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Walden University

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Victor A. Carrillo

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Walden University
2016

Abstract

Community and Patient-Centered Medical Home in the Care of Chronically Ill Patients

by

Victor A. Carrillo

MPA, Pace University, 2003

BS, Pace University, 1997

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Public Health

Walden University

December 2016

Abstract

Large portions of the US population live in poor inner-city communities. Health needs assessment data have shown that these communities have disproportionately high rates of chronic illnesses. The patient-centered medical home (PCMH) model was developed to address the gaps that exist in the primary care system, and emphasizes a redesign of primary care that is patient centered, utilizes multiple levels of healthcare professionals, information technology, and care coordination. However, little evidence exists on the value of this model which may explain why it has not gained wide acceptance by primary care providers. Therefore, this study was designed to examine the efficacy of the PCMH model through emergency department and inpatient utilization reductions, and with a specific focus on the role of social connectedness. This research used existing data on 706 participants from Columbia University and a local New York inner-city hospital. An in-depth analysis of hospital utilization data, using an unpaired two-sample *t*-test and linear regression, found that the PCMH framework strengthens continuity of care and care coordination, and helps reduce avoidable hospitalization utilization. Additionally, these reductions were greater for study participants with strong social support networks. This research highlights the relationships between primary care, social support networks, and good health outcomes. Over time, further enhancement of the PCMH and systemic changes to the delivery of care may contribute to the development of a stronger primary care system that place patients at the center of care, focuses on the importance of social connectedness, and contributes to a lasting impact on society through the development of overall healthier communities.

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DEDICATION

This dissertation is dedicated to my loving family. To my beautiful wife, Patrizia, thank you for always being my rock and compass in life. It was your encouragement that drove me on the path of this life goal, and throughout this process, your support, love, and dedication pushed me forward. To my children (Victor, Marco, and Francesca) you are the joys of my life. Thank you for always reminding me that part of my job is to set the example, and for always making me laugh and remember not to take life too seriously. To my parents, Victor and Esperanza, thank you for your support throughout my life and instilling in me the importance of being a lifelong learner. Finally, to the rest of my friends and family, thank you for your words of encouragement and your support during these past few years.

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Chapter 1: Introduction

Introduction

This study was an examination the patient centered medical homes (PCMH) model of primary care, with a specific focus on the role of social connectedness. The PCMH concept was developed, in part, from research conducted in 2004 around the primary care of the chronically ill (Carney et al., 2009; Strange et al., 2010). The PCMH concept was examined for its effectiveness as a model for the care of chronically ill patients. I tested for a relationship between social connectedness and utilization among chronically ill PCMH patients. In this research I also examined potential gaps in the current PCMH model, and the need for the model to incorporate elements that address how primary care practitioners could assist their patients in connecting and strengthening their social support networks. In Chapter 1 I provide background on the community of focus, including a review of the disease burden of the community, information on the PCMH concept, and the role of social support in chronic care. In this chapter I also provide a description of the problem statement, the purpose of the research, and nature of the study including the research questions and the proposed methodology. Finally, the chapter includes a discussion of the theoretical framework and significance of the study.

Background

The Community

In this research I focused specifically on the New York City community of Washington Heights/Inwood. The Washington Heights/Inwood community is

geographically located on the furthest northern tip of Manhattan Island and is bounded by the Hudson and Harlem Rivers. This community has approximately 240,000 residents, of which approximately 84% are of minority descent (New York City Department of Health & Mental Hygiene, 2007). Among the 240,000 residents of Washington Heights/Inwood approximately 33.1% of the community, or 70,000 people, report having no primary health care provider (New York City Department of Health & Mental Hygiene, 2007). Also, 30,000 Washington Heights/Inwood residents reported that they went without needed medical care in 2011 due to financial and other structural barriers (New York City Department of Health & Mental Hygiene, 2011). According to a community survey, conducted by the New York City Department of Health and Mental Hygiene, approximately 25.3% of Washington Heights/Inwood residents rate their health as “poor” or “fair,” which is higher than the rate of New York City as a whole (New York City Department of Health and Mental Hygiene, 2007a). Community demographic statistics, combined with the high prevalence of chronic illness, have prompted the U.S. Department of Health and Human Services to designate Washington Heights/Inwood as a medically underserved community (U.S. Department of Health & Human Services, 2013).

Disease Burden

Chronic disease is a significant problem for inner city communities around the country and affects minority groups at a disproportionate rate when compared to nonminority groups. The high burden of chronic conditions, such as diabetes, heart

failure, depression, and obesity, faced by inner city communities point to a growing need for the type of coordinated care provided in the PCMH model of primary care. The PCMH model specifically focuses on the care of chronically ill patients and requires that medical practices interested in receiving PCMH certification identify chronic conditions of high importance for their patient populations. The following sections of this study highlight the high prevalence of chronic disease that exists within the community of focus in this study.

Diabetes. Among the community of New York City, the prevalence of diabetes is approximately 9.7% compared to 8.3% nationwide (Chamany, Silver, & Nathan, 2010). In 2007, there were 20,000 hospital admissions in New York City with a principal diagnosis of diabetes, and 3,000 nontraumatic lower extremity amputations associated with complications of diabetes (New York City Department of Health & Mental Hygiene, 2007b). Chiu and Wray (2010) found that lifestyle behaviors such as diet, alcohol consumption, stress management, physical activity, and regular visits to primary care physicians are the greatest influencers of glycemic control. In addition, Chiu and Wray pointed to the need for early outreach to minority groups, such as African Americans and Hispanics, who often suffer from this condition but remain undiagnosed.

Aside from the growing number of residents who have a confirmed diagnosis of diabetes, there is a large portion of the population of New York City who are unaware they suffer from this condition. In 2006, there were approximately 200,000 residents with undiagnosed diabetes (Chamany et al., 2010). Further complicating the health of

inner-city communities are language, social support, and cultural barriers, as well as low health literacy rates (Betancourt, Green, & Carrillo, 2004). These barriers contribute to poor treatment adherence, limited access to health services, and poor health outcomes (Nam, Chesla, Stotts, Kroon, & Janson, 2011).

According to the most recent data available from the Census Bureau and New York City Department of Health, there are approximately 240,000 residents in the New York City community of Washington Heights/Inwood (New York City Department of Health & Mental Hygiene, 2007a). This community is relatively young with 64% of the population under the age of 45 years (New York City Department of Health & Mental Hygiene, 2007a). In addition, it is predominately a minority population made up of approximately 68% Hispanic and 12% African American residents (New York City Department of Health & Mental Hygiene, 2007a). Unfortunately, 13.2% (or 22,000) of Washington Heights/Inwood residents are afflicted with a diagnosis of diabetes. This rate of diabetes is higher than the New York Citywide rate of 9.3% and represents a considerably higher prevalence than the neighboring and more affluent community of the Upper East Side, which experiences a diabetes prevalence of only 4.5% (New York City Department of Health & Mental Hygiene, 2012).

Heart Disease. Heart disease is among the leading causes of death and hospitalization in the United States (Centers for Disease Control and Prevention, 2013b). Similar to diabetes, and other chronic conditions, heart disease is a condition closely linked to lifestyle behaviors. The lifestyle behaviors that are associated with heart

disease include diets that are low in fresh foods and vegetables, lack of physical activity and the excessive consumption of alcohol (Centers for Disease Control and Prevention, 2013c). In 2007-2008, the United States mortality rate for heart failure represented a rate of approximately 25.6 per 100,000 of the total population (Centers for Disease Control & Prevention, 2010). However, the rate of heart disease is considerably higher in New York City and the inner-city community of Washington Heights/Inwood which are affected by this condition at a rate of 239.4 and 155.3 per 100,000 respectively (New York City Bureau of Vital Statistics, 2010).

Depression. Researchers have pointed to the associations between depression and chronic diseases such as diabetes and congestive heart failure. Berkman and Kawachi (2000) found that approximately 65% of acute myocardial infarctions (MI) patients also experience depression. Berkman and Kawachi also uncovered that patients with MI and depression demonstrated greater problems with social adjustment as they recovered from their hospitalization. Nouwen et al. (2010) found that patients with diabetes had a 24% greater chance of experiencing depressive episodes. This research points to a phenomenon in which a patient's depressive state is a contributing factor of social isolation (Nouwen et al., 2010). Chronically ill patients who are socially isolated also experience more complications in the management of their health care largely due to a lack of social support networks.

Obesity. There is a growing epidemic of obesity in the United States, and inner-city communities experience high rates of overweight or obese populations. According

to the National Center for Health Statistics, between 2009 and 2010 approximately 35.7% of adults in the U.S were categorized as overweight or obese (Ogden, Carroll, Kit, & Flegal, 2012). The community of Washington Heights/Inwood has a rate overweight or obesity of 56.4% (New York City Department of Health & Mental Hygiene, 2012). A potential contributing factor to the problem of obesity in the inner city is that race/ethnicity play major roles in how people think and interact with food. Using the Behavior Risk Surveillance System dataset researchers examined the obesity differences among different racial subgroups, and their examination illustrated that minority populations are disproportionately affected by obesity (Davis, Cook, & Cohen, 2005). According to the Centers for Disease Control (2011), the mean Body Mass Index (BMI) of different racial subgroups is higher among minority groups such as Hispanics and African Americans, 21.77; 21.87; when compared to White populations – 20.54. Additionally, this data demonstrates that while White children experience a prevalence of obesity of 9.1%, Hispanic and African American children experience rates of 14.7% and 15.9% respectively (Centers for Disease Control and Prevention, 2011). Unfortunately, the problems that children face with weight have a tendency to follow them into adulthood.

Cancer. A cancer diagnosis can be very scary for many patients and their families. There are multiple causes for cancer including environmental, chemical, and genetic. In the late 1980s, the Consumer Product Safety Commission and the Environmental Protection Agency discovered that exposure to asbestos, largely due to

occupation, was a major cause of mesothelioma (Cancer Alliance, 2011). Additional research on causes of myeloid leukemia found causal linkages among garment workers in the 1980s who were exposed to formaldehyde (Centers for Disease Control and Prevention, 2004).

Cancer is a significant problem for the approximately 8 million residents of the City of New York and has been consistently ranked among the top five leading causes of death. According to the Bureau of Vital Statistics, which keeps and catalogs important health and mortality data, malignant neoplasms (cancer) represented approximately 25.4% of all deaths or 13,333 deaths in 2009 (New York City Bureau of Vital Statistics, 2010). Similarly, among the residents of the Washington Heights/Inwood community deaths related to cancer accounted for approximately 24.8% of all deaths (New York City Bureau of Vital Statistics, 2010).

Ambulatory Care Sensitive Conditions

There is a classification of chronic conditions that are referred to as ambulatory care sensitive conditions. These diseases, such as diabetes, heart failure, and asthma, are identified as conditions that if managed through regular primary care and patient self-management could result in reduced emergency and inpatient hospitalizations (Magan, Alberquilla, Otero, & Ribera, 2011). ASCs are important conditions because the cost of treating these types of admissions in a hospital can be much greater than through routine visits in an outpatient setting (Reid et al., 2010; Shi, Samuels, Pease, Walter, & Corley, 1999). In addition, research has demonstrated that when patients do not manage their

ambulatory care sensitive chronic diseases through their primary care providers, they are more prone to present in a hospital setting with more complicated cases (Schoen et al., 2011).

The Patient Centered Medical Home Model

Under the environment of health reform and the Affordable Care Act (ACA), primary care and preventative care services have received a great deal of attention. One model that aimed to address this movement in health reform was the PCMH model. The PCMH model addressed primary care, and specifically the care of chronically ill patients, through the creation of an established “medical home” under which a patient’s care is managed and coordinated across the continuum of care. The PCMH model also highlighted the role of families in health care and the potential positive effects that families can have in fostering an environment of healthy behavior choices and good care (Carney, 2009; Pettoello-Mantovani, Campanozzi, Maiuri, & Giardino, 2009). The PCMH model was built upon six pillars of coordinated care that include:

1. Enhanced Access and Continuity
2. Identification and Management of Patient Populations
3. Plan and Managed Care
4. Self-Care Support and Community Resources
5. Tracking and Coordinating Care
6. Measurement and Performance Improvement

These six elements aim to place the patient in the center of their care and streamline the care across health care settings.

An important component of the PCMH model is an understanding of a patient’s culture and the role that culture plays in motivating patients to engage in primary care

and disease prevention/coordination programs. To understand the culture of a patient population, the PCMH model requires that medical practices adopt processes of cultural competency. The National Quality Forum (NQF), a not-for-profit group whose mission is to improve the quality of the American healthcare system, brought together a group of experts to propose cultural competency guidelines for the health care industry. In 2010, the NQF guidelines created seven domains for culturally competent health care:

1. Leadership
2. Integration into management systems and operations
3. Patient-provider communication
4. Care delivery structures and supporting mechanisms
5. Workforce diversity and training
6. Community engagement
7. Data collection, public accountability, and quality improvement

Each of these domains provide a framework for the development of culturally competent programs as well as a primary care practice that put patients at the center of care.

Problem Statement

Residents of inner-city New York communities experience higher rates of chronic conditions such as diabetes, congestive heart failure, and obesity. For example, in 2008 the prevalence of diabetes in New York City was approximately 9.7% compared to 8.3% nationwide (Chamany, Silver, & Nathan, 2010). There were approximately 200,000 residents with undiagnosed diabetes (Chamany et al., 2010). In 2007, there were 20,000 hospital admissions in New York City with a principal diagnosis of diabetes, and 3,000 nontraumatic lower extremity amputations associated with complications of diabetes (New York City Department of Health & Mental Hygiene, 2007). Further complicating

the health of inner-city communities are language, social support, and cultural barriers, as well as low health literacy rates (Betancourt, Green, & Carrillo, 2004). These barriers contribute to poor treatment adherence, limited access to health services, and poor health outcomes (Nam, Chesla, Stotts, Kroon, & Janson, 2011).

In addressing the growing national dilemma of the chronically ill, the Affordable Care Act has placed a great deal of focus on the need to strengthen primary care. One strategy available to health care providers is the development of PCMH. The PCMH concept grew from the 2004 report on the Future of Family Medicine and emphasized the redesign of primary care practices to include a team approach, enhanced health information technology, care coordination, and greater provider-patient communication (Carney et al., 2009; Strange et al., 2010). However, while an important part of the PCMH model is the redesign of primary care and engagement of the patient in disease self-management, it falls short in acknowledging the importance of a patient's social support network. Additionally, the medical home model fails to acknowledge the value of a patient's engagement with local community resources such as Community Based Organizations (CBOs) and Faith Based Organizations (FBOs).

Current researchers have suggested that a correlation exists between the effect of social connectedness and the health status of individuals. For example, Uchino (2009) found that there were positive correlations between social connectedness and physical health outcomes. In research regarding care management for the chronically ill, Rosland and Piette (2010) pointed to the need to develop programs that assist patients in

connecting with community support. Therefore, in this study I sought to examine the role of a patient-centered primary care design model and the value added by strengthening the social support networks available to chronically ill patient populations. Through a quantitative analysis of the data, I planned to examine whether patients in a PCMH practice, enhanced with integrated social support resources and networks, experience healthier communities, improved health outcomes and reduced hospitalizations when compared to PCMH patients who were not socially connected. In my study, I used engagement in a PCMH with and without social connectedness as my independent variables. In addition, I used emergency department visits and inpatient admissions as my dependent variables.

Purpose of the Study

The purpose of this quantitative study was to evaluate the role of the PCMH model of primary care on chronically ill inner-city population. This research also examined the role of social connectedness, and evaluated the relationship of social connectedness in the PCMH model of primary care. Examination of the PCMH model and the role of social connectedness may offer important insight into the care of chronically ill patients, and provide the health care system with information that will help shape the delivery of primary care in the ambulatory setting. This study will compare the emergency department and inpatient utilization of patients engaged in PCMH practices with the social connectedness component with that of those engaged in PCMH without the social connectedness component. Additionally, I leveraged a community survey to

measure social connectedness and examined the relationship of this variable to hospital emergency department and inpatient hospital utilization. Further, information on the design of this study, analysis, and results are described in Chapter Three of this dissertation.

Research Questions and Hypotheses

Research Question 1: What is the relationship between PCMH and Emergency Department visits?

H_01 : Engagement in a PCMH does not impact the patient's use of Emergency Department visits for ambulatory sensitive conditions.

H_11 : Engagement in a Patient PCMH does impact the patient's use of Emergency Department visits for ambulatory sensitive conditions.

Research Question 2: What is the relationship between PCMH and Inpatient admissions?

H_02 : Engagement in a PCMH does not impact the patient's use of Inpatient admissions for ambulatory sensitive conditions.

H_12 : Engagement in a PCMH does impact the patient's use of Inpatient admissions for ambulatory sensitive conditions.

Research Question 3: What is the relationship between PCMH patients with strong social connectedness and Emergency Department visits?

H_03 : Patients who are engaged in PCMH practices, and have strong social connectedness, do not show the reduced utilization of Emergency Department visits.

H_{13} : Patients who are engaged in PCMH practices, and have strong social connectedness, do show the reduced utilization of Emergency Department visits.

Research Question 4: What is the relationship between PCMH patients with strong social connectedness and Inpatient admissions?

H_{04} : Patients who are engaged in PCMH practices, and have strong social connectedness, do not show the reduced utilization of Inpatient admissions.

H_{14} : Patients who are engaged in PCMH practices, and have strong social connectedness, do show the reduced utilization of Inpatient admissions.

