THE IMPACT OF A TRANSITIONAL CARE INTERVENTION ON THE INITIAL 30-DAY READMISSION AFTER HOSPITAL DISCHARGE AMONG HIGH-RISK MEDICAID PATIENTS IN EASTERN NORTH CAROLINA

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This dissertation is lovingly dedicated to my wife, Alexandra Gaskins. Without her unwavering and unconditional support, this journey would have never been accomplished.

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ABSTRACT

THE IMPACT OF A TRANSITIONAL CARE INTERVENTION ON THE INITIAL 30-DAY READMISSION AFTER HOSPITAL DISCHARGE AMONG HIGH-RISK MEDICAID PATIENTS IN EASTERN NORTH CAROLINA

by Ronald E. Gaskins

The recent passage of the Affordable Care Act has propelled the evolution of value based care to a level unseen across today's health care landscape. Because of this hospital readmissions that occur within 30 days after discharge, while not only generating a substantial amount of cost for the U.S. health care system to the tune of $15 billion dollars annually, has become a key litmus test for policymakers when judging quality of care. Transitional care has emerged as a key strategy that stakeholders such as hospitals, state and federal governments, as well as payers, are deploying to help succeed in the new reality of value based reimbursement. The purpose of this study was to explore the impact that a transitional care intervention after hospital discharge might have on reducing 30-day Medicaid readmissions. The sample included two years of administrative Medicaid claims data, consisting of 2,411 high-risk Medicaid patients receiving care in 27 counties throughout eastern North Carolina. The study involved the independent variables of interest, which were home visit and medication reconciliation, and their relationship in reducing the dependent variable of 30-day readmission. Timing of the home visit was the third variable of interest while gender, race, age, and aggregated clinical risk groups acted as the other independent variables. The theoretical framework of logistic regression was used as the main statistical tool of analysis for the study. Findings indicated that home visits were statistically significant (p=.008) in reducing 30-day readmissions. However, medication reconciliation (p=.161)

and timing of home visit (.523) did not result in statistical significance. Findings also indicated that males are disproportionately more likely to suffer a 30-day readmission than females. Lastly, increased age and higher patient acuity were found to have significance indicating a statistical relationship with 30-day readmissions. Findings from this study suggest that the timing of a home visit is not nearly as important as the home visit itself in reducing 30-day readmissions. Furthermore, as a component of the home visit, medication reconciliation does not seem to be an influential factor in its overall efficacy.

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LIST OF ACRONYMS AND ABBREVIATIONS

This following acronyms and abbreviations will be used throughout this study document:

ACA	Affordable Care Act
CMS	Center for Medicare and Medicaid Services
CCNC	Community Care of North Carolina
RN	Registered Nurse
TCM	Transitional Care Model
APRN	Advanced Practice Registered Nurse
CTI	Care Transitions Intervention
Project Red	Re-Engineered Hospital Discharge
CCPEC	Community Care Plan of Eastern North Carolina
DMA	Division of Medical Assistance
ACRG	Aggregated Clinical Risk Groups
CMIS	Care Management Information System
SPSS	Statistical Package for the Social Sciences
VIF	Variance Inflation Factor

LIST OF DEFINITIONS

The following definitions will be used throughout this study:

Transitional Care – broad range of time-limited services designed to ensure health care continuity, avoid preventable poor outcomes among at-risk populations, and promote the safe and timely transfer of patients from one level or setting of care to another" (Naylor, Aiken, Kurtzman, Olds, & Hirschman, 2011).

Home Visit – a face to face visit made by a health professional after hospital discharge to a patient in their home.

Medication Reconciliation – obtaining the most accurate listing of all medications a patient is currently taking (e.g., drug name, dosage, and frequency) and comparing that list against the patient's providers medication orders.

Social Determinants of Health – the social determinants of health are the conditions in which people are born, live, and work, and are responsible for health disparities in areas such as income, education, health, etc.

Aggregated Clinical Risk Groups – the foundation of a population classification system that helps to predict the amount and type of healthcare services that individuals should have used in the past or can be expected to use in the future.

Administrative Data – data that originates from claims billing and includes inpatient, outpatient, pharmacy and enrollment information.

Discharge Planning – process in which you get the patient ready to leave a health care facility by conceiving a plan of care document to ensure the patient's medical needs will be met when they get "home".

CHAPTER I

INTRODUCTION

In this era of health care reform where performance, and hence reimbursement, is judged not only on cost but quality, ineffective care transitions adversely impacts not only the individual, but also the entire system, including providers and payers (Markanda, 2012). Hospital readmissions that occur within 30 days after discharge generate a substantial amount of cost for the U.S. health care system and has become a point of concern for policymakers. The Center for Health Care Strategies analyzed readmissions rates for Medicaid beneficiaries with disabilities and found 30-day readmission rates to be 16 percent, while 365 day readmission rates increased to 53 percent. 50 percent of those readmitted within 30 days did not visit a physician between discharge and readmission and the likelihood of readmission increased among those with a higher number of chronic conditions (Gilmer & Hamblin, 2010). When looking at medication management, studies have indicated that 32 percent of hospital readmissions are related to medication discrepancies stemming from medication use at home. Coupling medication use at home with the high prevalence of chronic conditions it is not difficult to understand the importance of transitional care home visits after hospitalization (Setter, Corbett, & Neumiller, 2012). Moreover, with early physician follow-up and provider continuity being key pieces in reducing 30-day readmissions, understanding the optimal timing of a home visit after hospitalization is of value in reducing cost and improving quality (Vedel & Khanassov, 2015).

Because of the available literature reflecting limited research that addresses Medicaid transitional care interventions, and the prevalence of existing literature on

Medicare transitional care interventions, this study will be focused on Medicaid as a payer group as opposed to Medicare. This study will explore the following three research questions, which are (a) the relationship between a home visit after hospital discharge and 30-day Medicaid readmissions, (b) the relationship between a medication reconciliation after hospital discharge and 30-day Medicaid readmissions, and (c) the relationship between the timing of a home visit after hospital discharge and 30-day Medicaid readmissions.

Background of Study

Transitional care is defined as a "broad range of time-limited services designed to ensure health care continuity, avoid preventable poor outcomes among at-risk populations, and promote the safe and timely transfer of patients from one level or setting of care to another" (Naylor, Aiken, Kurtzman, Olds, & Hirschman, 2011, p. 747). When transitions of care are poorly executed quality and safety are compromised many times leading to adverse clinical events such as medication discrepancies (Naylor et al., 2011). Among patients with multiple chronic conditions, it is these deficits and the ensuing high rates of health care utilization that has become a focal point of the transformation of health care from fee for service to value-based care.

This transformation to value-based care was brought on by a significant piece of federal legislation signed into law in 2010, entitled "The Patent Protection and Affordable Care Act" (ACA), which spurred change in the delivery and financing of health care. The ACA introduced financial incentives for the provider to improve the management of care for patients with chronic conditions inside new delivery models of

care, including accountable care organizations, medical homes, health homes and transitional care interventions (Volland, Schraeder, Shelton, & Hess, 2013).

The ACA was preceded by years of increasing health care costs which has put significant economic pressure on the U.S. health care delivery system. With health care costs growing at two and a half times the rate of the U.S. economy, it is expected that the percentage of the gross domestic product related to health care expenditures will increase from 17 percent in 2010 to more than 25 percent by 2025 (Brawley, 2011). While there are many factors that are contributing to this growth rate it is heavily influenced by underlying variables such as new technologies, new medications, and an aging U.S. population with an increasing prevalence of chronic conditions (Munoz, Munoz, & Wise, 2010).

The prevalence of chronic conditions could be considered an epidemic with almost half of the American population, 145 million people, living with a chronic condition such as heart disease, diabetes, or asthma. When looking at those who utilize health care services, it is individuals with chronic conditions that take up nearly 84 percent of health care spending. With a health care system that is fragmented across its continuum of care and many community-based organizations continuing to operate in siloes, it is not surprising that those accessing services the most are the ones likely subjected to poorly coordinated transitions of care (Shugarman & Whitenhill, 2011). Lack of quality care transitions cause undue stress for patients in navigating the health care system resulting in misinformation and unnecessary medical procedures leading to higher costs.

A core component that the Center for Medicare and Medicaid Services (CMS) has focused on in restraining costs centers on reducing preventable hospital re-admissions. On an annual basis it is estimated that hospital readmissions costs Medicare $15 billion dollars with $12 billion of those costs classified as preventable readmissions (Perry & Stevens, 2012). When looking at Medicare and Medicaid beneficiaries with disabilities, it is revealed that historically 20 percent and 16 percent, respectively, of discharged patients return to the hospital within 30 days (Dubard, Vann, & Jackson, (2014). To reduce costs and improve quality CMS is deploying an overall strategy focused on the investment of care transitions. (Bindman, Blum, & Kronick, 2013). This investment points to the growing body of research that suggests transitional care coordination can effectively reduce the number of discharged patients coming back to the hospital within 30 days (Dubard, Vann, & Jackson, (2014).

Although numerous interventions have been deployed to address care transitions, including The Transitional Care Model, The Care Transitions Intervention and the Re-engineered Hospital Discharge model, a lack of consensus remains around the ideal interventions in ensuring safe and effective transitions of care (Fuji, Abbott, & Norris, 2012). However, a core blend of interventions are threaded throughout the literature detailing the relationship between the health care provider and patient including comprehensive care plans, patient education, and community resource arrangements (Coleman & Boult, 2003). When interventions are working at their best, this type of activity would exist as a feedback loop with a bi-directional flow of information sharing. In reality however, primary care providers often do not have access to hospital discharge plans and vital clinical documentation when presented with a

patient in their office after a hospitalization (Hammond, 2015). This breakdown in communication fosters adverse patient outcomes such as medication errors and insufficient chronic disease management.

One way to address this breakdown in communication is the utilization of home visits after hospitalization. The ability of a care manager (e.g., nurse, social worker) to paint a picture of a patient's home environment is invaluable for a provider who only has limited patient information provided at short office visits. These limitations impede a provider's effectiveness in developing an accurate plan of care, while home visits alleviate this issue with comprehensive assessments detailing medical conditions, medication adherence, and overall patient care needs. The sharing of this information between provider and care manager provides continuity to better manage high-risk patients across health care teams (Monical, 2013).

Although information collected at home and shared among the health care team can help prevent future hospitalization, the timing of the home visit is equally as important as the actual home visit itself. Engaging the patient quickly upon discharge is important because the days following discharge is the timeframe when the patient is most vulnerable. Capturing the patients' attention at home and focusing on the plan of care can ensure timely and comprehensive communication between providers at points of transfer. For high-risk patients the 48-72 hour corridor after hospital discharge can make or break a meaningful handoff and determine if timely post hospitalization follow-up occurs in the provider's office (Bisognanop & Boutwell, 2009). The shift in care from the hospital to the ambulatory setting, and the handoffs that occur among providers, can promote adverse patient events if not done properly. Complex patients with multiple

chronic conditions need quick intervention to prevent delayed communication and inaccurate information (Kripalani et al., 2007). Timely home visits that are led by a care manager helps foster continuity so patients experience higher levels of satisfaction as they navigate the health care system.

One of the most common reasons for 30 day readmissions is the occurrence of medication discrepancies between transitions of care (Bruning & Selder, 2011). Although the role of medication management has evolved into an important aspect of chronic disease management, there has been a lack of sustained effort by the medical community to improve medication management around shared care plans during transitions of care from the hospital to the ambulatory setting (Smith, Giuliano, & Starkowski, 2011). This is represented by only five percent of hospitals having reported an implementation strategy around a medication management process (Walker, 2012). When hospitals do have such processes in place they are limited to “brown bag” reviews that are dependent upon the patient’s memory recall around adherence and compliance. This scenario not only occurs in hospitals but also in primary care provider offices who are often unaware of the number and type of medications their patients might be taking. A recent study indicated that half of all patients omit at least one regular medication while one fifth omit at least one prescribed medication during “brown bag” reviews by their individual provider (Willis, Hoy, & Jenkins, 2011).

This context sets the stage for care managers to conduct a home visit during which they can eyeball what is in the medicine cabinet against the patient’s “brown bag”. This exposure to the patient’s home environment helps identify medication discrepancies that often times precede 30-day readmissions (Traynor, 2011). With

medication reconciliation the care manager can use the advantages of a timely home visit within a transitional care model to shortcut potential adverse medication outcomes.

