vital role in symptom assessment, also, they may use the observation from the integrative evaluation to integrate fundamental symptom methods among the chronic liver disease population as well as enhance the advancement and administration of symptom management intervention (Kyungeh, et al., 2015).

Irrespective of the evolution of nursing practice, some procedure and proficiencies remain fundamental to nurses' competency to provide person-centered care, and the aptitude to perform or commence aseptic technique was one of these, together with observation, hand hygiene, medication management as well as cardiopulmonary resuscitation (Gallagher, 2019). The origins of modern-day aseptic practice rest in the advancement of asepsis in surgery., along with environment control employed decreasing the risk of contamination of the unprotected wound. Louis Pasteur's germ theory, which displaces the ideal that foul-smelling air (miasma) spread disease as well as triggered infection, was ultimately utilized in nursing practice and proffered beyond the operating

theatre to all car setting and situation. On the other hand, the acknowledgment of germs theory by leaders such as Florence Nightingale led to a concentration on the significance of cleanliness as well as prevention of contamination from direct and indirect physical contact (Gallagher, 2019).

Significance, Summary, and Conclusions

The objective of HACRP as proposed by the Affordable Care Act (ACA) of 2015 was to enhance the quality of health services through the reduction of infections as well as scores at the hospital. HACRP is expected to withhold reimbursement of 1 percent annually from poor performing healthcare facilities that fall to achieve this goal. The relationship between services and payments was initiated to persuade the hospital to deliver improved healthcare facilities. On the other hand, the program has encountered opposition since it was introduced with experts disclosing that the hospital-acquired conditions method of reducing payments uses a non-scientific cutoff.

The American Hospital Association (AHA) in 2018 did a study and published an analysis suggesting that out of 728 hospitals that had been reprimanded in 2017, 41% of them had patient safety indexes greater than those of facilities that had not been penalized also. 45% of the facilities that had been penalized in the year 2015 were teaching hospitals. Therefore, combining the two studied concludes that teaching hospitals are more likely to face penalties than nonteaching institutions irrespective of the fact that the former might have better patient conditions than the latter. That was not the purpose of the HACRP program when it was introduced under the Obamacare Act of 2015. There

was a need for reform to make sure that payment for quality services in encourage but at the same point does not harm facilities that have better patients' services.

Besides, because teaching facilities receive patients with high susceptibility to infections and have poor health status, these facilities constantly and religiously conduct thorough tests for patient's infection. This might not be the case in other non-teaching facilities and that means teaching facilities are punished for doing their jobs thoroughly. The more tests are conducted the more problem are uncovered and that means statistically teaching hospitals might look worse than nonteaching medical facilities which are not the case. Lowering the standard of teaching hospitals based on such data does not reflect the purpose for which HACRP was introduced by the ACA.

Another area of concern is on hospital ratings being used based on the patient's safety index. In the past, medical facilities have faced criticism for different measurements of hospital quality that they use. Under HACRP, an analysis by the Kaiser Health News found that some of the penalized hospitals were actually on the list of the best hospital honor according to the Beker's Hospital CFO Report and KNH research. The discussion in this study adds weight to the unintended effects of a pay-for-performance program that was based on the patient's safety index. This leads to increased health disparities and a poor definition of what it means by quality services in a hospital (Rajaram, et al., 2015). The results after analysis of various scholarly material suggest that a revision of the methodology used to achieve the recommended HACRP condition is urgently needed.

Section 2: Research Design and Data Collection

Introduction

Decreasing mortality and morbidity from hospital-acquired conditions was the main concern for the US Health System (Sankaran et al., 2019). The HACRP was established by the United States Patient Protection and ACA to offer an effective inducement for hospitals to decrease hospital-acquired conditions (Sankaran, Gulseren, Zlotnick, & Ryan, 2019). When a patient goes to the hospital to receive care for a condition and develops a different ailment during the hospital stay, the second condition is referred to as a HAC. Examples of (HACs) include pressure ulcers, adverse drug events, and infection at the site of the surgery, or are related to the use of a catheter or falls during the hospital stay. These HACs can lead to inadequate patient outcomes as well as high payout on health care (Cassidy, 2015). It was anticipated that 1.7 million infections are acquired at some point in hospital stays in the United States annually, resulting in nearly 100,000 deaths in addition to $20 billion in cost (Al Mohajer et al., 2018).

HAIs are related to significant morbidity and mortality (Al Mohajer et al., 2018). HAIs can exacerbate the patient's condition, critically hamper clinical treatment, lengthen the patient's hospitalization time, lead to serious disability and death, and increase their treatment expenditure as well as re-admission rate (Wang, et al., 2019). Consequently, the (CMS) took steps to reduce HAIs as well as decrease the related financial cost. The CMS, according to Brooks (2017), presently observes five HAIs (CLABSI, CAUTI, SSI,

abdominal hysterectomy and colon, MRSA bacteremia, and C. difficile) in domain 2 of the HAC reduction program.

Types of ownership and categories of safety-net hospitals are significant factors in describing how hospitals operate, which services they offer, and to whom these services are available (Bjorvatn, 2018). The purpose of this study was to investigate the association between CLABIS, CAUTI, and MRSAtotal ranking scores and hospital ownership in safety-net hospitals in the United States. In this study, I analyzed both the nature and the extent of the relationship between HACs total ranking score and hospital ownership. Analyzing the extent of a relationship implies analyzing whether the relationship was statistically significant or statistically insignificant. The Patient and ACA instituted HACRP to promote the reduction of an adverse event in hospitals (Morgan, et al., 2018). The 2005 Deficit Reduction Act compelled the Secretary of Health and Human Services to exercise evidence-based medicine to identify avoidable ailments and (HACs).

Research Design and Rationale

The dependent variables examined in this study included three HACs outcomes (CLABSI, CAUTI, MRSA, and TOTAL HAC SCORE), while the independent variables examined were types of hospital ownership and 340B hospitals. To determine if the independent process and structure variable predict the dependent outcome variables, I used a quantitative nonexperimental design using cross-sectional archival data from the CMS from FY16-FY18. This study used multiple linear regression to evaluate the

association between the independent variable and dependent variables controlling covariate.

The design option was consistent with other studies analyzing the hospital-acquired conditions reduction program. Rajaram et al. (2015) investigated the characteristics of hospitals penalized by the HAC Reduction Program, as well as appraise the relationship of a summary score of hospital characteristics connected to quality with penalization in the HAC program by creating a logistic regression model. Sankaran et al. (2019) applied a regression discontinuity study design to examine whether penalization was connected with improvement in the study outcome.

Methodology

Study Population

The target population for this study was safety-net hospitals in the United States. Safety-Net-Hospitals (SNHs) in the United States care for individuals and families irrespective of their aptitude to pay. Beginning in 1986, SNHs have accepted supplemental federal compensation through Medicare (DSH) disbursement. These disbursements have traditionally been calculated based on the percentage of hospital days accounted for by Medicare Supplemental Security Income plus Medicaid, non-Medicare inpatient days (Winkelman & Vickery, 2019).

Sample and Sampling Procedure

The secondary data set was acquired from the (CMS) website for FY 2020. The data set was meant for public access and use, and no license information was provided. The metadata was created on May 9, 2016, and was updated on February 26, 2016. This

study's analysis centered on 395 hospitals. Hospitals that are paid under other systems were exempted, such as Medicare's Critical Access Hospitals, Veterans Affairs hospitals, Indian Health Services Hospitals, and Children's hospital payment system. (AHA) annual survey data were merged with the (CDC) (NHSN) measure data to gather information on hospital ownership type, staffed number of beds, region, year, hospital size, and staff per patient.

Power Analysis

The connection between effect size and the sample size is fascinating. General use of effect size was in establishing the number of subjects to use in research to be convinced that a variation, if present, will be identified, likewise that a difference, if identified, was real. Power analysis was the method that was exercised for establishing the number of subjects that will be needed given a known or anticipated effect size (Gibson, 2015).