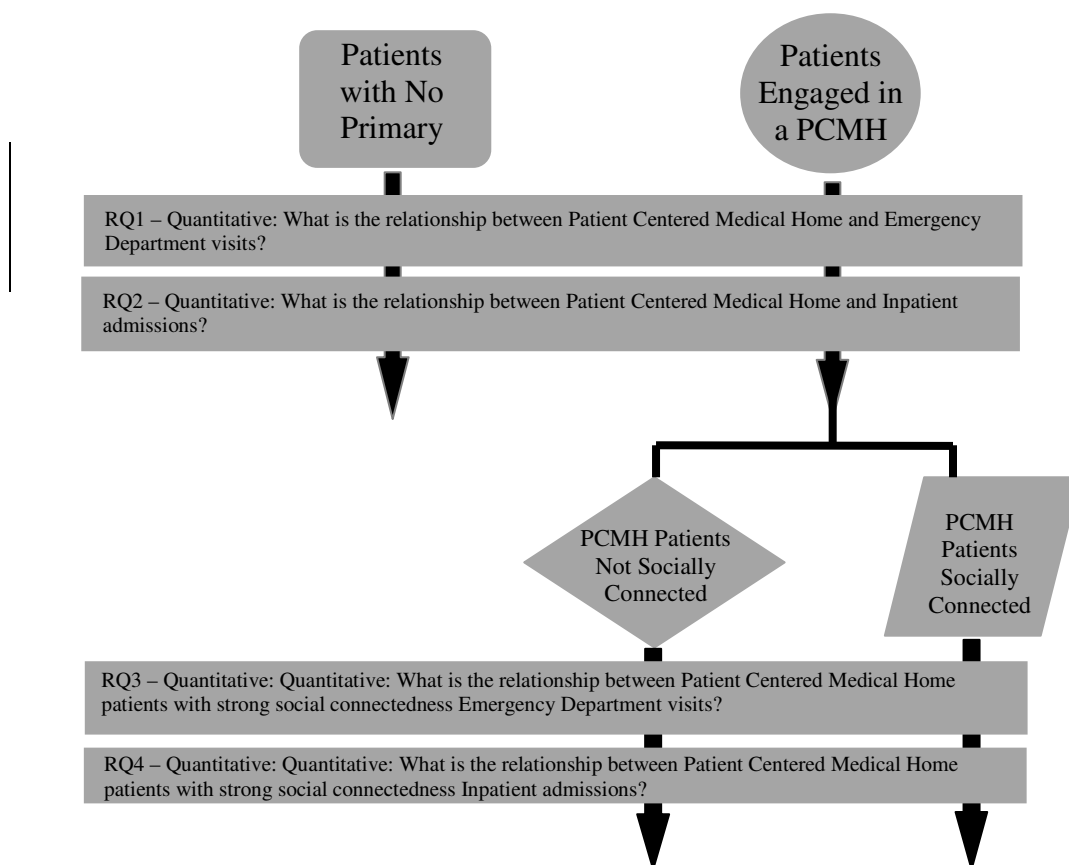


Figure 1. Research Model

Theoretical Framework for the Study

This section provides an overview of the theoretical framework upon which this research study was built. Chapter 2 of this study provides deeper explanation of these theories.

This research study was based on three primary theories. The first of these theories is social cognitive theory, and it explains the variety of factors that influence healthy behavior choices and the overall health of communities (Bandura, 2004; Babones, 2009). The second theory that grounds this research involves an examination of the relationship that exists between social cohesion and health status. This theory, collective efficacy, explains that important components of a person's health status are strongly associated with the social support network they have around them (Coyle & Dugan, 2012; Park et al., 2012). The final theory for this study, and for the development of the PCMH model of primary care, is the Wagner chronic care model. The chronic care model addresses the gaps in coordinated primary care and describes a model that restructures the primary care environment to increase patient engagement and self-management (Wagner et al., 2001).

Nature of the Study

This study was conducted as a quantitative analysis. The design of this research study was composed of four key variables, and will be explored in greater detail in Chapter 3. The two dependent variables of interest in this study are emergency department and inpatient visit utilization, and they were selected to examine the efficacy

of the Patient Centered Medical Home model of primary care among chronically ill patients. This study also has two independent variables. The first is whether patients belong to a PCMH. In this study, this variable was used to separate the study population into two groups: those patients with PCMH and patients without a medical home. Lastly, in this study, an independent variable of Social Connectedness was used to measure the social relationships of the patient population. To address the first two research questions, the success of the Patient Centered Medical Home model in reducing the Emergency Department visits and Inpatient admission of chronically ill patients, this study analyzed hospital emergency department visits and inpatient admissions data for patients of Patient Centered Medical Homes within the research target communities. These data were housed in a disease registry of over 24,000 patients. PCMH utilization data was compared to an equivalent control group not engaged in primary care. In addition, my research plan examined the mediating variables of social isolation through the leveraging of another community program that has surveyed over 1,500 of the 24,000 PCMH patients, via an administered questionnaire, regarding their involvement in social support and community resource networks. In this study survey responses were collected through a secondary data source, the Columbia University - WICER study, in the form of a set of eight questions derived from the PROMIS psychometric instrument. This data was linked to the hospital Emergency Department visits and Inpatient admissions data above in order to measure the effect of collective efficacy, and social support networks, on the PCMH model.

Definitions

The following section of this study provides a review and definitions of important variables and key terms used in this dissertation. The variables defined in this section include the independent and dependent variables, as well as the mitigating variables under investigation. Further information and analysis of these variables will be described in Chapter 3 of this dissertation.

Variables

Patient centered medical home (PCMH): this is a redesigned model of primary care that emphasizes patient-centeredness, care management and coordination across the continuum of care (Stange et al., 2010).

Emergency department (ED) Visit: in this study this variable is used to measure inappropriate use of the ED for conditions that could be self-managed and dealt with in an ambulatory setting by primary care providers (Buesching et al., 1985; Bodenheimer, Lorig, Holman, & Grumbach, 2002)

Inpatient admission: this variable is used to measure inappropriate admissions for hospital care for conditions that could be self-managed and dealt with in an ambulatory setting by primary care providers (Berg, Bonnelly, Miller, Medina, & Warnick, 2012; Harrison, Pope, Boberley, & Rula, 2012; Simon et al., 2010).

Social connectedness: this variable is a measurement of social isolation and used to define the social support network of the patient population (Cornwell & Waite, 2009; Barger, 2013).

Key Terms

This section provides definitions of key terms in the field of health care, ambulatory care, and public health. These key terms are also important to this study, and to the understanding of the growing need to treat chronically ill patients in inner city communities. The key terms include:

Ambulatory sensitive condition (ASC): this term represents conditions that can be managed through the primary care setting as opposed to a hospital setting (Balogh, Brownell, Ouellette-Kuntz, & Colantonio, 2010; Purdy, Griffin, Salisbury, & Sharp, 2009)

Care management: describes a system of providing targeted care for chronically ill patients that emphasize evidence-based practice, patient education and care planning (Bayliss, 2012; Mechanic, 2004)

Chronic disease: defines a set of diseases such as diabetes, heart disease, asthma, and obesity that can be prevented through healthy diets, regular exercise, and regular access to primary care (Centers for Disease Control and Prevention, 2013e).

Depression: this is a chronic disease classified under mental health which is often a co-morbid condition with other diseases such as diabetes and heart disease (Centers for Disease Control and Prevention, 2012a).

Diabetes: this is a chronic disease in which a person's pancreas is unable to make sufficient insulin to regulate blood sugar at normal levels (Centers for Disease Control and Prevention, 2012c).

Electronic medical record (EMR): a digital form of the paper medical record that allows clinicians to monitor, track, and identify needed medical services (HealthIT.gov, 2013; O'Reilly, Holbrook, Blackhouse, Troyan, & Goeree, 2012).

Health information technology (HIT): describes health-related information, such as medical records, in an electronic environment (U.S. Department of Health & Human Services, 2013).

Patient centered: describes the process of engaging patients in all aspects of the health care decision-making process, and encouraging them to be active participants in their health care (Barry & Edgman-Levitan, 2012; Inzucchi et al., 2012; Lorig, 2012).

Disease self-management describes a process in which patients are taught techniques in order to help control and manage chronic disease (Ory et al., 2013; Smith, Cho, Salazar, & Ory, 2013).

Social isolation: this term defines a situation in which individuals are cut off from or have a lack of connection to society (Greysen, Horwitz, Gordon, Ohl, & Justice, 2013; Pantell et al., 2013).

Social network: this term describes the support groups that surround an individual such as family and friends (Ahnquist, Wamala, & Lindstrom, 2012; Tkatch et al., 2011).

Socioeconomic Status (SES): this term defines the social standing and class of an individual, and is composed of a variety of factors such as income, education, and occupation (American Psychological Association, 2013; Centers for Disease Control and Prevention, 2012b).

Assumptions

The emergency department admission and inpatient visit utilization data source for this study was extracted directly from the patient's EMR and linked to the hospitals billing systems; therefore, there was strong accuracy of these data elements. However, there were a variety of assumptions that were made in this study. The largest of these assumptions revolved around the clinical practice of the PCMH model. Under this model of primary care, clinics are required to follow evidence-based guidelines in the delivery of care for chronically ill patients (National Committee for Quality Assurance, 2010; Strange et al., 2010). Therefore, the first assumption made in this study was because the chosen clinics were certified as level three PCMHs, the highest level achievable, I assumed that all clinicians followed the evidence-based guidelines the clinic attested to in their certification application.

The second set of research questions in this study involved an analysis of the relationship between the PMCH model and social connectedness of the patient population. In this study the variable of social connectedness was gathered through a survey administered by community health workers to subjects within the targeted community; however, this variable relied on self-reported responses. Therefore, a key assumption made with regard to this variable was the accuracy of the responses to the survey for social connectedness. For this study, I assumed that the community health workers who administered the survey gave the subjects proper instruction about the survey tool. Additionally, I assumed the surveyor answered all subject questions before

or during the administration of the survey, and that the surveyor recorded the responses accurately into the database. Finally, I assumed that the subjects answered the survey question truthfully and to the best of their ability.

Limitations

This study used the overuse of emergency department and inpatient utilization to measure the efficacy of the PCMH model. However, there are potential limitation in this methodology. The utilization data measured under this study was extracted from one hospital linked to the PCMH clinics. Although this hospital is located within the borders of the Washington Heights/Inwood community, there was no way to guarantee that these subjects had not also received emergency department and inpatient care at other unaffiliated hospitals. At the time of this study there was no connection across hospital systems that allowed for extracting a subject's overall emergency department and inpatient utilization. Therefore, this analysis was limited to only the emergency department and inpatient use at the linked hospital.

Significance

As the health care industry embarks on the path of health reform and begins to put into action the vision of the Affordable Care Act many health care professionals are seeking to implement the PCMH model. This model of primary care allows for better coordination for chronically ill patients and enhances the roles of providers, nurses, social workers, as well as the patient and their families in disease management (Wong et al. 2012). However, it does not address the gaps that exist within urban communities for

patients that lack social support networks and do not engage in local community resources (Ahern & Galea, 2011). In this study I sought to examine if the PCMH concept could be an effective model for the care of chronically ill patients. Through my research, I will tested for a relationship between social connectedness and emergency department/inpatient utilization among chronically ill PCMH patients. I also sought to highlight a gap in the current PCMH model, and the need for the model to incorporate elements that address how primary care practitioners can assist their patients in connecting and strengthening their social support networks. Furthermore, over time these systemic changes to the delivery of primary care may also contribute to the development of overall healthier communities.

Summary

In summary, primary care plays a significant role in the care of chronically ill patients. The PCMH model is a redesign of primary care that focuses attention on key elements that place patients at the center of decision-making (Bodenheimer et al., 2002; Carney et al., 2009). However, this model of care does not address the need for patients to have strong social support networks. This study examined the efficacy of PCMH model on the reduction of emergency department and inpatient admissions for patients with chronic illnesses, and the relationship of social connectedness on the PCMH model.

This first chapter of this study has provided a brief introduction into the background of this research, and an overview of the key elements of the study.

In the next chapter of this study, Chapter 2, I will provide a review of the literature associated with the PCMH model, the chronic diseases afflicting the target community and the role of social connectedness on health status. This review is meant to inform the reader of the important topics associated with this study, and the theoretical foundation of this dissertation. The review in Chapter 2 also focuses on existing knowledge gaps in current and past literature.

The third chapter of this study will provide a detailed overview of the research methodology. Chapter 3 will provide a detailed description of the target population, procedures used in the selection of case and control subjects, and ethical considerations. This chapter will also include the data analysis that will be used to test the research questions.

Chapter 2: Literature Review

Introduction

Examination of the health of populations across the United States revealed that a disproportionate burden of poor health status existed among communities with low social and economic status (Franks, Muennig, Lubetkin, & Jia, 2006). These inequities were evident in a variety of key health indicators such as life expectancy, disabilities, exposure to accidents and chronic disease burden (Merello-Frosch, Zuk, Jerrett, Shamasunder, & Kyle, 2011). An examination of a multi-year community registry uncovered that communities with low socioeconomic conditions had 50% higher prevalence of life-shortening chronic conditions such as cardiovascular disease, diabetes, and chronic obstructive pulmonary disease (Louwman et al., 2010). Research conducted by the World Health Organization (WHO) highlighted this gap in health equity through an examination of the life expectancy between the inner city communities of Washington D.C. and the neighboring suburban communities of Maryland and discovered that there existed a seventeen-year discrepancy (World Health, 2009). Similarly, studies found that residents of inner-city communities experienced higher rates of chronic conditions such as diabetes, congestive heart failure, and asthma (World Health, 2009). Dinca-Panaitescu et al. (2011) found that low socioeconomic communities had a greater risk of developing chronic conditions such as diabetes, compared to communities with higher socioeconomic status.

The aim of this literature review was to identify studies that were related to the formation and support of the PCMH and the care of inner-city communities with chronic conditions such as diabetes, depression and heart disease. The PCMH model of primary care was designed to strengthen the relationship and interaction between healthcare providers and patient, increase quality, and provide patients with needed self-management tools (Epstein, Fiscella, Lesser, & Stange, 2010). This model of primary care depends on upon a redesign of the delivery of care and requires clinics to modify their clinical workflows, increase psychosocial support, develop electronic patient registries, create patient portals that facilitate provider-patient communication, and develop visit summaries with detail post-visit instructions (Calman et al., 2013). However, this new model of care fails to recognize the need for patients to be socially connected and well supported. This study examined the effect of social support on the PCMH model.

Literature Search Strategy

This goal of this literature review was to explore and identify research related to the PCMH model, chronic diseases, and social connectedness. Journal articles for this study were identified from online databases such as PUBMED, SCIENCE DIRECT, and CINAHL. Literature for this study was identified using a variety of key terms including: *diabetes, cardiovascular disease, depression, obesity, cancer, patient centered medical home, health disparities, social connectedness, social isolation, collective efficacy, chronic care, disease management, social cognitive theory, socioeconomic status and*

minority communities, and Washington Heights/Inwood. In addition to key terms, references identified in selected literature were examined for inclusion in this study based on a review of the title and abstract. Finally, all references were cataloged into the database management system StyleEase, which also facilitated documentation into the narrative of the document.

Theoretical Foundation

A variety of internal and external factors influence how people utilize and access primary care. One such factor that plays an important role in how people interact with primary care is the Socioeconomic Status (SES) of a community. Socioeconomic status factors such as race, ethnicity, income, and educational attainment are key influencers of how a community internalizes health issues and uses the primary care system (Chando, Tiro, Harris, Kobin, & Breen, 2013). Within the structure of a community, socioeconomic status can affect the availability of healthy food alternatives, safe public recreation areas, and access to affordable health care (Kumanyika, 2008; Patrick, Nicklas, Hughes, & Morales, 2005). Poor socioeconomic conditions are a major contributing factor in the various barriers that keep urban communities from accessing healthcare and making smart health choices (Williams, Mohammed, Leavell, & Collins, 2010). The development of the PCMH was in part an attempt at addressing some of these barriers at a practice/provider level; however, these barriers are very difficult to address and often require a greater social change to take hold on a larger scale.

The framework of this study was grounded in three primary theories. The first of these theories is the social cognitive theory. This theory seeks to shed light on the various factors that influence health status and healthy behavior choices. The second theory is the concept of social efficacy. Theories of social efficacy explain the importance of social connectedness and the impact of social isolation on the health of individuals and communities. The third theory is the chronic care model, which established the theories of care for chronically ill patients and the foundation of the patient centered medical home.

Social Cognitive Theory

The social cognitive theory involves an examination in how and what motivates and drives a person's health. According to the social cognitive theory, the health of an individual is driven by three factors that all interact with one another (Bandura, 2004). The three factors that, according to this theory, interact to influence health include individual behaviors, the environment, and psychosocial factors (cognitive and biological) (Babones, 2009; Bandura, 2004). The figure below illustrates the interaction of social cognitive theory factors on health.

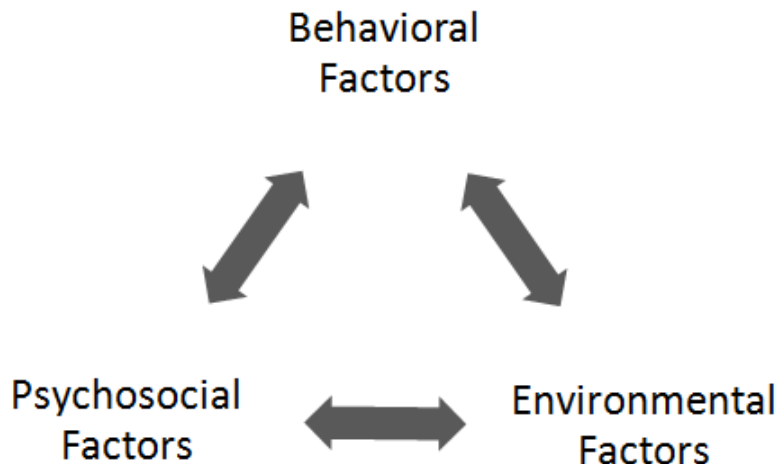


Figure 2. Social cognitive theory factors.

Behavioral Dimensions. The race/ethnicity and socioeconomic status of a community play a very important role in how residents interact with healthcare and exhibit healthy behaviors. Food and cultural dietary habits are an important part of all cultures. The interaction of food and our health belief systems are ingrained within us at an early age by our parents, caregivers, and families (Kumanyika, 2008). However, communities with low socioeconomic conditions often lack healthy food options and exhibit diets that do not include adequate quantities of fresh fruits and vegetables (Bonaccio et al., 2012). Further complicating this scenario, parents, in low SES families, are less likely to engage their children in healthy food option choices; rather, these parents follow a more authoritarian feeding style (Patrick et al., 2005). These behavior barriers are a major leading cause for the increased prevalence of chronic conditions such as obesity and diabetes among poor communities (Braveman, Egerter, & Williams, 2011; Seligman, Laraia, & Kushel, 2010). In addition, it is vital to note that the health

behaviors that children learn from their parents are often those they carry into adulthood and also pass along to their children.

