COMPARATIVE STUDY OF INPATIENT HOSPITALIZATION LENGTHS OF STAY AND DISCHARGE DISPOSITIONS ACROSS HEALTHCARE PAYER TYPES

by

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ABSTRACT

CHAD LOVETT. Comparative Study of Inpatient Hospitalization Lengths of Stay and Discharge Dispositions Across Healthcare Payer Types (Under the direction of DR. REGINALD SILVER)

Considering the progressive growth of healthcare expenses in the national economy, many of those impacts are directly seen in the cost to our publicly and privately funded healthcare insurance programs. This research will utilize a version of the Behavioral Healthcare Utilization Model (BHUM) to conduct a comparative analysis of medical insurance payers and discharge dispositions. It will look at all payer types of healthcare funding in comparison to discharge disposition outcomes concerning acute care hospital admissions for patients that are ages 45 to 75 and when diagnosed with Medical Severity Diagnosis Related Code 207, Respiratory Failure with Mechanical Ventilation Greater Than Ninety-Six Hours. This study will evaluate the lengths of stay, payer type, total charges of an acute care hospitalization as well as the discharge dispositions of those cases with the moderating effects of age, gender, and race on those relationships. The analysis will utilize the MS-DRG 207 as a control variable so that discharge disposition is moderated by the predisposing patient characteristics utilized by health systems and insurance payers to monitor per patient profit or loss variances. This research hopes to provide perspective on both the financial and quality of care aspects of a healthcare payer's influence on the healthcare system and how this impact may outweigh sociocultural and sociodemographic variables. Research objectives will benefit health system executives, healthcare insurance payer systems, and legislative planning committees. It will show how those differences in

care management could affect long-term healthcare costs associated with care through hospital lengths of stay and payer influences on this utilization services.

DEDICATION

I would like to dedicate this dissertation to my family, as they have been by my side through many years of professional and personal growth and development, all of which has required significant sacrifice on behalf of them.

Each one of them was supportive in their own way to help me succeed and for that I am forever grateful and have nothing but appreciation for them.

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ABBREVIATIONS

AHRQ	Agency for Healthcare Research and Quality
BHF	Behavioral Health Facility
BHUM	Andersons Behavioral Healthcare Utilization Model
CMS	Centers for Medicare and Medicaid Services
DHHS	Department of Health and Human Services
DRG	Diagnosis Related Group
HBM	Health Belief Model
HCUP	Healthcare Cost and Utilization Project
HHC	Home Health Care
HUT	Healthcare Utilization Theory
ICD	International Statistical Classification of Diseases
IRF	Inpatient Rehabilitation Facility
LTCH	Long Term Care Hospital
MS-DRG	Medical Severity Diagnosis Related Group
MEDPAC	Medicare Payment Advisory Commission
NIS	National Inpatient Sample
PVT INS	Private Insurance
SNF	Skilled Nursing Facility
TUT	Two-Communities Theory

CHAPTER 1
INTRODUCTION

Over the last several decades, with the impending introduction of the baby boomer generation into the Medicare health insurance program, there has been a heightened focus on the cost of healthcare and the impact that it will have on the solvency of government-funded health insurance programs (Services, 1979; U.S. Department of Health, 1971). Additionally, a parallel concern presented itself in the literature that skyrocketing healthcare costs result from a lack of adequate healthcare utilization of preventative measures to reduce the high cost of emergent or uncontrolled chronic health conditions studied from sociological and behavioral perspectives (L. A. Aday & Andersen, 1974; Lu Ann Aday, Fleming, & Andersen, 1984; J. G. Anderson, 1973; N. B. Anderson & Cohen, 1989; McKinlay, 1972; D. Mechanic, 1979; Rosenstock, 1966). Many of the cost mitigation strategies and governmental policies that emerged from these fields of research have been directed by the Medicare Payment Advisory Commission (MEDPAC) and the Department of Health and Human Services (DHHS) (CMS, 2020; DHHS, 2009, 2013, 2015, 2016, 2017, 2018; Trustees, 2018, 2019, 2020). Those strategies focused on reimbursement levels of hospitalization (Majhail, Mau, Denzen, & Arneson, 2012), cost of post-acute care (Allen, 2000), bundled/value-based payments systems (Froimson et al., 2013; Iorio et al., 2016), and even individual medical provider payment amounts across the various levels of care (Perloff, DesRoches, & Buerhaus, 2016).

Furthermore, significant amounts of research encompass the various types of healthcare payment systems such as commercial insurance, governmental insurance programs, and the impact that it has on healthcare cost (J. Kim, Yim, & Bae, 2015; Ladabaum, Mannalithara,

Brill, Levin, & Bundorf, 2018; Panczak et al., 2017). There currently exist obstacles and limitations to accessing healthcare at every imaginable level of care (N. D. M. D. Andersen et al., 2014; Barnato, 2011; Breslau, Han, Stein, Burns, & Yu, 2018; Lyon et al., 2011; Miller, Kirk, Kaiser, & Glos, 2014; Shi, Lebrun, & Tsai, 2010; Slatore, Au, & Gould, 2010; T.-F. Wang, Shi, Nie, & Zhu, 2013; Wehby & Lyu, 2018), and the quality of healthcare that patients are receiving based solely on their insurance status (Barouni, Ahmadian, Anari, & Mohsenbeigi, 2020b; Damianov & Pagán, 2013; Dougherty, Chen, Gray, & Simon, 2013; Geuss, Jungmeister, Baumgart, Seelos, & Ockert, 2018; Kelley, Deb, Du, Aldridge Carlson, & Morrison, 2013; Slocum, 2017).

Using Andersen's Behavioral Healthcare Utilization Model (BHUM) (R. M. Andersen, 1968; J. G. Anderson, 1973), this research will attempt to fill a gap in the current body of work between the fiduciary side of the healthcare cost literature and the socio-behavioral healthcare utilization body of work. These two bodies of work currently approach healthcare utilization and the cost of healthcare to the global system from differing perspectives. The fiduciary approach of research is usually at the patient level with a defined health concern or condition and analyses of a change in the medical care guidelines, healthcare system process, and how these things may affect the clinical outcome, length of medical stay, or the actual cost of the healthcare services (Bessaha, Shumway, Smith, Bright, & Unick, 2017; Bradley, Dahman, & Bear, 2012; Donahoe, 2012; Duarte et al., 2018; Hamel et al., 2000; Johnston, Wen, Hockenberry, & Joynt Maddox, 2018; Ladabaum et al., 2018; Majhail et al., 2012; Molloy, Martin, Moschetti, & Jevsevar, 2017; Panczak et al., 2017; Pearlman, Branch, Ozminkowski, Experton, & Li, 1997; Powers et al., 2019). Other researchers have taken the

approach of the actual reimbursement determinant, such as a Diagnosis Related Group (DRG) or International Classification of Diseases (ICD) coding and how these impact the cost or reimbursement of healthcare services (Barouni et al., 2020b; Bellavia et al., 2012; Boes & Napierala, 2021; Elinor et al., 2004; Frank & Haider, 2014; J. Kim et al., 2015; Kuntz, Scholtes, & Vera, 2008; Meng, Hui, Cai, Liu, & Wu, 2020; Pirson et al., 2013; Tabrizi, 2012; Tan et al., 2014).

Comparatively, the socio-behavioral body of work takes a much broader perspective by evaluating elements of socioeconomic disparities, (Breslau et al., 2018; Brown et al., 2018; Eric & Kisalaya, 1999; Gelberg, Andersen, & Leake, 2000; Miller et al., 2014; Shi et al., 2010; T.-F. Wang et al., 2013) socio-demographic differences, (N. B. Anderson & Cohen, 1989; Bime et al., 2016; Breslau et al., 2018; Brown et al., 2018; Lofters, Shankardass, Kirst, & Quiñonez, 2011; Shi et al., 2010; T.-F. Wang et al., 2013; Wehby & Lyu, 2018) sociocultural and healthcare belief systems, (R. M. Andersen & Newman, 2005; Gibson, 1972; Rosenstock, 1966), and how those factors globally or regionally impact the utilization or lack of healthcare services for patients defined within those demographics.

Using a version of Andersen's original BHUM shown in Figure 1.1, (R. M. Andersen, 1968), this research will investigate the financial aspects of healthcare and their impact on utilization, using cost metrics such as length of stay, primary payor, and total cost as it applies to the inpatient hospitalization to determine if the behavioral model can determine statistical trends in healthcare utilization when analyzing individual-level data sources and outcomes. The BHUM has 4 primary constructs to which variables are assigned. The first is Predisposing Characteristics, which tends to reflect what most would consider basic demographic variables such as age, race, gender, ethnicity, and such. The second construct is

Enabling Resources, which is made up of variable that are reflective of the resources that an individual or area might present, like their geographic location, social or ethnic community resources, or religious affiliations. The fourth construct is Need, which is identified as the actual or perceived need for medical care. The fourth and final construct, Use of Health Services, is the outcome or dependent variable of the prior three constructs.

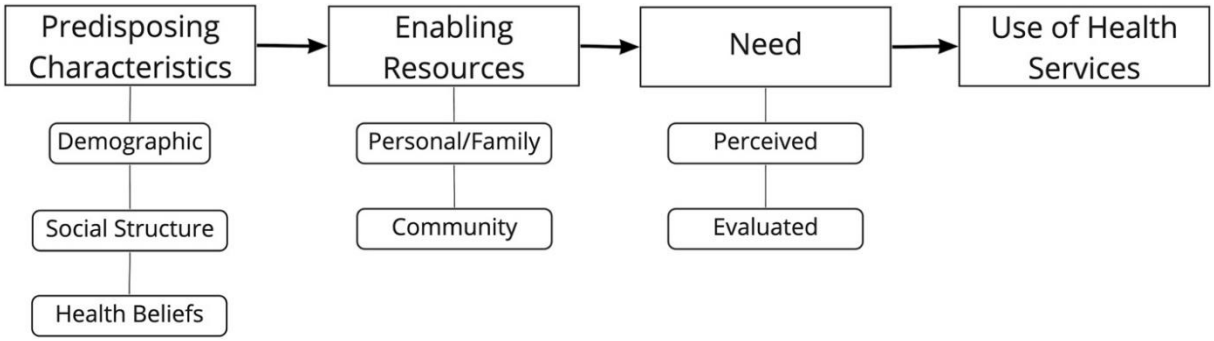

Figure 1.1: Andersen Behavioral Model

This model, which has been used primarily to see the social or behavioral impacts on healthcare utilization and access to care, will work well for this research goal to take a focused look at the financial variables of healthcare utilization and access to care (L. A. Aday & Andersen, 1974; R. M. Andersen, 1995). This perspective of analysis may bring light to what this author believes could be inherent weakness in the current body of work on this model, as much of the literature is focused on individuals' beliefs or feelings regarding healthcare utilization and lacks the detailed analysis of the financial drivers that could impose greater pressures or restrictions on those individuals that drive final outcomes. A simple example might be the fact that lack of a financial payer sources like insurance or sufficient personal income may completely limit access to a special medical service no matter how much the individual believes in or supports the healthcare utilization. This analysis will hope

to provide a new context to which the BHUM can be utilized in expanded research regarding the financial impacts of healthcare utilization.

Figure 1.2 provides a graphical representation of various potential episodes of care that could be reviewed by the BHUM and may impact the way this model would identify the model constructs to analyze use of health services. Figure 1.3 is an expansion of Figure 1.2, demonstrating the complexity of the continuum of care and the expansion of an episode review period. Figure 1.2 and 1.3 both show the complexity and variation that a single episode of care could present in its analysis, and how just one additional layer in healthcare use could create significant variation in the outcome results if studying the same phenomenon across two different episodes of care processes. The longer an episode of care occurs, the more complex that episode of care becomes. For example, a person attempting/needing to obtain a primary care physician visit is very different from a person hospitalized for an emergent event that may or may not require recovery healthcare utilization.

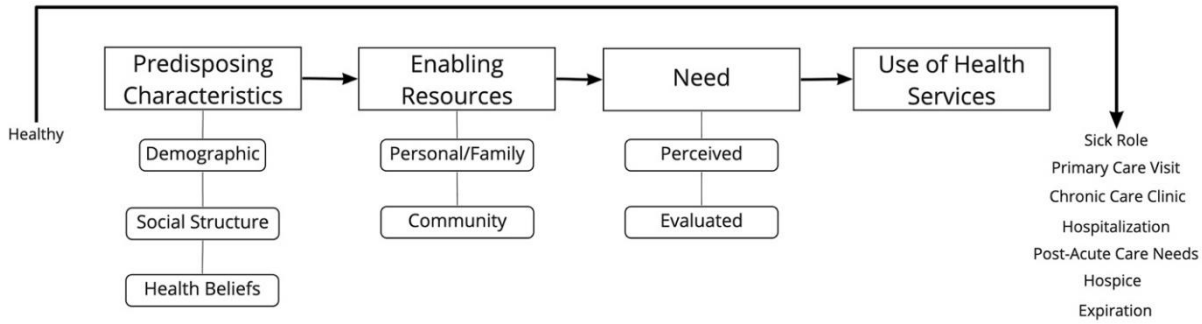

Figure 1.2: Graphical representation of potential BHUM episodes of care periods.

Consequently, this researcher believes that since the use of health services is the dependent variable in behavioral model research, the type or episode of care is a weakness with the behavioral model in its current theoretical approach in healthcare utilization.

Therefore, this researcher will explore the concept of a defined episodic care in combination with the behavioral model to determine if a single link in a two-sequence episode of care can be analyzed effectively with the Behavior Health Model. Applying the BHUM and utilizing it in a manner demonstrated in Figure 1.3 by the dotted line path, this research will explore a specific episode of care pathway with the assumption that the patient was healthy by design or a medically managed sick role which could be considered healthy.

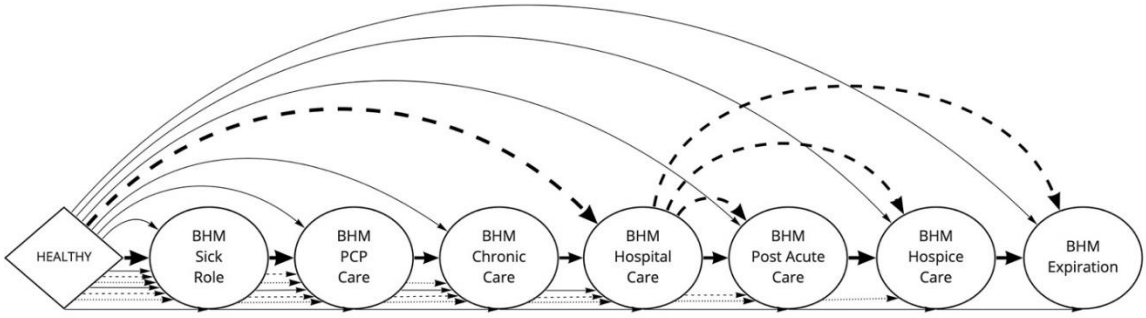

Figure 1.3: Graphical representation of the various points in continued care that the BHUM could be utilized.

This research will investigate a defined episode of healthcare services of a hospitalized patient that is experiencing an emergent and life-threatening illness that requires medical intervention to survive. An inpatient hospitalization is an episode of care that has specific certification requirements that must meet the DHHS and Centers for Medicare and Medicaid Services (CMS) criteria for inpatient admission to an Acute Care Hospital (CMS, 2014). A certified hospital admission Medical Severity-Diagnosis Related Group (MS-DRG) code 207 Respiratory System Diagnosis with Ventilator Support Greater Than Ninety-Six Hours that falls under all payor types and sources, will include self-pay, private pay and other (CMS, 2014). The ending point of the episode of care is a completed discharge from the

hospital, that is defined by the standardized uniform coding of the Healthcare Cost and Utilization Project (HCUP) data source. The categorical listing of discharge disposition defines the destination of the patients at the end of the episode of medical care.

This research utilizes the theoretical frameworks that gave foundation to the BHUM (R. M. Andersen, 1968) and is widely used throughout healthcare utilization studies. The BHUM approach with its three defining characteristics seen in Figure 1.1 is the foundational start of this researcher's interpretation of model variable constructs and how they might be utilized in a modified manner. Figure 1.4 is a graphical representation of a two-phase episode of care, or continuum of care that this research will utilize the BHUM to investigate the affects that financial metrics have on healthcare utilization. Figure 1.4 intends to demonstrate how BHUM constructs in the first phase of this episode of care (Healthy to Hospitalization episode of care) translate to the second phase (Hospitalization to Discharge Disposition) of this continuum of care episode.