Power analysis was based on Type 1 and Type 2 error and the effect size (Kocadal, et al., 2015). This study used free G*Power software (www.phycho.uni-duesseldorf.ed/abtilungen/app/gpower3/) to conduct power analysis with a t-test, Linear multiple regression: Fixed model, single regression coefficient. Input parameter of the power analysis were as follows: Tail(s) = Two, Effect size $F^2 = 0.0200000$, α err prob = 0.05, Power (1-β err prob) = 0.80, and number of predictors = 12. The output parameters were: Noncentraliry parameter $\delta = 2.8106939$, Critical t = 1.966135, Df = 382, Total sample size = 395, and Actual power = 0.8005704.

Type I error (α error) was the probability of finding a disparity between two applications at the end of the test when there was no disparity. Type II error (β error) describes the non-finding of a variation among two applications when there is a difference. Type 2 error may be reduced by raising the sample size. In a scientific test, the objective was to keep the α error at 0.05, as well as the minimum '1-β' value at 0.80 levels (Kocadal, et al., 2015).

Operationalization of Variables

The CMS assigns each hospital score on numerous patients' outcome divided into two domains: domain 1 comprises Agency for Healthcare Research and Quality (AHRQ) patient safety indications (PSI), and domain 2 include Center for Disease Control and Prevention (CDC) National Healthcare Safety Network (NHSN) measure. Every patient outcome measure received a rating on a scale of 1 to 10, which signified the decile into which all hospital's performance falls as related to all other comparable hospitals nationally. Subsequently, the two domain scores are weighted distinctly, and a total HAC score is derived (Brooks J. A., 2017). Total HAC scores will be centered on data for the three-component measure. Center for Disease Control and Prevention (CDC) National Healthcare Safety Network (NHSN), CLABSI, CAUTI, and MRSA (Spaulding, et al., 2018). Four dependent variables and two independent variables were explored in this study. CLABSI, CAUTI, MRSA, and TOTAL HAC SCORE are the dependent variables, while types of hospital ownership and 340B hospitals are the independent variables. The scores for the dependent variable are continuous, while the independent variables are categorical. The 340B program afforded safety-net hospitals that quality as protected

units the opportunity to purchase outpatient medications at a highly discounted price (Thomas & Schulman, 2020). Under the law according to Thomas & Schulman (2020), pharmaceutical establishments are compelled to offer 340B hospitals a discount to be qualified to participate in the Medicaid program. While the accurate discount prices are confidential Thomas & Schulman (2020) revealed, the Department of Health and Human Services reports that 340B providers are offered a discount of between 25 percent to 50 percent on outpatient drug prices. Participating hospitals are assigned an overall score ranging from 1 to 10 where higher scores reflect the worst performer. 340B hospitals and ownership will be stated as categorical variables, and variables will be turned into dummy variables. while hospital ownership was grouped in the subsequent three core categories: government-owned hospitals for this study denoted non-federal community not-for-profit hospitals. For-profit hospitals are investor-owned hospitals, while not-for-profit hospitals are tax-exempt hospitals that file under section 501(C)(3) which permit federal tax exemption (Hamadi, et al., 2020). 340b hospitals were grouped into 340b and other groups. Hospital ownership according to Hamadi, et al. (2020) was deeply correlated with its community service proffering obligation under the Affordable Care Act of 2010 as well as the Internal Revenue Services taxation code. Not-for-profit hospitals provide community health services that are significantly linked to increased improvement in community health.

Data Analysis Plan

Statistical Package for Social Science (SPSS) Version 27 was used to analyze data associated with total HACRP scores and CMS penalties for FY16-FY18, acquired from

the Center for Medicare and Medicaid Services (CMS) website for the FY2020. This study used a cross-sectional design to investigate the relationship between HAC outcome scores and hospital ownership. The study constrained the analysis to include 804 non-federal safety-net hospitals participating in CMS's HACRP. Descriptive Analysis, One-Way ANOVA test, Univariate Analysis of Variance Test, and Nonparametric Test were used to summarize the final data set.

Threat to Validity

External Validity

Hospital-to-hospital difference information technology may result in disparities in the recognition of adverse events. For instance, electronic surveillance systems regularly help hospital infection preventionist in their detection of hospital-acquired infections (Rajaram, et al., 2015). Only 34.4% of NHSN facilities according to Rajaram, et al., (2015) used an electronic surveillance system. In the absence of these systems, the detection of hospital-acquired infection was done manually as wells mostly effort-dependent (Rajaram, et al., 2015). Unsatisfactory risk adjustment could also rationalize why hospitals with apparently higher levels of quality are penalized in the HAC program. Hospitals serving at-risk or medically complex patient populations may be penalized more frequently in CMS pay-for-performance programs. The CLABSI and CAUTI NHSN measures utilized in the HAC program, though clinically collected, similarly have risk-adjustment concerns. For both methods, risk adjustment was implemented using only three variables: type of patient care location, hospital affiliation with a medical school, and bed size (Rajaram, et al., 2015).

Internal Validity

Although HACRP assessed hospitals using measures from both the AHRQ PSI-90 and the Centers for Disease Control and Prevention's (CDC) National Healthcare Safety Network, because CDC data may not be available, this study outcome may contain only measures contained in the AHRQ PSI-90. In response to penalization, hospitals might selectively target CDC measures, with the understanding that those were more deeply weighted under the HACRP (Sankaran, et al., 2019).

Section 3: Presentation of the Results and Findings

Introduction

In this section, I describe my use of the Donabedian structure-dependent and independent variables, the process and outcome of care, the research questions, and the associated hypotheses. The purpose of this study was to investigate the association between the CLABSI, CAUTI, MRSA, and TOTAL HAC scores and types of hospital ownership among safety-net hospitals in the United States.

RQ1: Is there an association between MRSA rates and type of hospital ownership?

$H_0$1: There is no association between MRSA rates and type of hospital ownership

*H*a1: There is an association between MRSA rates and type of hospital ownership.

RQ2: Is there an association between CLABSI rates and type of hospital ownership?

$H_0$2: There is no association between CLABSI rates and type of hospital ownership.

*H*a2: There is an association between CLABSI rates and type of hospital ownership.

RQ3: Is there an association between CAUTI rates and type of hospital ownership?

$H_0$3: There is no association between CAUTI rates and type of hospital ownership.

*H*a3: There is an association between CAUTI rates and type of hospital ownership.

RQ4: Is there an association between MRSA rates and type of safety-net hospital?

$H_0$4: There is no association between MRSA rates and type of safety-net hospital.

*H*a4: There is an association between MRSA rates and type of safety-net hospital.

RQ5: Is there an association between CLABSI rates and type of safety-net hospital?

$H_0$5: There is no association between CLABSI rates and type of safety-net hospital.

H_a5: There is an association between CLABSI rates and type of safety-net hospital.

RQ6: Is there an association between CAUTI rates and type of safety-net hospital?

$H_0$6: There is no association between CAUTI rates and type of safety-net hospital.

*H*a6: There is an association between CAUTI rates and type of safety-net hospital.

Section 3 includes the results of the statistical analyses (cross-sectional) of data used from the (CMS) FY 2020. Section 3 also includes archival data from the (CDC) (NHSN) measure dataset from FY 2016 to FY 2018. This section provides a brief description of the time frame for data collection, response rates of the data set, discrepancies in the data set, descriptive and demographic characteristics of the sample, representativeness of the sample, univariate analysis of the sample, and a summary of the results.

Data Collection of Secondary Data

This study used archival data published by the CDC (NHSN)for the FY 2016 to FY 2018 on the CMS, a list of hospital-acquired conditions to force hospital accountability (Harrold, 2015). The CDC is the nation's most extensively used healthcare-associated infection tracking system that offers facilities and governments with data required to discover problem areas, assess the progress of prevention efforts, and eradicate healthcare-associated infections (CDC, n.d.).

The secondary data set initially comprised 3,225 hospitals from all 50 states and the District of Columbia that participated in the HAC Reduction Program. The data were filtered to safety-net hospitals. Of the 3,225 hospitals, only 804 were safety-net hospitals. The exclusion of the 2,421 hospitals may have resulted from not meeting the safety-net hospital criteria. The G*Power analysis required a minimum sample size of 395 (power = 0.80, alpha = 0.05, and effect size $F^2 = 0.02$), creating a limitation of the data set.