Environmental Dimensions. Environmental factors that create barriers for low socioeconomic status communities take many forms. Environment barriers, such as violence, crime, drugs, unsafe or inadequate parks, and lack of healthy food choices, limit the opportunities community residents have to engage in healthy behavior choices. For example, in low SES communities plagued by violence, drugs, and inadequate number of stores that sell fresh fruits and vegetables there is also a reduction in participation in physical activities among all age groups, an increase in sedentary lifestyles, and a higher consumption of unhealthy foods such as fatty fast food and soft drinks (Kumanyika, 2008). These environmental restrictions have shaped the communities and contributed to the growing prevalence of chronic diseases such as obesity, asthma, diabetes, and congestive heart failure among low SES communities (Carlson, Brooks, Brown, & Buchner, 2010; Zenk et al., 2011). While many, if not all, of these environmental influences, are outside of the scope of primary health prevention, it is still important for the healthcare industry to understand the environment of their patient population.

Within the targeted communities of this research study, environmental forces may be complicated by the closure of many of the larger supermarkets due to gentrification and increasingly higher rent demands. What are left in the wake of their departure are small grocery stores called Bodegas. Bodegas are small shops that often carry a very limited supply and variety of food, and more often do not carry healthy food alternatives

such as fresh fruits and vegetables. The proportion of Bodegas, in low socioeconomic communities such as East and Central Harlem, comprise 65.4% and 66.2% of all food stores, compared to only 33.1% in the neighboring, and more affluent community of the Upper East Side (Gordon, Ghai, Puciel, Talwalker, & Goodman, 2007). Supermarket density of the community, or the percent of supermarket food retail space, has also been used to evaluate access to healthy food choices. Low socioeconomic communities in urban areas often have very low supermarket density, and low supermarket density has been found to be inversely proportional to the prevalence of chronic diseases within the same population (Gordon et al., 2007). This problem is prevalent in the lower SES communities of New York City; therefore, the Department of Health and Mental Hygiene have classified these communities as “food deserts.”

Psychosocial Dimensions. Under the spectrum of psychosocial barriers, it is valuable to consider how communities of lower socioeconomic status internalize health promotion and the education efforts of the healthcare industry. Research conducted by Carrillo et al. (2011) highlights that communities of low SES face a variety of structural barriers that can have an adverse effect on how community residents internalize health messages and education, and as a byproduct on the communities overall health status. One example of the types of structural barriers that affect low SES communities is the diversity and cultural awareness of the local healthcare workforce. Urban and low SES communities have a long history of distrust for the health care industry. Inner city and minority communities have a distrust for health care and researchers, and feel that the

healthcare industry takes advantage and exposes unsuspecting groups to diseases or harmful experimental treatments (Crosby, DiClement, & Salazar, 2006). However, there exists evidence that providers who are of similar background or exhibit cultural sensitivity have patients who are more satisfied and engaged in their care (Betancourt et al., 2004). Other structural barriers that can have a negative effect on how low SES communities access and utilize the healthcare system include how close patients live to the healthcare facility, access to providers via phone, the availability of qualified interpreters, the availability of translated health documents, and adequate directional signage (Betancourt et al., 2004). In addition, it is important to note that aside from these structural barriers, there are also barriers internal to the patient that may hinder their successful navigation of the healthcare system.

If a patient can overcome the various structural barriers described in the previous section, they must still be able to have effective communication with their providers. Patient-provider communication is a two-sided coin. In the previous section, I described the need for healthcare providers to be culturally sensitive to, not only the race and language of their patients, but also to the cultural perspective that often colors how patients engage in their care (Carrillo et al., 2011). This cultural sensitivity is best known in the healthcare industry as cultural competency and is a growing field of research and exploration. However, in examining the patient-provider interaction, we must acknowledge the cognitive barriers that face many patients in low SES communities. One measure that must be considered is the patient's functional health literacy (FHL),

which is a product of their communication skills, literacy level, and understanding of health care. Research in this field indicates that there exists a correlation between a patient's FHL and their health status, and that patients with low FHL are also more likely to report poor health outcomes (Berkman, Sheridan, Donahue, Halpern, & Crotty, 2011; Schillinger, Bindman, Wang, Stewart, & Piette, 2004). These barriers in communication illustrate the gaps that exist among communities of low SES, and the need for further examination to find ways to address the problem from both sides of the gap.

Collective Efficacy

The second theory upon which this study is based is the concept of collective efficacy, which involves an examination of social cohesion and the role of social networks as a measurement of social isolation (Curley, 2005). According to the theory of collective efficacy, people who experience a lack of social support networks are more prone to suffer complications from chronic diseases and poorer health outcomes (Coyle & Dugan, 2012; Park et al., 2012). Research conducted by Ahern and Galea (2011) found that older adults who had high rates of collective efficacy, or a greater social support network, exhibited a 6.2% lower rate of depression compared to a comparable group that did not have good support. Research into type-2 diabetes management among middle-aged adults found a positive correlation between high collective efficacy and adherence to clinical protocols, such as blood sugar testing and exercise regimens (Beverly & Wray, 2010). This research demonstrates not only the links between collective efficacy and health, but also the correlation of social isolation and health care.

Social isolation is a measurement of how connected an individual is to others, and is also used to measure loneliness. The variable loneliness describes a person's perception of a strong support network and an acknowledgment that they are not alone in dealing with social and health issues (Hawkley & Cacioppo, 2010; Pinqart & Sorensen, 2001). Research conducted into the effect of social isolation, and cardiovascular disease found that children who are socially isolated are at a higher jeopardy, risk ratio of 1.37 (95% CI: 1.17-1.61), for poor health outcomes when compared to children with strong social networks (Caspi, Harrington, Moffitt, Milne, & Poulton, 2006). Research, that examined questionnaire responses used to measure social isolation from eight thousand subjects above the age of 50 years old, found that those respondents that reported feelings of loneliness were also more likely to experience poor health outcomes such as diabetes, cardiovascular disease, and depression (Shanker, McMunn, Banks, & Steptoe, 2011). This research highlights the importance of social support networks in the care of chronically ill patients, and the need for models of care that go beyond the standard practice of medical care.

Chronic Care Model

The PCMH is grounded in the theory of the Wagner chronic care model. This model reconstructs the care of chronically ill patients around a primary care structure that places the patient at the center of care, and finds ways to connect a patient's care with information technology (IT) and care management resources to improve health outcomes (Wagner et al., 2001). The chronic care model was developed to address three major

gaps in primary care. The first gap addressed by the Wagner chronic care model was that traditional primary care was designed to address the acute needs of patients, rather than the care management needs of the chronically ill. The second gap Wagner identified was that chronically ill patients are often not well educated about their conditions, self-management techniques, and primary care providers do not furnish patients with the tools needed to empower them to self-manage their conditions. Lastly, Wagner determined that the current primary care structure does not give physicians the time per patient visit needed to educate and support chronically ill patient populations.

Wagner's chronic care model attempts to address these gaps and suggests that primary care practices should move away from the old model of physician-centric care to one that leverages a team-based approach. Under this model, the care of patients is shared between physicians, nurses, social workers, community health workers, and back office staff such as registrars and practice administrators (Isaacs & Knickman, 2006). This model also requires that all members of the clinical care team operate at the top of their license, and are not performing tasks more effectively completed by lower level team members, in order to ensure that patients are receiving high-quality care. In addition to redesigning the care teams, the chronic care model builds on six core principles:

- Medical practices should identify and encourage patients to engage with existing community resources.

- Practices should engage their team in communication about quality improvements and strategies for corrective action.
- Medical practices need to provide patients with education and tools to increase self-management of chronic conditions, including setting achievable goals and treatment plans.
- Medical practices need to develop clear roles and responsibilities among care team functions and establish the roles of each team member in the care of patients from pre-visit to post-visit follow up.
- Clinical care for chronic diseases must be evidence based, and medical practices must establish decision support mechanisms to help providers handle scientific and psychosocial issues.
- Medical practices must establish electronic medical records (EMR) in their practices, which should include (but is not limited to) key features such as reminders, tracking of referrals, e-prescribing, drug-drug interaction notices and benchmarking.

The figure below highlights these six key features of the chronic care model, and how each interacts with both the medical team and the patients in the practice.

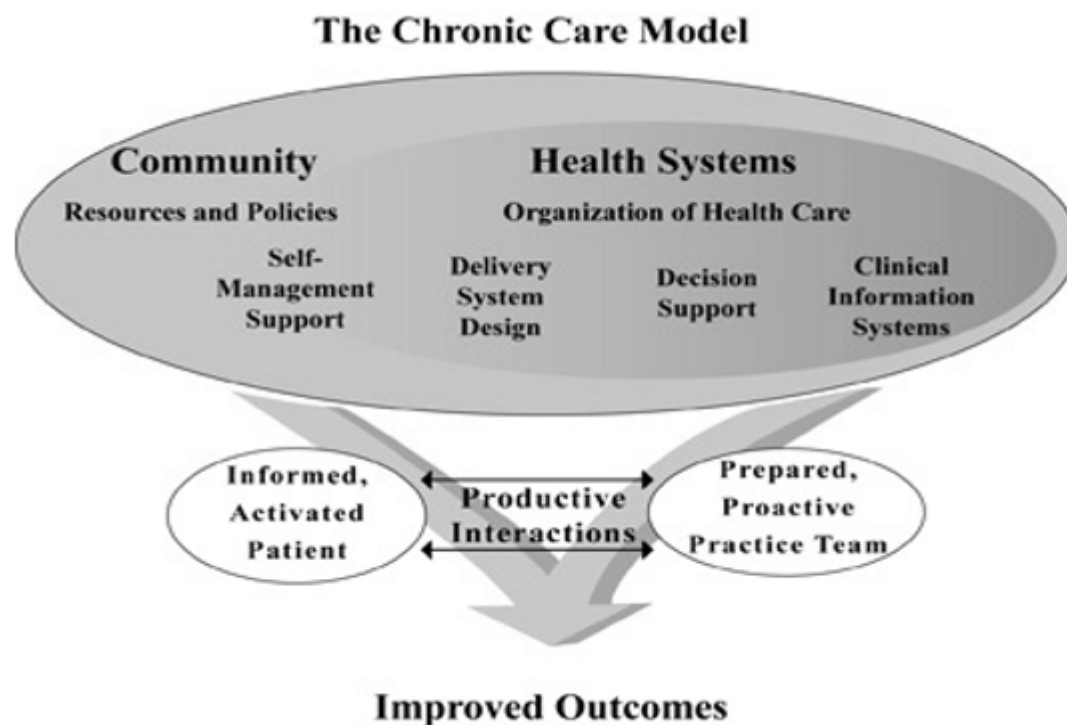


Figure 3. The Wagner chronic care model.

The Community

Research indicates that in order to understand the community and its health status it is important to understand the neighborhood characteristics and the effect of the environment on the health status of inner-city populations (Haines, Beggs, & Hurlbert, 2011, Yen, Michael, & Perdue, 2009). Moore et al. (2010) found that various physical and social barriers, such as race, ethnicity, educational attainment, and socioeconomic status, contribute to the health status of inner-city communities. Additional studies have found that the race and ethnicity of groups in the inner city can have an effect on health care access and health care status (Richardson & Norris, 2010). In addition to the

socioeconomic conditions that affect the health of a community, it is also important to consider the disease prevalence of a community. Considering the disease prevalence of a community helps explain how the chronic illnesses of communities drive not only health care status, but also health care utilization at the ambulatory and hospital levels.

Disease Burden

Diabetes. According to the Centers for Disease Control and Prevention (2012c), diabetes is a disease of the pancreas in which blood sugar levels increase to abnormal levels. Diabetes is also one of the most common chronic diseases that affect the citizens of our country. In fact, the prevalence of diabetes has almost quadrupled between 1980 and 2011, from 5.6 million individuals in 1980 to 20.9 million in 2011 (Centers for Disease Control and Prevention, 2013d). This chronic condition has also been found to be associated with other complicating health conditions such as cardiovascular disease, end-stage renal disease, lower extremity amputations, visual impairments and mental health disorders (Centers for Disease Control and Prevention, 2013a; Jortberg, Miller, Gabbay, Sparling, & Dickinson, 2012). However, there exists evidence that the PCMH model of care can have a positive effect on clinical outcomes and long-term complication (Jortberg, Miller, Gabbay, Sparling, & Dickinson, 2012; Pagan & Carlson, 2013).

Depression. The comorbid associations of depression and chronic conditions have also been linked to poor behavior choices, such as higher sedentary lifestyles and tobacco use, which have complicating effects on the health of a population. Skala et al. (2006) found that depression have a negative effect on behavior and aids in creating

situations where patients do not reach out for help, delay or put off treatment, and fail to adhere to treatment regimens for not only their depression but also for their comorbid chronic conditions. Skala et al. (2006) examined the association between heart disease and depression and found that there exists a negative association between adherence to medication treatment and depression. This research found that depressed patients had higher rates of non-adherence when compared to non-depressed patients, 14% versus 5% respectively (Skala, Freeland, & Carney, 2006). Other examples of the complications associated with depression include poor follow up to care, increased weight fluctuations and decreased physical activity that may contribute to obesity.

Obesity. Kumanyika (2008) found through investigation of inner city communities that adults teach and pass along dietary cultural habits and belief systems to their children. This also includes the meaning and use of traditional foods and the role of food in cultural, social situations (Kumanyika, 2008). This correlation highlights an important phenomenon; research found that parents of low SES background tend to have more “Dictatorial” feeding style (Patrick, Nicklas, Hughes, & Morales, 2005). This feeding style is characterized by caregivers having total control of what food is purchased and fed, and often does not give children the opportunity to engage in healthy food selection. Patrick et al. (2005) linked this feeding style, in low SES family units, to a reduced consumption of fresh fruits and vegetables and higher rates of childhood obesity. Additional research indicated that obesity in early years of development lead to obesity in

adulthood, creating an endless cycle of obese children and parents (Magarey, Daniels, Boulton, & Cockington, 2003).

The Patient Centered Medical Home Model

Core to the success of the patient centered medical home model is the concept of engaging patients in the self-management of their chronic condition. The PCMH model of disease self-management involves medical practices educating and giving their patients tools for them to monitor and manage their disease (Jordan & Osborne, 2007). Chodash et al. (2005) found that patients who were engaged in disease self-management demonstrated statistically significant reductions in blood sugar levels by 0.81% and reductions in blood pressure by 5 mm hg (Chodosh et al., 2005). Similar positive health outcomes and cost reductions were also discovered among arthritis and asthma patients (Bodenheimer, Lorig, Holman, & Grumbach, 2002).

Although the adoption of PCMH in primary care practices is in its infancy, there exists preliminary evidence that this model of care has some association with reductions in emergency department utilization. Homer et al. (2005) describe pediatric practices in Michigan and Boston who adopted the PCMH model for children with special health care needs and found that emergency department admissions for these patients were reduced from 36% to 22% for the general population. In North Dakota, a healthcare system, North Dakota MeritCare Health System, developed a PCMH practice that focused on the management of chronically ill patients and found after two years of intervention that these patients experienced a 24% reduction in emergency department admissions

(Commonwealth Fund, 2008). However, neither of these programs placed emphasis on the linkage between the PCMH model and community resources.

Other isolated PCMH programs have experienced positive preliminary findings associated with unnecessary inpatient hospital admissions. The Geriatric Resource for Assessment and Care of Elders (GRACE) model of primary care functions under the PCMH standards, and provides care management by skilled nurses and social workers for patients 65 years and older who had annual incomes of less than 200% of the federal poverty level. Over the course of two years, the GRACE program demonstrated statistically significant reductions in inpatient utilization compared to a control group (Counsell et al., 2007). A similar geriatric PCMH program in Eastern North Carolina incorporated case management, Telehealth and patient education in the care of populations 65 years and older, and found these patients had inpatient utilization reductions of up to 69% (Duke, 2005). Another program under the Blue Cross Blue Shield system used the PCMH model in the care of chronically ill patients and found that adults and children in this program experienced 12% and 23% lower odds of unnecessary hospitalizations (DeVries et al., 2012). However, once again these programs did not incorporate or acknowledge the value added by community connectedness.

The benefits of community connectedness have been documented through a variety of other programs, and point to the need to build a connection with the PCMH model of care. For example, research has shown that programs such as the Reach Out & Read program and Women, Infants and Children Program (WIC) have positive

association with addressing social determinants of health in pediatric patients, and suggests that these types of programs should be expanded to other community groups such as the elderly and incorporated in the PCMH model (Grag, Jack, & Zuckerman, 2013). Additionally a number of studies have been conducted that demonstrate the various physical and social barriers that contribute to the health status of inner city communities, such as: race, ethnicity, educational attainment, and socioeconomic status and that need to be incorporated into the PCMH model (Moore et al., 2010; Richardson & Norris, 2010). Other research point to the need for the PCMH model of primary care to consider the importance of neighborhood environments and the health status of inner city populations (Haines, Beggs, & Hurlbert, 2011; Yen, Michael, & Perdue, 2009).

Summary

In summary, it is evident in the literature that chronic diseases are a growing problem for our country, and a particular burden on our most vulnerable inner city communities. There exists a variety of behavioral, environmental, and psychosocial barriers that affect how people access and engage with the health care system. The literature also identified that these barriers are further exacerbated by social isolation or the lack of strong social support networks. The combination of these barriers and social isolation contribute to a growing chronically ill population and a greater burden on the healthcare system due to inappropriate use of emergency department and inpatient admission utilization. Early evidence exists which point to the value of redesigning the manner by which we deliver primary care. The PCMH model of primary care has

demonstrated preliminary evidence that it can be an effective model for the reduction of emergency department and inpatient admission utilization for ambulatory sensitive conditions. However, this model does little to address the need for greater patient connection to social support systems, and the need to eliminate social isolation among our vulnerable populations.