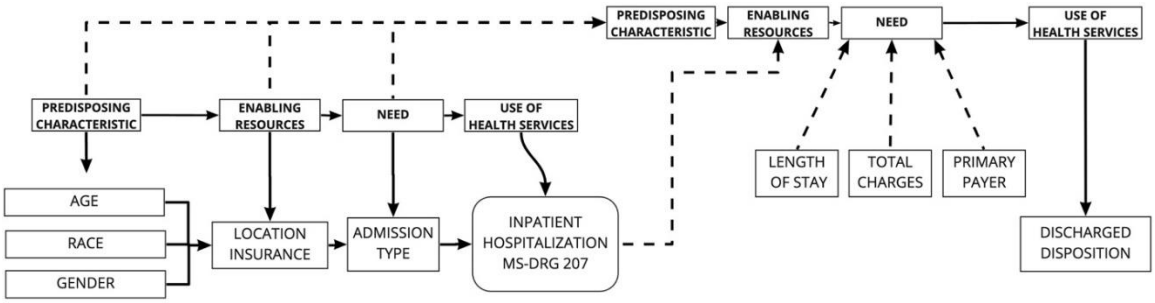

Figure 1.4: A Two Stage Behavioral Healthcare Utilization Model Episode of Care

Utilizing a National Inpatient Sample (NIS) HCUP database that collects inpatient hospitalization data, such admission type, age, race, gender, geographic location, payment source, length of stay, medical diagnosis, hospital charges, and final discharge disposition during the hospital admission. Historically, these variables would be broken up into the three BUHM construct variables, were as this research will combine basic

demographic variables such as age, race, gender, geographic location, and admission type to represent the BUHM construct Predisposing Characteristics (L. A. Aday & Andersen, 1974; R. M. Andersen, 1968, 1995).

The second variable in the BHUM construct is "Enabling Resources," which historically represents family and community resources such as health services within the individual's living environment (L. A. Aday & Andersen, 1974; R. M. Andersen, 1968, 1995). This element of the model will be treated as a control variable, since this research will only be reviewing individuals admitted to the hospital with the Medical Severity Diagnosis Related Code 207. This control variable is the first step of the second phase of this episode of care being studied, and as a defined medical condition, is an aggregate of enabling and need resources from the first phase of the episode of care illustrated in Figure 1.4. Since this research will only be reviewing individuals that have had an inpatient hospital admission, it will not capture those individuals that may have chosen not to seek medical intervention as well as those who may have recovered or expired. Barriers to access of care because of limited family, community/medical resources, or the lack of seeking medical treatment due to cultural or ethnic healthcare beliefs, stigmas about care, or location of care have been noted in studies that have looked at access to healthcare (H. Chen, Chi, & Liu, 2019; Huang, 2017; Sutter, 2017; Yoon, Jung, Kim, & Ha, 2019). Using the BHUM in this way will address what this researcher sees as a gap in the literature as it relates to episodes of care. By defining the specific episode in a continuum of care, researchers could replicate this in future research under different DRG codes, and potentially do comparative studies of single and combined episodes of care to determine if there are differences in utilization-related outcomes and which variables might moderate them.

The third element of the BHUM is "Need," which describes the perceived or evaluated need for medical or healthcare resource utilization (L. A. Aday & Andersen, 1974; R. M. Andersen, 1968, 1995). This element of the research model will be represented by the financial metrics that hospitals and insurance payers utilize to monitor potential profit or loss on individual patients during an episode of care. Financial variables are being employed evaluate the impacts or potential driving effects that these variables have on discharge dispositions. For example, if a patient had an evaluated clinical need to be discharged to a Skilled Nursing Facility (SNF), but this required an insurance payer's approval for that transfer, the clinical evaluation alone is not the sole need for the continued utilization of healthcare. The goal of including this need parameter is to increase the focus of less studied financial factors that influence downstream healthcare utilization as individuals recover or do not recover from life-threatening medical events. It is at this point in the model that it is believed that the greatest impact that organizational factors of healthcare utilization processes and metrics demonstrate the most influence on "Healthcare Utilization" which is the outcome of the BHUM (L. A. Aday & Andersen, 1974; R. M. Andersen, 1968, 1995).

This researcher believes that payer resources are a defining factor in the discharge disposition of individuals that have sustained the same life-threatening event, and a clear delineation of how insurance resources or hospital profits begin having a determining factor in the actual utilization of healthcare utilization at hospital discharge. Since primary care hospitals and healthcare systems have an ethical, legal, and moral obligation to provide lifesaving medical care to all that enter their doors, payer sources have little impact on the front-end delivery of healthcare when it is emergent utilization. However downstream medical service providers such as post-acute care, SNF, Home Health Care (HHC), and

hospice agencies do not have the same requirements to provide medical care for unfunded or indigent patients. They have the right to deny a patient admission to their facility or medical service based on medical funding status, or even the fact that they may be out of network with an insurance provider. This denial of acceptance or admission to a healthcare service based on financial resources, determining medical care guidelines, medical providers lack of referral, or even the insurance payer's denial of the admission to a lower-level care can prevent or eliminate healthcare utilization to hold a patient at a level of care that they have already expended reimbursement funding (Froimson et al., 2013; Hyeyoung, 2017; Medicine, Guidelines, Lohr, Field, & National Academy of, 1992; Mitus, 2008).

These three financial variables will provide the foundation for statistical analysis of the factors that drive "Use of Healthcare Resources" (L. A. Aday & Andersen, 1974; R. M. Andersen, 1968, 1995). J.G. Anderson's work on the Healthcare Utilization Theory (HUT) provides a secondary theoretical element that will bring additional depth to the primary BHUM in regards to the organizational impact of healthcare utilization (J. G. Anderson, 1973). HUT has a foundation that encompasses three distinct support systems (J. G. Anderson, 1973). The first being the sociocultural approach, which takes the cultural aspects of an organization's local or regional community into consideration when reviewing healthcare research utilization. The sociodemographic approach to medical care and services utilization, which utilizes readily available data, such as age, race, gender, income, and location in combination with healthcare volume or cost data to conduct the study of utilization, is used in many healthcare studies (J. G. Anderson, 1973). Other healthcare studies have utilized the Social-Psychological approach to assess the utilization of healthcare services. The social-psychology method is a more individualistic approach, using qualitative

data as it evaluates the individual patient's perspective and how they made decisions regarding the utilization of healthcare services (J. G. Anderson, 1973). Taking a macro level approach of healthcare utilization, the Organizational Approach was utilized to accomplish the type of research, using system-level management and approach to see how healthcare may be available or delivered based on consumer/medical needs, market demands, or profitability (J. G. Anderson, 1973).

Utilizing the BHUM and insights of the Organizational HUT model to capture the underrepresented financial aspects of healthcare utilization. This research hopes to shed light on the financial variables that potentially impact utilization of healthcare services. Potentially expanding the profitability of healthcare organizations and insurance payer sources at the expense of a patient that does not get needed healthcare.

INTRODUCTION SUMMARY

Utilizing the nationally available NIS-HCUP data, this research will use the BHUM to explore this healthcare utilization research problem. Goals of the research will be to assess financial variables from a different method of analysis by investigating the length of stay, payer type, total charges, and their impact on the final discharge disposition of a single medical severity diagnosis-related code across all healthcare payer types as defined by the HCUP uniform coding. This method is intended to place the health system or insurance payer in a position of a primary antecedent, to see how this will influence a patient's discharge disposition outcome, when moderated by predisposing characteristics. Utilizing standard financial metrics, such as payer type, length of stay, and total charges that health system and payer utilization review processes monitor will provide evaluation of the potential impacts that these variables have on discharge disposition of this defined patient type. If payers or

health systems have direct impact on discharge dispositions based on these monitoring metrics, significance in discharge dispositions would be supported and raise additional questions to the purpose of these metric monitors, if not to control health system and payer cost.

Should this research be supported, it would give the audience a glimpse of the potential healthcare outcomes that one receives or does not receive based on their insurance provisions, length of stay in the hospital, and climbing hospital charges in the face of a life-threatening illness. This research hopes to shed light on the reality of our current healthcare system and the monitoring metrics that may determine healthcare care provisions provided to patients. The actual healthcare utilization or the lack of utilization based on financial metrics might be significantly different than what healthcare consumers are expecting from the healthcare system or the insurance payer to which they subscribe.

In a perfect world, we would hope that a person with a life-threatening illness such as Respiratory Failure, who would have post-illness recovery needs, would receive the same type of care options whether they were uninsured, private pay, or had any of the numerous governmental and commercial insurance healthcare plans. However, numerous health utilization studies have demonstrated differences to healthcare access. Some have been based on racial or ethnic dipartites (Austin, Qu, & Shewchuk, 2013; Breslau et al., 2018; Brown et al., 2018; Huang, 2017; Nwobilor, 2017; Shi et al., 2010; T.-F. Wang et al., 2013; Wehby & Lyu, 2018). While others' experience access variance based on age disparities (N. B. Anderson & Cohen, 1989; Austin et al., 2013; Bazargan, Bazargan, & Baker, 1998; Guo, MacDowell, Levin, Hornung, & Linn, 2001; Harel, McKinney, & Williams, 1990; Wolinsky, 1990), and even in Sutter's gender study it was demonstrated that transgender and

nonconforming patients experienced unique disparities (Sutter, 2017). The body of work in healthcare utilization has been able to demonstrate in many ways that patients are not all created equal in healthcare utilization. This researcher believes that this research will be able to demonstrate that these variables have significant impact on healthcare utilization, and that individual patients are more pawns of the financial system that powers healthcare and insurance system profitability.

CHAPTER 2

LITERATURE REVIEW

Health Services Utilization Theory Foundational Roots

Healthcare utilization research has taken several different turns over the past five decades and has been approached from differing angles with very similar intentions for its use, cost reduction, and increased access to healthcare. For example, a study conducted by Phillips et al. (1998) looked at environmental variables that were utilized in health utilization studies (Phillips, Morrison, Andersen, & Aday, 1998). Whereas another research team looked at the effect of health utilization model's vulnerable patient populations (Gelberg et al., 2000). Others evaluated the impacts age or medical diagnosis had on healthcare utilization (Austin et al., 2013; Fleury, Ngui, Bamvita, Grenier, & Caron, 2014; Greene, 2016). To the point that international studies in Germany, Korea and China used healthcare utilization models to see outcomes in those unique geographic populations (H. Chen et al., 2019; Jin, Lee, & Lee, 2019; J. I. Kim & Kim, 2021)

From this broad body of healthcare utilization research, three predominant models arose from this work: Two-Communities Theory (TUT), Health Belief Model (HBM), and the BHUM (R. M. Andersen, 1968; Caplan, 1979; Rosenstock, 1966). These theories and models emerged from the preliminary work of sociologists and psychologists who attempted to explain why an individual or their family would decide to utilize or not utilize healthcare resources (R. M. Andersen, 1968; Caplan, 1979; Gibson, 1972; McKinlay, 1972; Rosenstock, 1966; Wallston, Strudler Wallston, & DeVellis, 1978). The rise and fall of the Medical Sociologist discipline occurred during this time, as its vital work regarding the macro aspects of healthcare utilization got lost in the economic and political agendas of the time

(Pescosolido & Kronenfeld, 1995). The Medical Sociologist lost the ability to effectively communicate in the political environment that was being dominated by quantitative analysis of the time (David Mechanic, 1978; Pescosolido & Kronenfeld, 1995). However, the work they started did not get lost, as other disciplines moved forward with these models in a myriad of methods to utilize them to explain healthcare utilization that expanded beyond sociological works of its roots.

Two-Communities Theory

The Two-Communities Approach was more focused on the social scientist's ability to affect social change through the political movement of decisions being made that would positively impact what was being considered non-utilization behaviors (Caplan, 1979). This research effectively demonstrated a significant gap in the communication between social need and the political structure that could potentially affect change (Caplan, 1979; Wingens, 1990) even though the Two-Communities approach to research and outcomes presented fruitful and beneficial contributions to the literature and the field of mental and biological healthcare utilization. Caplan (1979) and Wingens (1990) also effectively defined the barriers to the success of the particular theory and how variables and resources almost had to line up perfectly to create successful utilization of the research material in social-political change in our healthcare system (Caplan, 1979; Wingens, 1990).

Health Belief Model

According to the Health Belief Model (HBM), healthcare utilization is a sequence of decisions based on beliefs or behaviors influenced by socio-cultural, environmental, religious, and learned beliefs (Rosenstock, 1966). This research added an element that defines the Sick or Non-sick roles in an individual's belief structure, which is intriguing as it

can determine whether an individual even sees themselves as sick and by that fact alone may not seek healthcare services (Gibson, 1972; McKinlay, 1972; Rosenstock, 1966). This single construct of the Sick role behavior is very profound, as even if an individual felt that they were sick unless the individual was completely independent, the supporting family or community may not see this individual in this Sick role and the individual might still not receive healthcare services (Kasl & Cobb, 1966). Much of the research using this theory focused on the individual utilization of the initial medical services such as preventative care or primary care physicians (Gibson, 1972; McKinlay, 1972; Rosenstock, 1966). The related research has also been inconsistent in its findings because of the variation in medical coding, interpretation, and the elements that make up the health belief construct. Due to the retrospective nature of this type of research, complications in obtaining consistent data were reflected in many of these studies (Gibson, 1972; Kegeles, 1980; McKinlay, 1972; Rosenstock, 1966). It has also been noted by other research models that the health beliefs element may not have as much impact on healthcare utilization as one would think (R. M. Andersen, 1995).

Behavioral Healthcare Utilization Model

The BHUM that Ronald Andersen (1968) developed in his doctoral dissertation took a functional analysis of how healthcare decisions were being made at the family unit level (R. M. Andersen, 1968). Andersen's research also focused on the decision process of health utilization as a multistage process with varied influences and stakeholders. These processes where defined as the need for healthcare being determined by "predisposed", "enabling", and the "need" to move the process towards healthcare utilization or non-utilization (R. M. Andersen, 1968). The BHUM continued to evolve in its research application, which was

represented in various modifications to the original framework, giving it the ability to have adaptation to new research parameters. Anderson reviewed these evolutions of his original framework in a 1995 publication and noted that it had expanded in four phases, increasing the model's scope and capacity as an analytical framework (R. M. Andersen, 1995). The BHUM and subsequent works using this model took advantage of both readily available health system, governmentally collected, and survey data that remained closer to the individual unit than TCT and HBM where reviewing, which makes this model the most promising approach to consider in this research project.

Health Services Utilization Theory

The Health Services Utilization Theory (J. G. Anderson, 1973) has been used throughout the healthcare sector in resource utilization studies. This theoretical approach has several different perspectives that can be considered when reviewing healthcare data for utilization analysis. The first is the Sociocultural approach, which takes the cultural aspects of an organization's local or regional community into consideration when reviewing healthcare research utilization. Many of these approaches found their beginnings in the Thought and Language work by Lev Vygotskiĭ (1962), which started in the area of education development and has evolved over the years in various academic research categories and used in medical utilization studies (Vygotskiĭ, 1962).

Consideration of these various theoretical foundations for healthcare utilization research presented a challenge. Some frameworks were developed to assess qualitative data, attempting to capture the emotions and feelings associated with healthcare utilization. While others utilize quantitative data resources to obtain a global or macro in their attempt explain the use or lack of healthcare utilization.

When taking into account the factors of the data sources intended to be utilized for this research and the goals of micro level goals of this research, theoretical foundation of the BHUM is the desired foundation model for this research (R. M. Andersen, 1968). Over the life of this model and the body of work surrounding it, it has taken several advancements to its theoretical foundation expanding its capabilities and breadth of potential theoretical consideration (L. A. Aday & Andersen, 1974; R. M. Andersen, 1968, 1995; R. M. Andersen & Newman, 2005). These advancements in the original model took on what Andersen defined as four phases and ultimately became the BHUM. These later phases incorporated larger portions of information that would be at both contextual and individual characteristics in the healthcare decision-making process and outcomes based on consumer perceptions of the care (R. M. Andersen, 1995).

When considering the BHUM for this research project, the model in its purest 1960's form, Figure 1.1, would be the best model for this research project. This research will investigate the parallel healthcare utilization pathway that prior research does not effectively address in its search for behavioral-driven aspects of healthcare utilization. Prior studies do not fully explore the financial variables that drive healthcare provider reimbursement and how those variables impact healthcare utilization outcomes. Financial variables that insurance or healthcare systems utilize such as length of stay, total charges in comparison to reimbursement rates to monitor individual patient performance have impacts on healthcare utilization, are not always the choice or decision of the individual patient, their family, community, or even the healthcare provider (Hyeyoung, 2017).

The BHUM has four primary variable constructs: Predisposing Characteristics; Enabling Resources; Need; and Use of Health Services. The following sections will define

these constructs as they have been used historically. While also demonstrating how this research intends to realign those global constructs in new and unique method of utilization for this framework.

Predisposing Characteristics

The BHUM, in its purest form Figure 1.1 had four distinct constructs that define the types of variables that fed into the healthcare utilization analysis. The first is, "Predisposing Characteristics," which is primarily made up of demographic, social structure and health belief data primarily obtained from the healthcare system data sources, governmentally reported data, qualitative survey, and questionnaire data sources (L. A. Aday & Andersen, 1974; R. M. Andersen, 1968, 1995, 2008; R. M. Andersen & Newman, 2005; Gelberg et al., 2000; Phillips et al., 1998; Travers, Hirschman, & Naylor, 2020). This research will take a similar approach in utilizing nationwide healthcare system data to obtain base demographic and location data to align with the predisposing characteristic approach. This research will use the age, race, gender, location, and admission type variables as the predisposing characteristics which will moderate the need variables (Austin et al., 2013; Bazargan et al., 1998; Carey & Lin, 2014; Fleury et al., 2014; Gelberg et al., 2000; Heider et al., 2014; D. Mechanic, 1979; Riley & Riley, 2000; A. Z. Wang et al., 2018). Since this data is specific to inpatient hospitalization, the intent is to consider the social structure and health beliefs element as fixed, as the need for emergent medical care could override many of the social/cultural mechanisms that might impact a non-emergent medical decision pattern. This thought is supported by work conducted by Bazargan et al. (1998) that demonstrated that age and race were significant in the utilization of emergency services, which would support the

idea that social and cultural influences may not have as important a role in the utilization of health services in the role of an emergent health event (Bazargan et al., 1998).