Descriptive Statistics

Table 1 represents the descriptive statistical data output for the study, using the result for 804 340B hospitals and other ownership type hospitals in the United States. Of these 804 hospitals, 711 were 340B hospitals and 93 hospitals were of other types. The analysis encompassed the dependent variables of hospital-acquired infection (CLABSI W, CAUTI W, MRSA W, and TOTAL HAC SCORES) and the independent variable of 340B hospitals and ownership-type hospitals. From the descriptive table, it was apparent that a variation existed in the means for the different infections recorded in the different hospitals. For instance, CAUTI W had the highest mean, whereas MRSA W had the

lowest mean. There were also differences in the standard deviations for the different infections (CLABSI W, CAUTI W, and MRSA W). However, further analysis was required to establish whether there was a significant variation in the variances for the different infection types. In terms of ranges, CAUTI W had the smallest minimum value, whereas MRSA W had the largest maximum value. For the infection types -CLABSI W, CAUTI W, MRSA W, and TOTAL HAC have skewness values that are within the range of -1 to +1. Consequently, the data for the different infection types did not meet the normality requirement; this is more evident from the histograms. On the other hand, the kurtosis values for all infection types are within the -1 to +1 range. Hence, the data meet the normality requirement. However, for CLABSI W and MRSA W, the kurtosis values are negative, meaning that the distribution of data for infection types is slightly flatter than normal. This can be seen from the histograms.

Table 1

Descriptive Statistics

		CLABSI W Z score	CAUTI W Z score	MRSA W Z score	TOTAL HAC score
N	Valid	637	708	603	804
	Missing	167	96	201	0
Mean		.070193	.093462	.013973	.057115
Mode		-1.4459	-1.5354	-1.4453	-.7602[a]
Std. deviation		.9674973	.9799889	.9433929	.5490050
Skewness		.422	.342	.578	.122
Std. error of skewness		.097	.092	.100	.086
Kurtosis		-.340	-.462	-.097	.195
Std. error of kurtosis		.193	.183	.199	.172
Minimum		-1.4459	-1.5354	-1.4453	-1.4352
Maximum		2.1941	2.1854	2.2502	2.3575

Note. a. Multiple modes exist. The smallest value is shown.

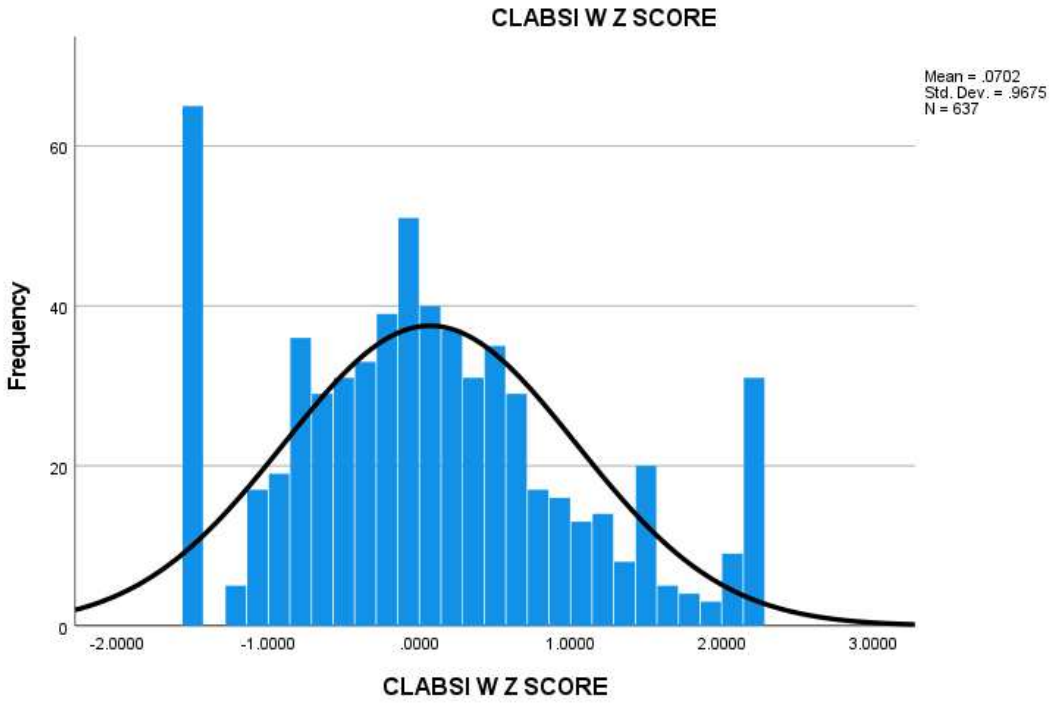

Figure 1. Histogram of selected variable – CLABSI W Z SCORE.

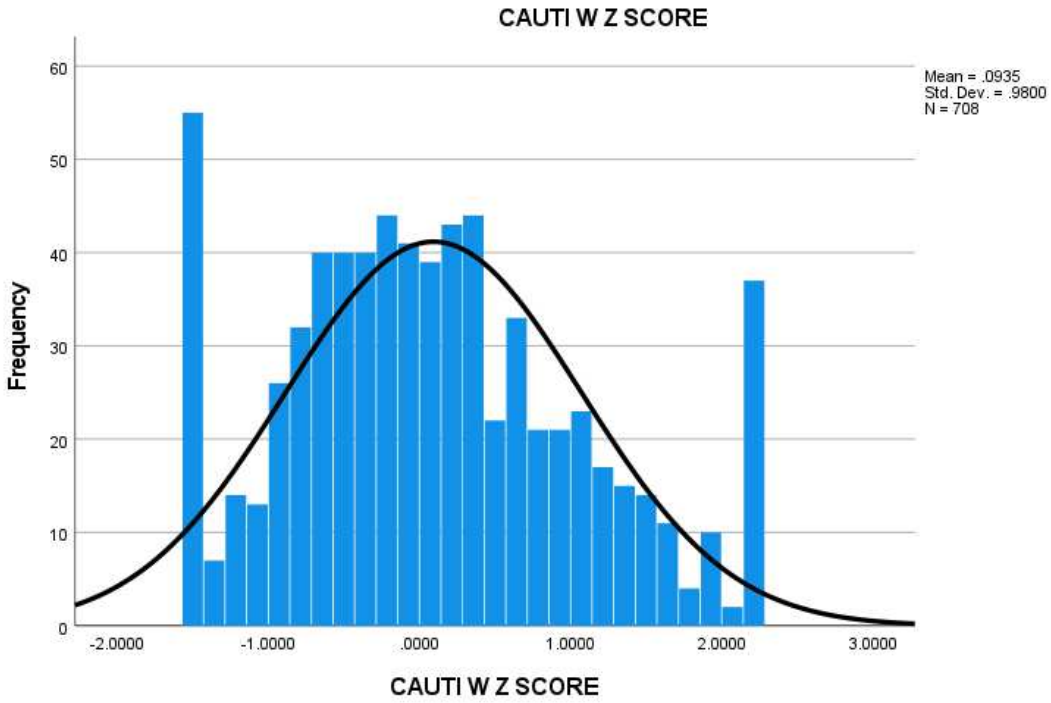

Figure 2. Histogram of selected variable – CAUTI W Z SCORE.