One model that has had significant success with care transitions has been Community Care of North Carolina's (CCNC) transitional care program. This statewide program incorporates key elements of care transitions including home visits within 72 hours after discharge, timely provider outpatient follow-up, medication management, and patient and family education (DuBard, Cockerham, & Jackson, 2012). Through prior research CCNC has shown that for every 100 Medicaid patients who receive transitional care, 8.7 readmissions were avoided within 30 days, while over the course of 365 days this number rises to 17.4 (Jackson, Trygstad, DeWalt, & DuBard, 2013). These results are achieved through the mining of available patient data that includes both administrative Medicaid claims data as well as real time hospital admission, discharge, and transfer data. This information is used by care managers to target the highest risk patients at hospital discharge. CCNC defines its highest risk patients as those having the transitional care priority indicator. In CCNC's Care Management Standardized Plan, this indicator is generated using an algorithm that focuses only on non-dual Medicaid patients who are at-risk for a failed transition after a hospital stay. A few of the variables included in the algorithm are medication information, claim based utilization history, and the presence of multiple chronic conditions, including behavioral health conditions (Care Management Standardized Plan, 2015). It is within the context of CCNC's transitional care program that the interventions of this study will be analyzed to determine the impact on high-risk Medicaid patients and 30-day Medicaid readmission rates.

Statement of the Problem

Prior research studies have shown conflicting results in the role home visits play in reducing 30-day readmissions (Wong et al., 2008). With the ACA shifting focus towards value-based reimbursement, Medicare has seen substantial funding increases for initiatives within this specific population. Over the last 10 years CMS has invested resources in 34 care coordination demonstration programs centered on home visits with mixed results in reducing Medicare expenditures among high-risk beneficiaries (Xing, Goehring, & Mancuso, 2015). The by-product of a singular focus on Medicare has resulted in a gap in the knowledge around hospital readmissions and the impact of care transitions within the Medicaid population (Trudnak et al., 2014). Although prior research has shown that a home visit by a care manager within 72 hours of discharge can reduce short-term readmission rates (i.e., 30 days), the empirical evidence is more prevalent in the Medicare population as opposed to the Medicaid population (Verhaegh et al., 2014). This lack of empirical evidence underscores the need to understand how timely home visits and medication reconciliation impact high-risk Medicaid patients after hospital discharge and how evidence based interventions improve outcomes. Historically, Medicaid readmissions has not been adequately studied. Consequently, patterns of post hospitalization around home visits and medication management are only recently becoming understood. This study will add to the limited research around such interventions targeted towards high-risk Medicaid patients (Coleman, Min, Chomiak, & Kramer, 2004).

Need for Study

The principal aim of this study is to determine if there is a relationship between a home visit and a medication reconciliation after hospital discharge on 30-day readmission rates among high-risk Medicaid patients. The need for this study is made relevant by the ever increasing growth of the Medicaid population in the U.S. As of 2013 there were 62 million Medicaid beneficiaries, making it the largest payer in the country. This growth is being fueled by the 32 states across the country who have expanded Medicaid through the ACA. The expansion of coverage has spurred increased utilization within emergency departments and hospitals as beneficiaries find it easier to access health care services (Trudnak et al., 2014). As health care reform continues to evolve and more states expand Medicaid coverage, state governments will be under increasing pressure to manage costs. This study's focus on both the timing of the home visit and the role of medication reconciliation will offer new insight on how best to manage high-risk beneficiaries during care transitions after hospital discharge. This insight could also help state policymakers addressing resource allocation, while identifying strategies to improve not only better health outcomes for Medicaid recipients but also lower costs.

In addition to the growth of the number of Medicaid beneficiaries as a result of expansion, the growth in the number of Medicaid beneficiaries covered under Medicaid managed care organizations also provides a need for this study. Over the last 20 years 38 states have converted to Medicaid managed care, resulting in an enrollment increase from 10 percent in 1991 to 75 percent in 2015 of all eligible Medicaid beneficiaries across the U.S. (Dickson, 2014). In October of 2015, the state of North Carolina (NC) passed legislation to privatize Medicaid and bid its services to managed

care companies, contingent upon CMS approval. State governments across the country continue to embrace managed care expansion, however performance outcomes in managing costs have not necessarily been conclusive. Past research has been mixed when looking at care coordination outcomes in managing complex high cost beneficiaries in states with Medicaid managed care (Xing et al., 2015). In a recent study (Trudnak et al., 2014) performed a retrospective analysis across 19 managed care states and found that "30-day readmissions averaged $77 million dollars annually for each state which represented 12.5 percent of all Medicaid payments" (p.1339). Because Medicaid managed care programs operate under a capitation system, it is important to manage costs effectively for financial viability. This research could benefit managed care executives searching for evidence based interventions that reduce cost among high-risk beneficiaries within a capitated environment.

Although CCNC has conducted previous research on the impact of its transitional care program, the results have been statewide and not narrowly focused on a specific region of the state. Other prior studies on care transition models have not examined the unique demographics and characteristics that exist in the eastern part of the state. Eastern NC is a depressed region dominated by a rural geography. High unemployment rates are common while many household wages are below poverty levels. A lack of primary care providers combined with a high prevalence of co-morbidities such as diabetes and heart disease make eastern NC susceptible for poor health outcomes (Kearney, Rafferty, Hendricks, Landon, & Tutor-Marcom, 2014). This study and its outcomes on 30-day readmissions will be centered exclusively on Medicaid recipients who receive their primary care in eastern NC. This focused perspective will add to the

body of research around home visits and medication reconciliation after hospital discharge.

Research Questions

This study will aim to evaluate the relationship between a home visit and medication reconciliation after hospital discharge on the initial 30-day Medicaid readmission. The study proposes to answer three questions, which are:

1. Is there a relationship between a home visit after hospital discharge and 30-day readmissions?
2. Is there a relationship between a medication reconciliation after hospital discharge and 30-day readmissions?
3. Is there a relationship between the timing of the home visit after hospital discharge and 30-day readmissions?

Hypotheses

This study posits the following hypotheses:

Home visit and 30-day readmission

1. $H1_o$: There is no relationship between a home visit after hospital discharge and 30-day readmissions.

   $H1_a$: There is a relationship between a home visit after hospital discharge and 30-day readmissions.

Medication reconciliation and 30-day readmission

2. $H2_o$: There is no relationship between a medication reconciliation after hospital discharge and 30-day readmissions.

$H2_a$: There is a relationship between a medication reconciliation after hospital discharge and 30-day readmissions.

Timing of home visit and 30-day readmission

3. $H3_o$: There is no relationship between the timing of the home visit after hospital discharge and 30-day readmissions.

   $H3_a$: There is a relationship between the timing of the home visit after hospital discharge and 30-day readmissions.

Summary of Introduction

This introductory chapter outlines the importance of 30-day readmissions and its impact on health care reform. Transitional care was defined and placed within the context of a strategy being deployed by CMS in reducing health care costs. Home visit and medication reconciliation interventions were discussed and their role in the care transitions process to improve communication across provider settings. Models of transitional care were mentioned including CCNC's transitional care program. A paucity of studies within the literature on Medicaid readmissions indicated a gap in the knowledge that defined the problem statement. The opportunity to add to empirical research that considers both increased Medicaid enrollment and managed care coverage benefiting state government policymakers and managed care administrators provided a need for the study. The principal intent of this study is to determine if there is a relationship between a home visit and medication reconciliation after hospital discharge on 30-day readmission rates among high-risk Medicaid patients. In chapter two a comprehensive literature review and statistically relevant studies will be presented.

CHAPTER II

LITERATURE REVIEW

The aim of this study is to determine what impact a home visit and medication reconciliation have on the initial 30-day readmission among high-risk Medicaid patients. This section attempts to frame these interventions within the context of the changing health care landscape and the various transitional care models that have been deployed with success. Moreover, this section will help increase understanding of the literature and research already completed in these areas. This literature review includes a review of published knowledge related to health reform implications, key elements of transitional care, and several examples of current models of transitional care.

Health Reform Implications

Signed by President Barack Obama in March 2010, the ACA is a major piece of health reform legislation seeking to increase insurance coverage for an additional 32 million American citizens at an overall cost of $940 billion across a ten year time span. At the core of this expansion is Medicaid, which already covers nearly 60 million lives, and through the ACA will assume 16-18 million more (Olsen, 2012). Although the ACA had some initial difficulties with numerous website issues that stymied enrollment, the pace has picked up since and through 2014 seven million more Americans have gained coverage through the health insurance marketplace. Similarly, with 28 states embracing the ACA's expansion of Medicaid, intended for adults whose family income is below 133 percent of the federal poverty level, there have been nine million more enrollees gaining Medicaid coverage as of 2014. All of this has helped decrease the uninsured rate by 10 million since 2013 (Oberlander, 2014.)

A recent study done in Oregon on the effects of Medicaid coverage highlighted the benefits of expansion on those seeking services. It was reported that newly enrolled Medicaid recipients were 70 percent more likely to have a medical home versus those without insurance, while 55 percent were more likely to have a primary care provider. This access correlated with increased utilization of preventive services for both mammograms and cholesterol monitoring at 60 percent and 20 percent, respectively. However, although coverage promoted continuity of services and access for Oregon Medicaid enrollees it also increased cost. Outpatient care went up by 35 percent, prescription drugs increased by 15 percent, hospital admissions rose by 30 percent, which altogether amounted to an increase of total annual health care expenditures by 25 percent (Baicker & Finkelstein, 2011).

This enrollment increase, although beneficial for access and continuity of care, is only going to put more strain in balancing state budgets, while inducing policymakers to find strategies in lowering costs. Across the country, Medicaid expenditures regularly assume 20 percent of a state's budget and in many cases is the fastest growing budget expense (Wilson, 2009). Although the federal government will cover 100 percent of the cost for individuals gaining Medicaid coverage through the ACA expansion, via federal matching enhanced rates, this rate of support will level off beginning in 2017 to 90 percent (Byrne, 2014). As the payer base for Medicaid expands in the states there will be pressure to further constrain costs to accommodate increased utilization as new enrollees seek care. This research will help inform policymakers, concerned about growing Medicaid costs and new enrollees, which potential strategies to deploy for reduced costs and higher quality.

Even for the 19 states who currently haven't expanded Medicaid they will still most likely experience an increase in enrollment by what is known as the "woodwork" effect. In health policy terminology, the "woodwork" effect applies to individuals who were eligible for Medicaid before the ACA but did not enroll. Accompanied with the rollout of the ACA in 2013 was outreach and educational campaigns to educate consumers on the different insurance plans available on the health exchange. With consumers getting the same application form for both private insurance and Medicaid, he or she is being assessed for Medicaid eligibility automatically. This has resulted in the "woodwork" effect where individuals already eligible but not enrolled gain Medicaid coverage. An example of this is NC, who hasn't expanded Medicaid but is still estimating the Medicaid rolls to grow by 87,127 people by 2021. Unlike individuals gaining coverage under the ACA who were not previously eligible for Medicaid, the federal government will not pay for 100 percent of the cost. For those enrollees considered part of the "woodwork" effect, the states have to pay their share of the cost in line with their current federal medical assistance percentage rate, which for NC is 35 percent. This means NC pays 35 percent on every dollar of cost for those currently Medicaid eligible, enrolled or not, while the federal government pays 65 percent (North Carolina Institute of Medicine, 2013). After education, Medicaid is NC's biggest line item expenditure and represents a large portion of the state's $20 billion dollar total budget, and finding strategies to contain costs among those that are deemed high-risk is important. This study highlights a homegrown transitional care model based in NC that could help alleviate the impact of the "woodwork" effect and the costs generated by high-risk enrollees.

Those enrollees seen as high-risk, and therefore costly, are oftentimes the disabled and elderly. In NC the aged, blind, and disabled enrollees account for only 25 percent of the Medicaid population but assume 75 percent of the spending on services. From a broader perspective nationally, when looking at individuals with costs above $25,000 dollars per year, you find 4 percent of enrollees accounting for 48 percent of total Medicaid spending (Wilson, 2009). These outcomes point towards a need to target and coordinate care across settings for those that are tagged high-risk, and consequently consume a higher percentage of acute services.

Looking at the ACA, one of its goals is to do exactly that by improving care coordination across providers and settings (Guterman, Davis, Stremikis, & Drake, 2010). Section 2602 of the ACA mandated the creation of the Federal Coordinated Health Care Office (FCHCO), which aims to improve access and care coordination for dually (i.e., Medicaid/Medicare) eligible individuals. FCHCO is researching and testing new models of care while preserving current models that have proven to be successful. In conjunction with the Center for Medicare and Medicaid Innovation Center, FCHCO intends to improve both the delivery of quality care while reducing the cost that is generated in providing it.