Age as a predisposing factor has been widely researched. It has been a variable that many sources have used to determine one's eligibility for receiving support from social programs, which directly ties to healthcare resources utilization (Riley & Riley, 2000). Gelberg et al. (2000), used the BHUM to analyze how the predisposing variables of the vulnerable homeless population occurred and found that age and gender were significant when the selected vulnerability variables were analyzed (Gelberg et al., 2000). This finding demonstrated that individuals of differing ages or gender could have significant impact on results when situational vulnerability was present in the analysis, which could be present in a situation where a person has suffered a life-threatening event. Another study demonstrated that the single variable of age was significant when considering a single episode of care with a defined clinical parameter such as education of physical activity by primary care physicians, supporting the ideology that at least in a primary care setting age has influence on healthcare utilization (Austin et al., 2013). This finding within a single episode care, though significant could be limited to this type of healthcare utilization, as this research will test the moderating effects of age in a more complex healthcare setting and expanded episode of care. Wang et al. (2013) review of racial demographics in comparison to insurance availability again showed the importance of basic demographics such as race as an indicator of healthcare utilization while demonstrating the importance that insurance has on the accessibility of healthcare services (T.-F. Wang et al., 2013). Age and gender were significant predisposing characteristics when readmission data were compared among patients with a life-threatening event of a heart attacks. When moderating the HMO insurance payer with

age it impacted the readmission rates of those patients (Carey & Lin, 2014). This study provided strong support of both a study that evaluated a life-threatening event episode of care with the post-care need and how a single payer impacted healthcare outcomes through readmission data analysis. BHUM work conducted by Fleury et al. (2014) in mental health found that gender, specifically female, played a dominant role in utilizing mental health resources (Fleury et al., 2014). The demographic of aged females is found to be a recurrent theme in BHUM studies that this review conducted and will be tested to determine if this outcome is consistent in this study's results. In another study by Heider et al. (2014) the predisposing characteristics of age did not impact medical cost in Germany (Heider et al., 2014). The lack of age impact in the German study could be accounted for because Germany has a social healthcare program that provides more effective preventative healthcare that reduces the negative impacts of chronic illness as German's age (Heider et al., 2014).

Some researchers would argue that the predisposing characteristic of age, race, gender, etc. do not have as large of an impact as the enabling resources of the BHUM, because they would moderate them (Janssen, Swart, & von Lengerke, 2014). The idea that one construct could moderate another within the BHUM supports this researcher's propositions that some aspects of the model could be fixed elements, creating a moderating effect to prior construct variable relationships and bring more clarity to the outcomes, in essence removing disruptive noise in the data. In Miller's (2014) work, they demonstrated that race was significant with the access to or the lack of healthcare insurance, which in turn affects an individual's access to healthcare utilization (Miller et al., 2014). In a Korean Health Panel study that evaluated inpatient and outpatient health utilization, it was noted that the predisposing conditions of age, and gender were significant with healthcare utilization

(H.-K. Kim & Lee, 2016). This study which focused on transgender and gender-nonconforming adults found that variables such as lack of insurance, prior victimization, socio-vulnerabilities, and negative experiences with healthcare services could affect both the predisposing and the enabling characteristics as they created personal and structural stigmas that delayed or prevented healthcare utilization (Sutter, 2017). This finding is interesting because it presents the idea that a polarizing or taboo topic could create a stigma that would limit healthcare utilization. In similarity, a racial stigma could impact healthcare utilization in an unconscious bias towards that population. Studies conducted by Chen et al. (2019) drew their population samples from China found that age, gender, and race were significant predisposing variables and that racial elements provided the highest dipartites in health utilization (H. Chen et al., 2019). A breast cancer screening study conducted in Korea found that predisposing factors were not significant in the unitization of preventive health screening but were dominated by the "need" elements of the BHUM (Jin et al., 2019). In Turkey, healthcare utilization research by Basar et al. (2021) found that age, gender, and marital status were significant predisposing variables regarding healthcare equity when reviewing inpatient and outpatient health service utilization (Basar, Ozturk, & Cakmak, 2021). A study by Kim, et al. (2021) on caregiver cost for the elderly demonstrated that age and enabling resources had an increasing impact on caregiver cost (J. I. Kim & Kim, 2021). Geriatric studies conducted in Pakistan resulted in similar results, demonstrating that age had significance in the utilization of private versus government-funded healthcare facilities when insurance provisions were present (Naz, Ghimire, & Zainab, 2021), Naz et al. (2014) study provides support for this research as it was able to demonstrate study's notion that the type of funded

service impacts the level of services that are chosen, available or received to the healthcare consumer.

Many healthcare utilization studies incorporate the location of both the recipient and healthcare services as a determinant of utilization (H. Chen et al., 2019; Huang, 2017; Sutter, 2017; Yoon et al., 2019). In this research, I will utilize location as a predisposing characteristic, which is not commonly done as it is seen more as an Enabling Factor in the BHUM body of work. McKinlay's (1972) work on HHC service utilization demonstrated that a location variable alone was not complex enough to provide a meaningful addition to utilization research when analyzing a large-scale dataset (McKinlay, 1972). This finding by McKinlay (1972) has been supported by other research that concluded that combinations of race and location or age and location provide significant findings when larger datasets are utilized (Akintoye et al., 2017; Eric & Kisalaya, 1999; Gordon, 1973; Kumar, Henzer, Rodday, & Parsons, 2018; Lewis, 1981; McKinlay, 1972; Naz et al., 2021; Sutter, 2017). An assumption is made that this association might be occurring because the variables such as age, race, gender, and economic status are routinely utilized as predisposing characters to the dependent variable that get moderated by the enabling factors of the BHUM. Moving these same variables into a moderating position in this study and fixing the enabling variable so that it is the same for all encounters may result in very different location related results.

Hospital length of stay research conducted by Gordon (1973) and Lewis (1981) demonstrated that larger hospitals, which could be associated within dominant communities had longer lengths of stay, which would support that the availability of service in a geographic region would determine utilization availability (Gordon, 1973; Lewis, 1981). In research conducted regarding access to healthcare, location of resources is a recurrent theme

that ranges from the physical location of health systems, the population served, to the simplicity of a patients' ability to cross town from one clinic to another to complete a series of services (Medicine, Services, Millman, & National Academy of, 1993). Some studies on behavioral healthcare utilization that reviewed location or geographic variables found inconsistency in the data, giving variance in a location important in a study (Phillips et al., 1998). In asthma and respiratory health studies, geographic location was a primary variable as it identified the areas of high or low pollution potential, which could potentially correlate to more metropolitan areas of city, and having higher potential for needs of health services as well as access to healthcare services (Eric & Kisalaya, 1999; Rush, Lother, Paunovic, Mooney, & Kumar, 2021).

Studies on homeless and vulnerable populations found that knowledge of resource locations was a determining factor in the actual access of healthcare resources and utilization, demonstrating that not only the location of a resource is important, but also the knowledge of that resource availability (Gelberg et al., 2000). Location as an element is even considered in governmental payment structures as they make accommodations for regional or location cost differences and give financial designations for healthcare facilities in urban and rural areas that translate into reimbursement differences (CMS, 2020; DHHS, 2009, 2013, 2015, 2016, 2017, 2018; Trustees, 2018). This difference is based on Metropolitan Statistical Areas status in payment structure calculations, which translates into per patient day reimbursement variances when connected to DRG payment systems. It has shown that the location of an individual can have an impact on their potential mortality during hospitalization for heart failure, which like respiratory failure, is a life-threatening event (Akintoye et al., 2017). Geographic characteristics have demonstrated a difference in hospitalization length of stay

when at a regional level of analysis (Bessaha et al., 2017). Location of a hospital and the surrounding community that supports that hospital are connected to Medicare cost to charge ratio development and can impact the cost of healthcare in a market (Molloy et al., 2017).

Lack of access due to the absence of a specific medical specialty in a location or a location that is not favorable to that patient's potential access can reduce utilization (Sutter, 2017). In some cases, patients would be put on a waiting list because the availability of specific medical resources were not readily accessible to patients in specific locations and by default would limit their access or utilization, creating a situation where emergent care needs would dominate lack of access (Travers et al., 2020). Governmental health system use has also shown to have higher levels of utilization by individuals that are poor, elderly, and from rural geographic locations (Naz et al., 2021).

The type of hospital admission whether elective or non-elective can also impact the availability of health resources in each area. In places similar to the US, where elective surgeries tend to be higher in frequency than in other developed countries, there tends to be a greater presence of available surgeons in metropolitan areas, increasing access and reducing emergent need (Gibson, 1972). Since this study will be evaluating the impacts of elective or non-elective hospitalizations type, it would still be an interesting question to compare this variable in this single MS-DRG model. When elective health utilization is studied in comparison to primary care physicians, the data can be misleading due to increased utilization which can result in duplication of information. This noted duplication of data due to healthcare system coding limitations support this researcher’s intention to limit this data to a singular DRG code (D. Mechanic, 1979). The elective or non-elective status of a patient’s reason for hospitalization has shown reduced days that met requirements for an acute care

hospital stay, reducing the length of stay in studies (C. J. Poulos, Magee, Bashford, & Eagar, 2011). Additional support of having the elective/nonelective variable as a predisposing characteristic can be seen in studies that have analyzed the mortality rates of patients that have had a life-threatening surgical event such as thoracic surgeries and how those that were nonelective had higher mortality rates than those that were electively based (N. D. M. D. Andersen et al., 2014). Medicare and Medicaid Services also find the variable of elective medical care important. In several years of the Federal Register, they dedicated great effort to discuss reimbursement structures around elective surgical and medical services, as it may affect global healthcare costs (CMS, 2020; DHHS, 2009, 2013, 2015, 2016, 2017, 2018). A similar payor study that compared Traditional Medicare to Medicare Advantage programs exhibited a distinct difference in the discharge outcomes and the impacts that elective admission status had on those outcomes; they demonstrated that traditional Medicare admission had higher mortality during hospitalization rate (Henke et al., 2018).

The predisposing characteristics of age, gender, and race that this research project intends to use as its defining characteristics are well supported in this manner through the healthcare utilization literature. However, the utilization of the location and elective status can be used as both those predisposing characteristics and enabling resources throughout the literature. Each dynamic focused on capturing how this variable might be a precursor or the enabling support mechanism for a health service utilization. Considering that the enabling resources for this research will be the actual hospital admission, it is not outside of the realm to take the variables of age, race, gender, location, and elective status as predisposing characteristics and feel that the prior work in this area supports this thought.

Enabling Resources

The BHUM has a second construct called "Enabling Resources," represented by family and community resources that the patient had or did not have access to that could lead to or prevent healthcare utilization (R. M. Andersen, 1968, 1995). In the body of work on the BHUM, many different enabling resources have defined possible variables, but this research will take a different perspective on this variable and make it a fixed element. By having this construct, a fixed element, it will also represent the combined efforts of the first phase of a two-period episode of care represented in Figure 1.4, where the actual hospitalization event is the final health utilization product of that first phase. Using this variable in this way will be a new perspective to utilize the enabling resource construct, using this variable through the lens of a particular episode into an expanding episode of care. The following review will demonstrate how this will fill a gap in the literature.

Enabling resources can be seen in different ways; some research sees them have varying levels of influence and impact that can be environmentally influencing or community-based care delivery systems (Phillips et al., 1998). This perspective supports the concept of this research plan to fix the enabling resources as a defined inpatient hospitalization medical service. In vulnerable populations, the effectiveness of enabling resources can be the determining factor in access to healthcare (Gelberg et al., 2000). So, this brings interest to this research to discern if the lack of financial enabling resources will affect the continuation of healthcare utilization when a life-threatening event has occurred. This work by Andersen and Newman (2005) defined that enabling and illness-based factors are essential for the utilization of healthcare resources and give support to the idea that an enabling resource could be a fixed element to see what demographic and need-based

variables will result in the analysis of a continued episode of care (R. M. Andersen & Newman, 2005). Controlling for predisposing and enabling conditions has been used in research models to determine what types of preventive health utilization would occur, like Austin et al. (2013) work on physicians' recommendations based on patient demographics that had sought medical services and received differing outcomes (Austin et al., 2013). This work also provides support for this researcher's plan to control the predisposing and enabling variables. In a German study by Heider et al. (2014), they found similar results that the enabling factors of multiple morbidities would be a key indicator for the higher cost of healthcare utilization and have higher need for healthcare utilization (Heider et al., 2014). Given that a life-threatening event would, in theory, be a type of multiple morbidity one could assume that this would create a need for utilization of post-hospitalization healthcare, but will this effect occur when this is an insurance payer or lack of payer resource? Research conducted in Germany, where insurance was an enabling predictor in studies regarding patients with disabilities, insurance did not have a moderating effect on racial and ethnic differences. (Miller et al., 2014). Considering that Germany has a social healthcare system, enabling resources such as location or another resource demographic comparable to transportation might be barriers to healthcare utilization.

This can even be seen in American studies, as many individuals with disabilities are afforded government assistance with healthcare. However, this assistance does not always translate to all levels of healthcare services in America, such as post-acute care services like Long Term Care Hospital (LTCH), SNF, Behavioral Health Facility (BHF), and HHC Services. A 2015 Federal Register clearly defines the factors outside of the medical severity diagnosis-related code that hospitals utilize for Medicare reimbursement, and that they are

impacted by other variables as it is related to post-acute care and the cost of that extended episode of care. These costs bring about the idea of a "Clinical Episode-Based Payment" system that might cover more extended care (DHHS, 2015). Again, in the 2016 Federal Register, discussion regarding Medicare hospitalization reimbursement and the additional cost of post-acute cost care called for a revision to the reimbursement rules for the Long-Term Acute Care hospital post-acute care setting to bring boundaries to those growing costs. Bringing light to the fact that the original hospital admission is the precursor to post-acute care utilization and where a payer falls in that system (DHHS, 2016).

During this same time period, the healthcare industry begins to see an increase in the utilization and integration of healthcare utilization review/management software programs like InterQual by McKesson to help healthcare systems maintain profitability while producing quality healthcare outcomes through Medical Care Guidelines (Solutions, 2016). These actions by healthcare systems are done to meet the demands of all the stakeholders that revolved around the financial aspects of healthcare while using quality care as the metric to make it sound more palatable to deny or limit access to care.

The efforts of payment banding at the governmental level, supports research that Medicare beneficiaries will have much higher post-acute care utilization than other payer types, as well as the idea that the BHUM may need to adjust how it perceives an episode of care. Korean studies on healthcare utilization have found that enabling factors alone were not significant, but when coupled with a need or predisposing characteristics, the significance would present itself (H.-K. Kim & Lee, 2016). This research supported the ideology that a fixed or defined enabling factor could more clearly show the significance of healthcare utilization as to whether a predisposing or need factor was related to it.

Huang's (2017) research on an elderly Asian population found similar results as Kim and Lee, that the enabling resources did not directly impact utilization but were shown to indirectly impacted healthcare utilization in Asian culture (Huang, 2017). Chens et al.'s (2019) work on Chinese patient hospitalization utilization saw the significance of need in their results. Even with the introduction of new social and spatial enabling variables, predisposing and need-based variables continued to be significant in the outcome results (H. Chen et al., 2019). These results also support those racial/cultural beliefs could result in a different outcome when reviewed as a predisposing characteristic with a fixed enabling resource variable in the American healthcare system utilization. When considering the transgender and gender non-conforming community, Sutter (2007) found that stigma-related stressors as enabling resources have a significant impact on this segment of our society (Sutter, 2017). This concept around stigmas can be compared to other stigmas identified by ethnic cultures about placing loved ones in nursing homes for post-acute care that provides support for this researcher's idea that minorities will utilize discharge disposition resources differently than White communities. This support might also be seen if results demonstrate that ethnic communities that have insurance resources don't utilize post-acute resources at the same rate as others. Some studies utilized the Lubben Social Network Scale to define enabling factors that are beneficial for social or cultural dynamics, but less fruitful on categorical elements like those in this research.

The aggregation of data elements into a single value is supportive of the idea that a complex process such as hospital admission can be considered a single value enabling resource (H. Chen et al., 2019; Heider et al., 2014). Cancer prevention studies created a composite score of enabling factors were analyzed in the study, this method is not being used

in this study, but provides additional support that a complex set of elements could be aggregated into a single enabling factor that could be used for analysis (Jin et al., 2019).