Conclusion

In conclusion, it is evident that the health care system cannot sustain the current burden of chronic disease, in terms of cost to the healthcare system and the health status of our vulnerable communities. Our inner city communities suffer a plethora of barriers and disadvantages that make chronic diseases more difficult to manage. The PCMH model of primary care offers a redesign of outpatient practice which shows early promise with chronically ill populations. The Wagner chronic care model and the value of placing the patient as the central focus of health care delivery heavily influence the PCMH model of primary care. The PCMH model also emphasizes the engagement of the patient as a part of the healthcare team, not just as bystanders in their health care. However, it falls short in addressing the role of social support systems, their contribution to better health, and the value of social support networks in increasing the ability of patients to self-manage their conditions.

Chapter 3 of this dissertation will review in detail the research design of this study, and the examination of a PCMH model on an inner city minority population in

New York City. This research design will also pay particular attention to an analysis of the need to incorporate community connectedness in the PCMH model of primary care.

Chapter 3: Research Method

Introduction

This study was an examination the Patient Centered Medical Homes (PCMH) model of primary care, with a specific focus on the role of social connectedness. The PCMH concept was developed, in part, from research conducted in 2004 around the primary care of the chronically ill (Carney et al., 2009; Strange et al., 2010). The PCMH concept was examined for its effectiveness as a model for the care of chronically ill patients. This research also tested for a relationship between social connectedness and utilization among chronically ill PCMH patients. This study examined potential gaps in the current PCMH model. Specifically, this research highlighted the need for the PCMH model of primary care to incorporate elements that address how primary care practitioners can assist their patients in connecting and strengthening their social support networks.

In this chapter, I review the research questions for this study and the underlying principles for selecting the research design. Within this chapter, the setting and sample sections provide a summary of the study population, research sample, a definition of the procedures used in selecting the sample, and an explanation of the selection of the sample size. This section also describes the procedures used by investigators in the Washington Heights/Inwood Informatics Infrastructure for Comparative Effectiveness Research (WICER) study to recruit subjects into their program. In this chapter, I will review the questionnaire used to collect variable data from the sample community. Under the data

section of this chapter, I also review the process used for mapping and merging the various questionnaire elements with patient clinical utilization data. This section also includes a review of the processes used to conduct data hygiene and ensure accuracy and reliability of the various data elements. Finally, this chapter reviews the process by which secondary access was obtained, secured and the process by which respondent data was protected.

Research Design and Rationale

In this study, I examined the effect of the PCMH model of primary care on emergency department and inpatient utilization, and also analyzed the relationships that exist between the PCMH model and social connectedness of subjects. This research will be conducted as a quasi-experimental quantitative research design. Specifically, this research study I employed a pre-post test design using a control and intervention group. The intervention group was represented by those patients who responded to the WICER questionnaire, and also report having a Primary Care Provider (PCP) in a certified PCMH. The control group was represented by those patients who responded to the WICER questionnaire and report not having a PCP and therefore no medical home.

In order to accomplish this research analysis, a secondary data set from an administered questionnaire was used to measure the social connectedness of the patients receiving care in PCMHs. This data was then compared with emergency department and inpatient utilization at the local hospital in the community. In order to complete this

analysis, this study examined four research questions about the PCMH model and social connectedness among an ambulatory patient population:

- RQ1 – Quantitative: What is the relationship between Patient Centered Medical Home model of primary care and Emergency Department visits?
- RQ2 – Quantitative: What is the relationship between Patient Centered Medical Home model of primary care and Inpatient admissions?
- RQ3 – Quantitative: What is the relationship between Patient Centered Medical Home patients with strong social connectedness and Emergency Department visits?
- RQ4 – Quantitative: What is the relationship between Patient Centered Medical Home patients with strong social connectedness and Inpatient admissions?

Setting and Sample

Population and Sampling Method

This study analysis will rely on a secondary data set collected by the Columbia University's Washington Heights/Inwood Informatics Infrastructure for Community-Centered Comparative Effectiveness Research (WICER) project through the Columbia University School of Biomedical Informatics. The WICER project was conducted by senior faculty of the Columbia University School of Biomedical Informatics. Funded by the Agency for Healthcare Research and Quality (AHRQ), WICER is a multidisciplinary research project to study the causes of disease and to compare the different methods of

preventing, diagnosing and treating health conditions (also known as comparative effectiveness research) through the use of a community-focused data infrastructure.

The WICER study was built upon the principles of community-based participatory research and with the goal of improving the health of the Washington Heights/Inwood community. The WIER study conducted face-to-face interviews with community residents and collected data on a variety of categories including demographic information, socioeconomic detail, and healthy lifestyle choices. Of particular interest to this study was the set of interview questions that focused on the patient's access to care, particularly their engagement in PCMHs, and a set of eight evidence-based questions that were adapted from the PROMIS questionnaire on Participation in Social Roles (PROMIS PSR). Within this study, the PROMIS PSR scores were be used to measure social connectedness in the study population. In total, the WICER study consented and surveyed 6,000 participants through a variety of sampling methodologies that are described in detail in a later section of this chapter. However, for the purposes of this study, approximately 1,100 of the 6,000 respondents agreed to release their information for other research, and could be matched through their hospital medical record numbers to emergency department and inpatient utilization. In addition, of those 1,100 respondents, a total of 706 subjects met all the inclusion criteria detailed in Table 1.

By administering longitudinal patient health surveys to the Washington Heights/Inwood community (zip codes: 10031, 10032, 10033, 10034, 10040), the WICER project developed a health registry of the Washington Heights/Inwood

community to establish a comprehensive understanding of the population. The participants were asked to answer survey questions which provide general information about where they are from, health-related behaviors, and their family's medical history. Data from the survey was matched with New York-Presbyterian Hospital's clinical information in order to add information on the patient's emergency department visits and inpatient admission utilization. Information from the health registry assisted researchers and organizations in developing better ways to provide health care and develop health programs for the Washington Heights/Inwood community. It also aids community residents in understanding their health, choices and what they can do to improve their quality of life.

Table 1

Study Inclusion and Exclusion Criteria

Inclusion	Exclusion
WICER study consent	
Hospital Medical Record Number	No Hospital Medical Record Number
English or Spanish speaking	Did not speak English or Spanish
At least 24 months of pre-and-post intervention	Less than 24 months of pre-and-post intervention
Complete PROMIS PSR data	Missing PROMIS PSR data
18 years or older	Under the age of 18

Sample Size

The sample for this research study is derived from a secondary dataset, the WICER study. Therefore, the sample size was limited to the participants of that study. In addition, the sample size of this study was limited by the inclusion and exclusion

criteria of the WICER study, and specifically for this study by the subjects who responded to the survey questions that measured social connectedness. The inclusion and exclusion criteria for this research are defined in Table 1. In consultation with the WICER study principal investigators it was determined that from the 1,100 Ambulatory Care Network patients who responded to the WICER survey, approximately 706 subjects met all the criteria detailed in Table 1 for inclusion in this study.

Procedures for Recruitment, Participation, and Data Collection

Setting

The WICER study was conducted in the Washington Heights/Inwood section of Northern Manhattan. This particular neighborhood is comprised of five zip codes (10031, 10032, 10033, 10034, and 10040) and has approximately 240,000 residents, of which approximately 84% are of minority descent (New York City Department of Health & Mental Hygiene, 2007). Subject data collected under this study was gathered from households, local businesses, community spaces, the Columbia-Community Partnership for Health, and the Ambulatory Care Network of NewYork-Presbyterian Hospital.

Recruitment Procedures

The WICER study used a variety of recruitment procedures and strategies to identify and consent eligible subjects. In total, the WICER study data set was approximately 4,070 subjects, made up of various smaller sample sets. For example, the research team used convenience sample methodologies to recruit community residents who engaged in health care services and screenings at the Columbia-Community

Partnership for Health and the Ambulatory Care Network clinic sites of New York-Presbyterian. Household surveys used three methodologies to recruit participants into the WICER study including randomization of community household dwellings, cluster sampling, and network sampling. For example, there are approximately 68,000 resident units in the zip codes covered by the WICER study, of which approximately 70% received their health care from the New York-Presbyterian Hospital/Columbia University Medical Center. The WICER study research team randomized and weighed these units by geographic region, in order to identify a sample distribution across the catchment area that could be targeted for recruitment. Upon consenting a subject household, the research team would then employ a clustering methodology to recruit up to five neighboring household subjects in or around the consented subject's residence. Finally, the research team also used network sampling methodologies that would allow consented subjects, who completed the survey, to refer friends or family members that might also want to participate in the study.

Survey Procedures

The WICER study employed a staff of survey interviewers that were trained on the survey protocols and interviewing techniques. All subjects were given and explained the consent information in either English or Spanish, depending on the subject's preference, before being engaged in any survey questions. In addition, informed consent was secured from all subjects prior to conducting the survey interviews. Besides the survey questionnaire, research staff also collected information on the subject's blood

pressure, height, weight, and waist measurement. The total time to completion of the survey per participant was between 45 minutes to one hour.

Participant Compensation. All subject of the WICER study that completed the survey interview were given a choice of three compensation incentives, each choice had a monetary equivalent of \$25 dollars: (a) two movie tickets, (b) a subway metro card, or (c) a food voucher that could be used at a local grocery store in the Washington Heights/Inwood neighborhood.

Data Validity

The principal investigators of the WICER study utilized a variety of tools to control for both internal and external threats to data validity. Data from interview surveys were entered into a web-based data management tool, Lime Survey (<http://limesurvey.org>). This management software allowed for the survey data that was collected to be password protected and accessible only to the research team. All hard copies of survey results were then stored in a locked cabinet in a locked office and were also only accessible to approved members of the WICER research team. The research team took necessary steps to clean the entire data set of duplicate entries by matching personal information, dates of birth and address. In order to further strengthen the validity of the survey data, the research team analyzed the data set for invalid, out of range and logically inconsistent data elements. After these elements had been identified, the research team compared the data with the hard copies of respondent interviews and corrected the errors in the data set manually. Finally, the clean data set was imported into

REDCap (<http://www.project-redcap.org/>), a secure web-based system designed to store and support survey data for research studies.

Data Access Procedures

In order to access the WICER data set, researchers must petition the WICER governance team with the proposed study premise and hypothesis. Once approved the newly accepted researcher is required to complete all the Columbia University Medical Center IRB training, and must be added to the existing WICER IRB. This process begins the relationship between the researcher and the WICER team and provides access to the data set codebook. However, full access to the survey data was not provided until I received full approval from the Walden University and the Columbia University Medical Center review boards. Upon defense of this dissertation proposal, and successful completion of all required paperwork I received formal approval from the Walden University IRB. This study received Walden University IRB approval on April 7, 2016, IRB approval number 04-07-16-0194370. Following the IRB approval, a formal communication was provided to the WICER study governance board in order to obtain formal IRB approval from Columbia University Medical Center and gain full access to the data set for analysis in Chapter four of this study.

Study Variables

The two dependent variables of interest in this study, emergency department and inpatient admission utilization, were selected in order to examine the efficacy of the PCMH model of primary care among chronically ill patients. In addition, this study was

interested in examining the relationship between the social connectedness of patients who are in PCMHs and their emergency department and inpatient utilization. Table 2 lists the dependent and independent variable selected for analysis in this study. These variables were selected to test the hypotheses in this study based on a review of research literature and their availability in the WICER study and medical record data.

Emergency Department Utilization

In this research study, emergency department utilization was used as a dependent variable. This variable was used to measure the efficacy of the PCMH model. This study focused on the PCMH model as a way for patients with chronic conditions, which often can be better managed through an ambulatory care setting, to engage primary care and better manage their disease (Bodenheimer, Lorig, Holman, & Grumbach, 2002; Bodenheimer, Wagner, & Grumbach, 2002; Buesching et al., 1985; Committee on the Future of Emergency Care in the United States Health System, 2007; Falik, Needleman, Wells, & Korb, 2001; Northington, Brice, & Zou, 2005; Owens et al., 2010; Shi, Samuels, Pease, Bailey, & Corley, 1999). Data on emergency department utilization was collected for all patients who responded to the WICER survey by matching the respondent's medical record number against the WICER data set.

Inpatient Admission Utilization

Similar to the emergency department variable, the inpatient admission utilization variable was the second dependent variable in this study, and was used to measure the effectiveness of the PCMH model on patients with chronic conditions. In this study the

inpatient admission utilization variable will is used to measure inappropriate hospital care for conditions that could be self-managed and dealt within an ambulatory setting by primary care providers (Berg, Bonnelly, Miller, Medina, & Warnick, 2012; Harrison, Pope, Boberley, & Rula, 2012; Simon et al., 2010). Data on inpatient admission utilization was collected for all patients who responded to the WICER survey by matching the respondent's medical record number against the WICER data set.

Patient Centered Medical Home

The PCMH is a redesigned model of primary care that emphasizes patient-centeredness, care management and coordination across the continuum of care (Reid et al., 2009). Within this research study this element was selected as an independent variable and was coded within the data set as a Yes or No response. This variable will be used to separate the study population into two groups: those subjects with a PCMH and subjects without a medical home. The emergency department and inpatient admission utilization was then compiled on both populations in order to examine the correlations that exist between engagement in PCMH practices and utilization.

Social Connectedness

Within this study, the social connectedness variable was selected as an independent variable that in this study was used to measure the social relationships of the subject population. The social relationship measure is composed of three main elements: the quality of the social support network, the quantity social support, and the measurement of the patient's social isolation (Hahn et al., 2010). For the purposes of this

study, the social connectedness variable was a measurement of social isolation and used to define the social support network of the subject population (Barger, 2013; Cornwell & Waite, 2009).

This data variable was collected from the WICER study in the form of a set of eight questions derived from the PROMIS psychometric instrument. This instrument was a general tool that was not specific to any particular disease or condition (National Institutes of Health, 2014). This study utilized the PROMIS Participation in Social Roles (PSR) short-form eight questions to measure the respondent's participation in social relationships. The WICER interviews asked subjects a series of eight questions:

1. I am satisfied with how much work I can do (include work at home).
2. I am satisfied with my ability to work (include work at home).
3. I am satisfied with my ability to do regular personal and household responsibilities.
4. I am satisfied with my ability to perform my daily routines.
5. I am satisfied with my ability to meet the needs of those who depend on me.
6. I am satisfied with my ability to do household chores/tasks.
7. I am satisfied with my ability to do things for my family.
8. I am satisfied with the amount of time I spend performing my daily routines.

Responses from interview subjects were recorded in one of seven categories: Not at all; A Little Bit; Somewhat; Quite a bit; Very much; Don't know; or Refused. These responses were then translated on a Likert scale where a score of 5 was considered very good, and a score of 1 was given for responses of not at all. Based on the PROMIS PSR methodology, scores from the surveys were entered into a computer scoring system that converted the questionnaire scores into a T-score for each participant that range between 26.9 and 66.1 (Bjomer, Kosinski, & Ware, 2005; DeWalt, et. al., 2007; Lai, Cella, Change, Bode, & Heinemann, 2003; Revicki & Cella, 1997; Wainer & Mislevy, 2000). The range of the score represent the strength of the respondent's participation in the social network; therefore, the higher the PROMIS T-score, the stronger the social relationship network. The figure below represents the T-score conversion tables for each of the PROMIS PSR short forms (four, six, and eight), and the PROMIS PSR test for reliability which has been shown to represent a Cronbach's Alpha of 0.90 (PROMIS Network Center, 2011).

Satisfaction with Participation in Social Roles 4a
Short Form Conversion Table

Raw Score	T-score	SE*
4	29.0	4.2
5	33.6	2.5
6	35.7	2.2
7	37.3	2.1
8	38.8	2.1
9	40.3	2.1
10	41.7	2.1
11	43.2	2.1
12	44.8	2.1
13	46.4	2.1
14	48.1	2.1
15	49.8	2.2
16	51.6	2.2
17	53.5	2.2
18	55.6	2.3
19	58.1	2.7
20	64.1	5.1

*SE = Standard Error

Satisfaction with Participation in Social Roles 6a
Short Form Conversion Table

Raw Score	T-score	SE*
6	27.8	4.1
7	32.0	2.5
8	33.8	2.1
9	35.2	1.9
10	36.4	1.9
11	37.5	1.8
12	38.5	1.8
13	39.5	1.8
14	40.5	1.8
15	41.5	1.8
16	42.5	1.8
17	43.6	1.8
18	44.6	1.8
19	45.7	1.8
20	46.8	1.9
21	48.0	1.9
22	49.2	1.9
23	50.4	1.9
24	51.7	1.9
25	53.0	1.9
26	54.3	1.9
27	55.8	2.0
28	57.4	2.2
29	59.6	2.7
30	65.0	5.0

*SE = Standard Error

Satisfaction with Participation in Social Roles 8a
Short Form Conversion Table

Raw Score	T-score	SE*
8	26.9	4.1
9	30.6	2.5
10	32.5	2.1
11	33.8	1.9
12	34.9	1.8
13	35.8	1.7
14	36.7	1.7
15	37.5	1.6
16	38.3	1.6
17	39.1	1.6
18	39.9	1.6
19	40.6	1.6
20	41.4	1.6
21	42.2	1.7
22	43.0	1.7
23	43.9	1.7
24	44.7	1.7
25	45.5	1.7
26	46.4	1.7
27	47.3	1.7
28	48.2	1.7
29	49.1	1.7
30	50.0	1.7
31	51.0	1.7
32	52.0	1.7
33	53.0	1.7
34	54.0	1.7
35	55.1	1.7
36	56.2	1.8
37	57.4	1.9
38	58.9	2.2
39	61.0	2.7
40	66.1	4.9

*SE = Standard Error

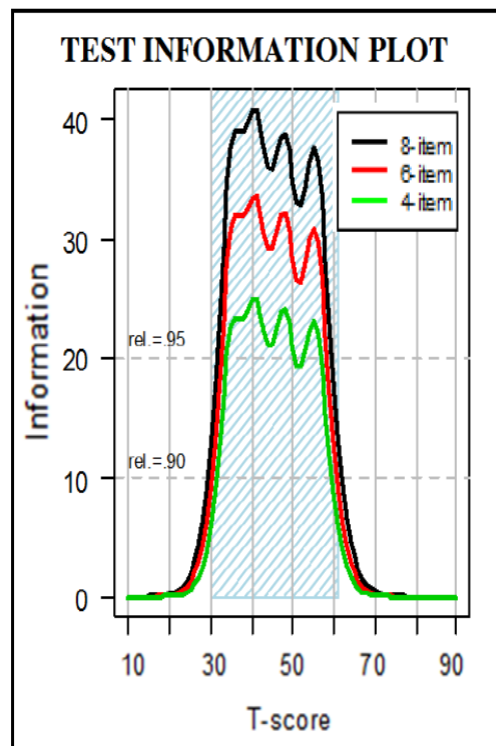


Figure 4. PROMIS - participation in social roles scoring and reliability

Table 2

Study Variables

<i>Variable Type</i>	<i>Variable Name</i>	<i>Level of Measurement</i>	<i>Potential Response</i>	<i>Variable Data Source</i>	
				<i>WICER Survey</i>	<i>Medical Record</i>
<i>Dependent</i>	<i>ED Utilization</i>	<i>Nominal</i>	<i>Calculated extraction from medical record</i>		<i>X</i>
<i>Dependent</i>	<i>IP Utilization</i>	<i>Nominal</i>	<i>Calculated extraction from medical record</i>		<i>X</i>
<i>Independent</i>	<i>PCMH</i>	<i>Nominal</i>	<i>Yes/No</i>	<i>X</i>	
<i>Independent</i>	<i>Social Connectedness</i>	<i>Ordinal</i>	<i>Not at all/A Little Bit/Somewhat/Quite a bit/ Very much/Don't know/Refused</i>	<i>X</i>	

Data Analysis Plan

In this study, I examined two overarching aims, each with two research questions. The first aim of this study was to determine the effect of the PCMH model of primary care on emergency department visits and inpatient admissions. The second aim of this study was to measure the effect of social connectedness, within patients engaged in the PCMH on emergency department visits and inpatient admissions. As described in the previous section of this chapter, this study utilized a secondary data source from the Columbia University Washington Heights/Inwood Informatics Infrastructure for Comparative Effectiveness Research (WICER) study. As part of this analysis, data was cleaned up by the WICER study staff prior to analysis. Given the potential limitations with the use of secondary data, particular attention was placed on limiting data miscoding and to remove missing data entries (Frankfor-Nachmias & Nachmias, 2008; Thygesen & Ersboll, 2014). Upon completion of data hygiene, the WICER study released a complete data set, and it was stored in a secure network hard drive. The data for this study was analyzed using the Statistical Package for Social Science (SPSS) 22.0 computer software program.