The ACA also authorized other delivery models, such as Section 3023 that focuses on hospital readmissions reduction programming or Section 3503, which looks at better medication management practices (Grabowski, 2012). Although other payers such as Medicare and commercial insurers have gotten more publicity for value-based payment reform and delivery innovation, it is the administrative oversight that the states provide within Medicaid that provides an ideal platform for unrestricted innovation

leading to new approaches (Dickson, 2015). Within this context, and the opportunities afforded by the ACA, the outcomes of this study and its outcomes could be of interest to national policymakers who are looking for best practices that have produced positive results in reducing costs by lowering 30-day readmission rates.

Key Elements of Transitional Care

This section will focus on the different components of the transitional care process. An overview will be presented regarding the key elements that define transitional care across published literature. In addition, an in-depth discussion will be presented focusing on both home visits and medication management, which are the two aspects of transitional care that act as a focal point for this study.

Overview

Transitional care is defined as a "broad range of time-limited services designed to ensure health care continuity, avoid preventable poor outcomes among at-risk populations, and promote the safe and timely transfer of patients from one level or setting of care to another" (Naylor, Aiken, Kurtzman, Olds, & Hirschman, 2011, p. 747). Transitional care serves as a set of interventions that should start in the inpatient setting and continue through discharge and primary care follow-up (Verhaegh et al., 2014). With approximately 20 percent of patients experiencing an adverse event in the weeks following a hospital discharge, it is important to have a set of interventions that can help prevent unnecessary readmissions and adverse events from occurring during the inpatient to outpatient transition phase (Rennke & Ranji, 2015). This phase is often challenging for patients, families, and the primary care providers they see because of

missing information that is not communicated at discharge (Ornstein, Smith, Foer, Lopez-Cantor, & Soriano, 2011). Care coordination before and after a hospital discharge can help mitigate this lack of communication by improving coordinated handoffs during transitions. Coordinated handoffs can help alleviate factors related to social determinants of health that impact readmissions after discharge such as poverty, transportation, social supports, and housing (Rennke et al., 2013). Research by Jones et al. (2016) found that phone calls, patient education, coordinated hospital discharge planning, physician follow-up, home visits, and medication reconciliation were the most common elements in transitional care programs addressing both clinical and social determinants of health.

A telephone call after discharge can be a low cost intervention strategy to help patients better understand their discharge instructions from the hospital. However, the literature is not consistent regarding the efficacy of phone calls in helping to reduce readmissions (Soong et al., 2014). In a study conducted between 2010 and 2012 in Madison, Wisconsin at the William S. Middleton Memorial Veterans Hospital, the Coordinated-Transitional Care (C-TraC) program was implemented, which is a phone based, scripted intervention within 48-72 hours post-discharge designed to reduce 30-day readmissions. Out of 708 veterans who enrolled in the C-TraC program, 47 percent were found to have a medication discrepancy with the average being two discrepancies per veteran. When looking at the C-TraC veterans before they enrolled in the program you saw a 30-day readmission rate of 34 percent. However, when they enrolled in the C-TraC program you saw the 30-day readmission rate drop to 23 percent ($p = 0.013$) (Kind et al., 2012).These results suggest a statistically significant relationship within this

cohort of veterans regarding 30-day readmissions and phone calls. However, in a separate study conducted between 2012 and 2013 at the University of California, San Francisco registered nurses (RN's) were embedded in a general internal medicine practice. As patients assigned to the practice were discharged from the hospital, RN's made scripted phone calls within 72 hours to help address problems as they were happening real time. Those patients contacted received fully scripted calls with a readmissions rate of 12.8 percent, while those that could not be contacted by phone had a readmission rate of 14.7 percent. Although the readmission rate was lower for those contacted it was not statistically significant ($p = 0.72$) (Tang, Fujimoto, & Karilner, 2014). This research reflects the inconsistent outcomes that is present in the literature around post-discharge phone calls.

Many times as patients leave the hospital they are not sufficiently educated on how to manage their chronic illness. This is compounded by the fact that getting discharged from a hospital can be a stressful time for both the patient and caregiver (Aspenson & Hazaray, 2012). Discerning the optimal time to engage the patient when in the hospital is important. Many times patient education is only performed at hospital discharge in a hurriedly manner when anxiety is high and understanding is minimal (Hari & Rosenzweig, 2012). This inpatient reality highlights the importance of patient education by a care manager in the home environment after discharge. Approaching patient education both in the hospital and at home is a subtle process that must be targeted to the needs of the patient, including assessing health literacy level and what, if any, social supports the patient has. Patient education during transitions of care should reflect a collaborative process that embodies trust through a shared care plan between

the patient, care manager, hospital discharge planner, and the primary care physician for follow-up (Putnam, 2016). Hospitals have started to implement specific strategies during the transitional care process to better train staff on how to assess patient needs. One such strategy is called the “teach-back” method. This method trains staff to verify that the patient understands their discharge instructions by encouraging verbal responses to questions and creating an atmosphere of openness. Staff learn to speak plainly and not overload patients with too much information that can’t be processed easily (Kornburger, Gibson, Sadowski, Maletta, & Klingbeil, 2013). As mentioned earlier the transitional care process begins at the inpatient setting and follows through to the primary care visit. Patient education is a continual process throughout the transitional care intervention and should be reinforced after hospital discharge in both the primary care practice as well as the home. Patient education in the home has been demonstrated to be especially effective in prior research on the management of diabetes. In a study conducted by Rutgers University School of Nursing, home visits that included self-management diabetic education resulted in reduced A1C levels by 12 percent ($p=0.0107$) and serum glucose levels by 12 percent ($p=0.0994$) compared to home visits without self-management diabetic education (Lavelle et al., 2016). Employing patient education strategies such as the “teach back” method and motivational interviewing in the transitional care process helps increase patient activation which improves patient outcomes.

On an annual basis there are more than 35 million hospital discharges in the U.S. that in many cases is characterized by a lack of uniformity and standardization in its implementation (Apkon & Friedman, 2014). This lack of coordination among hospital

discharge planning protocols promotes fragmentation and poor communication of discharge instructions between hospital-based and community-based providers. It is estimated that the discharge summary is only available at the time of the primary care visit after discharge between 12 percent and 34 percent of the time. This range increases to between 51 percent and 77 percent at one month post-discharge (Doctoroff & McNally, 2014). Because of this variation and the focus on reducing readmissions, CMS is now measuring and publicly reporting on hospital discharge planning documentation. This increased transparency is expected to encourage best practices and standardization among hospitals that will result in improved patient outcomes (Jha, Orav, & Epstein, 2009). These outcomes should complement effective transitions of care through better patient and family engagement at discharge, open communication channels for sharing of patient information with receiving clinicians, and mobilizing support and follow-up for care coordination activities after discharge (Boutwell, 2010). In order to coordinate the discharge process you need an interdisciplinary, team-based approach that encourages direct communication between the hospital-based clinician, nurse, and social worker with the community-based care coordinator who will be following the patient after discharge into the practice and home based setting (Greysen, Schiliro, Curry, Bradley, & Horwitz, 2011). This “warm” hand-off promotes continuity between the inpatient and outpatient setting with a bi-directional flow of information.

One of the more important components of the discharge planning process is ensuring that the patient gets back to see their physician after hospitalization. Throughout the literature it is acknowledged that a patient’s failure to follow-up with their

primary care physician after a hospitalization is one of the leading causes of readmissions (Hardman & Newcomb, 2015). To reinforce this point prior research has indicated that the odds of a 30-day readmission increases by a factor of 10 when a hospital discharge is not accompanied by a visit to the primary care provider (Coller, Klitzner, Lerner, & Chung, 2013). Because of the vulnerable nature of transitioning from one setting to another, timely physician follow-up can help promote much needed continuity of care for the patient (Field, Ogarek, Garber, Reed, & Gurwitz, 2014). This continuity can help alleviate the fragmentation of care that a patient may experience during a transition after hospital discharge. The primary care provider can play a major role in spearheading this process to ensure a smooth transition from inpatient to outpatient. This role includes a thorough review of the patients discharge instructions to ensure medications are being managed properly and an assessment of services put in place by the hospital to confirm they are indeed being implemented (Kreimer, 2015). Any issues or discrepancies that may be identified can be addressed through the practice that has the resources to employ a support staff that includes social workers and RN's. Ultimately, the primary care provider with such resources is well positioned to address the issues that patients experience after hospital discharge. Barriers such as no social supports, lack of transportation, and difficulty navigating the health care system can potentially be addressed by a care manager who ensures a timely follow-up visit with a provider who is engaged and knowledgeable of community resources.

Home Visit

The transition after a hospitalization is a vulnerable timeframe for patients when handoffs between providers commonly result in errors being made. The shift from an

acute level of care to a lower level of care comes with many opportunities for mistakes to occur as patients fall through the cracks. This lack of continuity from an inpatient setting to an outpatient setting is compounded by high-risk patients with acute chronic conditions and complex needs (Kashiwagi, Burton, Kirkland, Cha, & Varkey, 2012). High-risk patients face both clinical and social issues that impact health outcomes after a hospital discharge. A home visit by a care manager after a hospital discharge can help alleviate these issues by connecting the patient to community-based resources to increase continuity and enhance health outcomes. Care managers can follow-up on the clinical status of the patient by performing a comprehensive health assessment that examines their physical, cognitive, and functional levels. Care managers can ensure adherence to discharge medications while addressing any potential contraindications, and establish a self-management plan for areas such as nutrition. The care manager can also connect the patient to the primary care provider to ensure timely medical follow-up after hospitalization. In addition to the clinical issues a care manager can also address the social issues. Because a home visit gives the care manager the ability to scan the home environment, social issues such as food instability, domestic violence, and transportation can be assessed firsthand (Krieger, Philby, & Brooks, 2011). This helps remove barriers, such as lack of social supports, which are difficult to assess and identify within the walls of the hospital setting. Home visits provide a layer of transparency and intimacy for the care manager into the patient's world that can't be achieved otherwise.

Although home visits can help educate patients and increase the level of patient engagement, there is conflicting outcomes within the literature regarding their efficacy

on reducing readmissions (Krieger, 2009). A randomized controlled trial conducted from 2003 through 2005 studied a cohort of patients and the impact of home visits within 7 days after discharge by a community nurse on 30-day readmissions. Each arm of the study, both the intervention and control groups, consisted of 166 patents with the intervention group receiving a home visit within 30 days of discharge. Although the results did indicate that patient satisfaction increased with home visits, there was not a statistically significant reduction in 30-day readmissions among the intervention group compared to the control group (p=0.648) (Wong et al., 2008). In another study in Burlington, Ontario, a group of 113 elderly people were divided up in two arms. The visiting nurse intervention arm had 59 participants and the usual care grouping arm had 54 participants. Those study participants in the visiting nurse intervention received a comprehensive assessment along with a care plan, home visits, and follow-up phone calls over the 14 month program. Outcome data showed no statistically significant difference (p=0.52) between the visiting nurse intervention group compared with the usual care group on readmissions or health care utilization for the study participants (Dalby et al., 2000).

There were also examples in the existing literature where home visits had a positive impact on 30-day readmissions. A study utilizing advanced practice nurses with patients that have chronic obstructive pulmonary disease (COPD) was conducted beginning in July 1999 in a large multi-disciplinary organization in Ohio. The study included 80 participants which were broken out into two arms. One arm consisted of 41 participants cared for by advanced practice nurses and supervised by a COPD management team, and the other arm was a control group of 39 participants receiving

routine home care. The advanced practice nurse grouping received discharge preparation coupled with coordinated home visits that included assessments including plan of care protocols, telephone calls, and a COPD advanced practice nurse specialist who is available 24-hours a day. The usual care grouping did not receive the advanced practice nurse expertise but did receive physical and environmental assessments. The outcomes revealed a statistically significant ($p<.05$) reduction in readmissions for those participants in the advanced practice nurse arm of the study (Neff, Madigan, & Narsavgage, 2003). Another study conducted between 1997 and 1998 at a teaching hospital looked at patients with chronic heart failure and what impact home visits would have on readmissions. The trial consisted of 165 randomized patients where 84 received the intervention while 81 received usual care. Usual care patients did not receive a home visit after discharge by a specialist nurse trained in heart failure while the intervention group did. These home visits included patient education, self-monitoring and management, and follow-up phone calls. A statistically significant result ($p=0.03$) showed that the risk of readmission for the intervention group was reduced while the number of admissions for heart failure was cut in half (Blue et al., 2001).