Research on economic interest and its impacts as an enabling variable is supportive of the idea that income and insurance type are determining factors in the amount of unmet medical needs (Yoon et al., 2019). Since payer factors are present before and during the hospitalization event, the question of whether those same payer resources translate into post-acute health utilization arises. Enabling resources that are categorical in nature are well represented, such as the availability of support and financial resources elements to congregate or create an overall enabled resource (Travers et al., 2020).

This line of reasoning aligns well with the idea that using an actual hospitalization event would be the combination of both support and financial resources in a real-time medical occurrence, setting the mechanism for the need construct of the BHUM. Naz et al.'s (2021) study that assessed the enabling factor of income resources as wealth or level of wealth category, which I believe could be mimicked in thought about the types of insurance that a patient has, from private insurance (PVT INS) products, Medicare to the unfunded, as each level would represent the various potential wealth level of individual patients as well as social status (Naz et al., 2021).

The utilization of a hospital admission as the enabling resource is not uniquely supported in the literature as a singular variable, but this is potentially due to the method that episodes of care are being analyzed within the BHUM. Taking the perspective that an inpatient hospital admission is potentially two separate episodes of care in a single medical event and that this research will be investigating the second phase of the hospital admission and discharge process utilizing the same variables that would be present during the first

phase with changed moderation would be a novel approach to BHUM research. The research is supportive of the cross utilization of the defined variables when used in either predisposing or enabling constructs to view health service utilization in differing ways. Therefore, the concept of utilizing an acute hospital admission as a complexity of resources that have come together to create that event as a viable enabling resource in the defined episode of care window.

Need

The third component of the Andersen Behavior Model of Health Services Use was "Need" which was defined as the actual evaluated or perceived need of healthcare services (R. M. Andersen, 1968). This element has been utilized in previous research in many ways, from the need of obtaining primary care physicians, preventive care visits for chronic illness, to the actual treatment one would receive/not-receive based on a physician's evaluation, or lack of that evaluation completely. The goal of this research is to explore whether a patient in a two-phase episode of care will demonstrate similar or different results compared to historical studies utilizing the BHUM.

The goal of this section will be to show the gap in the literature by identifying the various environments and variables that were identified as Need. Much of the historical work has demonstrated that the medical need of health services outweighs the other elements of the BHUM (Austin et al., 2013; Basar et al., 2021; H. Chen et al., 2019; Heider et al., 2014), however, some studies present a countering argument that the individual or family might have priority needs that overshadow medical needs (H.-K. Kim & Lee, 2016; J. I. Kim & Kim, 2021; Sutter, 2017; Yoon et al., 2019), especially if there is not defined sick role

identification or urgency in those medical needs which would lead to the continuous decline in chronic illness that can result in the need for emergent medical services (McKinlay, 1972).

In other studies, the need for health services were more defined as a social or functional element of a healthy society where policy was needed to satisfy unmet healthcare issues (J. G. Anderson, 1973). The question of access versus need has been a recurrent theme addressed in research, balancing the thought that access to needed healthcare at the time of medical need, and then the need for greater clarification in medical services as the level of illness or symptoms were experienced by the individual (L. A. Aday & Andersen, 1974; Medicine et al., 1993). In some research, this would have occurred at the conversion from healthy to the sick role for the individual (Gibson, 1972; McKinlay, 1972; D. Mechanic, 1979).

Need has been identified in several studies when the healthcare utilization is combined with age; the belief that age is a contributing factor to chronic disease, which is why higher utilization or need appears in the elderly (Blanken, 1976). A longitudinal study of mental health disorders found that even though all three BHUM constructs were important in utilizing healthcare resources, this study found that the need, i.e., mental health disorders was the most significant factor in the utilization of healthcare services (Fleury et al., 2014). This information supports this researcher's plan to utilize what has been historically used as predisposing characteristics or enabling resources to moderate as the need function of utilization of post-acute health services.

Need has also been identified as an actual medical event and measured by various forms, such as length of medical stay, clinical symptom indicators to validate or quantify the need for continued medical care (D. Mechanic, 1979). Whereas in some research the continued acute hospital care need is not clinically supported, and the need for discharge is

requested (C. J. Poulos et al., 2011; R. G. Poulos, Poulos, & Eagar, 2007). This study will analyze the need construct as the timeline between the acute hospital admission and the final discharge disposition. It will consider that care need may not be finalized for all patients that readily discharge from the hospital in the sense of what is considered acute care needs. In the healthcare sector, this is called the discharge planning process, which starts the moment a patient admits to the hospital and involves many stakeholders that may have nothing to do with the actual patient. Andersen (1995), in follow up work on his BHUM noted that "If we examine beliefs about a particular disease, measure need associated with that disease, and observe the services received to deal specifically with the disease, the relationships will probably be much stronger than if we try to relate general health beliefs to global measures of need and a summary measure of all services received in a given period" (R. M. Andersen, 1995). This idea supports what is occurring in the healthcare industry, and this researchers' efforts to highlight those factors. Defining a specific illness or disease that can be utilized to see what parameters at the point of recovery may be needed. While analyzing if predisposing and enabling characteristics impact health utilization outcomes for that patient demographic. Pescosolido and Kronenfeld's (1995) study regarding medical sociology and its impacts on healthcare utilization studies demonstrated that "Need" was a primary driver of healthcare utilization system, and that as data sample become larger this fact become clearer in the outcomes (Pescosolido & Kronenfeld, 1995). Longitudinal studies for elderly healthcare that made comparisons with insurance sources resulted in differing healthcare utilization and demonstrated that some payers paid higher medical costs than others for the same plans of care. This raises a question as to whether continued care was needed at all, or was the higher utilization of healthcare executed because those payers had lower thresholds to service

acquisition? However, it is also possible that payers that had lower utilization denied access to care that might have been needed for recovery (Pearlman et al., 1997). This research intends to use a similar concept that Bazargan et al. (1998) used in their study that utilized fifteen different need variables to conduct their analysis, which identified chronic health conditions that had been identified by a physician and led to continued or needed healthcare utilization. This study will utilize the enabling resources of hospitalization that continued care need to determine utilization outcomes based on these potential mediations (Bazargan et al., 1998). Studies conducted on vulnerable populations that evaluated competing needs had a similar approach to this research as both analyzed periods beyond the singular events of healthcare utilization. Gelberg (2000) analyzed health outcomes of a homeless population and their continued utilization of healthcare resources for chronic and mental health conditions (Gelberg et al., 2000). This research intends to assess a similar post-acute recovery care aspect of healthcare utilization on patients that are recovering from a life-threatening medical event. Blanken's (1976) research on hospital discharges and length of stay in short stay hospitals demonstrated that the enabling resource of income was a significant factor in the length of stay in the hospital, supporting the idea that income, or insurance resources promote healthcare utilization (Blanken, 1976). In Bazargan's (1998) work, they also find that the insurance component is an important function of accessing preliminary healthcare utilization functions as they provided six measures in their study. Yet, they also found that the predisposing factors had a moderating effect on hospital admissions, emphasizing the importance of predisposing characteristics (Bazargan et al., 1998).

Other researchers found that healthcare payers need to have efficient utilization of a finite health financial system and that healthcare economics and outcome data have been a

strong supporter and influence on the payer portion of the healthcare need evaluation, which provides support for this research's model of payer relationship (Levine, Taylor, Ryan, & Sculpher, 2002). Studies regarding physician recommendations also used need variables such as body mass index; activity limitations; health status; and medical comorbidities to express an indicator of need in a composite rating but found that age, a predisposing characteristic was still a primary driver of the lack of action on physicians' behalf (Austin et al., 2013). The composite rating could be comparable to Medical Care Guidelines utilized by insurance payer systems, providing support that a payer could influence the utilization of healthcare through those medical care guidelines. This medical care guideline aspect of patient care pathways could especially influence outcomes if it created additional work on healthcare staff to overcome a potential insurance denial, in turn influencing the decision outcomes that healthcare provider may make in the hospital discharge planning process. In addition, this supporting study demonstrated that the global body of work had been macro-focused and the need to bring the study down to a smaller catchment area to see if those same findings would be relevant when it was defined to a specific healthcare service used (Fleury et al., 2014).

A similar approach of defining the specific illness that is being studied gives a narrowing focus on how post-hospitalization outcomes occur when payer types, hospital length of stay, and billable costs metrics are seen as a moderator. Heider et al (2014) in his German study on elderly patients utilized a Cumulative Illness Rating Scale for Geriatrics to determine the need for healthcare utilization in a predetermining fashion (Heider et al., 2014). In contrast, this study will be investigating recovery need after an inpatient hospitalization of a life-threatening illness. Though this tool would be an appropriate additional need evaluator, the intended data set for this study does not have access to such

healthcare data to implement this tool. However, this would be a good future expansion study of this research to determine if a variation in results would be seen when those variables are considered.

The Wang et al (2013) study provided insight into the impacts of insurance as an enabling resource and how it made differences in what has been seen as racial disparities in other research, which provides support to this research's concept that insurance resources have more impact on healthcare utilization then earlier believed were social and cultural variables (T.-F. Wang et al., 2013). Research into healthcare utilization disparity based on whether a person had a disability as the need for healthcare services highlighted that insurance access was a significant factor in the utilization of healthcare services, and this progressively changed with racial demographics (Miller et al., 2014).

Others have demonstrated that preconditions such as chronic disease or disabilities tend to be very strong need factors, so this research is contending that an acute hospital inpatient admission is a precondition to continued need for utilization of health resources (H.-K. Kim & Lee, 2016; J. Kim et al., 2015; Miller et al., 2014; Yoon et al., 2019). A Chinese healthcare utilization study supported that need variables such as patient's daily activities, their ability to conduct activities of daily living, and chronic health conditions were strong predictors of healthcare utilization even in Chinese society where preventative healthcare is readily available (H. Chen et al., 2019). Having a life-threatening hospitalization event would create enough physical debility that could in theory create these needs in a hospitalized patient.

In Traver's (2020) research it was noted that the individual's perception of healthcare need, whether self-assessed or evaluated on the severity of one's health status set the tone for

health services utilization (Travers et al., 2020). Turkish socialist system healthcare utilization found that demographic equality existed, and healthcare need dominated the utilization of healthcare. It was also noted that this healthcare need created an increase in utilization of healthcare. The difference in insurance provisions effected the location of where healthcare utilization occurred, whether it was private healthcare or governmental supported resources (Basar et al., 2021). Behavioral/social variables again suggested that certain social-economic groups utilized more healthcare resources. When a comparison was made between government-provided resources and those of for-profit healthcare systems, funding became the primary need driver that impacted the utilization healthcare resources in the for-profit sectors (Naz et al., 2021).

This research study intends to utilize a version of the BHUM that has not yet been considered in the literature and will look specifically at the financial drivers of healthcare utilization. To date, much of the literature on the BHUM has been focused on the predisposing and enabling variables that influence an individual or their family decision-making process in the utilization of health services. The BHUM research is highly focused on the beginning of healthcare utilization pathways, whereas the current research will be analyzing the second phase of an episode of care, demonstrated in Figure 1.4. This figure presents how a continuum of care utilization of healthcare resources might present in a real-life medical event. Which in all intents and purposes would be a progressive or continuous phase expansion, or a chain of healthcare utilization can be demonstrated.

When thinking about healthcare utilization in this manner and realizing that a BHUM researching a person receiving a Primary Care Physician visit for preventative healthcare is significantly different than a hospitalized person with a life-threatening event or protracted

healthcare utilization such as hemodialysis or cancer treatments. Furthermore, when considering the longitudinal time of such treatments, they have not been mentioned in the literature, nor the socioeconomic changes such as loss of a job, or insurance might impact the BHUM outcomes.

This research project focuses on the second phase of Figure 1.4, hoping to demonstrate the role of hospital systems and insurance payers in the healthcare utilization framework. Utilizing the same predisposing characteristics, enabling resources, and need from the first phase that led to the inpatient hospitalization, to start the healthcare utilization sequence of events in phase 2 a presumed correlation can be seen in those connections of the same variable. In addition, this research will take an expanded view of how financial drivers and metrics utilized by healthcare systems and payers to monitor profitability and expenditures impact the discharge disposition or even the mortality of individuals suffering from the defined life-threatening medical condition of respiratory failure.

The complete theoretical model for this research can be seen in Figure 1.5, which defines the predisposing characteristics as Age, Race, Gender, Location, and Admission Type (whether the hospitalization was an elective or non-elective admission) will provide some base demographic variable in concert with geographic and medical severity designation of the individuals in the study. The actual hospitalization of a patient is the enabling resources and a fixed element that meets the defined admission criteria of MS-DRG 207. Utilizing this method of fixed enabling resource and the type of variable is where the research takes a turn in a new direction and fills a gap in the current literature. The need element of the BHUM will be the financial metrics, and enabling resources used in a moderation context. In prior BHUM research, these variables have been used as predisposing

or enabling resources that provided support to the need of healthcare utilization which tended to be a physical or psychological need. In this research model, these metrics will be the primary determining factors of the need for additional healthcare utilization. It is common knowledge that an individual arriving at a hospital with a life-threatening condition must receive lifesaving care no matter their financial resources. However, this research will explore whether patients receive needed recovery healthcare when financial resources are at play, even in the recovery of that actual life-threatening health event.

Hypothesis Development

The goal of this research project is to gain additional insight whether the original 1968 BHUM with slight construct modification can be used with retrospective data to explore the impact of business health system metrics and insurance payer variables on the utilization of healthcare resources (R. M. Andersen, 1968). In Figure 1.5, the research hypothesis model visually describes the defined characteristics of the BHUM and what data variable will represent each function of the construct (R. M. Andersen, 1968). The predisposing characteristics of Age, Gender, Race and Geographic location are well supported in the literature as acceptable predisposing characteristics. Adding the elective or non-elective status of the hospital admission as a predisposing characteristic would be new to the BHUM literature. The fact that an individual's hospital admission was an elective or non-elective admission could be a factor on post-acute healthcare utilization. The body of work has shown repeatedly that non-emergent hospitalization has the highest post-event care needs.

The elective or non-elective status of a hospital admission as an enabling resource, along with the payer, length of stay, and total charges as the antecedents would be new to the

body of work. Since this research is treating the defined MS-DRG 207 hospital admission as the enabling resource, assuming that this is a fixed representation of executed sociocultural, community and economic enabling resources. It also represents the healthcare utilization outcome of the first phase of the BHUM when you think about continued healthcare utilization as a chain of sequential healthcare events as represented in Figure 1.4.

HYPOTHESES

Utilizing the BHUM, this research will take NIS-HCUP data to analyze the following 19 hypothesis questions to the literature and body of work, to expand the current literature, and fill the gaps identified. Table 1.1 is a summary of the developed hypothesis for this research project, which evolved out the original out of two initial questions. The first question was: Do health systems and healthcare insurance payers influence healthcare utilization through standard industry metric monitoring? This initial question made this researcher look at various levels of care, episodes of care, and the types of potential outcomes of the various options. Preliminary review of literature found that the cost of healthcare, the lengths of stay of a patient, and the access to healthcare funding was a recurrent theme in literature. This became the primary independent variables that this researcher decided to focus this work upon. In the selection of potential dependent variables, this researcher began to think about episodes of care and the measurable outcomes of the differing types of episodes of care and found that patient discharge outcome or potential return to the hospital was a significant area of concern in the literature. So, this researcher chose to utilize discharge dispositions of a hospital admission to analysis as the dependent variable. When considering the utilization of the BHUM in this research project, it is natural to pull appropriate socio-demographic like age, race, gender, location, and admission type variables into this model to measure the moderating effects that they may have on the relationships between the primary independent variables and the dependent variables. Table 1.1 expresses those primary independent to dependent variable relationships, with the addition of those moderations for each of the primary relationship so that primary and

moderating effects and be evaluated across the spectrum through multinomial regression of the dataset.

Table 1.1 Summary of Research Hypothesis

H1: Payer Type affects the discharge disposition.
H1a: Age moderates the relationship between payer type and discharge disposition.
H1b: Race moderates the relationship between payer type and discharge disposition.
H1c: Gender moderates the relationship between payer type and discharge disposition.
H1d: Location moderates the relationship between payer type and discharge disposition.
H1e: Admission Type moderates the relationship between payer type and discharge disposition.
H2: Length of Stay affects the discharge disposition.
H2a: Age moderates the relationship between length of stay and discharge disposition.
H2b: Race moderates the relationship between length of stay and discharge disposition.
H2c: Gender moderates the relationship between length of stay and discharge disposition.
H2d: Location moderates the relationship between length of stay and discharge disposition.
H2e: Admission type moderates the relationship between length of stay and discharge disposition.
H3: Total Charges affects the discharge disposition.
H3a: Age moderates the relationship between total charges and discharge disposition.
H3b: Race moderates the relationship between total charges and discharge disposition.
H3c: Gender moderates the relationship between total charges and discharge disposition.
H3d: Location moderates the relationship between total charges and discharge disposition.
H3e: Admission type moderates the relationship between total charges and discharge disposition.