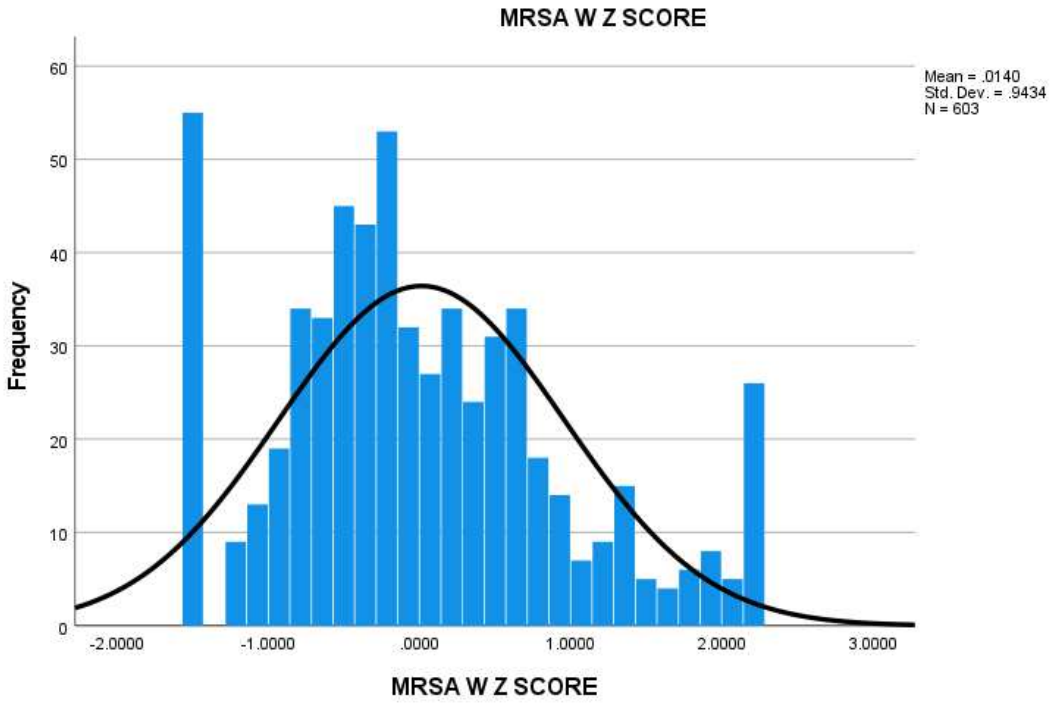

Figure 3. Histogram of selected variable – MRSA W Z SCORE.

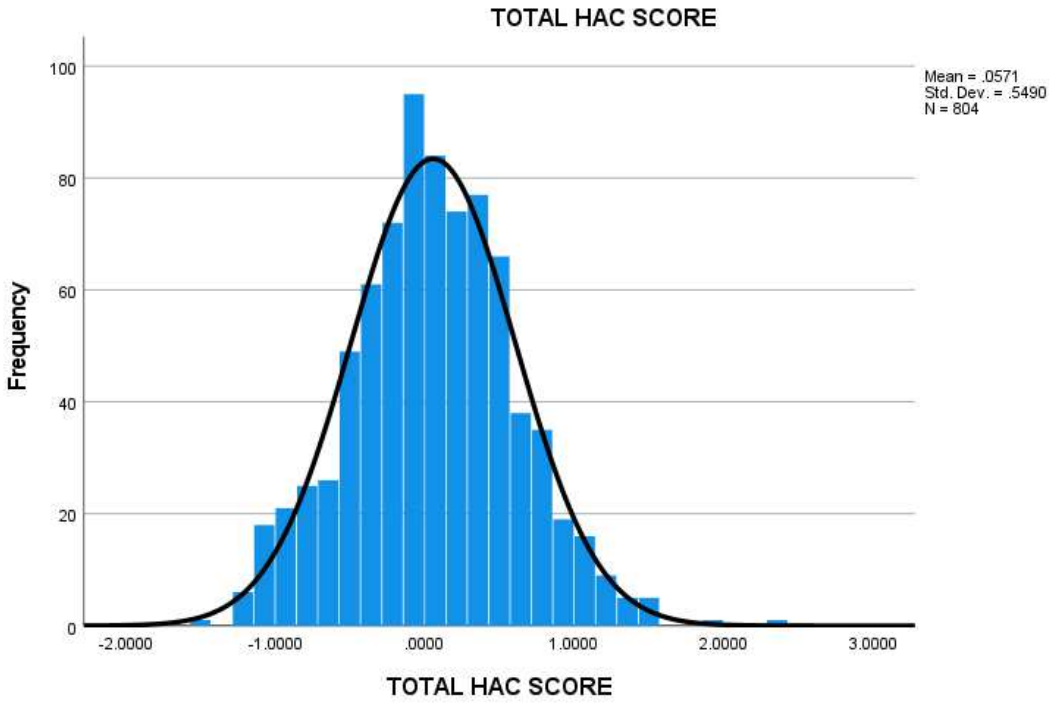

Figure 4. Histogram of selected variable – TOTAL HAC SCORE.

Table 2 and Table 3 represented the frequency and percentage distribution for 340B hospitals and OwnerCat hospitals, respectively. 340B hospitals are divided into two categories: other and 340B. The other category consists of 93 hospitals, whereas the 340B category consists of 711 hospitals, making a total of 804 hospitals. In terms of ownership (OwnerCat), the hospitals are categorized into government (189), nonprofit (517), and AllOther (98), making a total of 804. None of these categories (variables) had a missing value.

Table 2

340B Hospital Frequency and Percentage

		Frequency	Percentage	Valid percentage	Cumulative percentage
Valid	Other	93	11.6	11.6	11.6
	340B	711	88.4	88.4	100.0
	Total	804	100.0	100.0	

Table 3

OwnerCat Hospital Frequency and Percentage

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Government	189	23.5	23.5	23.5
	Nonprofit	517	64.3	64.3	87.8
	AllOther	98	12.2	12.2	100.0
	Total	804	100.0	100.0	

Test of Homogeneity of Variances, 340B Hospitals

Table 5 presents the Levene's test for dependent variable (CLASBI W, CAUTI W, MRSA W, and TOTAL HAC). In testing the homogeneity of variances, it was apparent from the table that all the significance values for the three infection types: CLABSI W, CAUTI W, and MRSA W, based on mean; median; median and with adjusted *df*; and based on trimmed mean are all greater than 0.05. CLABSI W (based on mean (1,635), $p = .964$; based on median (1,635), $p = .957$; based on median and with

adjusted *df* (1,634.927), *p* = .957; based on trimmed mean (1,635), *p* = .973), CAUTI W (based on mean (1,706), *p* = .067; based on median (1,706), *p* = .077; based on median and with adjusted *df* (1,701.979), *p* = .077; based on trimmed mean (1,706), *p* = .069), MRSA W (based on mean (1, 601), *p* = .075; based on median (1,601), *p* = .101; based on median and with adjusted *df* (1,598.006), *p* = .101; based on trimmed mean (1,601), *p* = .079), TOTAL HAC (based on mean (1,802), *p* = .893; based on median (1,802), *p* = .887; based on median and with adjusted *df* (1,798.308), *p* = .887; based on trimmed mean (1,802), *p* = .894). Because the significance values are greater than 0.05, Levene's test was nonsignificant and the variances are not statistically significant different. As such, equal variances are assumed for the ANOVA test

Table 4

Ownership Category Dependent Variable Comparison Table

Tests of Homogeneity of Variances					
		Levene's statistic	*df1*	*df2*	Sig.
CLABSI W Z SCORE	Based on mean	.002	1	635	.964
	Based on median	.003	1	635	.957
	Based on median and with adjusted *df*	.003	1	634.927	.957
	Based on trimmed mean	.001	1	635	.973
CAUTI W Z SCORE	Based on mean	3.353	1	706	.067
	Based on median	3.139	1	706	.077
	Based on median and with adjusted *df*	3.139	1	701.979	.077
	Based on trimmed mean	3.321	1	706	.069
MRSA W Z SCORE	Based on mean	3.184	1	601	.075
	Based on median	2.699	1	601	.101
	Based on median and with adjusted *df*	2.699	1	598.006	.101
	Based on trimmed mean	3.104	1	601	.079
TOTAL HAC SCORE	Based on mean	.018	1	802	.893
	Based on median	.020	1	802	.887
	Based on median and with adjusted *df*	.020	1	798.308	.887
	Based on trimmed mean	.018	1	802	.894

ANOVA

For CLABSI W, the significance value was 0.390 which was greater than the alpha value of 0.05. As such, the differences in means between and within groups are not statistically significantly different. For CAUTI W, the significance value was 0.505

which was greater than the alpha value of 0.05. Consequently, the differences in means between and within groups are not statistically significantly different. Also, for MRSA W, the significance value was 0.525 which was greater than 0.05. As such, the differences in means between and within groups are not statistically significantly different. However, for the TOTAL HAC, the significance was 0.018 which was less than 0.05. This means that the differences in means between and within groups are statistically significantly different.