These studies highlight the diverse outcomes that are present in the literature regarding the impact of a home visit in reducing 30-day readmissions. Although it is clear that home visits help promote continuity for the patient during transitions of care, the literature suggests its impact on reducing 30-day readmissions is variable.

Medication Reconciliation

Medication reconciliation has become an ever increasing factor in the quest to reduce readmissions among high-risk patients as multiple medications are typically

prescribed at hospital discharge (Hoisington, 2012). Prior research has shown that medication discrepancies are present in up to 70 percent of patients at either hospital admission or discharge, which often results in an adverse drug event occurring that eventually culminates in a readmission (Snyderman, Salzman, Mills, Hersh, & Parks, 2014). Non-adherence among high-risk patients is especially prevalent and contributes significantly towards adverse drug events. This non-adherence manifests itself in the patient having difficulty reconciling the medications they were taking prior to hospitalization and what was prescribed at discharge. This confusion results many times in contraindications for the patient and is associated with 66 percent of readmissions (Polinski et al,. 2016). This is why medication reconciliation soon after a hospitalization is crucial to educate the patient on what they are taking and how best to avoid medication omissions and duplications (Edlin, 2014). Medication reconciliation not only enhances the patients' health literacy level on the brand and generic drugs they are taking, it also helps alleviate fragmentation between the discharging hospital physician and the receiving primary care physician that often occurs at transitions of care (Hoban, 2012). Minimal communication at discharge between the care team members invites this type of fragmentation, which a care manager can help bridge by ensuring services are in place and medications are reconciled in the patient's home environment.

Although medication reconciliation can help prevent adverse drug events after discharge, there is conflicting outcomes within the literature regarding their efficacy on reducing readmissions. In a randomized trial study between 2002 and 2003 at Brigham and Women's Hospital in Boston, Massachusetts, 178 patients being discharged home were assigned to two groups. The intervention group consisted of 92 participants and

the usual care group consisted of 84.Those in the intervention group received a pharmacist intervention on the day of discharge where patients were screened for prior drug related problems and adherence. Additionally, the intervention group received a series of phone calls from a pharmacist at three to five days after discharge reconciling the medications they were taking before and after the hospitalization. As a final step these findings were communicated to the patient's primary care physician. The usual care group received a routine review of medications by a pharmacist as well as medication counseling by a nurse at hospital discharge. The outcomes of the study did not show any statistically significant reduction ($p>.99$) on either emergency department visits or readmissions between the intervention and usual care groupings (Schnipper et al., 2006). In another study conducted between 2006 and 2007 at the University of Michigan Medical Center in Ann Arbor, Michigan, 724 patients were enrolled at hospital discharge with the objective to see if medication reconciliation impacted 30-day readmissions. In the intervention arm of the study were 358 participants who received a pharmacist led discharge protocol encompassing a discharge medication therapy assessment, medication reconciliation, patient counseling and education, and several post-discharge telephone follow-up calls at 72 hours to monitor discrepancies. The control arm of the study consisted of 366 participants who received usual care at discharge. This included a nurse led discharge protocol consisting of education on discharge instructions that included a print out of medications with instructions. Outcomes of the study revealed that a reduction in 30-day readmissions was not statistically significant ($p=0.17$) between the two groups (Walker et al., 2009).

There were also examples in the existing literature where medication reconciliation did have a positive impact on 30-day readmissions. One of these examples was a study conducted March through June of 2007 at Baylor University Medical Center, where 41 patients who were recently discharged enrolled in both intervention and control study groupings. The intervention arm consisted of 20 participants who received medication reconciliation and education by a clinical pharmacist at discharge, discharge planning by a care manager, and several follow-up phone calls five to seven days after discharge from both the care manager and pharmacist to monitor medication discrepancies. The control arm received usual care which included medication reconciliation and education at discharge but did not include any follow-up phone calls from a pharmacist or care manager. Outcomes of the study saw a statistically significant reduction ($p=0.04$) in both 30-day readmissions and emergency department visits for the intervention group versus the control group (Koehler et al., 2009).

These studies highlight the diverse outcomes that are present in the literature regarding the impact of a medication reconciliation in reducing 30-day readmissions. Although it is clear that medication reconciliation helps minimize adverse drug events after hospital discharge, the literature suggests its impact on reducing 30-day readmissions is inconsistent.

Models of Transitional Care

This section will focus on several different models of transitional care that currently exists within published literature. These models include The Transitional Care Model, The Care Transitions Intervention, and the Re-Engineered Hospital Discharge

Model. The last transitional care model that will be discussed in this section is CCNC's Transitional Care Program, which will act as the model for this study's research.

The Transitional Care Model

Developed by Mary Naylor at the University of Pennsylvania is The Transitional Care Model (TCM). This intervention is led by a master's prepared advanced practice registered nurse (APRN) who takes a team-based approach incorporating the patient, their family, and provider in a coordinated plan of care. This model supplements the care the patent receives during the admission and discharge, while replacing the care the patient receives in the home after discharge. The TCM model includes a comprehensive patient assessment, evidenced-based care plans, regular home visits with medication reconciliation, telephonic support after discharge, clear communication channels between the hospital and primary care physician, and patient and family engagement strategies (Naylor & Sochalski, 2010). Inside TCM are specific components that include

- Screening which adults transitioning from hospital to home who are at high-risk for poor outcomes,
- Staffing APRN's who assume primary responsibility for care management throughout episodes of acute illness,
- Maintaining relationships with the patient and family caregivers,
- Engaging patients and caregivers in the design and implementation of the plan of care,
- Assessing and managing risks and symptoms for priority risk factors,

- Education on self-management to identify and respond to worsening symptoms,
- Collaborating by promoting a consensus on plan of care,
- Promoting continuity by involving the same clinicians across transitions of care, and
- Fostering coordination between health care and community-based practitioners

(Hirschman, Shaid, McCauley, Pauly, & Naylor, 2015). The focus of TCM is to facilitate optimal long-term outcomes for patients and their families after hospital discharge (Bixby & Naylor, 2009).

Based on prior research focusing on TCM, outcomes have been positive when looking at reducing the incidence of readmissions. A randomized study conducted between 1992 and 1996 at the hospital of the University of Pennsylvania and the Presbyterian Medical Center of the University of Pennsylvania Health System examined the effectiveness of using an APRN in reducing readmissions. The study enrolled 363 patients with both Medicare and Medicaid in an intervention and control group. In the intervention arm of the study 177 patients received an APRN led comprehensive discharge protocol, which included home visits within 48 hours of discharge and weekly telephone calls. The APRN also communicated goal plans to the patient's provider as well as family or caregivers to ensure the care team was aware of the details of the intervention. The control group received a less intense discharge and home care protocol that was considered standard care. The results of the study revealed a statistically significant outcome where at 24 weeks post-discharge the intervention

group was less likely to be readmitted (p<.001) and have fewer multiple readmissions (p=.01) than the control group (Naylor et al., 1999).

In another study at six Philadelphia academic and community hospitals, a group of 339 Medicare and Medicaid patients hospitalized with heart failure were enrolled in both an intervention and control study group. Conducted between 1997 and 2001, the intervention arm of the study had 118 participants who received an APRN led discharge protocol that started at admission and ended three months after discharge. The intervention included daily APRN inpatient visits, eight APRN led home visits with the first one being within 24 hours of discharge, and seven day a week telephone availability for patient issues. The control group of 121 participants received the standard discharge protocol for hospitalized heart failure patients. The control group only received follow-up care after discharge if they were referred to a home health agency for care at discharge. Looking at readmissions after 52 weeks the study revealed that the intervention group had statistically significant fewer readmissions (p=.047) than the control group (Naylor et al., 2004).

The Care Transitions Intervention

Developed by Eric Coleman to address the needs of complex patients being discharged from the hospital setting, The Care Transitions Intervention (CTI) model incorporates the element of a transitional care health coach in a model that is focused on patient activation and self-management education (Lattimer, 2012). CTI encourages high-risk patients to take more of an active role in the management of their heath by communicating with their provider. Trained APRN transition coach's follow-up with patients post-discharge with home visits and regular phone calls to ensure they connect

with their primary physician and receive on-going care (Voss et al., 2011). CTI begins at admission where a coach visits the patient and begins the process of engaging both the patient and the family. Upon discharge a home visit occurs where a care plan is put into place and medication are reconciled. Appointments with the primary care provider or specialist are managed addressing barriers such as transportation. The patient is also educated on red flags that assist in identifying worsening signs and symptoms (Gardner et al., 2014). CTI is broken down by four pillars that include (a) medication reconciliation, (b) review of the patients' health record, (c) arranging follow-up visits for provider appointments, and (d) education on visible "red flags" reflecting deterioration of the patient's health.

Based on prior research focusing on CTI, outcomes have been positive when looking at reducing the incidence of readmissions. A controlled trial at a large Colorado health care delivery system included 712 participants who were randomized in both an intervention arm and a control arm. This study, conducted between 2002 and 2003, had an intervention arm that included 360 patients who received home visits performed within 48-72 hours after discharge and a series of phone calls in the following weeks. These activities usually occur across a 28-day timespan after discharge. The control arm of the study included 352 patients who did not receive post-discharge follow-up. When looking at readmission outcomes 30 days after discharge the intervention group had statistically significant lower rates of readmissions ($p=.048$) than the control group. When looking further out from discharge at 90 days there was also a statistically significant reduction ($p=.04$) in readmissions (Coleman, Parry, Chalmers, & Min, 2006).

In another study, conducted between 2001 and 2002 in a managed care delivery system in Colorado, an intervention group of 158 Medicare and Medicaid enrollees chose to participate to see what impact a 24 day post-discharge follow-up process would have on readmission rates. This protocol included a home visit within 24-72 hours of discharge, medication reconciliation, patient-centered medical record review, provider follow-up, and “red flag” education addressing warning signs. In this study the health coach was a geriatric nurse practitioner who had experience in disease self-management. The control arm of the study included 1,235 Medicare and Medicaid participants that were extracted from the managed care delivery system’s historical administrative claims data. The control group did not receive the post-discharge intervention. When looking at 30-day readmissions from an odds ratio perspective, with a confidence interval of 95 percent, the intervention group was half as likely (0.52) as the control group to make a return trip to the hospital. At 90 days the odds ratio improved (0.43) even more when comparing the intervention group with the control group (Coleman et al., 2004).

Project Re-Engineered Discharge (RED)

The Re-Engineered Hospital Discharge (Project RED) model was created to improve the standardization of the discharge process in order to reduce readmissions after hospitalization. 12 distinct components of the process outline specific strategies that hospitals are deploying to not only reduce readmissions put improve patient safety (Tan-McGrory & Betancourt, 2014). Those components include

- Ascertain the need for language assistance,

- Make medical appointments and post-discharge tests for follow-up care,
- Make a plan for follow-up on the results of tests or labs pending at discharge,
- Organize post-discharge outpatient services,
- Make a plan of care for prescriptions so the patient can access them,
- Align the discharge instructions with national guidelines,
- Teach a written discharge plan the patient can understand,
- Provide patient education on his or her diagnosis and prescriptions,
- Identify red flags and instruct the patient what to do if a problem arises,
- Assess the degree of the patient's understanding of the discharge plan,
- Assist in communicating the discharge summary to receiving providers who will accepting care of the patient, and
- Provide telephone support of the discharge plan

(Re-Engineered Discharge (RED) Toolkit, 2014). Pharmacists play a key role within the Project RED process by educating the patient on their medications and providing telephonic support after discharge. Medication reconciliation, both in the hospital and by telephone within 72 hours after discharge, is a critical step where issues are resolved and information is communicated between the inpatient care team and the patients' primary care provider (Erickson, 2013). However, Project RED employs a team based approach with not only a pharmacist providing medication management during and after the discharge but potentially a social worker arranging post-discharge social supports. Clinical staff like registered nurses also engage in patient activation techniques such as "teachback" methods (Re-Engineered Discharge (RED) Toolkit, 2014).