Healthcare utilization studies routinely look at payer type as a resource or lack of needed resources to obtain access to healthcare services. These analyses have been done in different ways but have followed similar trends. A portion of these studies evaluate the success or quality of care based on payers, (Levine et al., 2002; Mapel & Pearson, 2002; Mehta, Flores, Thompson, & Nathan, 2017; Slocum, 2017; Van Der Molen, Pieters, Bellamy, & Taylor, 2002) where others have looked at the difference in care that one payer type may

receive versus another payer (E. E. Chen & Miller, 2017; Dalal, Liu, & Riedel, 2011; Henke et al., 2018; A. Kumar et al., 2018; Ladabaum et al., 2018). The analysis between the outcomes of government funded payers in comparison to commercial insurance or Medicare advantage programs is a recurring trend in the literature (E. E. Chen & Miller, 2017; Dalal et al., 2011; Franc, Perronnin, & Pierre, 2016; Henke et al., 2018; A. Kumar et al., 2018; Ladabaum et al., 2018; Wehby & Lyu, 2018). Type of insurance resources is also a prevalent topic of interest within the literature, as insurance type can be a determining factor in receiving health services (N. D. M. D. Andersen et al., 2014; Barnato, 2011; Bradley et al., 2012; Breslau et al., 2018; Damianov & Pagán, 2013; Eric & Kisalaya, 1999; Lyon et al., 2011; Miller et al., 2014; Shi et al., 2010; Slatore et al., 2010; T.-F. Wang et al., 2013; White, French, Zwemer, & Fairbanks, 2007).

Research has demonstrated that the payer resources are an important part of the healthcare utilization system, and in some cases may be the only way to receive services. The current body of work in its no payer or two payer comparisons creates a gap in the literature where all payer types are evaluated against the same dependent variable. The following hypothesis intends to address this by investigating all payer types and how they affect the discharge disposition of patients that have a specific admission diagnosis and will expand on similar work that was solely focused on Medicare patients (Frank & Haider, 2014).

Payers that utilize DRG code reimbursement structures have defined payment parameters that could influence discharge timelines or which discharge disposition is even available within that timeline (Elinor et al., 2004). It has also been demonstrated that DRG payers create potential cost savings by lowering lengths of stay through discharge (Meng et al., 2020). In some research it was found that 70% of discharges to LTCH had Medicare as a

primary payer (Frank & Haider, 2014). In worse case scenarios, lack of health insurance has been associated with reduced rates of service and higher mortality rates (Lyon et al., 2011). It has been shown that both discharge location and total cost of care is affected when Medicaid is the primary payer (Mehta et al., 2017). Therefore, I propose that that healthcare payers whether governmental, private, or self-pay will have effects on the final discharge dispositions. I formally present this hypothesis:

Hypothesis 1: Payer Type Affects Discharge Disposition.

The BHUM body of work and adjacent healthcare utilization research has supported that age was a strong indicator for the need or utilization of healthcare resources (N. B. Anderson & Cohen, 1989; Austin et al., 2013; Guo et al., 2001; Harel et al., 1990; Jarrett et al., 2005; U.S. Department of Health, 1971; Wolinsky, 1990). With continued concern regarding the rising cost of healthcare and its impacts on government funded healthcare insurances, age-based research was conducted to see the difference in its impacts (Dalal et al., 2011; Heider et al., 2014; Perloff et al., 2016; Powers et al., 2019). Reforms in payment reimbursement structures (Allen, 2000; Meng et al., 2020) to reduce cost have been implemented at many levels of care, and how the cost of care resources like care givers (J. I. Kim & Kim, 2021) have demonstrated positive or negative impacts on the elderly healthcare utilization.

The literature has demonstrated that as age increases, the cost of healthcare rises (Powers et al., 2019), and those biases can be present for elderly patients in the care that they receive (Austin et al., 2013). Korean studies found that the predisposing characteristics of sex and age were variables that affected continued health service utilization(H.-K. Kim & Lee, 2016).

Andersen et al. (2014) thoracic acuity study which compared insured to underinsured patients and found that age had a significant effect on outcome relationships (N. D. M. D. Andersen et al., 2014). In Chen et al. longitudinal study on the site of a patient's death, it was found that age was a significant covariate to the insurance payers analyzed (E. E. Chen & Miller, 2017) Therefore, I propose that age will have an effect on the payer to discharge relationship, an formally present this hypothesis:

Hypothesis 1a: Age will moderate the relationship between Payer Type and Discharge Disposition.

Much of the healthcare utilization body of work has noted that individuals of racial or ethnic minority status would receive less healthcare utilization opportunities due to a lack of income or insurance needed to receive those resources (Bazargan et al., 1998; Breslau et al., 2018; Brown et al., 2018; E. E. Chen & Miller, 2017; Shi et al., 2010; T.-F. Wang et al., 2013). The thoracic study conducted by Andersen et al. (2014) demonstrated that race, specifically white patients had significant findings in outcomes when insurance status was evaluated (N. D. M. D. Andersen et al., 2014). Bradley et al (2012) breast cancer mortality study found that difference in insurance type and race showed statistical significance on outcomes (Bradley et al., 2012). Frank and Haider (2014) in their Medicare study that looked at other facility discharge dispositions found that race was a significant factor in this relationship (Frank & Haider, 2014). Therefore, I propose that race as a moderator will have effect on payer/discharge relationships, and formally present this hypothesis:

Hypothesis 1b: Race will moderate the relationship between Payer Type and Discharge Disposition.

Throughout the healthcare utilization research, it has been noted that gender has an association with higher utilizations and discharges outcomes (Franc et al., 2016). Some studies noted that females had higher mortality rates than males (Rush et al., 2021), whereas in other studies it was found that males had higher mortality rates (Akintoye et al., 2017), and even studies on Transgender and nonconforming genders demonstrated differences in health services access (Sutter, 2017). As in the prior hypothesis, Korean studies supported gender as a variable that would impact continued health service utilization, as females demonstrated higher healthcare utilization (H.-K. Kim & Lee, 2016).

Insurance and emergency room utilization studies conducted by White et al. (2007) found that uninsured males had higher emergency room healthcare utilization (White et al., 2007). Chen and Miller (2017) conducted a study on mortality in comparison to Medicare insurance products and found that males had higher mortality rates than females in this payer comparison (E. E. Chen & Miller, 2017). The Medicare study by Frank and Haider (2014) that looked and post-acute discharge location found that the was difference in discharge locations based on gender, with females being discharged to the higher level post-acute care locations (Frank & Haider, 2014). The potential to die in the hospital when you are a Medicare insurance program subscriber was higher for males then females (Henke et al., 2018). Therefore, I propose that gender influences the payer to discharge relationship, and I formally present the following hypothesis:

Hypothesis 1c: Gender will moderate the relationship between Payer Type and Discharge Disposition.

Supporting literature shows that metropolitan areas tend to have higher healthcare utilization due to the access of health resources, and in some cases the quality of the healthcare services community can be associated with higher costs (Damianov & Pagán, 2013). In DRG based payment studies, it was found that discharges to more rural locations came at a higher cost to payers (Barouni, Ahmadian, Anari, & Mohsenbeigi, 2020a). Lack of a service or a contracted provider of that service in a specific location, or the higher associated cost that might be incurred by the payer or patient/family could be a determining factor in a discharge location and raised the following question. In Chen et al. (2019) study on hospital utilization in the China found that there were differences in utilization outcomes when the rural/urban status was considered in the analysis (H. Chen et al., 2019). Asthma studies that looked at insurance resources and the location of patients to negative environmental factors and the impacts on healthcare utilization was closely associated with patient locations (Eric & Kisalaya, 1999). Therefore, I propose that location will have effect on the payer/discharge relationship, and formally present this hypothesis:

Hypothesis 1d: Location will moderate the relationship between Payer Type and Discharge Disposition.

The type of hospitalization, whether emergent or elective, that translated into an Intensive Care Unit hospital admission impacted the level of care that was needed upon discharge (Hill et al., 2016). Henke et al. (2018) showed that Medicare recipients who arrived at the emergency room had clear differences in the care they received based on the type of Medicare beneficiary program that they were enrolled in (Henke et al., 2018). Even with limited literature to support the elective or non-elective impacts on discharges, it is prudent to

look at this variable in all antecedent accounts, as there could be a missed opportunity of information and fill a gap in the current literature, so with that the following question will be investigated.

The thoracic surgery study conducted by Andersen et al. noted that nonelective surgeries where higher in patients that were uninsured (N. D. M. D. Andersen et al., 2014). Henke et al. (2018) conducted a payer comparative study on hospital admissions and found that Medicare Advantage patients that were nonelective admission would require surgical intervention (Henke et al., 2018). Length of stay studies that compared payers with and the effects of variables such as admission type found that emergency admissions resulted in higher lengths of stay in Medicare and Medicaid patients (Mehta et al., 2017). Therefore, I propose that the type of admission whether elective or non-elective will have effect on the payer/discharge relationships and formally present this hypothesis:

Hypothesis 1e: Admission Type will moderate the relationship between Payer Type and Discharge Disposition.

Length of stay as a financial metric is widely used in the healthcare sector as a metric of financial performance, and is included on most quality-performance scorecards (Cram, 2019). In the case of IRF, analysis found that IRF utilization as a discharge disposition was effective in the reduction of length of stay and associated provider cost connected with the additional days of medical stay (Duarte et al., 2018). In some cases, this length of stay focus is driven by a payer's influence to reduce cost, were HMOs worked to shorten hospital lengths of stay, but did not affect overall hospital days, which could be related to an inappropriate discharge disposition that resulted in a hospital readmission (Experton, Li,

Branch, Ozminkowski, & Mellon-Lacey, 1997). In some literature that focused on LTCH discharge dispositions, which is the highest level of post-acute care, it was found that length of stay was not the longest, as you might think being the sickest of the patient population needing post-acute care (Frank & Haider, 2014). In another study that evaluated early utilization of inpatient rehabilitation services, it was demonstrated that reduced length of stay was associated with lower cost of care (Gruther et al., 2017). Length of stay as a variable has clearly demonstrated in the literature that it has influence over healthcare utilization, which is influenced by health system drivers as the advantages of its reduction impact system profitability. Therefore, I propose that length of stay will have a primary effect on discharge disposition and formally present this hypothesis:

Hypothesis 2: Length of Stay Affects Discharge Disposition.

Taking age into account when it comes to inpatient hospital length of stay is well documented in the literature, as age increases, it has an impact on length of stay that is secondary to a person's longer recovery time that occurs as we age (Gordon, 1973). Individuals that have suffered a critical illness have also demonstrated that medical severity of the illness in combination with age affect both the length of stay and mortality as a discharge disposition (Hill et al., 2016). Age was also a factor in the literature on patients that have fallen ill to Acute Myeloid Leukemia and had significant impact on length of stay and discharge outcomes of those patients (A. J. Kumar et al., 2018). In Lewis's (1981) research on the average length of stay in short term hospital found that age was having a covariate impact on length stay outcomes (Lewis, 1981). In very common surgical procedures such as total knee replacements, it was found that age had impacts on length of stay and recovery

outcomes (Molloy et al., 2017). Kumar et al. (2018) also found in an additional Acute Myeloid Leukemia study that older Asian/Pacific Islanders demonstrated longer lengths of stay then other groups. (A. J. Kumar et al., 2018). Therefore, I propose that age will have effect on the length of stay/discharge relationship, and formally propose the following hypothesis:

Hypothesis 2a: Age will moderate the relationship between Length of Stay and Discharge Disposition.

In Gordon's (1973) study on short term hospital lengths of stay, it was found that race impacted length of stay, as White patients demonstrated shorter lengths of stay than other racial groups (Gordon, 1973). The continuum of care is an impact factor in the discharge disposition process. It was found that race was associated with disparities in continued care opportunities due to lack of primary care connections which resulted in longer lengths of stay for that population (Miller et al., 2014).

Molloy et al. (2017) investigated surgical patients and found that race, along with age and sex had significant impacts on lengths of stay (Molloy et al., 2017). Acute Myeloid Leukemia studies demonstrated that in all categories Black patients related to longer lengths of stay (A. J. Kumar et al., 2018). In the Andersen et al. (2014) study on thoracic surgery needs, it was found that minorities had higher occurrence of emergent surgical needs then other races. (N. D. M. D. Andersen et al., 2014). Studies conducted regarding lengths of stay and hospital readmissions found that Black Males where significant for readmission with the 30 days of discharge (Carey & Lin, 2014). Therefore, I propose that race will influence the length of stay and discharge disposition relationship, and formally present this hypothesis:

Hypothesis 2b: Race will moderate the relationship between Length of Stay and Discharge Disposition.

Short term acute care hospital studies on length of stay have shown that both gender and location in combination have effects on length of stay (Gordon, 1973). Total knee surgical patients have also shown that gender is a significant factor in overall lengths of hospital stay (Molloy et al., 2017). A national database study on patients that experienced heart failure noted that males in urban areas had a higher likelihood to have home as a discharge disposition (Akintoye et al., 2017). Carey and Lin's (2014) study on heart attack hospital lengths of stay and readmission rates found that male patients had higher 30-day readmission rates than females, but also found that females had higher occurrence of heart failure (Carey & Lin, 2014). In this hospital length of stay study conducted by Ndanga and Srinivasan on patients with drug abuse histories found that males had higher frequency of admission then females (Ndanga & Srinivasan, 2019) Therefore, I propose that gender will have effect on the length of stay and discharge relationship, and formally present this hypothesis:

Hypothesis 2c: Gender will moderate the relationship between Length of Stay and Discharge Disposition.

Areas that have larger healthcare systems or significant differences in the type of health system tend to demonstrate patterns of higher health services utilization as well as longer lengths of medical stay (Gordon, 1973; Naz et al., 2021). In heart failure studies conducted on a similar NIS database found that regional differences in length of stay and

disposition, noting that urban locations had higher resulting values (Akintoye et al., 2017). It was found that the location or type of hospital, whether it was a teaching or non-teaching facility had differing values of length of stay and variance in clinical dispositions (A. J. Kumar et al., 2018). In Lewis' (1981) hospital and length of stay survey work he was able to demonstrate both regional and hospital size differences in length of stay, which only increased with patient age (Lewis, 1981).

The literature demonstrates in several areas that both health system size and location, whether at a regional level or urban/rural level, influences length of stay. This could be a potential link to access of medical services at the discharge period. Expanding this question on the locational impact I will assess this in relation to both the length of stay and discharge disposition. Therefore, I propose that location will influence the length of stay/discharge disposition relationship, and formally present this hypothesis:

Hypothesis 2d: Location will moderate the relationship between Length of Stay and Discharge Disposition.

Research on length of stay has demonstrated on various accounts that elective hospital admissions have longer lengths of stay (Gordon, 1973). Especially in cases where a patient might have to qualify for admission to a specific elective healthcare service, it was noted that this qualification review period increases the length of stay (Duarte et al., 2018). In one study it was noted that patients that had higher non-elective or emergent hospitalizations had lower levels of primary care resources and had more frequent utilization of emergency room hospitalizations (Bazargan et al., 1998). There are a variety of reasons why a patient might be brought to the hospital. Whether it was an elective surgery or an

emergent event, may dictate length of stay and discharge disposition of a patient that has a critical illness. Therefore, I propose that the type of admission whether elective or non-elective will have impact on the length of stay and discharge relationship, and formally present this hypothesis:

Hypothesis 2e: Admission Type will moderate the relationship between Length of Stay and Discharge Disposition.

Patients that suffered a critical illness and that require Intensive Care Unit level of health service have higher cost of care (Dalal et al., 2011). In studies regarding post-acute rehabilitation services, it was noted that increased access to these services had a cost of care reduction in comparison to routine care models (Duarte et al., 2018). In a similar study on early utilization of rehabilitation services, Gruther et al. (2017) was able to present that early intervention of rehabilitation services reduced length of stay and overall cost of care (Gruther et al., 2017).

Total cost of care is also seen to be different in differing location or regions (Elinor et al., 2004), which could be a relation to lack of discharge disposition access to needed care. In studies that investigated critical illness and discharges to LTCHs, those discharges demonstrated the highest median cost of care (Frank & Haider, 2014), and may not be a desired discharge location for payers that are attempting to manage per patient cost of care. In respect to cost managed care, Geuss et al. (2018) was able to demonstrate that it was possible to conduct predictive coding and reduce total cost (Geuss et al., 2018) which may produce a result of effective discharge positioning.

It has also been noted in studies regarding total charges and payer types such as Medicare Advantage and Traditional Medicare have significant difference in cost of care (Henke et al., 2018), which could be related to more effective discharge disposition planning. Similar finding can be found about patients that are funded by Medicaid (Mehta et al., 2017), but this finding could be due to lack of discharge disposition options with this government payer. Whereas, University Hospitals which have vast access to clinical care options demonstrated higher total cost (Boes & Napierala, 2021). In Kumar et al. (2018) study, it was found that early discharge with planned intervention of complications at the outpatient setting reduced cost per patient day (A. Kumar et al., 2018).

Currently, there are societal and governmental concerns regarding the cost of healthcare. While at the same time, there is clear attention in the literature on cost of care at both the cost per patient day and total cost of care level. Therefore, I propose that the financial metric of total charges will affect final discharge dispositions, and formally present the following hypothesis:

Hypothesis 3: Total Charges affect Discharge Disposition.