Research Question and Hypotheses

The following research questions were designed to test the hypotheses that engagement in the PCMH model of primary care was a more effective model for driving down emergency department and inpatient utilization. In addition, the latter sets of questions were designed to test the effect of social connectedness on emergency department and inpatient admission utilization.

Research Question 1: What is the relationship between PCMH and Emergency Department visits?

H_01 : Engagement in a PCMH does not impact the patient's use of Emergency Department visits for ambulatory sensitive conditions.

H_11 : Engagement in a Patient PCMH does impact the patient's use of Emergency Department visits for ambulatory sensitive conditions.

Research Question 2: What is the relationship between PCMH and Inpatient admissions?

H_02 : Engagement in a PCMH does not impact the patient's use of Inpatient admissions for ambulatory sensitive conditions.

H_12 : Engagement in a PCMH does impact the patient's use of Inpatient admissions for ambulatory sensitive conditions.

Research Question 3: What is the relationship between PCMH patients with strong social connectedness and Emergency Department visits?

H_03 : Patients who are engaged in PCMH practices, and have strong social connectedness, do not show the reduced utilization of Emergency Department visits.

H_13 : Patients who are engaged in PCMH practices, and have strong social connectedness, do show the reduced utilization of Emergency Department visits.

Research Question 4: What is the relationship between PCMH patients with strong social connectedness and Inpatient admissions?

H_04 : Patients who are engaged in PCMH practices, and have strong social connectedness, do not show the reduced utilization of Inpatient admissions.

H₁₄: Patients who are engaged in PCMH practices, and have strong social connectedness, do show the reduced utilization of Inpatient admissions.

Visual Interpretation of Data

A variety of steps were taken before the final data set for this research study were analyzed. To begin the WICER study data was stratified, and the respondents who met the inclusion criteria for the study were pooled. Once the WICER data was identified, including the PROMIS PRS data, respondents were matched via an algorithm with the hospital electronic medical records in order to identify 24 months of emergency department visits and inpatient admissions. All completed data was then de-identified and entered into a database for statistical analysis against the research questions in this study. A visual representation of these steps can be found in Figure 5 below.

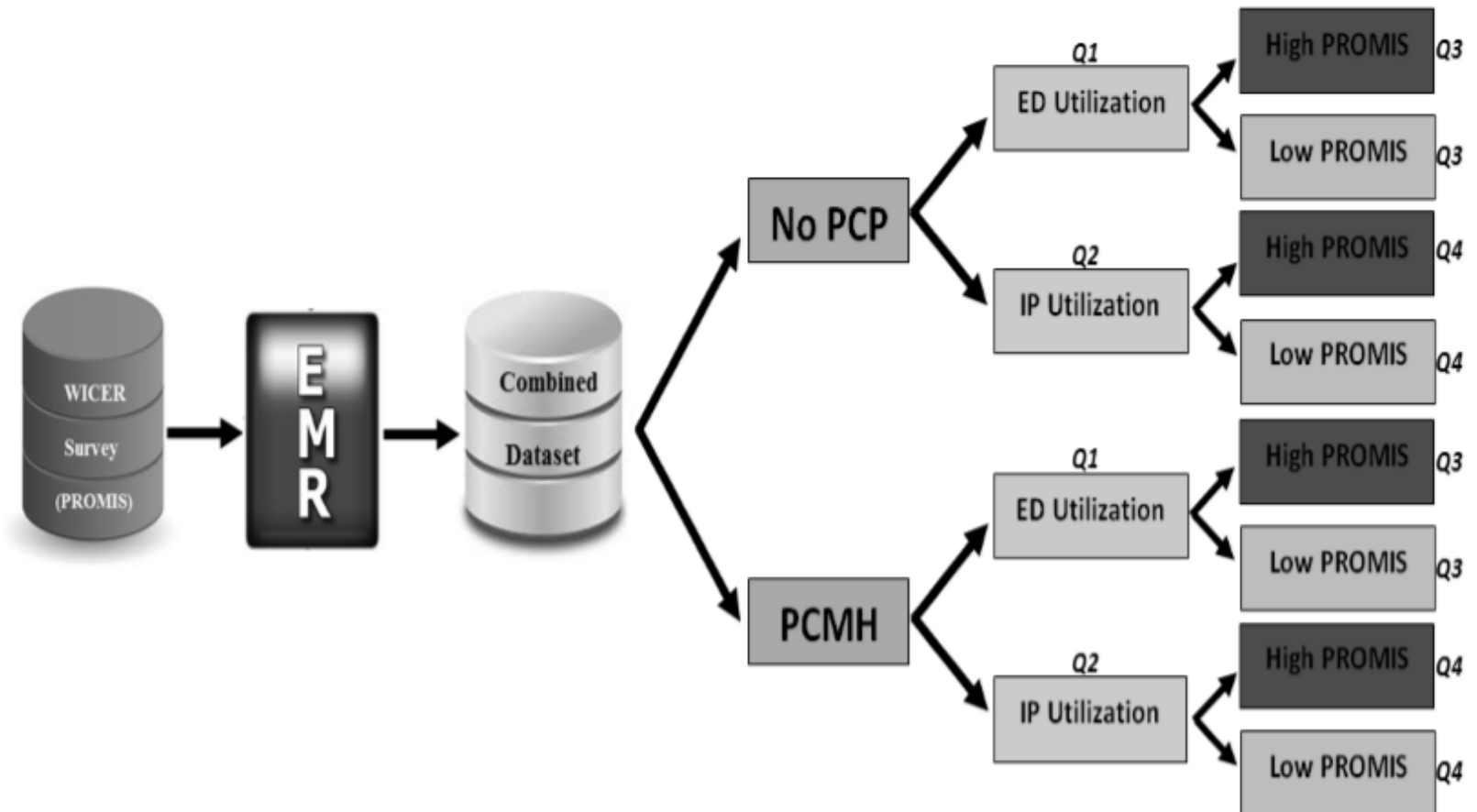


Figure 5. Survey data visualization

Statistical Analysis

Data analysis in this study was conducted using SPSS 22.0 statistical software package. All variables described in this chapter were examined for frequency and distribution. In addition, the basic statistical analysis was be conducted on all variables, including calculation of mean, standard deviation, frequency distribution, and range. The significance level for all statistical analysis was set at an alpha level of 0.05 and applied to all variables in order to control for testing multiple hypotheses.

In order to test the first two sets of hypotheses of this study, the effect of the PCMH engagement on Emergency Department visits and Inpatient admission, I employed the unpaired two-sample *t*-test statistical methodology. Using this analysis method, I examined emergency department and inpatient admission utilization for the two groups of subjects, those who report not having a primary care provider and those who report being engaged in a PCMH. The formula used in this analysis was:

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\left(\frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{(n_1 - 1) + (n_2 - 1)} \right) \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}}$$

Through this analysis, I tested the null hypothesis that the two populations have equal emergency department and inpatient admission utilization means.

The last two research questions of this study examined the concept of social connectedness in the PCMH population and their utilization of both emergency department visits and inpatient admissions. In conducting this analysis, a linear regression technique was used to compare PCMH population's PROMIS PSR scores

against their emergency department and inpatient admission utilization. For the purposes of this analysis the following formula for linear regression was used:

$$Y = a + X\beta$$

Within this analysis, Y represented our dependent variable, either emergency department visits or inpatient admission. The independent variable, social connectedness, was represented by X . The slope of our linear model was represented by β , and a represents the value of X equal to 0.

Threats to Validity

This study analysis used a secondary data source of participants who responded to the WICER PROMIS survey questions and placed subjects in the two groups based on their having a primary care provider. A variety of threats to internal validity were diminished due to the nature of this research study design. For example, the two study groups were selected from the same community, not based on extreme scores on the PROMIS survey or variances in emergency department or inpatient admission utilization. This selection of groups has diminished the risk of statistical regression. All subjects in this data set responded to the WICER survey and all received the same compensation options. This eliminated the potential for compensatory rivalry or resentful demoralization threats to internal validity. Therefore, this construction eliminated the potential for design contamination, because there was no way the subjects would have known if they were part of the control or experimental group.

Only two potential threats to internal validity were identified for this research study. The first potential threat to internal validity were the threat of history. This type

of threat is the result of events that may occur during the period of study that may unduly influence the outcomes of an experiment (Creswell, 2009, p. 163). However, this potential threat to this study was controlled by the fact the two groups of recruited subjects came from the same community. Therefore, both groups would have been exposed to the same external events that may have an influence on emergency department and inpatient admission utilization. The second potential threat to the internal validity of this study was one that involved selection. The internal validity threat of selection involves the selection of participants into control or experimental groups with certain characteristics that predispose them to the desired research outcomes (Creswell, 2009, p. 163). Within this study subjects were selected from the two comparison groups based on their care within (or without) a PCMH, and their emergency department and inpatient admission utilization are being tested; therefore, the threat for selection was not controlled for in this study.

The use of secondary data in this study eliminated a variety of external validity threats. For example, when subjects responded to the WICER PROMIS survey questions, they were not aware of this research study or clues that would lead them to respond to the survey questions in a manner that would have an influence on this study. Therefore, this study is not subject to interaction effect of testing or reactive effects of experimental arrangements. However, one potential external threat to the validity of this study involved the setting of the study. The threat of external validity described as the interaction of setting is defined as a threat for the researchers to generalize their results because of the specific characteristics of the setting of the research (Creswell, 2009, p.

165). The setting and participants of this study came from an inner city environment and from a community that largely utilizes services among academic medical centers. Therefore, the results of this dissertation may not be generalizable to rural environments or patients who receive their care from small practice providers.

Ethical Considerations

As stated in a previous section of this chapter, this research study utilized a secondary data set from the WICER study conducted out of Columbia University. The WICER household study and protocols received institutional review board approval from Columbia University Medical Center. In addition, all WICER study participants were provided informed consent in with English or Spanish by trained bilingual staff prior to engagement in the data collection process. To further protect the rights of participants, this study was submitted to the IRB of Walden University and Columbia University Medical Center for review and approval prior to gaining access to the data.

The complete study data set was then be de-identified and entered into a database for statistical analysis against the research questions in this study. To enhance the protection of research subjects all data was stored on an encrypted network drive. Access to the encrypted data set was limited to the dissertation candidate; however, access can be granted to members of the dissertation committee, Walden University, and Columbia University personnel upon request. Upon completion of this research study, and in compliance with Walden University and Columbia University IRB policy, the data set will be destroyed.

Summary

As the Affordable Care Act gains more acceptance and the medical community begins to place greater attention on the delivery of primary care and preventative medicine. The leading model for this new delivery of care is the PCMH model of ambulatory care; however, there still exists a great deal of debate on the efficacy of this model and its effect on utilization. Therefore, the research questions found in this study could provide important insight into the role of the PCMH model of patient care. Furthermore, the research questions that examined the role of social connectedness of patients may highlight additional potential gaps in the PCMH model of primary care, and the need for primary care to find ways of helping patients create and cultivate stronger support networks.

The quantitative design of this study and the statistical examination described in this chapter aimed to test for the relationships that exist in between the PCMH model and utilization model around the importance of social support networks. This chapter provided the detailed methodology for this quantitative secondary data analysis. Steps were taken to protect the data, including analysis of unidentifiable coded hospital data. Upon approval by the Walden University IRB, this proposal was submitted to Columbia University Medical Center's review board for review approval. Data access was requested, and analyses began once approval by Columbia University Medical Center is received.

Chapter 4: Results

Introduction

The purpose of this research study was to conduct a quantitative examination of the Patient Centered Medical Homes (PCMH) model of primary care, with a specific focus on the role of social connectedness. In conducting this research, four hypotheses were tested. The first set of research questions were used to examine if the PCMH model of primary care helps to reduce emergency department visits and inpatient admissions among chronically ill populations. The second set of research questions were used to further examine the role of social connectedness in the PCMH and its role in the reduction of emergency department visits and inpatient admissions. In this chapter, I will provide the results of the analyses outlined in Chapter 3, including but not limited to a description of the study population, descriptive statistics, and the results of the various statistical tests used to examine the four hypotheses questions.

Data Collection

Sample Demographics

The study participants for this research were identified from a secondary data source, the Columbia University's Washington Heights/Inwood Informatics Infrastructure for Community-Centered Comparative Effectiveness Research (WICER) study. Over the course of three years, the WICER study was used to survey and gain the consent of 6,000 community residents, of which approximately 1,100 respondents also agreed to release their medical record information. However, only 716 of the 1,100 residents met all the inclusion and exclusion criteria outlined in Chapter 3 of the proposed

study. The study participants for this study were a representative sample of the larger Washington Heights community, except that female respondents more heavily sampled the study, 106 (15%) were males and 610 (85%) were females. Tables 3 and 4 below provide summaries of the demographic characteristics of the Intervention and Control study populations.

Table 3

Demographic Characteristics of Intervention Sample (N=485)

Characteristics	N	%
Age Bracket		
18-30	88	18.2
31-40	69	14.3
41-50	73	15.1
51-60	119	24.6
61-70	95	19.6
71-80	32	6.4
81-90	8	1.7
90+	1	0.2
Ethnicity		
White	19	3.9
Black or African American	15	3.1
Asian or Pacific Islander	0	0.0
American Indian or Alaska Native	2	0.4
Hispanic	384	79.2
Other Race	7	1.4
Don't Know	47	9.7
Refused	11	2.3
Education		
Never went to school	2	0.4
Eighth grade or less	148	30.5
Some High School, not a High School graduate	77	15.9
High School graduate or GED	110	22.7
Some college or technical, trade or vocational school	68	14.0
Associates degree	29	6.0
Bachelors degree	47	9.7
Masters degree	1	0.2
Doctoral degree	0	0.0
Don't know	1	0.2
Refused	2	0.4

Table 4

Demographic Characteristics of Control Sample (N=231)

Characteristics	N	%
Age Bracket		
18-30	47	20.3
31-40	43	18.6
41-50	26	11.3
51-60	52	22.5
61-70	40	17.3
71-80	19	8.2
81-90	4	1.7
90+	0	0.0
Ethnicity		
White	9	3.9
Black or African American	14	6.1
Asian or Pacific Islander	0	0.0
American Indian or Alaska Native	1	0.4
Hispanic	166	71.9
Other Race	6	2.6
Don't Know	24	10.4
Refused	11	4.8
Education		
Never went to school	7	3.0
Eighth grade or less	74	32.0
Some High School, not a High School graduate	38	16.5
High School graduate or GED	55	23.8
Some college or technical, trade or vocational school	22	9.5
Associates degree	13	5.6
Bachelors degree	20	8.7
Masters degree	1	0.4
Doctoral degree	0	0.0
Don't know	0	0.0
Refused	1	0.4

The majority (56.6%) of the study respondents were between the ages of 41 and 70 years. The age distribution was equally distributed among the following age brackets: 41-50 (13.8%), 51-60 (23.9%), and 61-70 (18.9%). Respondents above the age of seventy represented a small percentage of the study population (8.8%). Similar to the larger community, the study sample was predominantly of Hispanic descent, representing

approximately 76.8% of the total participant population. Finally, it is also important to note that the study population was poorly educated. The vast majority of the population, 71.5%, reported having a high school diploma/GED or less, and just under half of that population, 31.3%, report having an eighth grade education or less. The demographic characteristics outlined in the tables above are of particular interest because research has shown that demographic variables such as age, ethnicity, and education attainment can affect how people utilize the health care system (Kerr et al., 2014). Therefore, part of this investigation also examined the effect of these demographic characteristics on the two study cohorts and their emergency department and inpatient utilization.