Table 5

340B Hospital ANOVA Statistics Table

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
CLABSI W Z SCORE	Between Groups	.692	1	.692	.739	.390
	Within Groups	594.636	635	.936		
	Total	595.328	636			
CAUTI W Z SCORE	Between Groups	.428	1	.428	.445	.505
	Within Groups	678.559	706	.961		
	Total	678.987	707			
MRSA W Z SCORE	Between Groups	.361	1	.361	.405	.525
	Within Groups	535.413	601	.891		
	Total	535.774	602			
TOTAL HAC SCORE	Between Groups	1.673	1	1.673	5.581	.018
	Within Groups	240.357	802	.300		
	Total	242.029	803			

ANOVA Effect Sizes, df=340B Hospitals

The significance values from table 7 only indicate whether differences between and within groups are statistically significant. However, these significance values do not indicate how important the differences are. As such, an ANOVA effect size analysis was

conducted to determine the importance of the differences in means between and within groups. For CLASBI W the point estimate value of the eta-squared was 0.001, for CAUTI W the point estimate was 0.001, for MRSAW the point estimate was 0.001 and for TOTAL HAC the point estimate is 0.007. Therefore, for all the infection types, the effect size of the differences was less than 1%. Since the effect size was so low, they are not meaningful and hence lack any practical meaning. Therefore, though there are statistically significant differences in means between and within-group for TOTAL HAC, the differences are very small to the extent that they lack any practical meaningful

Table 6

340B Hospital Confidence Interval Table

ANOVA Effect Sizes[a,b]

			95% Confidence Interval	
		Point Estimate	Lower	Upper
CLABSI W Z SCORE	Eta-squared	.001	.000	.012
	Epsilon-squared	.000	-.002	.011
	Omega-squared Fixed-effect	.000	-.002	.011
	Omega-squared Random-effect	.000	-.002	.011
CAUTI W Z SCORE	Eta-squared	.001	.000	.010
	Epsilon-squared	-.001	-.001	.008
	Omega-squared Fixed-effect	-.001	-.001	.008
	Omega-squared Random-effect	-.001	-.001	.008
MRSA W Z SCORE	Eta-squared	.001	.000	.011
	Epsilon-squared	-.001	-.002	.009
	Omega-squared Fixed-effect	-.001	-.002	.009
	Omega-squared Random-effect	-.001	-.002	.009
TOTAL HAC SCORE	Eta-squared	.007	.000	.023
	Epsilon-squared	.006	-.001	.022
	Omega-squared Fixed-effect	.006	-.001	.021
	Omega-squared Random-effect	.006	-.001	.021

a. Eta-squared and Epsilon-squared are estimated based on the fixed-effect model.

b. Negative but less biased estimates are retained, not rounded to zero.

Test of Homogeneity of Variances, OwnerCat

When the degrees of freedom were OwnerCat category the values for significance for CLABSI were all greater than 0.05 (Based on mean = 0.626, based on median =

0.711, based on median and with adjusted df = 0.711, and based on trimmed mean = 0.661). Therefore, Levene's Test was non-significant and the variance was not statistically different. As such, an equal variance is assumed for the ANOVA test.

For CAUTI W, the significance values were all less than 0.05 (Based on mean = 0.006, based on median = 0.009, based on median and with adjusted df = 0.009, and based on trimmed mean = 0.007). Consequently, Levene's test was significant and the variances are statistically significantly different. As such, unequal variances are assumed for the ANOVA test.

For MRSA W, the significance values are all greater than 0.05 (Based on mean = 0.378, based on median = 0.460, based on median and with adjusted df = 0.460, and based on trimmed mean = 0.398). Therefore, Levene's Test is non-significant and the variances are not statistically significantly different. As such, an equal variance was assumed for the ANOVA test.

For TOTAL HAC, the significance values were also all greater than 0.05 (Based on mean = 0.276, based on median = 0.275, based on median and with adjusted df = 0.275, and based on trimmed mean= 0.273). Therefore, Levene's Test is non-significant and the variances are not statistically significantly different. As such, equal variances are assumed for the ANOVA test.

Table 7

Ownership Category Dependent Variable Comparison Test

Tests of Homogeneity of Variances

		Levene Statistic	df1	df2	Sig.
CLABSI W Z SCORE	Based on Mean	.469	2	634	.626
	Based on Median	.342	2	634	.711
	Based on Median and with adjusted df	.342	2	631.098	.711
	Based on trimmed mean	.414	2	634	.661
CAUTI W Z SCORE	Based on Mean	5.095	2	705	.006
	Based on Median	4.734	2	705	.009
	Based on Median and with adjusted df	4.734	2	691.921	.009
	Based on trimmed mean	5.025	2	705	.007
MRSA W Z SCORE	Based on Mean	.974	2	600	.378
	Based on Median	.777	2	600	.460
	Based on Median and with adjusted df	.777	2	598.172	.460
	Based on trimmed mean	.923	2	600	.398
TOTAL HAC SCORE	Based on Mean	1.291	2	801	.276
	Based on Median	1.293	2	801	.275
	Based on Median and with adjusted df	1.293	2	793.621	.275
	Based on trimmed mean	1.301	2	801	.273

ANOVA Ownership Category

Table 9 present the analysis of variance for the Ownership Category. The table showed CLABSI W, with a significance value of 0.299 which was greater than the alpha value of 0.05. As such, the difference in means between and within groups are not statistically significantly different. For CAUTI W, the significance value is 0.753 which was greater than the alpha value of 0.05. Consequently, the differences in means between and within groups are not statistically significantly different. Also, for MRSA W, the significance value was 0.602 which was greater than 0.05. As such, the difference in means between

and within groups are not statistically significantly different. For the TOTAL HAC, the significance was 0.796 which greater than 0.05. As such, the difference in means between and within groups are not statistically significantly different.

Table 8

Ownership Category ANOVA Statistics Table

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
CLABSI W Z SCORE	Between Groups	2.265	2	1.133	1.211	.299
	Within Groups	593.063	634	.935		
	Total	595.328	636			
CAUTI W Z SCORE	Between Groups	.545	2	.272	.283	.753
	Within Groups	678.442	705	.962		
	Total	678.987	707			
MRSA W Z SCORE	Between Groups	.905	2	.452	.507	.602
	Within Groups	534.869	600	.891		
	Total	535.774	602			
TOTAL HAC SCORE	Between Groups	.138	2	.069	.228	.796
	Within Groups	241.892	801	.302		
	Total	242.029	803			

and within groups are not statistically significantly different.

ANOVA Effect Size

Table 10 represents the Analysis of Variance for Ownership Category effect size. In the table, for CLABSI W, the point estimate value of the eta-squared is 0.004, for CAUTI W the point estimate was 0.001, for MRSA W, the point estimate was 0.002 and for TOTAL HAC the point estimate was 0.001. Therefore, for all the infection types, the

effect size of the differences was less than 1%. Since the effect sizes are so low, they are not meaningful and hence lack any practical significance. In other words, the differences are very small to the extent that they lack any practical meaning.