Discharge disposition such as HHC have demonstrated an increase cost of care when associated with the aging population (Experton et al., 1997), which could be a cheaper option than inpatient medical services in the global picture. It was also noted in a total knee study by Molloy et al. (2017) that elderly patients experience higher total cost of care (Molloy et al., 2017), which could be related to longer recovery times in aging individuals (Gordon, 1973).

Age was also a determining factor on inter-hospital transfer of patients that were ventilator-dependent due to respiratory failure, especially when payer type and hospital profit

status was considered (Nadig et al., 2017). The association between age and increased healthcare utilization is well noted (Naz et al., 2021). This comparison has demonstrated a direct impact on individual and global cost of care. It has become common knowledge that as we age, we have increasing needs for healthcare utilization due to naturally declining physical bodies. However, the cost of healthcare has a heightened focus and how this is managed is still a question to be answered. Therefore, I propose that hospital total charges will have effect on the discharge dispositions, and formally present this hypothesis:

Hypothesis 3a: Age will moderate the relationship between Total Charges and Discharge Disposition.

Racial inequities and disparities in healthcare utilization have been noted in various areas, and race has been linked to longer lengths of stay and the corresponding higher total charges for those longer hospital stays (Miller et al., 2014). It was also noted in Molloy's (2017) study that race was a significant factor in total knee replacements included longer lengths of stay and higher total cost of care (Molloy et al., 2017). Similarly, in an Acute Myeloid Leukemia study it was found that Hispanic patients had higher cost per patient day in comparisons to other groups (A. J. Kumar et al., 2018). It was also noted that discharges to LTCHs, skilled nursing and IRF showed significant racial differences in hospital lengths of stay and facility cost of care (Frank & Haider, 2014). The literature has demonstrated that race and ethnicity can be an influential variable on the cost of care. Some being related to the lack of foundational resources or access to the care. Therefore, I propose that race will have effect on the total charge and discharge disposition relationship, and formally present the following hypothesis:

Hypothesis 3b: Race will moderate the relationship between Total Charges and Discharge Disposition.

In studies on blastomycosis and respiratory failure, it was shown that female patients had higher mortality discharge dispositions then males (Rush et al., 2021). A Pakistani study on private and governmental hospital utilization noted that elderly females were the highest utilizers of health services, which would translate into healthcare cost, but the study did not discuss discharge dispositions (Naz et al., 2021). Studies that looked at Medicare Advantage patients found that younger males had higher likelihood of being a high-cost patient (Powers et al., 2019). Research on unmet medical needs noted that being female was significant in not getting needed medical care (Yoon et al., 2019), which might translate into post-acute care needs as well. It was also noted that when a hospitalization was due to having a comorbidity of drug abuse caused longer lengths of stay in males and higher generated higher associated costs of care (Ndanga & Srinivasan, 2019). Gender is a variable that is routinely seen in the demographic data of healthcare utilization studies. Therefore, I propose that gender will have effect on the total charge/discharge disposition relationship, and formally present this hypothesis:

Hypothesis 3c: Gender will moderate the relationship between Total Charges and Discharge Disposition.

Location of a healthcare system and the type of healthcare system impacts the level of resources that might be available to patients, with larger, more complex locations having higher associate cost of care due to increased level of fixed cost (Damianov & Pagán, 2013).

University hospitals with their complex and full care portfolios have higher cost of care (Boes & Napierala, 2021). Even the access to post-surgical care services such as rehabilitation services. The location of those services has impact on the cost care (Duarte et al., 2018).

There can also be a difference in the cost of care that is related to governmental metric cost to charge differences based on regional or Medicare Set Aside factors (Elinor et al., 2004). These differences can be seen in the total charges and cost per patient day in various studies (A. J. Kumar et al., 2018; Naz et al., 2021). The location of a healthcare resource or the patient location in relation to that resource can have impacts on the total cost of care, and the following question poses to ask if the initial location of hospitalization has impacts on cost of care and final discharge disposition. Therefore, I propose that geographic location will have effect on the total charge and discharge disposition relationship, and formally present this hypothesis:

Hypothesis 3d: Location will moderate the relationship between Total Charges and Discharge Disposition.

It was shown that emergent hospitalization for intensive care units had significant impacts on the cost and length of stay for those patients analyzed (Dalal et al., 2011), and in Henke et al. (2018) study on different insurance payers it was noted that the type of hospital admission had direct effect on the total cost of care (Henke et al., 2018).

There are also numerous studies that have associated location with longer lengths of hospital stay (Akintoye et al., 2017; Gordon, 1973; A. J. Kumar et al., 2018; Lewis, 1981; Naz et al., 2021). The research suggests that emergent or urgent acute hospitalizations will have longer lengths of stay, and in turn have higher total cost, and this research intends to evaluate

whether this will hold true in this research environment. Therefore, I propose that admission type will have an impact on the total charge/discharge disposition relationship, and formally present this hypothesis:

Hypothesis 3e: Admission Type will moderate the relationship between Total Charges and Discharge Disposition.

HYPOTHEZIED MODEL

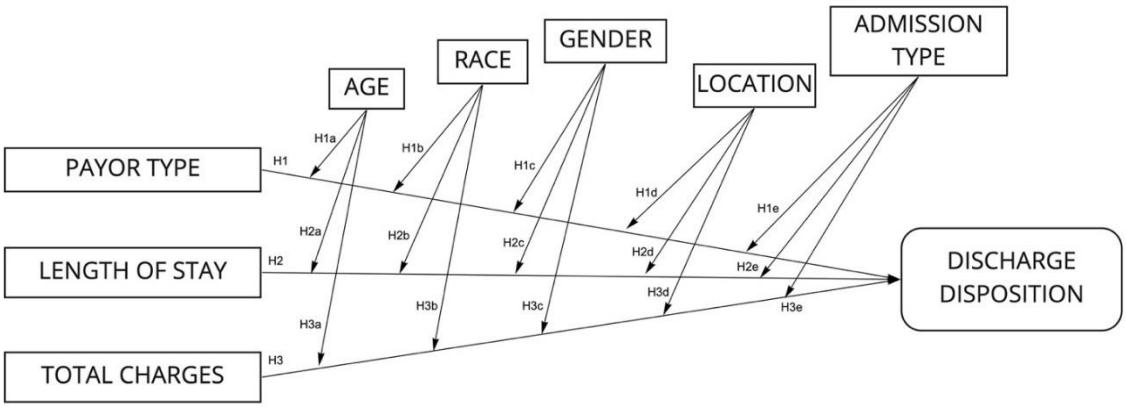

Figure 1.5: Research Hypothesis Model

The hypothesis model demonstrates a positive relationship of the antecedents Payer Type, Length of Stay, and Total Charges to the dependent variable Discharge Disposition. Since payer type reflects the type of medical payment source that the patient has during the hospitalization, it is proposed that different payer types will influence discharge dispositions, and that the lack of payer resources may result in increased mortalities or no care discharge disposition types. The opportunity to look at age, race, gender, location, and admission type as moderators to this relationship will gain knowledge as to what factors may have positive influences on the final discharge dispositions.

Literature has demonstrated that length of stay is an item that is monitored to improve quality of care, optimize inpatient level of care, and reduce cost of care (Cram, 2019). It is believed that lower lengths of stay provide better patient outcomes by moving patients to lower levels of care that also reduce cost of care. This parallel moderation of length of stay and payer type would hope to garner similar findings if discharge dispositions are determined by the clinical profile of the patient being discharged. It is assumed that this would generate normal bell curve of quickly recovering patients to the ones that struggled to recover and took longer.

Since the literature has identified a close connection between length of stay and cost of care (Akintoye et al., 2017), it would be assumed that longer lengths of stay would also accrue higher cost of care. However, the moderation of this relationship has potential to support that those individuals of certain demographic characteristics may endure the larger share of healthcare cost. The primary goal of this model is to utilize the BHUM in a novel way to evaluate whether the identified moderators that are the "Predisposing Characteristics" have significant impact on discharge dispositions which is "Healthcare Utilization" when a positive "Need" relationship is a financial metric or resource.

CHAPTER 3
METHODS

Data Collection and Sample

This research will be a retrospective cohort study that will utilize statistical data analysis of a NIS-HCUP database that is collected by the Agency for Healthcare Research and Quality (AHRQ) for FY 2018. The data was obtained by formal request with approval from the HCUP data administrators for research purposes. It is intended for use in inpatient hospitalization research and is a limited data set that does not require IRB approval for research use. The dataset consists of a United States nationwide collection of inpatient hospital admission that had occurred in the FY 2018, which include numerous potential variables that range from social demographic data to health service location information. The data sample contains over 7 million inpatient hospitalization encounters that will be limited and aggregated for this project, which will be filtered and cleaned to meet the needs of this research. Similar studies that utilized CMS datasets with the diagnosis related code 207 (Frank & Haider, 2014) obtained over seven thousand in their sample size, and anticipate that this dataset will have similar, if not a higher sample size due to the fact that this research will be reviewing all payer types, not just Medicare.

Table 1.2 below identifies which variables will be filtered for use from the master dataset. It is intended to demonstrate the coordinating Predisposing Characteristics, Enabling Resources, Need, and the Healthcare Services Utilization identifiers of the BHUM with the HCUP coding parameters. The date utilizes the HCUP uniform coding database structure.

Table 1.2

Behavioral Healthcare Utilization Model Hypothesis Variable Definitions			
Construct	Variable	Data Type/Limit	Description
Predisposing Characteristics	Age	Numeric Limited to 45yo to 75yo	Numeric age by years
	Race	Categorical	Race/Ethnic identification per Uniform Codes 1: White 2: Black 3: Hispanic 4: Asian/Pacific Islander/ Native American 5: Other
	Gender	Dichotomous	Gender identification per Uniform Code: 0: Male 1: Female
	Location	Categorical	Identification per Uniform Code 1: Large Central Metro 2: Large Fringe Metro 3: Medium Metro 4: Small Metro 5: Micropolitan 6: Noncore
	Admission Type	Dichotomous	Identification per Uniform Code 0: Non-elective admission 1: Elective admission
Enabling Resources	Inpatient Hospitalization	Numeric Limited to MS-DRG 207	Identification per Uniform Code that Matched CMS MS-DRG coding.
Need	Length of Stay	Numeric	LOS is a numerical calculation of the date of discharge minus the date of admission.
	Payer Type	Categorical	Identification per Uniform Code. 1: Medicare 2: Medicaid 3. Private Insurance 4: Self-pay 5: No charge 6: Other
	Total Charges	Numeric/Discrete	Total billed charges will be defined in the following distributions. Less than $50,000 $50,001- $100,000 $100,001- $200,000 $200,001- $300,000 $300,001- $400,000 $400,001- $500,000 Greater than $500,000
Healthcare Utilization	Discharge Disposition	Categorical	Identification per Uniform Code. 1: Discharged to home or self-care 2: Transfer: short-term hospital 3. Transfer: other type facility 4: Home health care 5: Against medical advice 6: Died in hospital 99: Discharged alive, destination unknown

The primary independent variables for this research will be Length of Stay, Payer Type, and Total charges. The dependent variable will be the categorical Discharge Dispositions. Additional independent variables Age, Race, Gender, Location, and Admission Type will be utilized as moderators of the relationship of the primary independent and dependent variable. They will include both continuous and categorical type variables.

METHOD OF ANALYSIS

The NIS-HCUP is a comprehensive nationwide inpatient hospitalization dataset that will be utilized for this analysis. The dependent variable Discharge Disposition is a four categorical variable that represents discharges to home, transfers short-term hospitals, Transfers to other type of facilities, and home healthcare. The primary independent variables payer type (categorical), length of stay (continuous) and total charges (categorical) and represent the primary relationship with the dependent variable. This model also incorporates moderating interactions with the variables age (continuous), Race (categorical), Gender (dichotomous), location (categorical), and admission type (dichotomous). To accurately analysis model that incorporates categorical and continuous values with a moderation, a Multinomial Logistic Regression will be conducted to analysis the data for statistical significance and odds ratio analysis. All inpatient hospitalization encounters that met the filtering criteria and have no missing data entries will be utilized in this analysis. IBM SPSS version 27.0.1.0, 64-bit edition will be used to modify and filter the data and conduct the subsequent statistical analyses.

Descriptive statistics and frequencies of the dataset will be calculated to obtain the median and quartile ranges of the nominal variables. A Pearson's Chi-square will be utilized with categorical variables to assess their model fit. Multinomial regression will be utilized to

conduct the formal statistical analysis of these hypothesized questions with statistically significance goal of a p value <0.05.

Following initial data analysis Descriptive and Frequency statistics were reviewed. The following compression and filters were added to the dataset to improve forward statistical review of the dataset and defined hypothesis goals. Since this research project is utilizing a BHUM to analyze the financial drivers that may have impacts on the relationships of hospitalization and potential discharge options, it was decided to filter the Discharge Dispositions to the categories that had numerically relevant numbers of encounters to produce potential significance in such a large dataset, as well as select discharge disposition that patients or families would most likely have decision-making relevance in the discharge process. Utilizing this refined perspective, the discharge disposition categories were filtered to only include the following discharge dispositions: Discharge to home or self-care, Transfer: short-term hospital, Transfer: Other type of facility, and Home health care. Hence removing Against Medical Advice, Died in the hospital, and Discharged alive, destination unknown from the analytic analysis.

The same review of data was conducted regarding the Total Charges and compression of the previously determined ranges was conducted to result in the following refinements: <$100,000, $100,001-$200,000, $200,001-$300,000, and >$300,000, no data was removed in this data filter compression. Similar compression modification was made to the location variable, compressing 6 categories to 3 categories that reflect a Large, Medium, and Small community parameter with the final categories of Large Central/Fringe Metro, Medium Metro, and Small Metro/Rural, the resulting variables categories are reflected in Table 1.3.

Table 1.3 represented the final data formatting parameters that were utilized in the analysis for this study. The original, age remained a numeric value of a person actual age and was a continuous numeric value, but the control limits were changed to 45-75 years old to ensure that a large enough sample group would be obtained in both governmental and private insurance payer types. Race and Gender were unchanged from their original NIS-HCUP standard formatting, with race having five categorical values and gender a dichotomous zero/one coding.

Location, however, was compressed from five categories to 3 categories, which incorporated the larger and smaller categories into one large and small category. Admission type was unchanged and maintained its dichotomous zero/one coding. The inpatient hospitalization was a control variable that limited the data sample to only those hospital admissions that had the MS-DRG code 207. Length of stay was a numerical value that represented to Date of discharge minus the date of admission of the hospital stays and is a continuous value.

Payer type was reframed from six categories to five, were No Charge and Other were combined to very low frequency values. The payer categorical codes represent governmental, private, patient, and unfunded payer categories. Due to very small frequencies at the higher and lower ranges of the original total charge categories, it was decided to combine the higher and lower categories to improve variable sample frequencies going from seven to four total charges categories, which represent the total charges in dollars that the hospital admission acquired during the stay. Discharge dispositions original seven categories were filter down to four categories which represented the NIS-HCUP location of final discharge code for that location.

Table 1.3

Behavioral Healthcare Utilization Model Redefined Variable Definitions			
Construct	Variable	Data Type/Limit	Description
Predisposing Characteristics	Age	Numeric Limited to 45yo to 75yo	Numeric age by years
	Race	Categorical	White Black Hispanic Asian/Pacific Islander/ Native American Other
	Gender	Dichotomous	Male Female
	Location	Categorical	Large Central/Fringe Metro Medium Metro Small Metro/Rural
	Admission Type	Dichotomous	Non-elective admission Elective admission
Enabling Resources	Inpatient Hospitalization	Numeric Limited to MS-DRG 207	Identification per Uniform Code that Matched CMS MS-DRG coding.
Need	Length of Stay	Numeric	LOS is a numerical calculation of the date of discharge minus the date of admission.
	Payer Type	Categorical	Medicare Medicaid Private Insurance Self-pay No charge/Other
	Total Charges	Numeric/Discrete	<$100,000 $100,001- $200,000 $200,001- $300,000 >$300,000
Healthcare Utilization	Discharge Disposition	Categorical	Discharged to home or self-care Transfer: short-term hospital Transfer: other type facility Home health care

CHAPTER 4

RESULTS AND FINDINGS

Utilizing the 2018 NIS-HCUP Inpatient Hospital Admission limited dataset for this research project, it proved to a well-suited option for this analysis. The dataset had an initial sample size of 7,105,226 inpatient hospital admissions with only 14,508 missing data entry points. The first filtering of this dataset for patients that had the final discharged MS-DRG 207 resulted in a sample size of 9,673 with 28 missing data entry points and completing this sample by removing all entries that had missing data points and limiting the dataset by the age range of 45 to 75 years old resulted in a final dataset of 3.701 final encounter to conduct this analysis.