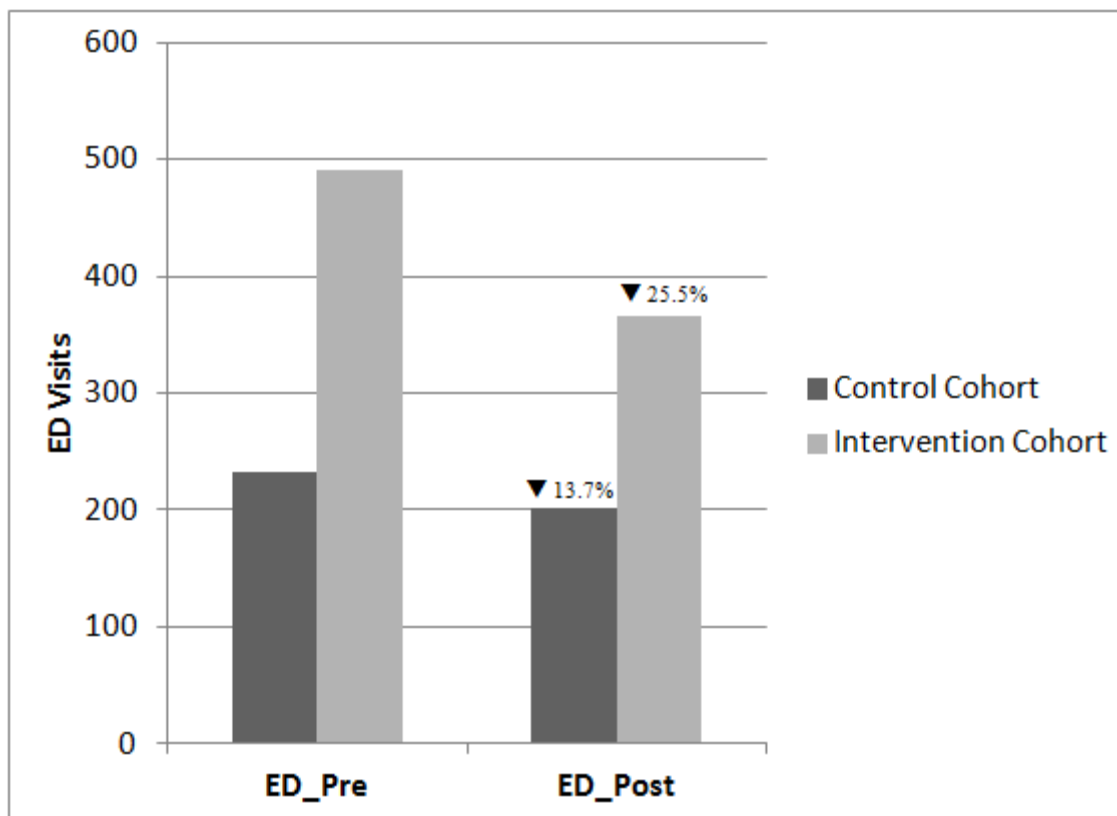
Results

Hypothesis 1

The first hypothesis under investigation in this study tested that engagement in a PCMH impacts a patient's use of emergency department visits for ambulatory sensitive conditions. Specifically under investigation was the null hypothesis that engagement in a PCMH does not impact the patient's use of emergency department visits for ambulatory sensitive conditions. The alternate hypothesis was that engagement in a PCMH does impact the patient's use of emergency department visits for ambulatory sensitive conditions. In order to analyze this hypothesis, emergency department utilization was compared between the control and intervention cohorts in the study population.

According to the data collected in the WICER study, the control cohort experienced 233 emergency department visits in the pre-intervention period and 201 visits in the post-intervention period. This represents a reduction in emergency department visits of

13.7%. The intervention cohort had 490 emergency department visits in the pre-intervention period and 365 visits in the post-intervention period. This represents a reduction in emergency department visits of 25.5%.



*Control Cohort p -value = 0.243; Intervention Cohort p -value = 0.001.

Figure 6. Emergency department utilization comparison ($N = 716$)

Table 5

Emergency Department Utilization Sample T-Test Comparison (N = 716)

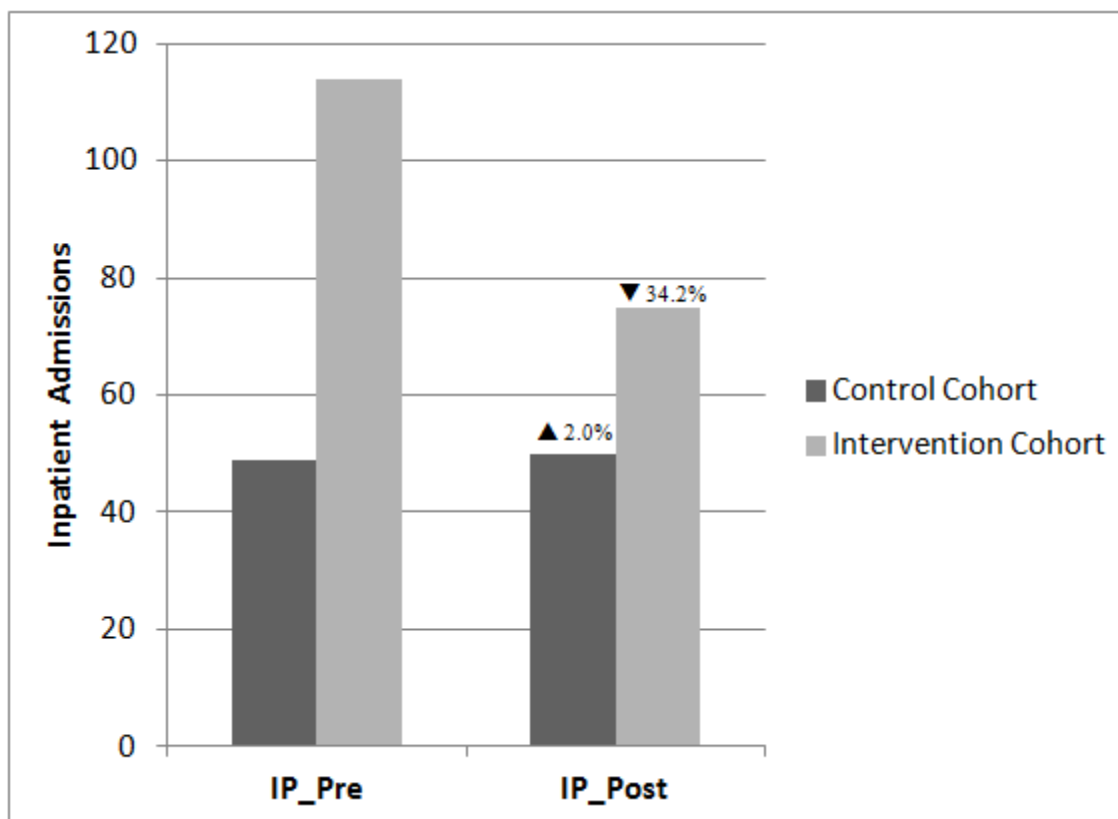
	Paired Differences		St. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-Tailed)
	Mean	Std. Deviation		Lower	Upper			
Control								
ED_Pre-ED_Post	.14	1.80	.12	-.10	.37	1.17	230	.243
Intervention								
ED_Pre-ED_Post	.26	1.70	.08	.11	.41	3.35	484	.001

To test this hypothesis, a sample *t* test was used to compare the mean difference in emergency department visit reduction between the control and intervention cohorts. The results of this analysis showed that the control cohort had a mean emergency department visits 1.01 visits per subject in the pre-intervention period, and mean emergency department visits of 0.87 visits per subject in the post-intervention period. Utilizing the *t*-test statistical methodology this represents a mean difference of 0.139 visits in the control cohort between the pre- and post-intervention periods (CI: -0.95 – 0.372; *p* value: 0.243). However, similar analyses showed that the intervention cohort had mean emergency department visits of 1.01 per subject in the pre-intervention period, and mean emergency department visits of 0.75 per subject in the post-intervention period. The *t*-test statistical methodology for the intervention cohort demonstrated a mean difference of 0.258 visits in the intervention cohort between the pre- and post-intervention periods (CI: 0.106 – 0.409; *p*-value: 0.001). Based on the results of this analysis the null hypothesis was rejected, and the data demonstrated that engagement in a PCMH results in a reduction in

emergency department visits. Values for the sample *t*-test on emergency department visits are represented in Table 5.

Hypothesis 2

The second hypothesis tested whether engagement in a PCMH has an effect on a patient's use of inpatient admissions for ambulatory sensitive conditions. Specifically under investigation was the null hypothesis that engagement in a PCMH does not impact the patient's use of inpatient admissions for ambulatory sensitive conditions. The alternate hypothesis was that engagement in a PCMH does impact the patient's use of inpatient admissions for ambulatory sensitive conditions. In order to analyze this hypothesis, inpatient utilization was compared between the control and intervention cohorts in the study population. According to the data collected in the WICER study, the control cohort experienced 49 inpatient admissions in the pre-intervention period and 50 visits in the post-intervention period. This represents an increase in inpatient admissions of 2.0%. The intervention cohort had 114 inpatient admissions in the pre-intervention period and 75 admissions in the post-intervention period. This represents a reduction in inpatient admissions of 34.2%.



*Control Cohort p-value = 0.935; Intervention Cohort p-value = 0.003.

Figure 7. Inpatient admission utilization comparison (N = 716).

Table 6

Inpatient Admission Utilization Sample T-Test Comparison (N=716)

	Paired Differences		St. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-Tailed)
	Mean	Std. Deviation		Lower	Upper			
Control								
IP_Pre-IP_Post	-.00	.81	.05	-.11	.10	-.08	230	.935
Intervention								
IP_Pre-IP_Post	.08	.60	.03	.03	.13	2.94	484	.003

To test this hypothesis, a sample *t*-test was used to compare the mean difference in inpatient admission reduction between the control and intervention cohorts. The results of this analysis showed that the control cohort had a mean inpatient admission 0.21 per subject in the pre-intervention period, and mean inpatient admissions of 0.22 admissions per subject in the post-intervention period. Utilizing the *t*-test statistical methodology this represents a mean difference of -0.004 admissions in the control cohort between the pre- and post-intervention periods (*CI*: -0.109 – 0.100; *p-value*: 0.935). However, similar analyses showed that the Intervention cohort had mean IP admissions of 0.24 per subject in the pre-intervention period, and mean Inpatient admissions of 0.15 per subject in the post-intervention period. The *t*-test statistical methodology for the intervention cohort demonstrated a mean difference of 0.080 admissions in the intervention cohort between the pre- and post-intervention periods (*CI*: 0.027 – 0.134; *p-value*: 0.003). Based on the results of this analysis the null hypothesis was rejected, and the data demonstrated that engagement in a PCMH results in a reduction in inpatient admissions. Values for the sample *t*-test on inpatient admissions are represented in Table 6.

Hypothesis 3

The third hypothesis in this dissertation was used to explore the role of social connectedness, through the use of the PROMIS Social scale, to predict the emergency department utilization patterns of participants with high levels of social connection as compared to those who have medium or low levels. Specifically under investigation was the null hypothesis that patients who are engaged in PCMH practices, and have strong

social connectedness, do not show reduced utilization of emergency department visits.

The alternate hypothesis was that patients who are engaged in PCMH practices, and have strong social connectedness, do show reduced utilization of emergency department visits.

Under this analysis, the PROMIS scores, which can range between 26.9 through 66.1,

were divided into three categories: High (66.1 – 51), Medium (50 – 42.2), and Low (41.4 – 26.9). An examination of the utilization patterns between the three social

connectedness categories demonstrated that the highest reduction in emergency

department visits was found among the subjects that had High PROMIS scores, 35.0%, as

compared to those participants with Medium or Low PROMIS scores. These groups

showed a reduction of 24.3% and an increase in emergency department visits of 11.7%

respectively.

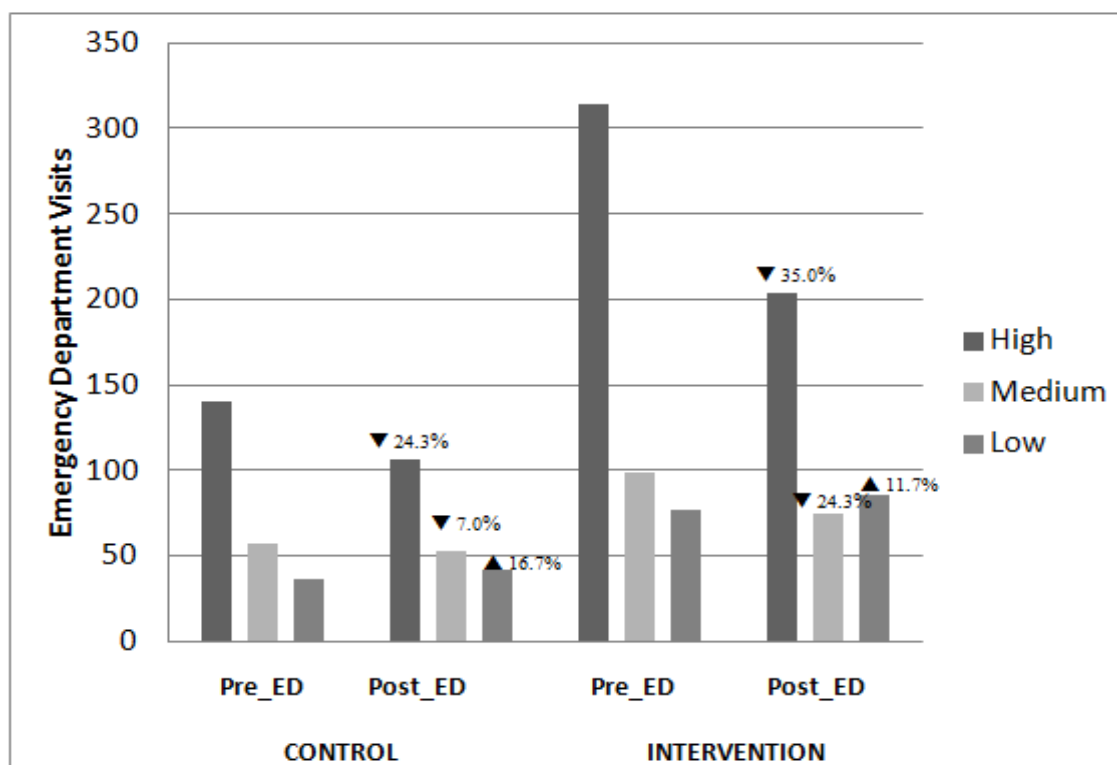


Figure 8. Emergency department utilization by social connectedness category ($N = 716$).

Table 7

Linear Regression Analysis Predicting ED visits from the PROMIS_Social_T score

Variable	B	Std. Error	β
PROMIS_Social_T	-0.03	.01	-0.12

Note. $R^2 = .014$ ($p = 0.001$); Adjusted $R^2 = .013$ ($p = 0.001$)

In order to examine the relationships between social connectedness and emergency department visits I utilized a linear regression methodology. Under this analysis, the regression model demonstrated a statistically significant predictability. The

analysis indicated that the subject's PROMIS score could be used to predict the emergency department utilization of chronically ill patients. The analysis demonstrated that regression was statistically significant. However, this analysis also showed that the PROMIS score only contributed to 1.4% of the variance in emergency department visits, $R^2=.014$, $F(1, 714) = 10.194$, $p = .001$. The strength of social connectedness, as measured through the PROMIS scale, significantly predicted the emergency department utilization of patients within this research study, $\beta = -0.119$, $t(714) = -3.193$, $p = .001$. Values for the linear regression analysis predicting emergency department visits from the PROMIS_Social scale are presented in Table 7 above.

Despite the small contribution of the PROMIS score to the variance in emergency department visits for the cohorts, these findings are still important to this field of study. These findings are smaller when compared to the contributions that the PCMH model have on emergency department utilization, which is largely concentrated on changes to the staffing, organizational structure and health information infrastructure of primary care sites. However, the incremental value added by the PROMIS score findings do support the theoretical model of collective efficacy; that addresses the value of social networks in supporting patient's suffering from chronic conditions and social isolation. Furthermore, these findings highlight the fact that there does exist a value contribution, small as it may be, in considering the role of social connectedness in the PCMH model on emergency department utilization.

In this analysis, the Beta coefficient (-0.119) indicated that there exists an inverse relationship between the level a subject's social connectedness and their use of the

emergency department. For example survey respondents who scored higher on the PROMIS scale, indicating that they had strong social connectedness, also reported lower use of the emergency department. The results of this regression analysis rejected the third null hypothesis of this study that PCMH patients with strong social connectedness do not have reduced utilization of emergency department visits. These findings are consistent with current literature that found that patients who lack social support system have an increased risk of adverse health outcomes and suffer from greater rates of mortality (Step tow, Shankar, Demakakos, & Wardle, 2013; Yan, McClintock, Kozloski, & Li, 2013).

Table 8

Multiple regression analysis predicting emergency department visits from the PROMIS_Social_T score, gender, age

Variable	B	Std. Error	β	<i>p</i>
PROMIS_Social_T	-0.04	0.11	-0.12	0.001
Gender	-0.69	0.29	-0.09	0.017
Age	-0.01	0.01	-0.08	0.026

Note. $F(3,712) = 6.668, p < .00005 R^2 = 0.027 (p < .00005)$; Adjusted $R^2 = 0.023 (p < .0005)$

It is important to note that there were a variety of factors that can affect the health outcomes of individuals. Research has demonstrated that factors such as age, gender, education, and socioeconomic status can all affect not only how people access the health care system but also their health status (Murray, 2013; Stewart, Chipperfield, Perry, & Hamm, 2016). Based on this evidence, further examination was necessary to determine if these factors had an effect on the study population. In order to accomplish this analysis, a multiple regression analysis was added using the following coefficients: gender, race, education, and age. After completing the multiple regression analysis neither race $\beta = -0.003, t(714) = -0.078, p = 0.938$, nor education $\beta = 0.046, t(714) = 1.240, p = 0.215$ were found to be significant coefficient in the regression model. The significant results of the multiple regression analysis are presented in Table 8 above.