Table 9

Ownership Category Confidence Interval Table

ANOVA Effect Sizes[a,b]

			95% Confidence Interval	
		Point Estimate	Lower	Upper
CLABSI W Z SCORE	Eta-squared	.004	.000	.017
	Epsilon-squared	.001	-.003	.014
	Omega-squared Fixed-effect	.001	-.003	.014
	Omega-squared Random-effect	.000	-.002	.007
CAUTI W Z SCORE	Eta-squared	.001	.000	.007
	Epsilon-squared	-.002	-.003	.005
	Omega-squared Fixed-effect	-.002	-.003	.005
	Omega-squared Random-effect	-.001	-.001	.002
MRSA W Z SCORE	Eta-squared	.002	.000	.011
	Epsilon-squared	-.002	-.003	.008
	Omega-squared Fixed-effect	-.002	-.003	.008
	Omega-squared Random-effect	-.001	-.002	.004
TOTAL HAC SCORE	Eta-squared	.001	.000	.006
	Epsilon-squared	-.002	-.002	.003
	Omega-squared Fixed-effect	-.002	-.002	.003
	Omega-squared Random-effect	-.001	-.001	.002

a. Eta-squared and Epsilon-squared are estimated based on the fixed-effect model.

b. Negative but less biased estimates are retained, not rounded to zero.

Nonparametric Tests

Because the distribution of Z scores is not normal, further analysis was required. To test the distribution of the infection's types across the categories of the two groups of hospitals -340B Hospitals and OwnerCat -the independent samples Mann-Whitney U Test and the independent samples Kruskal-Wallis Test were conducted. For the CLABSI W, the null hypothesis was the distribution of CLABSI W Z SCORE was the same across categories of 340B HOSPITALS. From the independent sample Mann-Whitney U Test, the significance value was 0.510. since 0.510 is much greater than 0.05, there was no statistically significant difference in distribution. As such, the null hypothesis was retained. It was therefore concluded that the distribution of CLABSI W Z SCORE was the same across categories of 340B HOSPITALS.

Table 10

40B Hospitals CLABSI W Z Mann-Whitney U Test

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.[a,b]
1	The distribution of CLABSI W Z SCORE is the same across categories of 340B HOSPITALS.	Independent-Samples Mann-Whitney U Test	.510

Hypothesis Test Summary

	Decision
1	Retain the null hypothesis.

a. The significance level is .050.

b. Asymptotic significance is displayed.

For the OwnerCat hospitals, the null hypothesis was that the distribution of CLABSI W Z SCORE was the same across categories of OwnerCat. The results of the independent samples Kruskal-Wallis Test gave a significant value of 0.416. since 0.416 was much greater than 0.05, there was no statistically significant difference in distribution. As such, the null hypothesis was retained. It was therefore concluded that the distribution of CLABSI W Z SCORE was the same across categories of OwnerCat.

Table 11

OwnerCat CLABSI W Z Kruskal-Wallis Test

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.[a,b]
1	The distribution of CLABSI W Z SCORE is the same across categories of OwnerCat.	Independent-Samples Kruskal-Wallis Test	.416

Hypothesis Test Summary

	Decision
1	Retain the null hypothesis.

a. The significance level is .050.

b. Asymptotic significance is displayed.

For the CAUTI W, the null hypothesis was that the distribution of CAUTI W Z SCORE was the same across categories of 340B HOSPITALS. From the independent samples Mann-Whitney U Test, the significance value was 0.423. Since 0.423 was much greater than 0.05, there was no statistically significant difference in distribution. As such, the null hypothesis was retained. It was therefore concluded that the distribution of CAUTI W Z SCORE was the same across categories of 340B HOSPITAL.

Table 12

340B Hospitals CAUTI W Z Mann-Whitney U Test

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.[a,b]
1	The distribution of CAUTI W Z SCORE is the same across categories of 340B HOSPITALS.	Independent-Samples Mann-Whitney U Test	.423

Hypothesis Test Summary

	Decision
1	Retain the null hypothesis.

a. The significance level is .050.

b. Asymptotic significance is displayed.

For the OwnerCat hospitals, the null hypothesis was that the distribution of CAUTI W Z SCORE was the same across categories of OwnerCat. The results of the independent samples Kruskal-Wallis Test gave a significant value of 0.978. Since 0.978 was much greater than 0.05, there were no statistically significant differences in distribution. As such, the null hypothesis was retained. It was therefore concluded that the distribution of CAUTI W Z SCORE was the same across categories of OwnerCat

Table 13

OwnerCat CAUTI W Z Kruskal-Wallis Test

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.[a,b]
1	The distribution of CAUTI W Z SCORE is the same across categories of OwnerCat.	Independent-Samples Kruskal-Wallis Test	.978

Hypothesis Test Summary

	Decision
1	Retain the null hypothesis.

a. The significance level is .050.

b. Asymptotic significance is displayed.

For the MRSA W, the null hypothesis was that the distribution of MRSA W Z SCORE was the same across categories of 340B Hospitals. From the independent samples Mann-Whitney U Test, the significance value was 0.244. Since 0.244 was greater than 0.05, there was no statistically significant difference in distribution. As such, the null hypothesis was retained. It was therefore concluded that the distribution of MRSA W Z SCORE was the same across categories of 340B Hospitals.

Table 14

340B Hospitals MRSA W Z Mann-Whitney U Test

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.[a,b]
1	The distribution of MRSA W Z SCORE is the same across categories of 340B HOSPITALS.	Independent-Samples Mann-Whitney U Test	.244

Hypothesis Test Summary

	Decision
1	Retain the null hypothesis.

a. The significance level is .050.

b. Asymptotic significance is displayed.

For the OwnerCat Hospitals, the null hypothesis was that the distribution of MRSA W Z SCORE was the same across categories of OwnerCat. The results of the independent samples Kruskal-Wallis Test gave a significance value of 0.458. Since 0.458 was much greater than 0.05, there were no statistically significant differences in distribution. As such, the null hypothesis was retained. It was therefore concluded that the distribution of MRSA W Z SCORE was the same across categories of OwnerCat

Table 15

OwnerCat MRSA W Z Kruskal-Wallis Test

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.[a,b]
1	The distribution of MRSA W Z SCORE is the same across categories of OwnerCat.	Independent-Samples Kruskal-Wallis Test	.458

Hypothesis Test Summary

	Decision
1	Retain the null hypothesis.

a. The significance level is .050.

b. Asymptotic significance is displayed.

For the TOTAL HAC, the null hypothesis was that the distribution of TOTAL HAC SCORE was the same across categories of 340B Hospitals. From the independent samples Mann-Whitney U Test, the significance value was 0.020. Since 0.020 was much smaller than 0.05, there was a statistically significant difference in distribution. As such, the null hypothesis was rejected. It was therefore concluded that the distribution of TOTAL HAC SCORE was not the same across categories of 340B Hospitals.

Table 16

340B Hospitals TOTAL HAC Mann-Whitney U Test

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.[a,b]
1	The distribution of TOTAL HAC SCORE is the same across categories of 340B HOSPITALS.	Independent-Samples Mann-Whitney U Test	.020

Hypothesis Test Summary

	Decision
1	Reject the null hypothesis.

a. The significance level is .050.

b. Asymptotic significance is displayed.

For the OwnerCat Hospitals, the null hypothesis was that the distribution of TOTAL HAC SCORE was the same across categories of OwnerCat. The results of the independent sample Kruskal-Wallis Test gave a significant value of 0.861. Since 0.861 was much greater than 0.05, there were no statistically significant differences in distribution. As such, the null hypothesis was retained. It was therefore concluded that the distribution of TOTAL HAC SCORE was the same across categories of OwnerCat.

Table 17

OwnerCat TOTAL HAC Kruskal-Wallis Test

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.[a,b]
1	The distribution of TOTAL HAC SCORE is the same across categories of OwnerCat.	Independent-Samples Kruskal-Wallis Test	.861

Hypothesis Test Summary

	Decision
1	Retain the null hypothesis.

a. The significance level is .050.

b. Asymptotic significance is displayed.