The resulting dataset sample of 3,701 is sufficient to complete the multinomial regression of the hypothesis model presented. The specific breakdown frequencies of the categorical variables are noted in Appendix A; however, the 3,701 payer type entries broke down in the following manner: 2200 Medicare, 676 Medicaid, 596 Private Insurance, 129 Self Pay, and 100 No Charge-Other. Length of stay is a continuous variable that has frequency values ranging from 1 to 259, with the larger frequencies being from LOS range five to 20 days. The Total Charge primary variable ranges resulted in the following frequency outcomes: 988 <$100,000, 1431 $100,000-$200,000, 672 $200,001-$300,000, and 610 $300,000. The discharge dispositions had the following values: Discharge to home or self-care n=726, Transfer: short-term hospital n=307, Transfer: other type of facility n=2159, and Home healthcare with an n of 608. All 3,701 entries within this dataset contain all data points for the independent, moderating, and dependent variables intended within this study. Initial descriptive statistics resulted int the following mean and standard deviation outcomes:

DRG (M = 207, SD = .000); Discharge Disposition (M = 4.24, SD = 1.744); Payer (M = 1.72, SD = 1.029), Length of stay (M = 16.81, SD = 20.482), Age (M = 62.14, SD = 7.830); Race (M = 1.58, SD = 1.026), Gender (M = .49, SD = .500), Admission Type (M = .05, SD = .213), Total Charges (M = 3.57, SD = 1.660), and Location (M = 1.7568, SD = .86135) which can be noted in Table 1.4.

Table 1.4 Descriptive Statistics

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
DRG	3701	207	207	207.00	0.000
Discharge Disposition	3701	1	6	4.24	1.744
Payer	3701	1	5	1.72	1.029
Length of stay	3701	1	365	16.81	20.482
Age	3701	45	75	62.14	7.830
Race	3701	1	6	1.58	1.026
Gender	3701	0	1	0.49	0.500
Admission Type	3701	0	1	0.05	0.213
TOTCRG2	3701	2	7	3.57	1.660
Location	3701	1.00	3.00	1.7568	0.86135
Valid N (listwise)	3701				

TEST OF RESEARCH MODEL

Continuing the analysis of hypothesis model fit, Table 1.5 represents the fit information for this research's proposed model, which resulted in X^2 (63, N = 3701) = 459.319, p = .000. As can be seen by the Likelihood ratio test of Table 1.5 this model is a good fit and statistically significant over the null.

Table 1.5 Model Fitting Information

Model Fitting Information

Model	Model Fitting Criteria -2 Log Likelihood	Likelihood Ratio Tests Chi-Square	df	Sig.
Intercept Only	8125.003			
Final	7665.685	459.319	63	0.000

TEST OF HYPOTHESIS

Interpretation of the hypothesis model testing will be interpreted from the dependent variable perspective of the model; which Home Healthcare was the primary reference category. This statistical analysis was conducted IBM SPSS version 27.0.1.0, 64-bit edition, via multinomial regression with a custom forward stepwise method, and the complete table of result are located within Table 1.9 at the end of this interpretation.

Discharge to Home or Self Care

In this analysis Discharge to home or selfcare demonstrated the greatest number of significant findings in this study and can be noted in Table 1.6 and 1.9. Starting with the primary independent variable to dependent variable relationship with home healthcare being the reference category, the results concluded that Medicare payer type was significant with the discharge to home category with an OR= 0.9999999994; CI = 0.9999999999986, 0.9999998 and *p*-value = 0.000. Medicaid as payer was significant with an OR = 0.9999999995; CI = 0.9999999999990, 0.9999997 and *p*-value = 0.000, Private Insurance demonstrating significance with an OR = 0.9999999989; CI = 0.999999999998, 0.9999994 and *p*-value = 0.000, and Self Pay was significant with OR = 0.999999996; CI =

0.999999999999, 0.99998 and *p*-value = 0.000. Each of these findings indicated that patients with these payers had higher probability to be discharged to home healthcare then No Charge patients. No other primary independent variable such as Length of Stay, or Total Charges demonstrated significance within the primary relationship.

Some moderation effects were noted as significant is this analysis, Medicare with Age moderation demonstrated significance with an OR = 0.03; CI = 0.05,0.01 and *p*-value = 0.014 noting that this patient as age increase would have a 97% lower change of this discharge then to home healthcare. Private insurance that was moderated by age was also significant with an OR = 0.05; CI = 0.08,0.01 *p*-value = 0.016, which like Medicare is favored toward home healthcare discharges by 95%. The No Charge payer category was significant in both age and admission type moderations with age having and OR = 0.10; CI = 0.2,0.02 and *p*-value = 0.013, and admission type having an OR = 0.99999993; CI = 0.99999999, 0.9999993 and *p*-value = 0.000.

When it comes to gender moderation of the primary relationships, the only relation that this had significant effect was the Total Charge to Discharge to Home pathway, which occurs in two of the total charge categories. First was the total charge category $100,001-$200,000 which was significant for males at an OR = 1.0; CI =0.4,1.8 with a *p*-value = 0.000, and category >$300,000 was significant with and OR = 0.94; CI = 0.01,2.7 with *p*-value = 0.045, signaling those males in the $100,001-$200,000 category would have 1.0-times higher probability to be discharges home with self-care then females would be, yet the >$300,000 category would have 6% lower potential for this discharge location then females.

Table 1.6 Discharge to Home or Self Care Significant Findings

Discharge Disposition[a]		Sig.	Odds Ratio	95% Confidence Interval for Lower Bound	95% Confidence Interval for Upper Bound
Discharged to home or self care	Medicare	0.000	0.9999999994	0.9999999999986	0.9999998
Discharged to home or self care	Medicaid	0.000	0.9999999995	0.9999999999990	0.9999997
Discharged to home or self care	Pvt Ins	0.000	0.9999999989	0.999999999998	0.9999994
Discharged to home or self care	Self Pay	0.000	0.999999996	0.999999999999	0.99998
Discharged to home or self care	Medicare * Age	0.014	0.03	0.05	0.01
Discharged to home or self care	Pvt Ins * Age	0.016	0.05	0.08	0.01
Discharged to home or self care	No Charge * Age	0.013	0.10	0.2	0.02
Discharged to home or self care	No Charge * Non-elective	0.000	0.99999993	0.99999999	0.9999993
Discharged to home or self care	Male * $100,001-$200,000	0.000	1.0	0.4	1.8
Discharged to home or self care	Male * >$300,000	0.045	0.9	0.01	2.7

Transfer to Short Term Hospital

In the analysis of the discharge disposition Transfer: short term hospital, it was found to only have three hypotheses pathways that were significant for this discharge disposition, and all three where those of moderating relationships that can be found in both Table 1.7 and 1.9. First, I will start with the age moderation effect of the payer to discharge disposition pathway, as it was significant for the payer Medicare that was moderated by Age with an OR = 0.04; CI = 0.01,0.07 and *p*-value = 0.003. This finding is indicating that as a Medicare patients age increased, they are 96% less likely to have this discharge disposition then being discharges to home healthcare. The next moderator that indicated significance was admission type in two different payer categories. Patients with Medicare when moderated by admission type demonstrated significance with the non-elective admission type with an OR = 0.86; CI = 0.94,0.68 and *p*-value = 0.000, whereas Medicaid patients with non-elective admission were significant with and OR = 089; CI = 0.96,0.66 and *p*-value = 0.000. Both payer types where significant with the indication that Medicare at 14% lower and Medicaid at 11% lower probability of being transferred to short term hospital then home healthcare then elective patients within those payer type would be.

Table 1.7 Transfer: Short-Term Hospital Significant Findings

Discharge Disposition[a]		Sig.	Odds Ratio	95% Confidence Interval for Lower Bound	95% Confidence Interval for Upper Bound
Transfer: short-term hospital	Medicare * Age	0.003	0.04	0.01	0.07
Transfer: short-term hospital	Medicare * Non-elective	0.000	0.86	0.94	0.68
Transfer: short-term hospital	Medicaid * Non-elective	0.000	0.89	0.96	0.66

Transfer Other Type of Facility

Since Home Healthcare was reference category, Transfer: Other Type of Facility will be final interpretation of this studies analysis findings, these finding can be noted in Table 1.8 and 1.9. Like discharge to home, Transfer: other type of facility demonstrated significance in the primary independent variable payer type to discharge disposition relation in four payer categories: Medicare was significant with and OR = 0.9999998; CI = 0.999999998, 0.9999774 and a *p*-value = 0.000, Medicaid was significant with an OR = 0.9999996; CI = 0.999999998, 0.9999307 and a *p*-value = 0.000, Private Insurance was significant with an OR = 0.9999998; CI = 0.999999998, 0.99996 and a *p*-value = 0.000, and Self pay was significant at OR = 0.999999; CI = 0.9999999996, 0.996 and a *p*-value = 0.001. All these payer relationships demonstrate that they have 1% lower probability of being discharge to other facility then to home healthcare.

Another, primary relationship pathway that was significant in these findings what that of the Total Charge to Discharge Disposition hypotheses pathway. There were two total charge categories that significance was found in those relationships, first was the total charge category <$100,000 which was significant with and OR = 0.36; CI = 0.58,0.03 and a *p*-value = 0.038, and the second one being the total charge category $100,001-$200,000 at an OR = 0.41; CI = 0.60.0.12 with a *p*-value = 0.009, with both showing that they have at least 59% lower probability of being discharge to another type of facility then home healthcare.

The only relationship that demonstrated moderating effect with this discharge location was that of payer type and age. Patients that had Medicare insurance and increasing age shown significance in this discharge category at an OR = 0.04; CI = 0.02,0.05 and a *p*-value = 0.000. Though this finding was significant it was not in favor of this discharge category, as the finding indicated that a patient that had Medicare and was increasing in age had 96% lower probability to be discharged to a post-acute facility then to home healthcare.

Table 1.8 Transfer: Other Type of Facility

Discharge Disposition[a]		Sig.	Odds Ratio	95% Confidence Interval for Lower Bound	95% Confidence Interval for Upper Bound
Transfer: other type of facility	Medicare	0.000	0.9999998	0.999999998	0.9999774
Transfer: other type of facility	Medicaid	0.000	0.9999996	0.999999998	0.9999307
Transfer: other type of facility	Pvt Ins	0.000	0.9999998	0.999999998	0.99996
Transfer: other type of facility	Self Pay	0.001	0.999999	0.9999999996	0.996
Transfer: other type of facility	< $100,000	0.038	0.36	0.58	0.03
Transfer: other type of facility	$100,001-$200,000	0.009	0.41	0.60	0.12
Transfer: other type of facility	Medicare * Age	0.000	0.04	0.02	0.05

Table 1.9 Research Model Parameter Estimate

Discharge Disposition[a]		B	Std. Error	Wald	df	Sig.	Odds Ratio	95% Confidence Interval for Lower Bound	95% Confidence Interval for Upper Bound
Discharged to home or self-care	Intercept	22.611	2.946	58.888	1	0.000			
	Medicare	-21.314	3.054	48.689	1	0.000	0.9999999994	0.9999999999986	0.9999998
	Medicaid	-21.393	3.208	44.471	1	0.000	0.9999999995	0.9999999999990	0.9999997
	Pvt Ins	-20.654	3.199	41.692	1	0.000	0.9999999989	0.999999999998	0.999999
	Self-Pay	-19.251	4.336	19.717	1	0.000	0.999999996	0.999999999999	0.99998
	No Charge	0[b]			0		1.00	1.00	1.00
	< $100,000	0.546	0.299	3.338	1	0.068	0.73	0.04	2.10
	$100,001-$200,000	0.119	0.288	0.172	1	0.678	0.13	0.36	0.98
	$200,001-$300,000	0.456	0.330	1.907	1	0.167	0.58	0.17	2.01
	>$300,000	0[b]			0		1.00	1.00	1.00
	Medicare * Age	-0.026	0.011	6.052	1	0.014	0.03	0.05	0.01
	Medicaid * Age	-0.009	0.021	0.176	1	0.675	0.01	0.05	0.03
	Pvt Ins * Age	-0.046	0.019	5.798	1	0.016	0.05	0.08	0.01
	Self-Pay * Age	-0.076	0.048	2.513	1	0.113	0.07	0.16	0.02
	No Charge * Age	-0.110	0.044	6.212	1	0.013	0.10	0.18	0.02
	Medicare * Non-elective	-0.508	0.496	1.050	1	0.305	0.40	0.77	0.59
	Medicare * Elective	0[b]			0		1.00	1.00	1.00
	Medicaid * Non-elective	-0.865	0.588	2.165	1	0.141	0.58	0.87	0.33
	Medicaid * Elective	0[b]			0		1.00	1.00	1.00
	Pvt Ins * Non-elective	0.302	0.729	0.172	1	0.679	0.35	0.68	4.65
	Pvt Ins * Elective	0[b]			0		1.00	1.00	1.00
	Self-Pay * Non-elective	1.789	1.323	1.829	1	0.176	4.98	0.55	78.92
	Self-Pay * Elective	0[b]			0		1.00	1.00	1.00
	No Charge * Non-elective	-16.524	1.188	193.382	1	0.000	1.00	1.00	1.00
	No Charge * Elective	0[b]			0		1.00	1.00	1.00
	Male * < $100,000	0.084	0.213	0.155	1	0.694	0.09	0.28	0.65
	Male * $100,001-$200,000	0.684	0.183	13.958	1	0.000	0.98	0.38	1.84
	Male * $200,001-$300,000	0.378	0.299	1.597	1	0.206	0.46	0.19	1.63
	Male * >$300,000	0.662	0.331	4.005	1	0.045	0.94	0.01	2.71
	Female * < $100,000	0[b]			0		1.00	1.00	1.00
	Female * $100,001-$200,000	0[b]			0		1.00	1.00	1.00
	Female * $200,001-$300,000	0[b]			0		1.00	1.00	1.00
	Female * >$300,000	0[b]			0		1.00	1.00	1.00
Transfer: short-term hospital	Intercept	-5.887	3538.340	0.000	1	0.999	1.00	1.00	1.00
	Medicare	4.072	3538.341	0.000	1	0.999	57.66	1.00	.c
	Medicaid	6.538	3538.341	0.000	1	0.999	689.89	1.00	.c
	Pvt Ins	5.862	3538.341	0.000	1	0.999	350.27	1.00	.c
	Self-Pay	-10.375	3538.343	0.000	1	0.998	1.00	1.00	.c

	No Charge	0[b]			0		1.00	1.00	1.00
	< $100,000	0.157	0.335	0.222	1	0.638	0.17	0.39	1.25
	$100,001-$200,000	-0.099	0.318	0.097	1	0.755	0.09	0.51	0.69
	$200,001-$300,000	-0.078	0.382	0.042	1	0.837	0.08	0.56	0.95
	>$300,000	0[b]			0		1.00	1.00	1.00
	Medicare * Age	0.042	0.014	8.704	1	0.003	0.04	0.01	0.07
	Medicaid * Age	0.015	0.025	0.367	1	0.545	0.01	0.03	0.07
	Pvt Ins * Age	-0.008	0.023	0.121	1	0.728	0.01	0.05	0.04
	Self-Pay * Age	-0.012	0.069	0.030	1	0.862	0.01	0.14	0.13
	No Charge * Age	0.078	0.061	1.667	1	0.197	0.08	0.04	0.22
	Medicare * Non-elective	-1.963	0.428	21.052	1	0.000	0.86	0.94	0.68
	Medicare * Elective	0[b]			0		1.00	1.00	1.00
	Medicaid * Non-elective	-2.192	0.574	14.562	1	0.000	0.89	0.96	0.66
	Medicaid * Elective	0[b]			0		1.00	1.00	1.00
	Pvt Ins * Non-elective	-0.262	0.790	0.110	1	0.740	0.23	0.84	2.62
	Pvt Ins * Elective	0[b]			0		1.00	1.00	1.00
	Self-Pay * Non-elective	16.400	0.000		1		13,250,987.85	13,250,987.85	13,250,987.85
	Self-Pay * Elective	0[b]			0		1.00	1.00	1.00
	No Charge * Non-elective	-0.020	3538.338	0.000	1	1.000	0.02	1.00	.c
	No Charge * Elective	0[b]			0		1.00	1.00	1.00
	Male * < $100,000	-0.060	0.264	0.052	1	0.820	0.06	0.44	0.58
	Male * $100,001-$200,000	0.217	0.229	0.897	1	0.344	0.24	0.21	0.95
	Male * $200,001-$300,000	0.562	0.367	2.344	1	0.126	0.75	0.15	2.60
	Male * >$300,000	0.487	0.361	1.815	1	0.178	0.63	0.20	2.30
	Female * < $100,000	0[b]			0		1.00	1.00	1.00
	Female * $100,001-$200,000	0[b]			0		1.00	1.00	1.00
	Female * $200,001-$300,000	0[b]			0		1.00	1.00	1.00
	Female * >$300,000	0[b]			0		1.00	1.00	1.00
Transfer: other type of facility	Intercept	15.255	2.356	41.929	1	0.000	1.00	1.00	1.00
	Medicare	-15.479	2.439	40.281	1	0.000	0.9999998	0.999999998	0.99998
	Medicaid	-14.730	2.629	31.388	1	0.000	0.9999996	0.999999998	0.99993
	Pvt Ins	-15.242	2.577	34.971	1	0.000	0.9999998	0.999999998	0.99996
	Self-Pay	-13.566	4.145	10.710	1	0.001	0.999999	0.9999999996	0.99567
	No Charge	0[b]			0		1.00	1.00	1.00
	< $100,000	-0.447	0.215	4.320	1	0.038	0.36	0.58	0.03
	$100,001-$200,000	-0.522	0.200	6.806	1	0.009	0.41	0.60	0.12
	$200,001-$300,000	-0.148	0.236	0.390	1	0.532	0.14	0.46	0.37
	>$300,000	0[b]			0		1.00	1.00	1.00
	Medicare * Age	0.035	0.008	18.658	1	0.000	0.04	0.02	0.05
	Medicaid * Age	0.021	0.019	1.235	1	0.267	0.02	0.02	0.06
	Pvt Ins * Age	0.026	0.016	2.664	1	0.103	0.03	0.01	0.06