Hypothesis 4

The fourth hypothesis in this dissertation was used to explore the role of social connectedness, through the use of the PROMIS Social scale, to predict the inpatient admission utilization patterns of participants with high levels of social connection as compared to those who have medium or low levels. Specifically under investigation was the null hypothesis that patients who are engaged in PCMH practices, and have strong social connectedness, do not show the reduced utilization of inpatient admissions. The alternate hypothesis was that patients who are engaged in PCMH practices, and have strong social connectedness, do show the reduced utilization of inpatient admissions. An examination of the utilization patterns between the three social connectedness categories demonstrated that the highest reduction in inpatient admissions was found among the subjects that had High PROMIS scores, 58.3%, as compared to those participants with Medium or Low PROMIS scores. These groups showed inpatient admission reductions of 10.0% and 5.9% respectively. These findings are consistent with the theoretical model of collective efficacy. Based on this theoretical model subjects who experiences a lack of social support networks are more prone to suffer complications from chronic diseases and poorer health outcomes (Coyle & Dugan, 2012; Park et al., 2012).

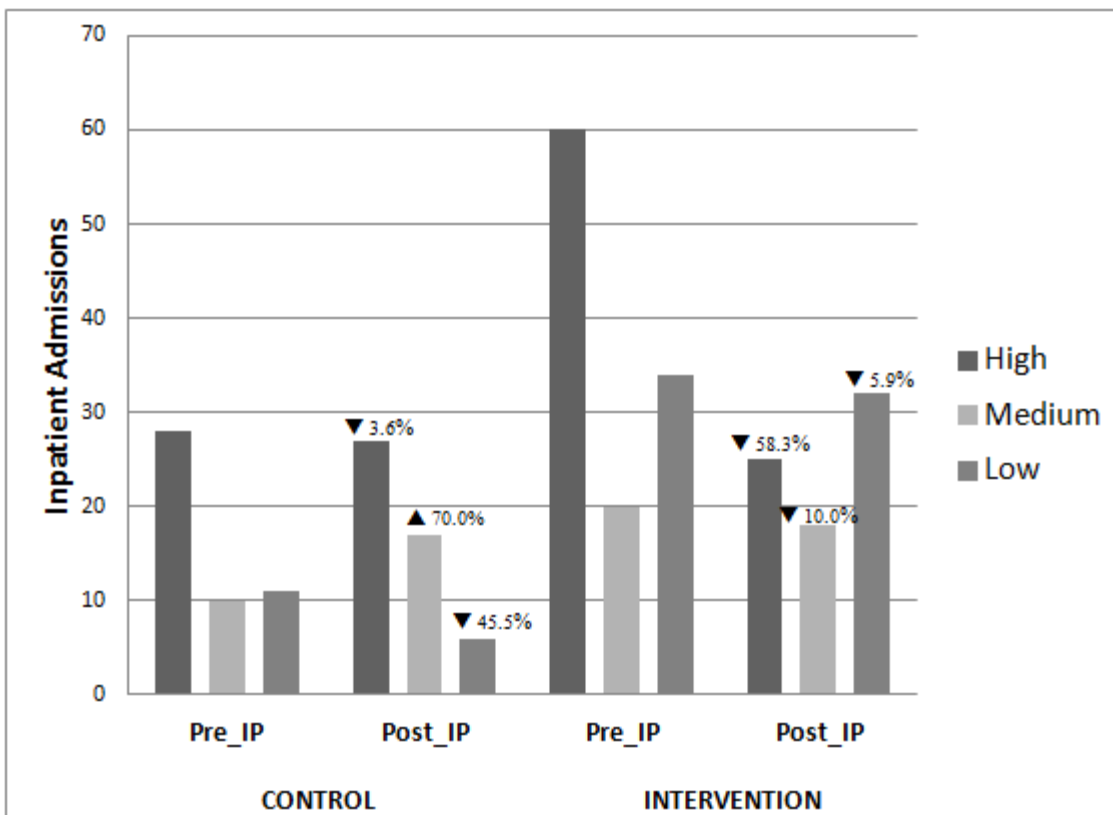


Figure 9. Inpatient utilization by social connectedness category (N = 716)

Table 9

Linear regression analysis predicting inpatient admission from the PROMIS_Social_T score

Variable	B	Std. Error	β
PROMIS_Social_T	-0.02	.00	-.19

Note. $R^2 = .036$ ($p < .0005$); Adjusted $R^2 = .035$ ($p < .0005$)

To examine the relationships between social connectedness and inpatient admissions, I utilized a linear regression methodology. Under this analysis, the

regression model demonstrated a statistically significant predictability. The analysis indicated that the subject's PROMIS score could be used to predict the inpatient utilization of chronically ill patients. The analysis demonstrated that the regression was statistically significant. However, this analysis also showed that the PROMIS score only contributed to 3.6% of the variance in inpatient hospital admissions, $R^2=.036$, $F(1, 714) = 26.705$, $p < .0005$. The strength of social connectedness, as measured through the PROMIS scale, significantly predicted the inpatient utilization of patients within this research study, $\beta = -0.190$, $t(714) = -5.168$, $p < .0005$. Values for the linear regression analysis predicting inpatient hospital admission from the PROMIS_Social scale are presented in Table 9 below.

Similar to the effect seen in the previous research question, the findings showed a small contribution of the PROMIS score to the variance in inpatient utilization for the cohorts. However, the incremental value added by the PROMIS score findings do support the theoretical model of collective efficacy and address the value of social networks in supporting patient's suffering from chronic conditions and social isolation. Furthermore, these findings highlight the fact that there does exist a value contribution, in considering the role of social connectedness in the PCMH model on inpatient utilization. It also highlights the value of adding a measure of social connectedness to the medical home model, which currently does not consider the role of social connectedness in the management of primary care patients.

In this analysis, the Beta coefficient (-0.190) indicated an inverse relationship between the level of a patient's social connectedness and patient hospital inpatient

admissions. For example survey respondents who scored higher on the PROMIS scale, indicating that they had strong social connectedness, also reported lower use of inpatient hospital admissions. Based on these results of this regression analysis I reject the fourth null hypothesis of this study, which stated that PCMH subjects with strong social connectedness do not have reduced utilization of inpatient hospital admissions.

Table 10

Multiple regression analysis predicting emergency department visits from the PROMIS_Social_T score, gender, age

Variable	B	Std. Error	β	p
PROMIS_Social_T	-0.04	0.11	-0.12	0.001
Gender	-0.34	0.11	-0.11	0.002

Note. $F(2,713) = 18.338$, $p < .00005$ $R^2 = 0.049$ ($p < 0.00005$); Adjusted $R^2 = 0.046$ ($p < 0.0005$)

Similar to the multiple regression analysis conducted for emergency department utilization, the same analysis was conducted for inpatient admissions. No significant findings were found for the following coefficients: race, $\beta = 0.005$, $t(714) = 0.150$, $p = 0.881$; education, $\beta = 0.037$, $t(714) = 1.019$, $p = 0.308$; age, $\beta = 0.043$, $t(714) = 1.155$, $p = 0.248$. The significant results of the multiple regression analysis are presented in Table 10 above.

Summary

The statistical analyses of this quantitative, correlational analysis led to the rejection of four null hypotheses under investigation in this study. In comparing

emergency department visits between the intervention group and the control group, the analysis found that those subjects who had a PCMH also experienced reduced utilization of the emergency department. Similarly, the analysis comparing inpatient hospital admissions between the intervention and control groups found once again that subjects with PCMH experienced reduced hospitalizations. Examination of the last two research questions required the use of the PROMIS scale for social connectedness. The various regression analyses indicated that subjects with high social connectedness scores had a greater reduction in emergency department visits. In consideration of the various confounding variables that can affect health care utilization, a multiple regression analysis was conducted using gender, race, education, and age coefficients. This analysis uncovered that social connectedness, gender, and age had significant effects on a patient's utilization of the emergency department. Finally, a regression analysis found that patients with high social connectedness scores had a greater reduction in inpatient hospital admission. A similar multiple regression analysis conducted using gender, race, education, and age coefficients uncovered that social connectedness and gender had significant effects on a patient's utilization of inpatient hospital admissions.

In the following chapter of this study, I will be summarizing and presenting the interpretation of findings of this research. Chapter 5 of this dissertation, I will also discuss the implications of these findings in the field of public health, primary care, and social change. Finally, in the following chapter, I will provide information on the limitations of this research as well as recommendations for further study in this field.

Chapter 5: Discussion

Introduction

This research involved an examination the Patient Centered Medical Homes (PCMH) model of primary care, with a specific focus on the role of social connectedness. The PCMH concept was developed, in part, from research conducted in 2004 around the primary care of the chronically ill (Carney et al., 2009; Strange et al., 2010). This model of primary care requires a reorganization of the delivery of care to include six key elements that include:

1. Enhanced Access and Continuity
2. Identification and Management of Patient Populations
3. Plan and Managed Care
4. Self-Care Support and Community Resources
5. Tracking and Coordinating Care
6. Measurement and Performance Improvement

Each of these elements aims to place the patient in the center of their care, streamline the care across health care settings, and enhance interdisciplinary collaboration among care team members.

In this study, the PCMH concept was examined for its effectiveness as a model for the care of chronically ill patients. Additionally, this research tested for a relationship between social connectedness and utilization among chronically ill PCMH patients. Finally, the results of this research help to expose the potential gaps in the current PCMH model, and a need for the model to incorporate elements that address how primary care

practitioners can assist their patients in connecting and strengthening their social support networks.

Summary and Interpretation of Findings

The findings of this study provide a great deal of value to the delivery of ambulatory care for populations of patients who suffer from chronic conditions. Analysis of data in the research cohort of this dissertation found that chronically ill patients who are engaged in PCMH experienced a greater reduction in both emergency department and inpatient admissions when compared to a control cohort. The PCMH cohort of patients experienced 22.5% reduction in emergency department utilization compared to only 13.7% among the control groups. Similarly, the PCMH cohort experienced 34.2% reduction in inpatient admissions compared to an increase of 2% among the control group. Finally, this study was examined the effect of social connectedness on emergency department and inpatient admissions among PCMH patients. To accomplish this analysis subjects were administered a questionnaire which placed their level of social network in three levels of intensity: high, medium, or low. This analysis demonstrated that there exists an inverse relationship between social connectedness and emergency department and inpatient admissions.

The PCMH and Emergency Department Utilization

The first research question in this dissertation was: What is the relationship between PCMH and emergency department visits? The first research question was used to test the hypothesis that the PCMH model of primary care is an effective model in reducing emergency department utilization of chronically ill patients. In particular, this

dissertation examined the effect of the PCMH model on patients that suffer from ambulatory care sensitive (ACS) conditions. ACS conditions are those that are most appropriately dealt with in an outpatient setting (Freund et al., 2013; Harrison et al., 2014; Lin, Eberth, & Probst, 2016). Research has shown the patients who suffer from ASC often disproportionately utilize the emergency department for care, do not engage in regular primary care, and do a poor job of managing their chronic conditions (Johnson, Ghildayal, Ward, Westgard, & Hokanson, 2012; Joynt, Gawande, Orav, & Jha, 2013).

To test this first hypothesis, emergency department utilization was compared between a control and intervention cohort in the study population. The data for this analysis were collected from a secondary source, the WICER study out of Columbia University. This analysis found that the control group, those patients not connected to a PCMH, experienced 233 emergency department visits in the pre-intervention period, compared to 201 visits in the post-intervention period. This represents a reduction in emergency department visits of 13.7%. In comparison, the intervention cohort, or the group of subjects directly connected to a patient centered medical home, had 490 emergency department visits in the pre-intervention period and 365 visits in the post-intervention period. This represents a reduction in emergency department visits of 25.5% and a statistically significant difference between the two cohorts. The comparison between the control and intervention cohort demonstrates that engagement in a PCMH results in a reduction in emergency department visits.

The PCMH and Inpatient Utilization

The second research question in this dissertation was: What is the relationship between PCMH and inpatient admissions? The second research question was used to test the hypothesis that engagement in a PCMH affects a patient's use of inpatient admissions for ambulatory sensitive conditions. Similar to the patterns seen in emergency department utilization, research has shown that patients with low socioeconomic status suffer from high hospital admissions (Blustein, Hanson, & Shea, 1998; Iwane et al., 2013; Roos, Walld, Uhanova, & Bond, 2005). The focus on ASC conditions also highlights the fact that many of the hospitalizations that burden these population are preventable and would be best managed in an outpatient setting (Cho et al., 2016; Nyweide et al., 2013; Wiebe et al., 2014).

Using the WICER study dataset, we found that the control cohort experienced 49 Inpatient admissions in the pre-intervention period and 50 visits in the post-intervention period. This represents an increase in inpatient admissions of 2.0%. By contrast, the intervention cohort had 114 inpatient admissions in the pre-intervention period and 75 admissions in the post-intervention period. This represents a reduction in inpatient admissions of 34.2%. These results demonstrate that engagement in a PCMH results in a reduction in inpatient admissions.

Social Connectedness and Emergency Department Utilization

The third research question in this dissertation was: What is the relationship between PCMH patients with strong social connectedness and emergency department visits? The third research question was used to test the hypothesis that PCMH patients

with strong social connectedness also had reduced emergency department utilization.

The concept of social connectedness describes the social support networks that surround patients and support their health care journey. Research has shown that social networks are an important factor in the health of chronically ill patients (Hodge, English, Giles, & Flicker, 2013; Liao & Brunner, 2016; Stopford, Winkley, & Ismail, 2013). Additionally, research has found that patients who lack a social support system and suffer from social isolation have increased risk of adverse health outcomes and suffer from increased mortality rates (Step tow, Shankar, Demakakos, & Wardle, 2013; Yan, McClintock, Kozloski, & Li, 20013). However, the PCMH model of primary care does not place emphasis on whether patients have the social support networks to help them adhere to their health care plans and manage their health conditions.

To provide insight and explore the value of social connectedness, the WICER data set and specifically the PROMIS Social scale was used to predict the emergency department utilization patterns of participants with high levels of social connection as compared to those who have medium or low levels. An examination of the utilization patterns between the three social connectedness categories demonstrated that the highest reduction in emergency department visits was found among the subjects that had High PROMIS scores, 35.0%, as compared to those participants with Medium or Low PROMIS scores. These groups showed a reduction of 24.2% and an increase in emergency department visits of 11.7% respectively. The analysis indicated that the subject's social connectedness could be a strong predictor of emergency department utilization of chronically ill patients, and these results are supported by recent search by

Hahn et al. (2016). These finds are significant because it illustrates the importance of social support networks in healthcare, and the need for a care provider to consider if their patients have the proper support systems to manage their health.

Social Connectedness and Inpatient Utilization

The fourth research question in this dissertation was: What is the relationship between PCMH patients with strong social connectedness and inpatient admissions? The fourth research question was used to test the hypothesis that PCMH patients with strong social connectedness also had reduced inpatient utilization. This is an important examination because research has shown that patients with poor social connectedness are at greater risk for Inpatient admission and re-hospitalization (Friedler, Crapser, & McCullough, 2015; Giuli et al., 2012; Mistry, Rosansky, McGuire, McDermott, & Jarvik, 2001; Nicholson, 2012). However, this is often ignored by the health care system and by primary care providers. In fact, the PCMH has no standards that seek to incorporate the social support networks that the literature highlights as vital to the health of these vulnerable populations.

Similar to the previous hypotheses, this examination of the utilization patterns between the three social connectedness categories utilized the WICER data set and the patient's response to the PROMIS score. This analysis demonstrated that the highest reduction in inpatient admissions was found among the subjects that had High PROMIS scores, 58.3%, as compared to those participants with Medium or Low PROMIS scores. These groups showed inpatient admission reductions of 10.0% and 5.9% respectively. The results of this examination demonstrate that PCMH patients with strong social

connectedness have reduced utilization of inpatient hospital admissions. Although no research was found that compare the PCMH model and social connectedness, the findings of this research are consistent with comparable research studies that studied the PROMIS scale and chronic diseases. For example, Irwin et al. (2015) found similar results using the PROMIS score with health care clinical outcomes and quality of life for patients with chronic obstructive pulmonary disease.

Complicating Variables: Gender, Race, Education, and Age

Research has demonstrated that there are a variety of demographic variables that can affect the health care of individuals and the manner by which they engage with the health care system (Kerr et al., 2014). Connell (2012) found that gender differences play an important role in the manner by which people interact with the health care system. Additionally, a variety of researchers have found that the differences in the way the health care system interact with different genders has created great inequalities in their health status and policies (Borrell et al., 2014; Shabnam, Jaleel, Liza, Sara, & David , 2014; Socia, Koehoorn, & Shoveller, 2016). A review of literature points to the need to explore the role of gender in this dissertation.

There exists extensive research that points to the effect of race and racial disparities in the health care system. Research has demonstrated that there exist many barriers that disproportionately affect patient of minority groups, and contribute to the growing inequalities in the care provided to minority groups (Andaya et al., 2013; Burgess et al., 2013; Clark et al., 2013; Hunt, Eisenberg, Lu, & Gathright, 2015). These disparities have given rise to a variety of barriers that keep minorities from engaging in

the healthcare system (Levy et al., 2014; Liss & Baker, 2014; Valenzuela et al., 2014). Furthermore, these barriers and challenges contribute to late presentation for care, poor adherence to clinical regimens, and overall poor health care status (Bergamo et al., 2013; Gueler et al., 2015; Leeper et al., 2014). These findings also point to the need to explore issues of cultural competence system development and professional medical training in cultural sensitivity.

Finally, a review of available research has shown that patients with poor educational attainment also experience greater disparities in health care and poor health care outcomes. Saydah et al. (2013) found that poor educational attainment and low socioeconomic status are closely associated with poor health care outcomes. Additional research points to the fact that poor education and low health literacy has been found to exacerbate barriers to care and adds to poor health care outcomes of poor and minority populations (Omachi, Sarkar, Yelin, Blanc, & Katz, 2013; Sarkar, Asti, & Chisolm, 2016; Schumacher et al., 2013; Yin, Jay, Maness, Zabar, & Kalet, 2015). Results of this research suggest a link between education and health outcomes and illustrate the need to examine the role of education in this research.