Summary

This study examined the association between hospital-acquired infections (CLABSI, CAUTI, MRSA, and TOTAL HAC) and types of hospital ownership among safety-net hospitals in the United States. A mean test outcome shows 340b hospitals have a mean TOTAL HAC of .040620 while the other hospitals have a mean TOTAL HAC of .183226. The difference was shown to be statistically significant, suggesting that 340b hospitals are better at preventing infections than other safety-net hospitals. Because the distribution of the Z scores was not normal, a nonparametric test was conducted to test the distribution of the infection's types across the categories of 340b safety-net hospitals and OwnerCat hospitals using the independent sample Mann-Whitney U Test and the independent sample Kruskal-Wallis Test. Hospital type could not be studied because there was only one hospital type among the safety-net hospitals. For the RQ1, the independent sample Kruskal-Wallis test confirmed the null hypothesis there was no

association between MRSA rates and type of hospital ownership. The test gave a significance value of .458 which was greater than 0.05, suggesting that there was no statistically significant difference in distribution. As such, the null hypothesis was retained. The independent-sample Kruskal-test for RQ2 also confirmed the null hypothesis which states there is no association between CLABSI rate and type of hospital ownership. The result of the test gave a significant value of .416 which was greater than 0.05, suggesting that there was a statistically significant difference in distribution. As such, the null hypothesis was retained. The same test for CAUTI on RQ3 reinforced the null hypothesis that there was no association between CAUTI rates and type of hospital ownership. The significance values were .978 and above 0.05 suggesting no statistically significant difference in distribution. As a result, the null hypothesis was retained. When the same independent sample Kruskal-Wallis test was used on TOTAL HAC score, it gave .861 significant value and confirmed the null hypothesis which stated that there was no association between TOTAL HAC score and types hospital ownership. This outcome suggests no statistically significant difference in distribution and as a result, the null hypothesis was retained.

Furthermore, a second nonparametric test was performed on the relationship between hospital-acquired infections and 340b safety-net hospitals using the independent Whitney U test. For the RQ4, the independent sample Whitney U test confirmed the null hypothesis there was no association between MRSA rates and types of safety-net hospitals. The test gave a significance value of .244 which is greater than 0.05, suggesting that there was no statistically significant difference in distribution. As such,

the null hypothesis was retained. The independent-sample Whitney-U test for RQ5 also confirmed the null hypothesis which states there is no association between CLABSI rate and type safety-net hospitals. The result of the test gave a significant value of .510 which was greater than 0.05, suggesting that there was a statistically significant difference in distribution. As such, the null hypothesis was retained. The same test for CAUTI on RQ6 reinforced the null hypothesis that there was no association between CAUTI rates and type of safety-net hospital. The significance values were .423 and above 0.05 suggesting no statistically significant difference in distribution. As a result, the null hypothesis was retained. However, when the same independent sample Whitney U test was used for TOTAL HAC score, it gave 0.020 which is less than 0.05 significant value and on the other hand, confirmed the aliterate hypothesis which stated that there was an association between TOTAL HAC score and types safety-net hospital. This outcome suggests a statistically significant difference in distribution and as a result, the null hypothesis was rejected.

In summary, the results of this study confirm the null hypothesis that types of hospital ownership and types of safety-net hospitals affected hospital-acquired condition rates, except for types of safety-net hospital's influence on TOTAL HAC score.

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

Introduction

The purpose of this study was to investigate the association between the (CLABSI), (CAUTI), (MRSA) and (TOTAL HAC) scores and types of hospital ownership among safety-net hospitals in the United States. The study employed a quantitative cross-sectional research design using a general linear model analysis. The rationale for the study design was to examine the association between the independent and dependent variables. The dependent variables of interest comprise (CLABSI), (CAUTI), (MRSA), and (TOTAL HAC) score, while the independent variables of interest are types hospital ownership types and 340B hospitals. (CMS) (HACRP) decreases reimbursement for organizations with poor patient safety performance (Spaulding et al., 2018). According to Spaulding et al. (2018), HACRP does not indicate the structure and process through which organizations should attempt to decrease (HACs) but does demand that hospitals control the number and rate of HACs. The theoretical framework for this study was the Donabedian model, which is the most universal as well as a comprehensive quality assessment framework (Mulnea et al., 2020). The Donabedian model was a theoretical model for quality measurement, integrating three key components: structure of care, the process of care, and outcomes of care (Sund et al., 2015). There was a connection between these key elements; that is, structure predicted both process and outcome of care, and better processes predicted better functional outcomes, as well as user gratification (Sund, Iwarsson, & Brandt, 2015). In 2001, the Institute of Medicine (IOM) published a landmark report on the quality of US health care:

Crossing the Quality Chasm: A New Health System for the 21st Century. The report details major flaws in six dimensions of quality: safety, timeliness, effectiveness, efficiency, equitable, and patient-centered referred to as "STEEEP" (Berwick et al., 2018). In the virtually two decades since, reports have demonstrated that several flaws persist and that the "quality chasm" was global (Berwick et al., 2018). To further enhance health and healthcare value-based decision-making, there remained a necessity for methodological transparency across assessment and the standardization of consensus-based measures that signify the IOM's quality structure (Thomas, et al., 2020). In this study, the hospital type variable, both safety-net, and ownership represented the structural element of the Donabedian model.

Interpretation of the Findings

The findings of this research are crucial to literature within the field. The results confirmed the null hypothesis that hospital ownership types did not influence the distribution of infection Z scores. This finding is in alignment Schroder et al. (2018), Al Mohajer et al. (2018), Rajaram, et al. (2015), and O'Hara et al. (2018).

Schroder et al. (2018) investigated the association between hospital ownership and the rate of (HCAI) in Germany. Five different elements of the German national nosocomial infection surveillance system were analyzed concerning the impact of hospital ownership in the period 2014-2016. Endpoints comprised ventilator-associated pneumonia, central-venous-catheter-associated bloodstream infections, urinary-catheter-associated urinary tract infections, (SSI) following hip prosthesis as well as colon surgery,(MRSA), (CDI), and hand rub consumption per 1000 patient-days. Three hospital

ownership types (public, non-profit, and private) were analyzed using univariate and multivariate methods. Schroder et al. (2018) concluded that hospital ownership was not found to have a key result in the incidence of healthcare-associated infections.

Al Mohajer et al. (2018) performed univariate analysis to detect variables linked with total hospital-acquired condition reduction programs score (CDC) penalties for the FY15-FY17. The study found no enhancement in HACRP scores for the large hospitals as well as teaching hospitals, even though the large and teaching hospitals were less aware of the HACRP than the small and nonteaching hospitals.

Rajaram et al. (2015) investigated the characteristics of hospitals penalized by the HACRP, as well as appraised the relationship of a summary score of hospital characteristics connected to quality with penalization in the HAC program. The study concluded that among hospitals that partook in the HACRP, hospitals that were reprimanded more regularly were accredited and proffered advanced services.

O'Hara et al. (2018) used a mixed-method study commenced July 2014 to February 2015, engaging professional discussion and statistical modeling to recognize the indication of quality and safety which was in line with the Donabedian model. The Donabedian model is a theoretical model for quality measurement integrating three key components: structure, which refers to the setting in which care occurs, process, which describes how care is delivered, and outcome, which referred to the effects of care on the health of the patient and the population (Sund et al., 2015). O'Hara et al. (2018) instituted a set of standards to appraise decisions about which indicators were strong and positive measures as well as whether these can be used to classify positive deviants. The study

found that several pointers were used for disparity at the level of the services or ward, which is crucial for quality and safety enhancement since large deviation is anticipated across services within hospitals.

The quantitative outcome of this study revealed that since all the significance values are much greater than 0.05, it was clear that hospital ownership does not influence the distribution of CLABSI, CAUTI, and MRSA infections. These results were even more apparent when multiple comparisons were conducted using Bonferroni on OwnerCat category of hospitals. The comparisons of different types of hospitals (government, nonprofit, and AllOther) indicated that there were no significant differences in the influence of the different hospital types. For example, for MRSA W, 340B Hospitals have a significance value of p=0.835 while OwnerCat has a significance value of p=0.869. The combination of the two categories (340B Hospitals and OwnerCat) has a significant value of p=0.686. Since all the significance values are much greater than 0.05, it was clear that the hospital category does not influence the distribution of MRSA W infection.