Based on prior research using Project RED, outcomes have been positive when looking at reducing the rate of hospital utilization. In a study set between 2006 and 2007 at Boston Medical Center in Boston, Massachusetts, 738 participants were randomly assigned into an intervention group and a usual care group. The 370 participants in the intervention group received a three part protocol that included an in-hospital nurse discharge advocate, an after-hospital care plan, and a pharmacist who called within two to four days after discharge to reinforce the discharge plan. For the 368 participants in the usual care group this level of intervention was not available. The outcomes of the study revealed that the participants in the intervention group had a statistically significant ($p=.009$) lower rate of hospital utilization than the usual care group (Jack et al., 2009).

In another study, conducted at Boston Medical Center from July 2012 through May 2013, a retrospective chart review was performed where 401 patients were extracted to see who received a discharge nurse education intervention as well as a phone call from a pharmacist. This phone call was within two to four days post-discharge and helped reconcile the patient's medications and reinforce their discharge instructions. In the intervention group were 277 participants who received both and in the control group were 124 patients who had been unable to contact after discharge. When looking at the outcome, which was the rate of unplanned hospitalization within 30 days of discharge, the intervention group saw a 17.7 percent rate while the control group had a rate of 33.9 percent. This was statistically significant at $p<0.001$, which indicates the intervention was successful (Sanchez, Douglass, & Mancuso, 2015).

Community Care of North Carolina Transitional Care Program

CCNC is a state-wide network of 14 regional networks covering all 100 NC counties offering access to care for 1.9 million Medicaid patients. Each regional network offers care management (usually a registered nurse), quality improvement, and data informatics for practices enrolled as medical homes. CCNC medical homes provide access to coordinated, high-quality health care with CCNC care managers embedded to work alongside primary care providers (Dubard, 2013). Through the proximity to the practice and its providers the care manager can help improve patient outcomes by collaborating on patient treatment plans. This can include reinforcing provider recommendations, educating on lifestyle changes, and ensuring community-based supports are in place for the patient when referrals are made by the provider (Steiner et al., 2008). Over the last several years CCNC has developed a robust model of transitional care that is data driven and focused on finding the most impactful patient after hospital discharge. The transitional care period spans 30 days and includes components taken from previous transitional care models including both Coleman and Naylor (Schiff, 2016). CCNC's transitional care model includes a visit by a care manager at bedside upon admission. A comprehensive health assessment is started and a rapport with the patient is developed. This assessment can only be done by an RN, a social worker with a bachelor or master's degree, or a pharmacist per guidelines. At discharge the care manager works closely with hospital staff to ensure a "warm" handoff through clear and open communication. Within 72 hours of discharge a home visit is supposed to be conducted where the comprehensive health assessment is continued, which includes a medication reconciliation. The intense review of

medications is intended to identify any issues that could result in a negative outcomes for the patient. Screenings for depression, substance abuse, and palliative care are conducted. If a need arises from these screenings referrals are made to community resources for follow-up. The care manager confirms with the patient of any appointments that could have been scheduled at discharge and arranges transportation. The patient is managed at a “heavy” status for 30 days which requires a weekly contact by the care manager. Per transitional care guidelines, the care manager is required to complete a home visit, medication reconciliation, and a health assessment on “heavy” patients. Once the patient is stabilized the care manager can document that the patient is “well-linked” and/or “identified needs/goals have been met” and move on to another patient. In the situations where the patient refuses a home visit after discharge the care manager can attempt to contact the patient by phone and provide the intervention. If after three to five unsuccessful attempts to contact the patient fails there is a process in place for the care manager to defer the patient as “unable to contact”. Although the care manager must follow the transitional care guidelines there is flexibility and clinical judgment allowed at the discretion of the care manager. This flexibility allows the care manager to accommodate the patients’ needs when presented and not become too rigid in their approach.

Based on existing research, outcomes have been positive for CCNC when looking at reducing overall cost and the rate of hospital utilization. In a study looking at Medicaid claims data between 2007 through 2011, 169,667 CCNC eligible Medicaid recipients between 0-64 were analyzed to see the impact of the program on cost. Comparing those recipients enrolled with CCNC and their months of eligibility

(1,737,096) with those recipients not enrolled (2,550,284) with CCNC and their months of eligibility, you find a statistically significant per member per month savings of $190.91 for the first year of the study in 2007 and $63.74 per member per month for the last year of the study in 2011. Over the course of the 5 year study it was estimated overall savings of $184,064,611 for those recipients who were in enrolled in CCNC versus those recipients not enrolled in CCNC (Fillmore, DuBard, Ritter, and Jackson, 2014). In another CCNC study using a respective cohort analysis, a 12-month window from July 2010 to June 2011 of hospital discharges were reviewed to see if the CCNC nurse directed transitional care intervention reduced future hospitalization. Those retrospectively assigned to the intervention group (1,104) received a transitional care screening or assessment within 30 days of discharge by a CCNC nurse. The usual care group did not receive this intervention. When looking at the outcome measure of any readmission within 30 days occurring, you find the intervention group with a 30-day readmission rate of 16.3 percent versus the usual care group of 25.9 percent. This 10 percent reduction in 30-day readmissions suggests the CCNC transitional care intervention as an effective strategy within the Medicaid population (Jackson et al., 2015).

Key Takeaways

When looking at the overview of the research studies within the literature review (see Table 1) the outcomes regarding 30-day readmissions varied by study. Studies focusing on home visits implemented research designs that were both observational and experimental, while enrolling similar number of study participants. The setting of the studies varied widely from foreign countries such as Hong Kong and Canada, to the

state of Ohio in the U.S. Outcomes were mixed with half of the studies showing statistical significance in reducing 30-day readmissions while the other half did not (those studies with a statistical significant observed effect are highlighted in red).

A great example of an intervention focused on medication reconciliation is Project Red, which is an intervention focused on patient advocacy at hospital discharge and a pharmacist following up with post discharge phone calls focused on medication management. When reviewing the literature both experimental and observational research design studies resulted in a statistically significant reduction in 30-day readmissions. Although there was another study focused on medication reconciliation that did not result in statistical significance, overall the articles based on this intervention had an outcome favoring significance in the reduction of 30-day readmissions.

Many of the studies blended both home visits and medication reconciliation into their models such as TCM, CTI, and CCNC's Transitional Care Program. These comprehensive interventions included both observational and experimental studies with a range of different settings and fluctuating numbers in terms of participants who enrolled. The studies produced outcomes reflecting statistical significance in reducing 30-day readmissions, which indicates a positive return on investment.

Table 1. Overview of Research Studies within the Literature Review

Intervention	Setting	Number of People	Research Design	Observed Effect on 30-Day Readmissions
Coordinated Transitional Care (C-TraC) (phone based protocol drive program)	William S. Middleton Memorial Veterans Hospital Madison, WI.	708	observational	(p = 0.013)
Embedded nurses in practices calling patients within 72 hours discharge	General internal medicine practice at University of California in San Francisco	790	observational	(p = 0.72)
Home Visits by nurse within 30 days	3 regional hospitals in Hong Kong	332	experimental	(p = 0.648)
Home visit by nurse after discharge	Primary care practice in Ontario, Canada	113	experimental	(p = 0.52)
Advanced practice nurse home visits for COPD patients	Multi-disciplinary agency in Ohio	80	observational	(p < .05)
Home visits by nurse specialists after discharge	Acute medical admission unit in a teaching hospital	165	experimental	(p = 0.03)
Pharmacist counseling at discharge and phone call at 3-5 days after discharge	Brigham and Women's Hospital Boston, Mass.	178	experimental	(p > .99)

Table 1. Overview of Research Studies within the Literature Review (Continued)

Intervention	Setting	Number of People	Research Design	Observed Effect on 30-Day Readmissions
Medication therapy, counseling, and telephone follow-up	University of Michigan Medical Center	724	observational	(p = 0.17)
Medication counseling, discharge planning by care manager, phone follow-up at 5-7 days	Baylor University Medical Center	41	experimental	(p = 0.04)
Transitional Care Model (comprehensive discharge planning and home follow-up)	Two urban academic medical centers	363	experimental	(p < .001)
Transitional Care Model (advanced practice nurse comprehensive discharge planning and home follow-up)	Six Philadelphia academic and community hospitals	239	experimental	(p = .047)
Care Transitions Interventions (advanced practice nurse home visit and medication reconciliation	Large not-for-profit capitated delivery system	712	experimental	(p = .048)

Table 1. Overview of Research Studies within the Literature Review (Continued)

Intervention	Setting	Number of People	Research Design	Observed Effect on 30-Day Readmissions
Project RED (medication reconciliation by phone, hospital nurse discharge advocate, and after hospital care plan	Boston Medical Center	738	experimental	(p = .009)
Care Transitions Interventions (advanced practice nurse home visit, patient education, and medication reconciliation	Large integrated delivery system in Colorado	1,398	observational	0.52 (Odds ratio perspective with a CI of 95% where the intervention group less likely for a 30-day readmissions)
Project RED (phone based medication reconciliation by a pharmacist, hospital nurse discharge advocate, and after hospital care plan	Boston Medical Center	401	observational	(p < .0.001)
CCNC Transitional Care Program (home visit with 72 hours, medication reconciliation, and patient education)	NC Medicaid recipients enrolled in CCNC	1,717	observational	Reduction in 30- day readmissions (control – 25.9% versus. intervention 16.3%)

Summary of Literature Review

This section highlighted existing literature related to transitional care and its impact on 30-day readmissions. First, the focus of this study on 30-day readmissions was put into context alongside the ACA and its goal of higher quality and reduced cost. Secondly, individual elements of transitional care were discussed that included phone calls, patient education, coordinated hospital discharge planning, physician follow-up, home visits, and medication reconciliation. Lastly, current models of transitional care such as TCM, CTI, Project RED, and CCNC's Transitional Care Program was discussed and key takeaways were briefly touch upon. In chapter three the methodology of the study will be reviewed.

CHAPTER III

METHODOLOGY

This section presents the research design, study setting and a brief discussion of the sample. In addition, chapter three includes an overview of the data, data collection procedure used, data analysis, and a summary of the chapter.

Research Design

The design of this research study is non-experimental, comparative study using a retrospective cohort with secondary data obtained from the North Carolina Division of Medical Assistance (DMA), which is the entity responsible for administering and overseeing Medicaid. This is an observable study and not a randomized trial therefore the variation will be explained rather than controlled.

Study Setting

The setting of the study are the 27 counties across eastern NC that encompass the catchment area for Community Care Plan of Eastern Carolina (CCPEC). CCPEC is one of 14 networks that comprises CCNC (see Figure 1), which is the primary care case management arm of NC Medicaid with a presence in all 100 counties.