Based on the evidence found in the literature, it was determined that further examination was necessary to determine if the factors of gender, race, education, and age had an effect on the study population. This examination was undertaken using a multiple regression analysis. After completing the multiple regression analysis, the null hypotheses around the effect of social connectedness were rejected; furthermore, gender and age were found to have a significant effect on a patient's utilization of the emergency

department. A similar analysis conducted using gender, race, education, and age coefficients uncovered that social connectedness and gender had significant effects on a patient's utilization of inpatient hospital admissions.

Test Reliability

The social connectedness variables under investigation in this dissertation data were analyzed from the WICER study in for form of a set of eight questions derived from the PROMIS Participation in Social Roles (PSR) instrument. This psychometric tool is not specific to a disease state or condition but instead is a general tool that has been shown to provide insight into the strength of a subject's social network and social connectedness (National Institutes of Health, 2014). The Cronbach Alpha is a common test for reliability, among psychometric instruments, and is used to measure the reliability or internal validity of an instrument to predict a pair of variables. The Cronbach Alpha score is measured from zero to one, with one being complete reliability. The PROMIS PSR instrument test for reliability has been shown to represent a Cronbach's Alpha of 0.90 (PROMIS Network Center, 2011).

Implications for Social Change

As the healthcare industry embarks on the path of health reform and begins to put into action the vision of the Affordable Care Act many health care professionals are seeking to implement the PCMH model. This model of primary care allows for better coordination for chronically ill patients and enhances the roles of providers, nurses, social workers, as well as the patient and their families in disease management (Wong et al. 2012). However, it does not address the gaps that exist within urban communities for

patients that lack social support networks and do not engage in local community resources (Ahern & Galea, 2011). I sought to examine if the PCMH concept could be an effective model for the care of chronically ill patients. Through my research, I tested for a relationship between social connectedness and emergency department and inpatient utilization among chronically ill PCMH patients. I also sought to highlight a gap in the current PCMH model, and a need for the model to incorporate elements that address how primary care practitioners can assist their patients in connecting and strengthening their social support networks.

The findings of this study have implications for clinical practice in ambulatory settings. According to the National Committee for Quality Assurance (NCQA), just over ten percent of primary care sites across the United States are recognized as Patient Centered Medical Homes (National Committee for Quality Assurance, 2014). As described in Chapter 1 of this dissertation, the PCMH model is built upon six pillars of coordinated care. Through the six pillars, the PCMH model seeks to address the care coordination components of the primary care system that support the care of patients and have the greatest potential for fragmentation. Research has shown that lack of coordination and continuity of care, as described in the PCMH model, can lead to poor health outcomes (Amjad, Carmichael, Austin, Chang, & Bynum, 2016; Flynn, Betancourt, Garberoglio, Regts, & Northington, 2015; Weir, McAlister, Majumdar, & Eurich, 2016). Additionally, researchers have demonstrated that lack of proper primary care coordination also leads to increase medical spending due to quality and cost of care (Frandsen, Joynt, Rebitzer, & Jha, 2015; Geyman, 2016; Romano, Segal, & Pollack,

2015). Therefore, the value of this study and its findings highlight the value of this model for providers in creating a framework to strengthen the ambulatory care setting. Additionally, the model demonstrates that utilizing the PCMH model framework has the benefit of strengthening continuity of care, care coordination and helping reduce avoidable hospitalizations.

Finally, it is important to note that the results of this study also provide valuable information for the general public. The first set of hypotheses in this study focused on the value of the PCMH model, and the importance of primary care on avoidable hospitalizations in the emergency department and inpatient. The findings of this research highlight the need for patients to connect with PCMH practices, and the correlation between of primary care continuity and good health outcomes. Additionally, the second set of hypotheses focused on the importance of social support networks on health care outcomes. Therefore, this research can provide the general public with useful information on the role that their support systems have on their health. Furthermore, these research questions bring to light the importance to be sensitive to the impact of social isolation on health care outcomes.

Limitations, Delimitations, and Future Research

As with any study, this dissertation has limitations that need to be considered as we evaluate the findings. The primary limitation of this study was that the dissertation uses the overuse of emergency department and inpatient utilization to measure the efficacy of the PCMH model. This was done because the primary focus of the PCMH model is to engage patients in the outpatient/ambulatory setting, with their primary care

provider, and out of the hospital (Bergert, Patel, Kimata, Zhang, & Matthews, 2014; Stange et al., 2010; Stranges et al., 2015). However, there is a potential limitation in this methodology. The utilization data measured in this study were extracted from one hospital linked to the PCMH clinics. Although this hospital is located within the borders of the Washington Heights/Inwood community, there is no way to guarantee that these patients have not also received emergency department and inpatient care at other unaffiliated hospitals. At the time that this data set was collected there were no connections across hospital systems that allows for extracting a patient's overall emergency department and inpatient utilization. Therefore, this analysis is limited to only the emergency department and inpatient use at the linked hospital.

The limitation in this study highlights the need for future research around the PCMH model. After the data collection period of this study a program was developed across New York State to connect health care system to create greater health information exchange, the Regional Health Information Organization (RHIO) (Dixon, Gibson, Frederickson, & Rosenman, 2014; Frisse et al., 2012; Winkler, Ozturk, & Brown, 2016). Within the study population service area, the Healthix RHIO provides the participating organization the ability to share clinical information such as emergency department and Inpatient utilization across organization electronic medical records. Leveraging this new health information exchange platform, this research could be augmented to develop a complete picture of the study population's true health care utilization across health systems. This new and deeper study would help frame this analysis at a larger scale, and would greatly minimize this study's limiting factor.

Finally, it is also important to consider the delimitation in this study. This study was an investigation into the PCMH model for the delivery of primary care of chronically ill patients. This study relied upon emergency department and inpatient utilization as a measurement of efficacy in the PCMH; however, this study did not investigate the cost of the model or the return on investment associated with PCMH development. A review of existing literature found that there is a great deal of variation in the setup costs associated with the development of PCMH (Klien, Laugesen, & Liu, 2013). The PCMH model requires significant investments in health information technology, leadership, care coordination, staff development, and patient/family engagement (Fernald et al., 2011; Holt, Helfrich, Hall, & Weiner, 2010; Homer & Baron, 2010). Research in this area has also found that establishing a PCMH increases on average that annual operating cost for a medical practice by as much as \$508,207 (Nocon et al., 2012).

The concept of the development cost and return on investment represent important consideration in determining the benefit and value of the PCMH model. However, the investigations of this study were limited to the efficacy of the model on health care utilizations, not to the exploration of the model as economically feasible. This delimitation was selected because there currently does not exist a system of sharing cost savings with health care providers, and there are very few reimbursement structures in place to encourage primary care providers to transform their practices into PCMH (Friedberg, Schneider, Rosenthal, Volpp, & Werner, 2014; Hahn, Gonzalez, Etz, & Crabtree, 2014; Scholle, Asche, Morton, Solberg, Tirodkar, & Jaen, 2013; Quinn et al., 2013). To begin it is vital to mention that future research in this area may be required to

investigate the potential return on investment of the PCMH model, and the contribution of reduced health care utilization to the cost structure of the model.

Implications

This research study has expanded the knowledge base in the field of primary care and the development of PCMH across the country. This model of primary care is still in its infancy across the industry. For example, the National Committee for Quality Assurance (NCQA), which is the accrediting body that certifies medical practices, reports that only ten percent of primary care clinical sites in the United States were certified as PCMH (National Committee for Quality Assurance, 2014). Early outcomes evidence on this model was mixed. Some research on the model found that there was evidence of reduced emergency department utilization for patients in the medical home (Homer et al., 2005; Jackson et al., 2013). Other studies that examined the various components of the medical home model, such as care management, patient education, and self-management, found positive outcomes of clinical indicators (Bodenheimer, Lorig, Holman, & Grumbach, 2002; Chodosh et al., 2005). However, other early research did not find evidence of positive outcomes to support the efficacy of the model (Alexander & Bae, 2012; Glancey & Kennedy, 2016; Holmboe, Arnold, Weng, & Lipner, 2010). Additionally, no research was uncovered that studies the effect of social connectedness on the PCMH model of primary care.

The findings in this study provide a great deal of information that may be very informative to the care of chronically ill patients, and specifically those that suffer from ambulatory care sensitive conditions. This study examined emergency department visits

between an intervention group and the control group, and this analysis found that those subjects who had a PCMH also experienced reduced utilization of the emergency department. The study also compared inpatient hospital admissions between intervention and control group. This analysis found once again that subjects with PCMHs experienced reduced Inpatient hospitalizations. Both the emergency department and inpatient utilization reductions for subjects enrolled in PCMHs is supported in the literature, but these previous findings were among special groups such as the geriatric population (Boucher, White, & Keith, 2016; Patel et al., 2015; Peikes, Zutshi, Genervro, Parchman, & Meyers, 2012). Similar results exist in the literature among patients in the veterans health administration system (Nelson et al., 2014; Rosland et al., 2013; Spencer, 2013).

The study findings surrounding the investigation of social connectedness also offer important information for the health care industry. This study examined the role of social connectedness, or social isolation, for subjects that were a part of a PCMH versus those who were not a part of a medical home. This analysis showed that patients who had strong social support networks also had few emergency department visits and inpatient admissions. Research conducted in Australia found similar connections between social isolation and hospitalization (Logman, Passey, Singer, & Morgan, 2013). Other researchers in the United States have studied this connection in special population such as the HIV community and among veterans, and have seen similar predictive value (Cornwell & Waite, 2009; Barger, 2013; Greysen et al., 2013; Williams, Kunik, Springer, & Graham, 2013). An exhaustive search through existing literature could not find

previous examinations of social isolation and the PCMH. Therefore, the findings in this study highlight not only a gap in the current literature, but also important elements that require a more in-depth consideration in the care of chronically ill patients.

The findings in this study are of a great deal of value to a variety of stakeholders. The PCMH model brings a great deal of value to primary care providers. Establishing a medical home forces primary care providers and practices to create greater efficiency, more care coordination, and better continuity of care for their patients (McAllister, Colley, Van Cleave, Boudreau, & Kuhlthau, 2013; Porter, Pabo, & Lee, 2013; Taylor, Machta, Meyers, Genevro, & Peirkes, 2013). The findings in this study also demonstrate the value that the PCMH model brings primary care providers through the reduction of emergency department visits and inpatient admissions, and therefore better patient health care outcomes.

The findings surrounding the PCMH and issues of social connectedness have a great deal of value for the hospital industry. Many hospitals across the United States have entered into value-based purchasing programs, which are risk based relationships that are driven by value and quality (Blumenthal & Jena, 2013; Chen & Ackerly, 2014; VanLare & Conway, 2012). One of the quality measures that are closely associated with value-based payment programs is hospital readmissions. Under these programs, hospitals are penalized when patients that they treat and discharge are hospitalized again within thirty days (Dharmarajan et al., 2013; Gilman et al., 2015). One way that hospitals try to avoid readmissions, and the financial penalties that accompany them, is to connect

patients with primary care providers that can coordinate their care post hospital discharge.

The findings in this study also have value for patients. The core principles of the PCMH are focused on strengthening the primary care system through care coordination, self-management, enhanced health information technology, and greater access to care. These principles are the driving force behind the transformation of the medical home model, and the greater engagement of patients with their primary care providers keeps patients healthier and out of the hospital (Braddock III, Snyder, Beubauer, Fischer, & American College of Physicians Ethics, 2013; Koh, Brach, Harris, & Parchman, 2013; Laurance et al., 2014). Another value of the PCMH revolves around the patient experience. Researchers in this area have found that patients who are part of a medical home report higher levels of satisfaction with their primary care providers and with the care that they receive from their care teams (Jubelt et al., 2014; Maeng, Davis, Tamcavage, Graf, & Procopio, 2013; McFarland, Wallace, Parra, & Baker, 2014). Increased patient satisfaction with their PCMH translates into a more engaged patient, and a stronger patient-provider relationship.

Finally, it is important to note that the findings of this study have significant implications for health policy. The inception of the Affordable Care Act place greater emphasis on primary care as the true front line of care delivery (Blumenthal, Abrams, & Nuzum, 2015; Sommers, Buchmueller, Decker, Carey, & Kronick, 2012). The emergency department and inpatient admission reductions associated with the PCMH adds to the knowledge base and addresses the efficacy of the medical home model. The

medical home model also emphasizes the important of the interdisciplinary team structure, and leverages the expertise of physicians, nurses, social workers, nutritionists, and frontline staff in the care of patients (Bolin, Gamm, Vest, Edwardson, & Miller, 2011; Cubic, Mance, Turgesen, & Lamanna, 2012; Markova, Mateo, & Roth, 2012). The increased focus on interdisciplinary teams speaks to the need for new policies in healthcare education that develops programs to educate all levels of health professionals in a cross-functional manner that encourages teamwork and collaboration.

These findings also point to the need for more policies that create funding streams that can make PCMH implementation for economically feasible for primary care practices. Research in the development of PCMHs has identified that startup costs and ongoing sustainability funding are major barriers for primary practices to establish medical homes (Cromp et al., 2015; Gonzalez, Mejia de Grubb, & Roger, 2015; Helfrich et al., 2016). The creation of policies that secure dedicated funding streams for PCMH development should help alleviate these barriers and help the medical home model become more affordable for primary care providers. Policies that would make the implementation of primary care medical home more affordable would increase adoption across the country and the reduction in avoidable emergency department visits and inpatient admissions would create significant cost savings to the health care system.

Conclusion

Research conducted in the field of family and pediatric medicine in 2004 laid the foundation for the PCMH (Carney et al., 2009; Strange et al., 2010). This model was specifically created for the care of chronically ill patients and populations with special

health care needs. The focus of this study was an examination of the efficacy of the PCMH model of primary care through reductions in avoidable emergency department and inpatient utilization. This research also examined the role of social connectedness in the medical home model and utilization among chronically ill PCMH patients. Finally, this study also examined the gaps in the current medical home model and the need for the model to incorporate elements that address how primary care practitioners can assist their patients in connecting and strengthening their social support networks.

The inner city communities that are part of the examination of this study suffer from a variety of problems. This study specifically focused on the Washington Height/Inwood neighborhood, an inner city New York City community, that experience high rates of chronic conditions such as diabetes, congestive heart failure, and obesity (Chamany, Silver, & Nathan, 2010; New York State, 2007). Further complicating the health of inner city communities are language, social support, and cultural barriers, as well as low health literacy rates (Betancourt, Green, & Carrillo, 2004). These barriers contribute to poor treatment adherence, limited access to health services, and poor health outcomes (Nam, Chesla, Stotts, Kroon, & Janson, 2011).

In order to address the growing problem of chronic disease across our country and especially in our inner city communities, the Affordable Care Act has refocused a great deal of attention on strengthening primary care. A key strategy in addressing these problems could be the development of PCMHs. This model of care emphasizes the redesign of primary care practices to include a team approach, enhanced health information technology, care coordination, and greater provider-patient communication

(Carney et al., 2009; Strange et al., 2010). However, this model of primary care does not address the importance of a patient's social support network and how connected a patient is to the social support system.

This research study was conducted through a quantitative analysis of a secondary data set from Columbia University Medical Center. In this analysis, I examined whether subjects in a PCMH practice, enhanced with integrated social support resources and networks, experience healthier communities, improved health outcomes and reduced hospitalizations when compared to subjects who are not socially connected. In this study being a part of a PCMH, with or without social connectedness, were considered independent variables. In addition, emergency department visits and inpatient admissions were considered dependent variables.

Upon completion of an indepth analysis of the data set for the four research questions, the four null hypotheses of this study were rejected. The first research question analysis found that subjects who were a part of a PCMH had a greater reduction in emergency department utilization when compared to subjects, not in medical homes, 25.5% versus 13.7% respectively. The second research question analysis found that subjects that are a part of a PCMH had 34.2% reduction in Inpatient admission compared to a 2% increase among subject not in a PCMH. The last two research questions revolve around the issue of social connectedness, using the PROMIS score as a measurement of the strength of a social support network. The third research question analysis found that subjects that were part of a PCMH and had strong social support networks also had greater reductions in emergency department visits, 35.0% compared to 24.3%. Similarly,

the fourth research question analysis found that subjects that were part of a PCMH and had strong social support networks also had greater reductions in inpatient admissions, 58.3% compared to only 3.6 % for subjects not a part of a medical home.

In conclusion, the evidence in this study provides an important contribution to the knowledge base on the significant roles of primary care and social connectedness in the care of chronically ill patients. The examinations in this research demonstrate that the PCMH model and the PCMH six pillars of primary care help to strengthen the coordination of care in the ambulatory setting. Furthermore, the findings of this study support the theories and early literature that postulate that engagement in a PCMH yields greater coordination of care and reduced utilization of emergency department and inpatient admissions. The benefits of these findings have multiple implications. Patients engaged in PCMH's are more connected with their primary care providers/care team, receive more coordinated care and have fewer emergency department and inpatient utilization, therefore, saving the health care system money for avoidable hospitalizations.

However, the PCMH model of care does not address the need for patients to have strong social support networks. This dissertation provides an analysis of the importance of social connectedness on health care outcomes. The research findings of this dissertation demonstrated that patients who have strong social support systems also have better health care outcomes in the way of reduced utilizations. Additionally, PCMH connected patients with strong social support systems had even greater reductions in emergency department and inpatient admission. Therefore, these findings point to the

need for the PCMH model to address the issue of social connectedness and the use of community resources in efforts to prevent patients from social isolation and the complications that are associated with this condition.

Healthcare in our country is in an active state of change and refinement. The Affordable Care Act has refocused the attention of the need for prevention and chronic disease management through the strengthening of primary care. Additionally, the Centers for Medicaid and Medicare Services (CMS) has established a variety of programs that focus on rewarding the industry for the quality of care, reductions in readmissions, and the elimination of waste in the care of patients. The development of the PCMH model of primary care and the need to focus on the social connectedness of patients illustrate another needed dimension in the evolution in the redesign of our health care system. The systemic changes highlighted in this dissertation to the delivery of primary care may also contribute to the development of overall healthier communities.

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