	Self-Pay * Age	-0.022	0.053	0.179	1	0.672	0.02	0.12	0.08
	No Charge * Age	0.022	0.038	0.326	1	0.568	0.02	0.05	0.10
	Medicare * Non-elective	-0.369	0.388	0.903	1	0.342	0.31	0.68	0.48
	Medicare * Elective	0[b]			0		1.00	1.00	1.00
	Medicaid * Non-elective	-0.293	0.570	0.264	1	0.608	0.25	0.76	1.28
	Medicaid * Elective	0[b]			0		1.00	1.00	1.00
	Pvt Ins * Non-elective	-0.255	0.585	0.191	1	0.662	0.23	0.75	1.44
	Pvt Ins * Elective	0[b]			0		1.00	1.00	1.00
	Self-Pay * Non-elective	0.372	1.094	0.116	1	0.734	0.45	0.83	11.38
	Self-Pay * Elective	0[b]			0		1.00	1.00	1.00
	No Charge * Non-elective	-15.511	0.000		1		1.00	1.00	1.00
	No Charge * Elective	0[b]			0		1.00	1.00	1.00
	Male * < $100,000	-0.011	0.175	0.004	1	0.949	0.01	0.30	0.39
	Male * $100,001-$200,000	0.225	0.145	2.403	1	0.121	0.25	0.06	0.66
	Male * $200,001-$300,000	0.384	0.238	2.607	1	0.106	0.47	0.08	1.34
	Male * >$300,000	0.040	0.245	0.027	1	0.870	0.04	0.36	0.68
	Female * < $100,000	0[b]			0		1.00	1.00	1.00
	Female * $100,001-$200,000	0[b]			0		1.00	1.00	1.00
	Female * $200,001-$300,000	0[b]			0		1.00	1.00	1.00
	Female * >$300,000	0[b]			0		1.00	1.00	1.00

a. The reference category is Home health care.

b. This parameter is set to zero because it is redundant.

c. Floating point overflow occurred while computing this statistic. Its value is therefore set to system missing.

Summary of Results

In a final review of these findings, a tabulated summary of the analysis can be noted in Table 1.10. There is significant difference noted in all payers, and those difference in results when compared is highly favored towards home healthcare discharges, which gives support that there may be other factors within payer or financial resources influences discharge disposition. These findings support also support Hypothesis 1 of this study. Statistical significance has also been noted in the age moderation of the payer to discharge disposition relationship. These findings support Hypotheses 1a that age has a moderating effect on the relationship between payer and discharge disposition. Admission type moderation was only significant in the relationship between payer and discharge disposition and was significant

for No Charge non-elective hospital admissions and like other results favored home healthcare discharges. This finding provides support for Hypothesis 1e that admission type has effect on the relationship between payer and discharge dispositions

Though a discouraging result, no discharge disposition category or moderating effect relations showed statistical significance in the Length of Stay hypothesis pathways. These results do not support any of Length of Stay hypothesis questions within this study. This also demonstrated that length of stay alone, nor with moderators have statistical effect on the discharge dispositions of patients. However, the Total Charge pathway of hypothesis questions did find significance in primary as well as moderating relationships. Giving support for the primary and gender moderated model relationships, supporting Hypothesis 3 and 3c. This was the only statistical finding of this study that demonstrated that the actual discharge disposition was favored over Home Healthcare. This is a concerning finding that males would have a higher probability of being sent home without secondary medical resources based on increasing total charges, but this finding also supports prior research on healthcare utilization by gender that had demonstrated higher healthcare utilization by females (Fleury et al., 2014; H.-K. Kim & Lee, 2016). These results, though disheartening, yet support hypothesis 3c of this project.

Table 1.10 is a summary of this studies hypothesis results, demonstrating that 5 of the fifteen hypothesis questions were statically supported. Surprisingly the findings also demonstrated that socials demographic variables like race and geographic location did not have significant impact out discharges dispositions. The findings demonstrate the importance of healthcare payer resources hat the impact that they have on current and continued

healthcare utilization, as well as the fact that total charge categories demonstrated significant in discharge placements that varied based on amount and gender.

Table 1.10 Research Hypothesis Results

HYPOTHESIS	FINDINGS
H1: Payer Type affects the discharge disposition.	Supported
H1a: Age moderates the relationship between payer type and discharge disposition.	Supported
H1b: Race moderates the relationship between payer type and discharge disposition.	Unsupported
H1c: Gender moderates the relationship between payer type and discharge disposition.	Unsupported
H1d: Location moderates the relationship between payer type and discharge disposition.	Unsupported
H1e: Admission Type moderates the relationship between payer type and discharge disposition.	Supported
H2: Length of Stay affects the discharge disposition.	Unsupported
H2a: Age moderates the relationship between length of stay and discharge disposition.	Unsupported
H2b: Race moderates the relationship between length of stay and discharge disposition.	Unsupported
H2c: Gender moderates the relationship between length of stay and discharge disposition.	Unsupported
H2d: Location moderates the relationship between length of stay and discharge disposition.	Unsupported
H2e: Admission type moderates the relationship between length of stay and discharge disposition.	Unsupported
H3: Total Charges affects the discharge disposition.	Supported
H3a: Age moderates the relationship between total charges and discharge disposition.	Unsupported
H3b: Race moderates the relationship between total charges and discharge disposition.	Unsupported
H3c: Gender moderates the relationship between total charges and discharge disposition.	Supported
H3d: Location moderates the relationship between total charges and discharge disposition.	Unsupported
H3e: Admission type moderates the relationship between total charges and discharge disposition.	Unsupported

CHAPTER 5
DISCUSSION

The goal of this research was to utilize Anderson's Behavioral Healthcare Utilization Model/Theory to analyze healthcare utilization from the perspective of payment metrics, and to see what the moderating effects of sociodemographic variables have on those relationships regarding final hospital discharge dispositions (L. A. Aday & Andersen, 1974; R. M. Andersen, 1968, 1995, 2008; R. M. Andersen & Newman, 2005). Utilizing a NIS-HCUP inpatient hospitalization data set to perform this retrospective cohort analysis it was found that eight of the 18 potential relationships were statistically significant. However, utilization of this dataset also created limitations to the full expression of the Behavioral Healthcare Utilization Model, and considerations were made to accommodate those differences. As noted in Figure 1. 4 the Predisposing Characteristic of this research is a combination of prior utilized predisposing characteristics, enabling resources and need in historical BHUM research. The Use of Health Services as the enabling resources in this research is new framework consideration. The use of the primary independent variable as the need variable in this research model and their relationship to discharge dispositions represents a continued use of health resources as the Use of Health Services construct.

Whereas some BMHU research utilizes survey data to capture the level of knowledge or decision factors that influences a family or patients decisions made regarding healthcare utilization or the failure to access healthcare services. The utilization of large healthcare dataset limits the ability for this type of analysis and was a limitation in this research project. However, combining demographic variables and the first step healthcare utilization is made to accommodate for this difference in data utilization. Additional limitation would be reflected in this data's inability to adequately account for medical comorbidities that may

cause a patient to be at higher risk for this type of hospital admission, the utilization of age filtering, MS-DRG 207 hospital diagnosis limitation and the defining of admission type was utilized to assist with mitigation of this limitation. The utilization a of the control variable MS-DRG 207 created an unexpected limitation in the length of stay data, due to this patient type controlling it produce a control band within the length of stay that unintentionally compressed the greatest frequencies of LOS to fall between days five and 20, hence reducing the potential for statistical significance in the length of stay relationships. However, this finding supports the idea that health systems and payers could be influencing discharge timelines and affecting LOS as well as discharge dispositions.

FINDINGS

Review of the results, the following interpretation has been found in the analysis, that many payers demonstrated statistical significance in the discharge dispositions. Like in the discharge disposition; discharge to home or self-care: Medicare was significant with an OR= 0.9999999994; CI = 0.9999999999986, 0.9999998 and *p*-value = 0.000. Medicaid: OR = 0.9999999995; CI = 0.9999999999990, 0.9999997 and *p*-value = 0.000, Private Insurance: OR = 0.9999999989; CI = 0.999999999998, 0.9999994 and *p*-value = 0.000, and Self Pay: OR = 0.999999996; CI = 0.999999999999, 0.99998 and *p*-value = 0.000, each indicating that discharges to the references category Home Healthcare would occur more frequently. Similar findings were noted for the discharge category Transfer: to other type of facility with Medicare being significant with and OR = 0.9999998; CI = 0.999999998, 0.9999774 and a *p*-value = 0.000, Medicaid: OR = 0.9999996; CI = 0.999999998, 0.9999307 and a *p*-value = 0.000, Private Insurance: OR = 0.9999998; CI = 0.999999998, 0.99996 and a *p*-value =

0.000, and Self pay: OR = 0.999999; CI = 0.9999999996, 0.996 and a *p*-value = 0.001, also demonstrating that these patients would more likely discharge to Home healthcare.

Length of stay alone, nor any of the moderating effects demonstrated discharge disposition significance in this study, which was counter to findings on prior Length of Stay research that demonstrated its influence on continued or access to healthcare utilization (Ajnakina et al., 2019; Akintoye et al., 2017; "Average length of stay: acute care," ; Bessaha et al., 2017; Blanken, 1976; Bradley et al., 2012; Carey & Lin, 2014; Chassin, 1983; Cram, 2019; Duarte et al., 2018; Gordon, 1973; Gruther et al., 2017; Kelley et al., 2013; A. Kumar et al., 2018; Lewis, 1981; Mehta et al., 2017; Ndanga & Srinivasan, 2019).

Total charges as a primary relationship demonstrated statistical significance in discharge disposition category Transfer: other type of facility with total charge category <$100,000 significant at an OR = 0.36; CI = 0.58,0.03 and a *p*-value = 0.038, and $100,001-$200,000 with an OR = 0.41; CI = 0.60.0.12 with a *p*-value = 0.009, with both showing lower probability of being discharge to another type of facility then home healthcare.

Discharges to home or self-care in gender moderated total charge relationship presented significant males gender results in category $100,001-$200,000 at an OR = 1.0; CI =0.4,1.8 with a *p*-value = 0.000, and category >$300,000 at OR = 0.94; CI = 0.01,2.7 with *p*-value = 0.045, denoting those males in the $100,001-$200,000 category have 1.0-times higher probability to be discharges home with self-care then females, however the >$300,000 have lower potential this discharge type. This finding raises concern as to what the difference may be in regard to the male and female difference, as it has been noted in numerous prior studies that females have higher healthcare utilization and males the lack of healthcare utilization and higher mortality rates (Akintoye et al., 2017; Fleury et al., 2014; Franc et al.,

2016; H.-K. Kim & Lee, 2016), but this finding directly supports Akintoye et al. (2017) work that also showed that males where more likely to be discharged home (Akintoye et al., 2017).

Age demonstrated some moderating effects of all there discharge disposition by differing payers; for Discharge to home or self-care: Age moderated Medicare OR = 0.03; CI = 0.05,0.01 and *p*-value = 0.014; Private insurance: OR = 0.05; CI = 0.08,0.01 *p*-value = 0.016, and No Charge: OR = 0.10; CI = 0.2,0.02 and *p*-value = 0.013, and admission type having an OR = 0.99999993; CI = 0.99999999, 0.9999993 and *p*-value = 0.000 which like the primary relationship was leaned toward home healthcare discharges. This age moderating effect was also statistically significant with the discharge category Transfer to short term hospital with an OR = 0.04; CI = 0.01,0.07 and *p*-value = 0.003, which like the prior moderating effect was also favoring home healthcare discharges. Age moderating effects were statistically significant in all three discharge categories but was supportive of discharges to home healthcare over other discharge options. Race found no moderating effects on the primary relationships, which would be counter to prior research that had demonstrated race's impact on healthcare utilization (Bazargan et al., 1998; Eric & Kisalaya, 1999; Gordon, 1973; Molloy et al., 2017; T.-F. Wang et al., 2013). Race as a moderator was not supported in this research as no Race moderation of these relationships was identified as statistically significant. These limited moderating effects noted in Age, Race, Gender, Location and Admission type is supportive of Janssen et al's (2014) work that noted that these types of varaibel have a limited impact on the healthcare utilization, which is counter the greater body of work (Janssen et al., 2014).

Location had no moderating effects on the primary relationships and is counter to the body of works support that location can have impacts on healthcare utilization. Admission

type only demonstrated moderation impacts on the payer-discharge disposition relationship. Supporting that non-elective admission type would have higher discharge potential to home healthcare when the insurance payer was Medicare or Medicaid, this is an interesting finding as they both are governmental payer systems and show a clear difference in comparison. This is also supportive of prior research that non-elective hospital admissions, even Medicare and Medicaid payers would have higher healthcare utilization (DHHS, 2009, 2013; Henke et al., 2018).

CONTRIBUTION TO THE HEALTHCARE UTILIZATION LITERATURE

These results and finding are supportive of several hypothesis in this study yet create additional questions regarding prior work on social demographic influences on health care utilization. This research provided support of research work that has been conducted on the importance and affect that having or not having insurance has on utilization of healthcare and added to that literature by expanding this across all payer types in a single analysis which provided presented very strong evidence that those with payer resources at a minim level would have continued health services utilization at the home healthcare level of care.

This research also provides support to BHUM studies that found that socio-demographic variables get muted or loose significance in the large data set analysis. While providing a small amount of support for the impact of Age and Gender moderation in the healthcare utilization studies. The gender aspect of this study made this research ask what is different males and female that would create differences in affect at the top and bottom spectrum of total charge categories. Do male patients want to return home sooner than females, do family encourage female to stay in the hospital longer and accrue higher charges. However, as whole this research did not find strong supporting evidence that general

demographic variables have significant impacts on the discharge disposition of the patients that have been hospitalized for the MS-DRG 207.

CONCULUSION

Utilization of the BHUM demonstrated effectiveness in researching a business perspective of continued healthcare utilization and the potential that business type metric variables have on pathways of healthcare use. This interpretation has added to the body of work by gaining knowledge of the impacts that financial metrics have on patient discharges. It also demonstrates that other factors can impact these decision processes that cannot be obtained by large data sets giving support to the social-demographic focused body of work on this topic.

This research has shown that no matter which payer type a patient has, they statistically have a higher potential to be discharged to Home Healthcare than other discharge options. The only difference to this would be with Male patients in certain total charge categories would be discharges to home or self-care which has even less post discharge healthcare resources. This is a very important finding, as many families may not be well equipped to take a recovering patient home to care for them in the home setting and many may require additional resources to be able to provide that home-based care. Additional research into this finding could be important to see the impacts of this dominant discharge trend of families and patient outcomes such as mortality.

Continuation of this research evaluating this type of moderation effects and model interpretation will need to be conducted, mainly to see if these findings replicate in other medical diagnosis categories or if these are anomalous findings. The differences in medical conditions and the severity of those conditions may produces uniquely different results. As

well, using an expanded medical data set that has more defined discharge dispositions would break them down to more detailed types or locations. Significant difference between what appears similar might have very different outcomes when reviewing a narrower band of the same discharge disposition types (Frank & Haider, 2014).

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Appendix: Categorical Variable Frequencies

Frequencies of Categorical Variables					
		Frequency	Percent	Valid Percent	Cumulative Percent
Discharge Disposition	Discharged to home or self-care	627	16.9	16.9	16.9
	Transfer: short-term hospital	307	8.3	8.3	25.2
	Transfer: other type of facility	2159	58.3	58.3	83.6
	Home health care	608	16.4	16.4	100
Payer	Medicare	2200	59.4	59.4	59.4
	Medicaid	676	18.3	18.3	77.7
	Private Insurance	596	16.1	16.1	93.8
	Self-Pay	129	3.5	3.5	97.3
	No Charge-Other	100	2.7	2.7	100
Race	White	2401	64.9	64.9	64.9
	Black	808	21.8	21.8	86.7
	Hispanic	308	8.3	8.3	95
	Asian/Pacific Islander/Native Amer	93	2.5	2.5	97.5
	Other	91	2.5	2.5	100
Gender	Male	1898	51.3	51.3	51.3
	Female	1803	48.7	48.7	100
Admission Type	Non-elective admission	3525	95.2	95.2	95.2
	Elective admission	176	4.8	4.8	100
Location	Large Metro/Fringe	1932	52.2	52.2	52.2
	Medium Metro	737	19.9	19.9	72.1
	Small Metro/Rural	1032	27.9	27.9	100
	Total	3701	100	100	