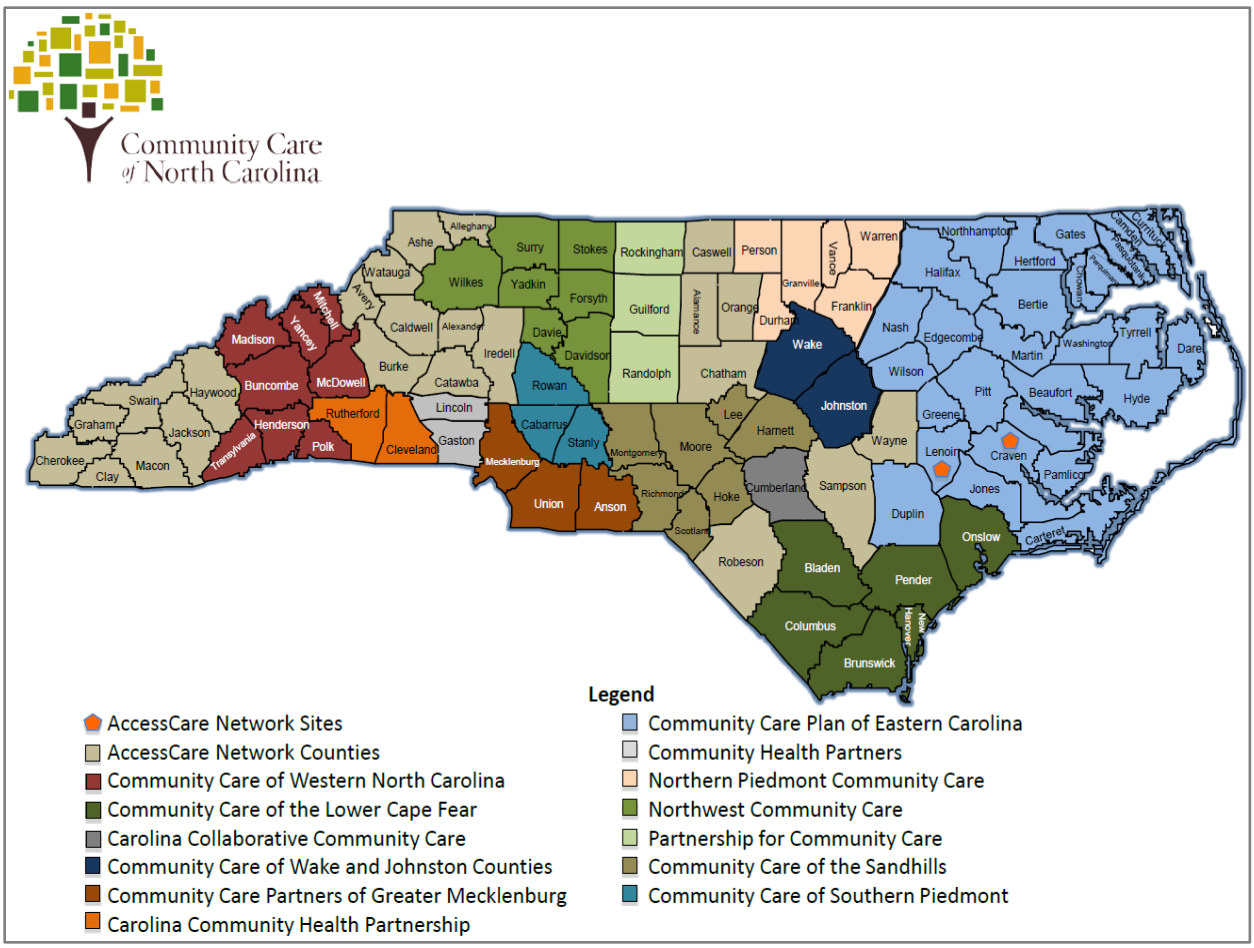

Figure 1. CCNC Network County Map
From "CCNC Network County Map," by CCNC, 2013, https://www.communitycarenc.org/ccnc-network-nc-county-maps/. Copyright 2013 by CCNC. Reprinted with permission.

With eastern NC having a contingent of rural counties with unfavorable social determinants of health outcomes, this area of the state is an appropriate location to study high-risk Medicaid patients. Moreover, data for CCPEC is available that would allow such a study to take place.

Sample

Across the 27 county CCPEC catchment area there are 190,000 unique Medicaid patients enrolled in the network. All Medicaid patients are assigned to a

primary care practice within CCPEC which serves as their medical home. Medicaid patients meeting specific risk stratification criteria receive targeted care management services. The sample for this study are those Medicaid patients with the specific designation of a transitional care priority indicator. This indicator recommends a standardized 30-day transitional care follow-up process for high-risk Medicaid patients discharged from a hospital setting. This study represents 100 percent of the population for those that meet the criteria.

The process to determine a sample size includes multiple criteria starting with a specific timeframe for the data set. The time frame covers the dates from July 1st 2013 through June 30th 2015 and includes 46,086 hospital admissions within CCPEC's 27 county catchment area. This two-year timeframe relies on NC Medicaid administrative paid claims data that was used for analysis.

Because CCPEC care managers normally only conduct a transitional care home visit on those Medicaid patients who live and are discharged from a hospital within CCPEC's 27 county catchment area, all hospital admissions not meeting that criteria are excluded. This exclusion results in 44,959 hospital admissions being left in the data set.

To increase consistency within the data Medicaid patients below 18 years old are excluded from the analysis. This is done to address the differing levels of acuteness in disease prevalence and severity between children and the adult Medicaid population. Because the study is targeting high-risk Medicaid patients it makes for a more uniform data set to focus on those age brackets with the highest prevalence of health burden. The intent was to create a more homogeneous group for comparison. All patients 65

years of age or older were excluded as well. This study is focusing on Medicaid only patients and those 65 years of age or older carry Medicare. These exclusions resulted in 15,459 hospital admissions being eliminated from the analysis which brings the number down to 29,500 hospital admissions.

This number is further reduced by 22,390 hospital admissions after dually eligible patients, those having both Medicare and Medicaid, as well as patients that don't have the transitional care priority indicator are excluded. Dually eligible patients are excluded on the account of incomplete Medicare claims data. When both of these exclusions are taken into account only 7,110 hospital admissions remain.

For this study transfers between hospitals and same day readmissions are excluded. Additionally, any obstetrical, newborn, malignancy, burn, or trauma care admissions or readmissions were excluded because many times these events are planned or unavoidable. These exclusions reduced the number of hospital admissions to 6,549.

Because the remaining 6,549 hospital admissions contain multiple readmissions by the same patients, and the intent of this study is to evaluate only the initial 30-day readmission, all subsequent readmissions by the same patient after the initial 30-day readmission is excluded resulting in a final sample size of 2,411 hospital admissions by unique Medicaid patient. This exclusion ensures that all observations are independent of one another. The final sample size of 2,411 hospital admissions is the data set used for analysis.

Data

The data points include admissions from 17 different hospitals across a 27 county region in eastern NC. The data set covers a time frame from July 1st, 2013 through June 30th, 2015. The variables included in the data set are 30-day readmission, home visit, medication reconciliation, time of home visit, race, gender, age, and aggregated clinical risk group (ACRG).

The 30-day readmission variable represents whether the Medicaid patient was readmitted within 30 days of the index hospital admission. All cause readmissions irrelevant of diagnoses accounted for 30-day readmissions, with the only exclusions being those outlined in the criteria that determined the sample. The 30-day readmission can occur at the same hospital as the original index admission or a different hospital. The ability to use NC Medicaid paid claims data allows a readmission to be captured regardless if it happened inside or outside CCPEC's 27 county catchment area. If a Medicaid patient is readmitted a 1 is recorded to indicate yes and if the patient is not readmitted a 0 is recorded to indicate no. This categorical variable is binary and has a level of measurement that is nominal. The 30-day readmission variable acts as the dependent variable throughout the study. The 30-day readmission variable is taken from Medicaid administrative paid claims data.

The data for home visit represents whether or not a Medicaid patient received a face-to-face visit by a care manager within the home setting. The home visit is to occur within 30 days of discharge to be eligible for the study. If the Medicaid patient receives a home visit a 1 is recorded to indicate yes and if the patient did not receive a home visit a 0 is recorded to indicate no. However, if the patient was readmitted within the 30-day

timeframe before a home visit was conducted then the subsequent home visit was recorded as a 0. Because this study is focused on the impact that a home visit plays in preventing the initial 30-day readmission it is crucial the home visit occur before a readmission takes place. Some of the reasons why a patient would not receive a home visit after discharge could be that the care manager could not reach the patient to schedule a home visit because of an inaccurate phone number or the patient could refuse care management services after discharge. Therefore, those that receive a home visit results from natural variation and it is this that is impactful as the study models the effect. The home visit variable is taken from a care management documentation system where it is entered by the visiting care manager in both a drop down menu format as well as a free text box. The home visit variable is categorical and because of its yes or no response is classified as binary. When looking at its level of measurement it is considered nominal. The home visit variable acts as an independent variable within the study.

The data for medication reconciliation represents whether or not a Medicaid patient received a medication reconciliation within 30 days after discharge. The medication reconciliation is to occur within 30 days of discharge to be eligible for the study. A medication reconciliation could occur face-to-face during the home visit or it could occur without a home visit by way of a telephone call. Some of the reasons why a patient would not receive a medication reconciliation after discharge could be that the care manager could not reach the patient to schedule a home visit, an inaccurate phone number prevented a telephonic medication reconciliation from taking place, or the patient could refuse care management services after discharge. Therefore, those that

receive a medication reconciliation results from natural variation and it is this that is impactful as the study models the effect. If the Medicaid patient receives a medication reconciliation a 1 is recorded to indicate yes and if the patient did not receive a medication reconciliation a 0 is recorded to indicate no. However, if the patient was readmitted within the 30-day timeframe before a medication reconciliation was conducted then the subsequent medication reconciliation was recorded as a 0. Because this study is focused on the impact that a medication reconciliation plays in preventing the initial 30-day readmission it is crucial the medication reconciliation occur before a readmission takes place. The medication reconciliation variable is taken from documentation provided by the care manager assigned to the Medicaid patient that is entered into a pharmacy based documentation system in both a drop down menu format as well as a free text box. In order for the care manager to capture a completed medication reconciliation three components have to be met, which are (a) completed medication list; (b) documented drug therapy problem; and (c) appropriate user credentials. When these three components are completed a medication reconciliation populates inside the pharmacy based documentation system. The medication reconciliation variable is categorical and because of its yes or no response is classified as binary. When looking at its level of measurement it is considered nominal. The medication reconciliation variable acts as an independent variable within the study.

The data for time of home visit represents the number of days it took for the Medicaid patient to receive a home visit from a care manager after hospital discharge. Because this study is only looking at 30 days after hospital discharge the timeframe of the home visit will range from one day up to 30 days. The time of home visit variable is

taken from a care management documentation system where it is entered by the visiting care manager in both a drop down menu format as well as a free text box. The time of home visit variable is discrete and when looking at its level of measurement it is considered ratio. The time of home visit acts as an independent variable within the study.

The data for race originates from the NC Medicaid eligibility and enrollment files. The classifications for race includes American Indian or Alaska Native, Asian, Africa American, Pacific Islander or Native Hawaiian, and Caucasian. Out of the 2,411 cases 2,288 are either Caucasian or African-American. If a patient was African-American a 0 was recorded and if the patient was Caucasian a 1 was recorded. The remaining 123 cases either had missing data classified as unreported (94) or were broken out between the various races of American Indian or Alaska Native (20), Asian (8), and Pacific Islander or Native Hawaiian (1). The 123 cases were treated collectively as missing data which will be discussed further in Chapter 4. The race variable is categorical and when looking at its level of measurement it is considered nominal. Race acts as an independent variable within the study.

The data for gender originates from the NC Medicaid eligibility and enrollment files. Gender is binary with only male and female classifications. If the Medicaid patient is a male then a 0 is recorded and if the Medicaid patient is a female a 1 is recorded. The gender variable is categorical and when looking at its level of measurement it is considered nominal. Gender acts as an independent variable within the study.

The data for age originates from the NC Medicaid eligibility and enrollment files. Because Medicaid patients under the age of 18 and over the age of 64 are excluded

from the study, this variable has a range from a low of 18 to a high of 64. The age variable is discrete and when looking at its level of measurement it is considered ratio. Age acts as an independent variable within the study.

The last variable that will be used for the analysis is ACRG's. ACRG's utilizes 3M Health Information System's Clinical Risk Groups (CRG) hierarchical clinical model that used standard claims data that includes (a) inpatient, (b) outpatient, (c) physicians, and (d) pharmacy data, which assigns each patient to a single mutually exclusive risk category. ACRG's constitute rolled up detailed CRG's into larger groupings which classifies patients according to the number and severity of their acute chronic conditions (Jackson, et al., 2013). This variable is aimed at gleaning the level of acuity the Medicaid patient has after hospital discharge. Each unique Medicaid patient is assigned an ACRG number grouping that ranges from a low of 62 to a high of 96. For those Medicaid patients with an ACRG number grouping in the 60's three chronic conditions will be present. If the Medicaid patient is in the 70's they will have three or more chronic conditions. If they are in the 80's malignancies such as cancer will be present, and if they are in the 90's catastrophic conditions like HIV will be present. The acuity of the chronic condition further determines where the patient will score in relation to the ACRG's. For example, if a patient has three chronic conditions and is therefore grouped with an ACRG number in the 60's but has a high acuity level for those chronic conditions, then that patient would have a higher probability of scoring a 66 as opposed to a 61. Within each ACRG number grouping (i.e., 60's, 70's, 80's, and 90's) there is an interval scale ranging from one through six. However, although the sample chosen for this study will have all the ACRG number groupings represented, not all the numbers

representing levels one through six appear within each ACRG number grouping (see Table 2).

Table 2. Aggregated Clinical Risk Groupings

ACRG Number Grouping	Description & Levels
62-66	Significant Chronic Disease in Multiple Organ Systems Level – 2, 3, 4, 5, 6
71-76	Dominant Chronic Disease in Three or More Organ Systems Level – 1, 2, 3, 4, 5,6
81-85	Dominant Metastatic, and Complicated Malignancies Level – 2, 3, 4, 5, 6
92-96	Catastrophic Conditions Level – 2, 3, 4, 5, 6

This is a result of the exclusion sample criteria eliminating certain numbers within each grouping. The ACRG variable is discrete and when looking at its level of measurement it is considered ratio. The ACRG data point acts as an independent variable within the study.