In testing the Homogeneity of Variance, the based-on mean, median, median and adjusted df and based on trimmed mean of all the dependent variables showed significance values greater than 0.05, suggesting that Lenene's outcome non-significant and the variances are not statistically significant. The Analysis of Variance (ANOVA) test also supported previous test outcomes. From the ANOVA test, the significance values of CLABSI, CAUTI, MRSA, and TOTAL HAC were all greater than the alpha value of 0.05, suggesting that the differences in means between and within groups are not

statistically significantly different. The fact that CLABSI has a point estimate value of the eta-squared of 0.004, CAUTI point estimate of 0.001, MRSA point estimate of 0.002, and TOTAL HAC point estimate of 0.001, shows that for all the infection types, the effect size of the differences is less than 1% w, suggesting that the effect sizes are low and lack any practical significance.

From the univariate analysis of variance, 340B HOSPITALS has a significance value of 0.736 while OwnerCat has a significance value of 0.272. The combination of the two categories (340B HOSPITALS*OwnerCat) has a significance value of 0.096. Since all the significance values are much greater than 0.05, it was clear that the hospital category does not influence the distribution of CLABSI W infections. These results are even more apparent when multiple comparisons are conducted using Bonferroni on OwnerCat category of hospitals. The comparison of the different types of hospitals (government, nonprofit and AllOther) indicates that there was no significant difference in the influence of the different hospital types on the distribution of CLABSI W infections since all the significance values are much greater than 0.05.

Nonparametric test to test the distribution of the infection types across the categories of the two groups of hospitals-340B HOSPITALS and OwnerCat revealed that with the Independent Sample Mann-Whitney U Test and the Independent Sample Kruskal-Wallis Test, the null hypothesis for all infection types were retained because the distribution of CLABSI Z SCORE, CAUTI W Z SCORE, MRSA W Z SCORE, and TOTAL HAC SCORE were all the same across the two groups of hospitals with the significance values much greater than 0.05 except the Independent Sample Mann-

Whitney U Test of TOTAL HAC SCORE distribution of 340B HOSPITALs with a significance value of 0.02 which was less than 0.50 significance and was rejected.

Limitations of the Study

This study utilized a cross-sectional perspective which limits the capability to comprehend trends or other tones of the data. Also, the data utilized for this study are collected from several data sets, which does not permit general declarations regarding the markets as well as individual characteristics of the hospitals across the United States. Conversely, the practice of merging multiple data sets decreases the overall number of organizations preserved for the analysis as well as enhances the probability of missing or incomplete data bias the results. Furthermore, the comprehensive nature of the data limits more specific understanding and control for organizational performance on HAC measures. Nevertheless, as the HAC scores are currently being used as an indication of quality, the approaches and rationale for including these indicators are justified.

Recommendations

Researchers noted that Hospital Acquired Infections (HAIs) negatively impact the cost-effectiveness of hospitals. Firstly, researchers should include 340b hospitals in future studies of safety-net hospitals as well as center future research on specific geographical areas other than the entire country in addition to relevant descriptive variables being included. Elements such as the number of beds, staff per patient, year, and hospital size locality can be studied to enhance the study knowledge as these factors might be helpful to hospitals in the United States. This could aid in collecting data that could be better validated; for example, future researchers would be able to have better control over the

variables being investigated, ensuring that the data uses the same calculation methods when aligning with the variables. Furthermore, healthcare facilities should develop as well as employ detailed quality improvement strategies that incorporate the Institute of Medicine's (IOM) six dimensions of quality: safety, timeliness, effectiveness, efficiency, equitable, and patient-centered referred to as "STEEEP". Furthermore, engaging the domains of STEEEP may reduce variation in how care is delivered and practiced, uncovering differences that exist across geographic, cost, and personal (e.g. racial) attributes (Thomas Craig, et al., 2020). The Donabedian framework according (Thomas Craig, et al., 2020), can help guide how comprehensive quality is evaluated across assessments using different performance measures.

Thirdly, hospitals should have detailed steps for environmental cleaning with the best cleaning agents as well as testing procedures to stand by rules and procedures. This recommendation is significant because the cleaning of the environment of care influences every department in the hospital. In a clean environment of care, cross-contamination by the hand will not be possible.

Implications for Professional Practice and Social Change

Morillo-Garcia, et al. (2015) conclusion indicates that the prevention of Hospital Acquired Infections (HAIs) can be cost-effective as well as would help to enhance the safety of the healthcare system. Any information secured from this research could help leaders of healthcare facilities to develop strategies to decrease hospital-acquired infections effectively. Decreasing HAIs could not only simply help with the economic efficiency of hospitals but in addition to its corporate social responsibility (CSR).

Rahdari, et al. (2020) conceptualize Corporate Social Responsibility as a long-prevailing socio-political movement intended solely but generally at businesses to decrease the social costs connected with industrial activity. Hospital leaders benefit from reduced hospital-acquired infections because of doing the right actions for patients, having an optimistic image in the community because of lower infections, as well as conceivably improving staff morale. Identifying and studying strategies to decrease hospital-acquired infections might upsurge awareness of the influences of the infection on the safety of patients, healthcare workers, and visitors.

Al Mohajer et al. (2018) performed univariate analysis to detect variables linked with total hospital-acquired conditions reduction program scores and Center for Medicare and Medicaid Services penalties for the FY15-FY17. The study revealed that teaching hospitals that are in general large, as well as have high percent acuity were extensively more likely to receive the CMS penalty, compared with small and nonteaching hospitals. The public policy implication of this analysis is significant. The finding for this study may deliver a footing for positive social change in which hospital policies would be established to promote a decrease in hospital costs. The Center for Medicare and Medicaid Services (CMS) should think about redesigning the Hospital-Acquired Condition Reduction Program to deal with two key design challenges. Firstly, instead of imposing all-or-nothing penalties for hospitals operating in the bottom quarter, the Center for Medicare and Medicaid Servicing should consider graduated penalties for all hospitals with higher than projected rates of hospital conditions (Sankaran et al., 2019). This method used in the Hospital Readmission Reduction Program according to

Sankaran et al. (2019), is more unbiassed as well as offers inducements for improvement among a larger range of hospitals. Furthermore, to improve equity, the CMS should consider amending penalization thresholds based on hospitals' share of indigent patients which will be comparable to recent reform to the Hospital Readmission Reduction Program that established various penalty thresholds for separate types of hospitals. Thirdly, the CMS should eradicate the financial disincentive to being scored on the Center for Disease Control and Prevention (CDC) measures, which could be achieved by establishing separate penalty standards according to whether hospitals are scored on the CDC measure. Future studies should evaluate whether the measures used to appraise patient safety as well as the design of the financial incentives in the HACRP are properly structured to improve safety.

Conclusion

In conclusion, this study provided insight into the Hospital-acquired condition ranking score among types of safety-net hospitals in the United States. Before this study, it was not clear how types of safety-net hospitals influence hospital-acquired condition rates. The findings of this study showed no association between hospital-acquired condition rate and safety-net hospitals, except for types of safety-net hospital's influence on Total hospital-acquired condition score. Decreasing Hospital Acquired Infections could not only help with the economic efficiency of hospitals but in addition to its corporate social responsibility (CSR). Identifying and studying strategies to decrease hospital-acquired infections might upsurge awareness of the influences of the infection on the safety of patients, healthcare workers, and visitors.

There was no difference in the means of the infection types between and within groups. Precisely, the mean values of the number of infections are the same between and within groups. In terms of the distribution of the infection types across the different categories of hospitals, this study concluded that the distribution of Central-Line-Associated Bloodstream Infection, Catheter-Associated Urinary Tract Infection, and Methicilin-Resistant Staphylococcus Aureus was the same across the two hospital categories 340B HOSPITALS and OwnerCat. However, for TOTAL HAC, the 340b hospitals have a significance value of p=0.029. Since the significance value of the 340b hospital category was smaller than 0.05, this study concluded that the 340b hospital significance value is statistically significant. As such 340b hospitals greatly influence the distribution of TOTAL HAC infections score. A mean test outcome shows 340b hospitals have a mean TOTAL HAC of .040620 while the other hospitals have a mean TOTAL HAC of .183226. The difference was shown to be statistically significant, suggesting that 340b hospitals are better at preventing infections than other safety-net hospitals.

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