Data Collection Procedure

The variables included in the data set are 30-day readmission, home visit, medication reconciliation, time of home visit, race, gender, age, and ACRG. The data covers the time frame from July 1st 2013 - through June 30th 2015. All of the data is secondary and comes from several different sources outlined in the data section of the methodology chapter.

Data for 30-day readmissions, race, gender, age, and ACRG are taken from paid Medicaid administrative claims data as well as the NC Medicaid eligibility and

enrollment file data system. This data is owned by DMA who administers NC Medicaid. In order to gain permission for this data to be included within the study a ”request for access to health information for research” form is submitted, and if approved, the NC DMA generates a letter authorizing the use of Medicaid data for research. For this study DMA authorized the use of Medicaid data for research. In order to gain access to the data a Memorandum of Agreement must also be executed with CCNC who houses the report entitled, “Inpatient Visit Report - By Currently CCNC Enrolled PCP”, which contains several of the variables needed for the analysis. For this study the Memorandum of Agreement was executed with CCNC. The report is then transferred over to an independent third party who de-identifies the data to ensure confidentiality.

The data points for home visit and time of home visit is taken from a web-based care management platform called Case Management Information System (CMIS). CMIS is an on-line documentation tool that allows the capture of care management activity. The Memorandum of Agreement with CCNC allows access to this data. The data is extracted by an independent third party who pairs it with Medicaid administrative claims data and the NC Medicaid eligibility and enrollment file data.

The data points for medication reconciliation is taken from a web-based platform called Pharmacy Home. This application captures medication related activity from both care managers and pharmacists. The Memorandum of Agreement with CCNC allows access to this data. The data is extracted by an independent third party who pairs it with the home visit, time of home visit, Medicaid administrative claims data, and the NC Medicaid eligibility and enrollment file data.

Because the data is de-identified by an independent third party before the researcher has the opportunity to analyze the data, the Central Michigan University (CMU) Institutional Review Board (IRB) issued a determination that the study should not be considered human subject research, therefore exempt from IRB approval.

Analysis

The data for the time frame covering July 1st 2013 through June 30th 2015 is evaluated collectively and not individually by year. The three research questions of the study are analyzed using multiple logistic regression with the independent variables of home visit, medication reconciliation, time of home visit, race, gender, age, and ACRG being used. The dependent variable used in the analysis is 30-day readmission. Multiple logistic regression is used because the dependent variable is categorical while the independent variables are both categorical and continuous. Multiple logistic regression is used because having a categorical outcome variable violates the assumption of linearity in normal regression. Multiple logistic regression deals with this by using a logarithmic transformation on the outcome variable which permits a nonlinear association in a linear way. The limitation for multiple logistic regression is that the outcome variable must be discrete, which the variable of 30-day readmission fits. However, the advantage of logistic regression is it allows for a dependent binary variable to be measured against both continuous and dichotomous variables simultaneously, where linear regression cannot. Multiple logistic regression answers whether an outcome variable can be predicted by a given set of independent variables. Multiple logistic regression reveals the relative importance of each independent variable as well as their interaction. For this study the outcome variable is 30-day readmission

and the independent variables of interest are home visit, medication reconciliation, and timing of home visit. In addition, there are several other independent variables consisting of race, gender, age, and ACRG that will be used in the analysis. The intent is that through using multiple logistic regression these independent variables will help explain the variation in the outcome variable. Several assumptions with multiple logistic regression is multicollinearity, no outliers, interdependence of errors, and a solid ratio of cases to variables. A two-sided alpha level of 0.05 is used for significance and a .20 beta level indicating power of 80 percent for the study. The software Statistical Package for the Social Sciences (SPSS) is used to run the multiple logistic regression analysis. The results of the analysis in this study are placed into tables and figures for presentation while narrative interpretation of the results is provided to further explain the results.

A prospectus power analysis was performed to determine, based on prior research, what the expected effect size would be for a similar intervention of home visit and medication reconciliation. Based on prior research by Wong et al. (2008) it is estimated that an effect size of 40 percent is appropriate for a reduction in 30-day readmissions between an intervention group and a control group. This 40 percent reduction applies both to the independent variables of home visit and medication reconciliation. Those who did not receive a home visit within the sample numbered 1,978. Based on previous literature the 30-day readmission rate for those who did not receive a home visit can be expected at 15 percent. Those who did receive a home visit within the sample numbered 433. Based on previous literature the 30-day readmission rate for those who did receive a home visit can be expected at 9 percent. With a two-

sided alpha level of 0.05 and a beta level of .20 this returned power of 93.4 percent. Those who did not receive a medication reconciliation within the sample numbered 2,023. Based on previous literature the 30-day readmission rate for those who did not receive a home visit can be expected at 15 percent. Those who did receive a medication reconciliation within the sample numbered 388. Based on previous literature the 30-day readmission rate for those who did receive a home visit can be expected at 9 percent. With a two-sided alpha level of 0.05 and a beta level of .20 this returned power of 91.1 percent. This suggests the study has sufficient sample size to meet a .20 beta level and power of 80 percent for both home visits and medication reconciliation.

Summary of Methodology

Chapter three outlined the research questions and hypothesis development that serve as the focal point of this study. The research design is a non-experimental, comparative study that utilizes secondary data from a retrospective cohort. This cohort includes data from July 1st 2013 through June 30th 2015. The setting of the study occurs across 27 counties in eastern NC which acts as the catchment area of CCPEC. The sample includes 2,417 high-risk Medicaid patients who are discharged from one of 17 hospitals. The data variables in the analysis are 30-day readmission, home visit, medication reconciliation, time of home visit, race, gender, age, and ACRG's. The data collection procedure includes a Memorandum of Agreement to access data from paid Medicaid administrative claims as well as the NC Medicaid eligibility and enrollment file system. In addition, care management documentation data is accessed through CMIS and Pharmacy Home, which are web-based applications that the Memorandum of Agreement also covers. The data is de-identified before analysis by an independent

third party that allows CMU to consider this study exempt from IRB approval. The data analysis is performed by SPSS utilizing multiple logistic regression as the modeling technique. A prospectus power analysis was performed meeting a two-sided alpha level of 0.05 as well as a beta level of .20, which indicated power of 93.4 percent for home visits and 91.1 percent for medication reconciliation.

CHAPTER IV

RESEARCH FINDINGS

This section will report the research findings of the study through descriptive characteristics, preliminary analysis, hypotheses testing of the three research questions, and a summary of the research findings.

Descriptive Characteristics

The intent of descriptive statistics is to describe the basic features of the data within this study. There are three basic components of descriptive statistics which are mean, standard deviation, and frequency. The mean is the average of all the scores within a specific variable while the standard deviation is a measure of how far the scores are dispersed from the mean. Frequency is the rate at which something occurs over a particular period of time in a given sample.

Table 3. Descriptive Statistics

Variable	Number (Valid)	Number (Missing)	Mean	Standard Deviation
30-Day Readmission	2,411	0	--	--
Home Visit	2,411	0	--	--
Medication Reconciliation	2,411	0	--	--
Gender	2,411	0	--	--
Race	2,317	94	--	--
Timing of Home Visit (days)	433	1,978	7.44	6.26
ACRG	2,411	0	72.35	9.868
Age (years)	2,411	0	47.37	12.551

In Table 3 the dependent and independent variables are listed with both the mean and standard deviation highlighted. For 30-day readmission, home visit, medication reconciliation, and gender there are 2,411 valid data points each with no missing data. The variable race has only 2,317 valid data points because 94 are missing. The 94 missing variables for race were labeled as unreported in the Medicaid administrative claims data set. The other 29 cases were spread out between American Indian or Alaska Native (20), Asian (8), and Pacific Islander or Native Hawaiian (1). With the unreported data points and the lack of frequency for the remaining race groups it was decided to treat all 123 cases collectively as missing data. With only 5.1 percent of the total number of data points affected within the variable of race, it is insignificant in terms of compromising the data for statistical analysis. Because 30-day readmission, home visit, medication reconciliation, gender, and race are categorical variables it is not meaningful to provide a mean or standard deviation value. For timing of home visit there are 433 valid cases and 1,978 missing cases. Timing of a home visit only includes instances where a home visit actually occurred, which excludes 80 percent of the cases. Because timing of home visit is a continuous variable it has a mean or average of 7.44 days and a standard deviation of 6.26 days, which is the square root of the variance. The standard deviation of 6.26 days indicates the data is clustered around the mean. When the data is clustered around the mean it indicates relatively few data points are extremely high or extremely low. For the variable of ACRG there are 2,411 valid cases and no missing cases. ACRG is a continuous variable and has a mean of 72.35 and a standard deviation of 9.87, indicating the data is also clustered around the mean. Looking at age there are 2,411 valid cases and no missing cases. Age is a continuous

variable and has a mean of 47.37 years and a standard deviation of 12.55 years, which although not as clustered around the mean as ACRG it is still fairly tight.

When looking at frequencies highlighted in table 4 you can get a sense of what the data looks like at a summary level. The table highlights frequency distribution, percentage frequency, valid percent and cumulative percent. For the dependent variable of 30-day readmissions there are 2,087 cases (86%) of no readmission and 324 cases (13.4%) of a readmission. For the independent variable of interest, home visits, there are 1,978 cases (82%) of no home visit and 433 cases (18%) of a home visit. Although 82 percent seems high for the number of patients not getting a home visit, this is actually in line with care manager averages for a high-risk case load. Because of the limited number of care managers employed throughout CCPEC, there are a limited number of patients that can receive complex care management. There are also barriers to engagement among high-risk patients, such as incorrect phone numbers and refusal of services that make it difficult to increase the participation rate. The other independent variable of interest, medication reconciliation, has 2,023 cases (83.9%) of no medication reconciliation and 388 cases (16.1%) of a medication reconciliation. Similar to home visits, medication reconciliation has the same barriers in increasing participation rates. Gender is more evenly split with males encompassing 1,035 cases (42.9%) and females totaling 1,376 cases (57.1%). Finally, race is broken down by African-American at 1,359 cases (56.4%), Caucasian at 929 cases (38.5%), American Indian or Alaska Native at 20 cases (0.83%), Asian at 8 cases (0.33%), Pacific Islander or Native Hawaiian at 1 case (0.04%), and Unreported/Missing at 94 cases (3.9%). Although only 94 cases are truly missing within the dataset, all 123 cases that are not

African-American or Caucasian are treated as missing data for SPSS statistical analysis purposes.

Table 4. Frequency Table

Variable	Frequency Distribution	Frequency Percent	Valid Percent	Cumulative Percent
30-Day Readmissions				
no (0)	2087	86.6	86.6	86.6
yes (1)	324	13.4	13.4	100.0
Total	2411	100.0	100.0	--
Home Visit				
No (0)	1978	82.0	82.0	82.0
yes (1)	433	18.0	18.0	100.00
Total	2411	100.0	100.0	--
Medication Reconciliation				
No (0)	2023	83.9	83.9	83.9
yes (1)	388	16.1	16.1	100.0
Total	2411	100.0	100.0	--
Gender				
Male (0)	1035	42.9	42.9	42.9
Female (1)	1376	57.1	57.1	100.0
Total	2411	100.0	100.0	--
Race				
African-American (0)	1359	56.4	58.65	56.4
Caucasian (1)	929	38.5	40.1	94.9
American Indian/Alaska Native	20	0.83	0.86	95.7
Asian	8	0.33	0.35	96.1
Pacific Islander/Native Hawaiian	1	0.04	0.04	96.1
Unreported	94	3.9	--	3.9
Total	2411	100.0	100.0	100.0

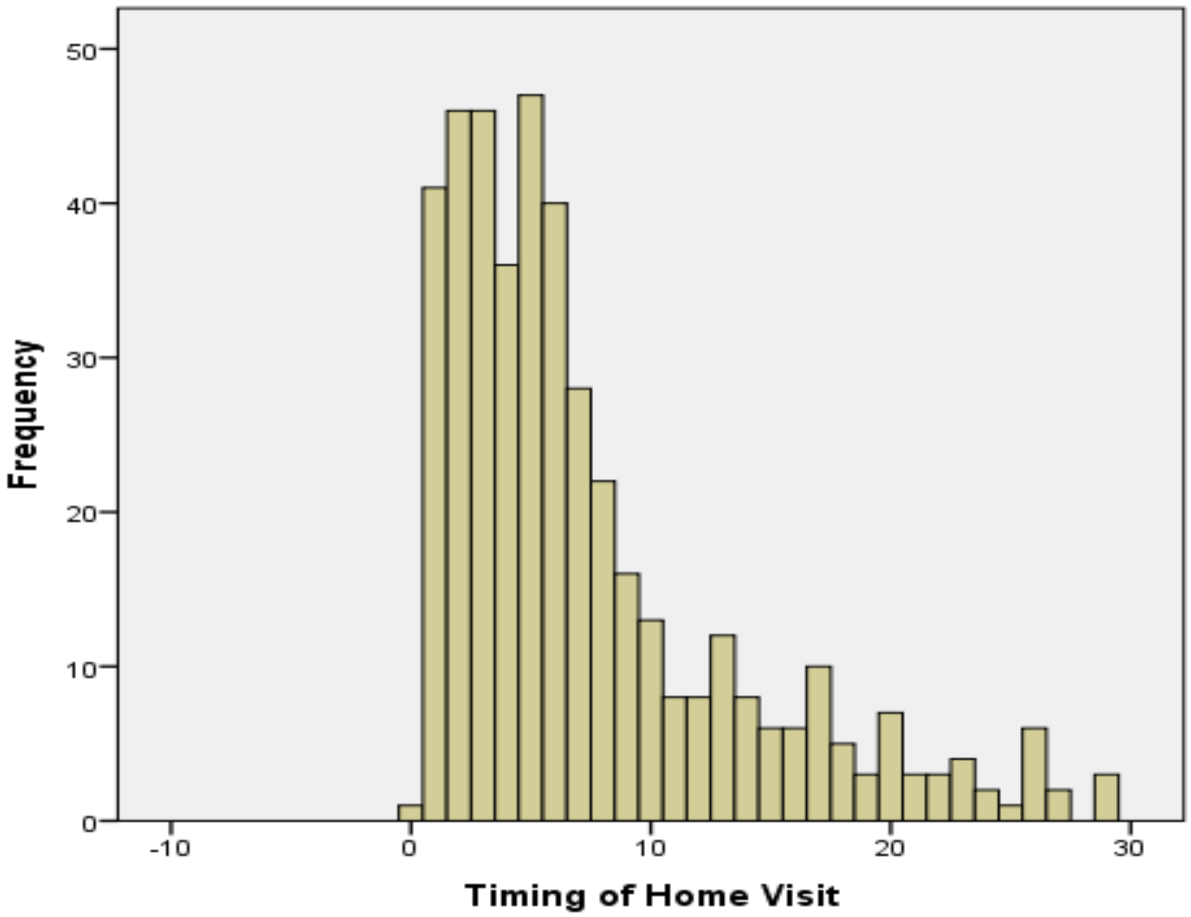

Figure 2. Timing of Home Visit Histogram

Timing of home visit has 433 cases with a range of 29 days that has 0 as its minimum and 29 as its maximum. Above in Figure 2 is a histogram that illustrates the shape of the data for timing of home visit. The data is non-symmetrical as most of the home visits occur between 0 to 10 days, which indicates the data is highly positively skewed right.

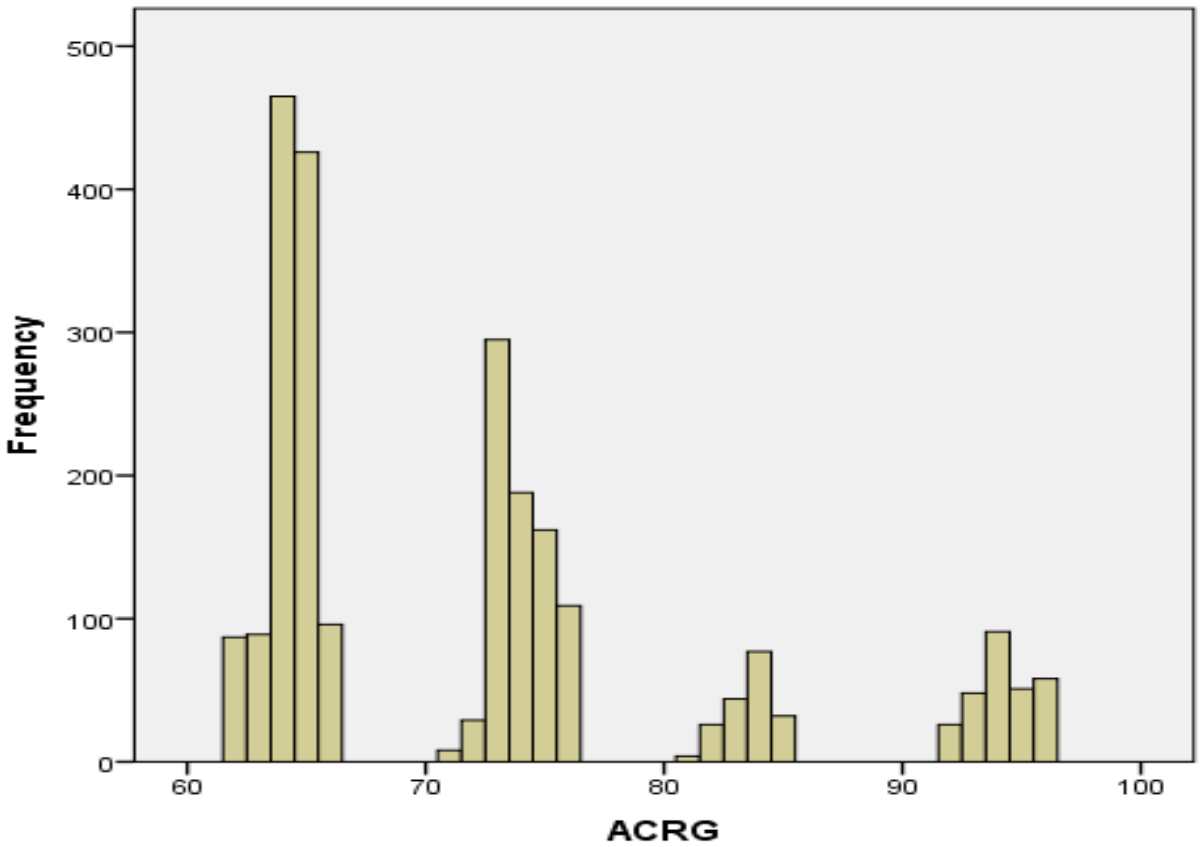

Figure 3. ACRG Histogram

ACRG has 2,411 cases with a range of 34 that has 62 as its minimum and 96 as its maximum. Above in Figure 3 is a histogram that illustrates the shape of the data for ACRG. The data is non-symmetrical as most of the ACRG's occur between 62 and 76, which indicates the data is highly positively skewed right.

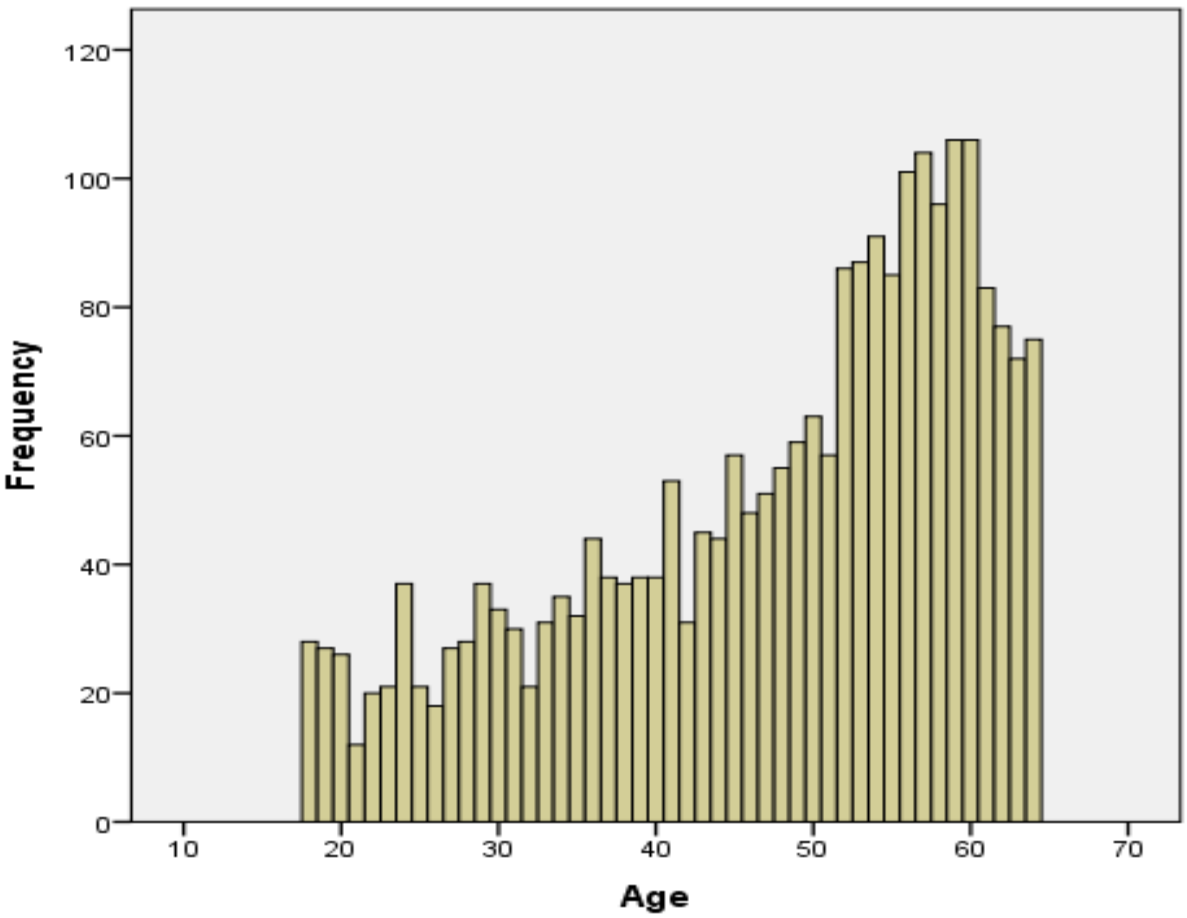

Figure 4. Age Histogram

Lastly, age has 2,411 cases with a range of 46 that has 18 as its minimum and 64 as its maximum. Above in Figure 4 is a histogram that illustrates the shape of the data for age. The data is non-symmetrical as most of the data points for age occur between 50 and 64, which indicates the data is moderately negatively skewed left.

When looking at the descriptive analysis of the readmission rates, table 5 highlights the actual observations of readmissions when considering home visits and medication reconciliations. Those patients who received both a home visit and medication reconciliation totaled 267 cases with 25 readmissions between them, and a readmission rate of 9.36 percent. Those patients who received only a medication

reconciliation totaled 121 cases with 12 readmissions, which resulted in a readmission rate of 9.91 percent. The number of patients who received only a home visit totaled 166 cases with 11 readmissions and a 6.62 percent readmission rate. Finally, those patients who didn't receive either a home visit or medication reconciliation totaled 1,857 cases with 276 readmissions, which resulted in a readmission rate of 14.86 percent.

Table 5. Descriptive Analysis of Readmission Rates for Home Visit and Medication Reconciliation

	Home Visit	No Home Visit
Medication Reconciliation	25 readmissions 267 cases 9.36% readmission rate	12 readmissions 121 cases 9.91% readmission rate
No Medication Reconciliation	11 readmissions 166 cases 6.62% readmission rate	276 readmissions 1,857 cases 14.86% readmission rate

With home visits being statistically significant and acting as a variable of interest within the study, Table 6 was created to see what differences were present between those who received a home visit and those who did not in relation to race, gender, and ACRG. One key takeaway from this crosstab is that looking at the data proportionally, 20.8 percent of African-Americans versus 14.1 percent of Caucasians received a home visit. Another key takeaway is the fact that 20.2 percent of females versus 14.9 percent of males received a home visit. Lastly, patients with the ACRG grouping from 71 through 76 seemed to get a higher percentage (25%) of home visits than those in other ACRG groupings. Running a chi-square to test significance found race and home visits with a value of 16.493 and a Pearson Chi-Square of $p<.001$, indicating statistical

significance. Running gender and home visits with a value of 10.956 and a Pearson Chi-Square of p=.001, indicating statistical significance. Lastly, running ACRG and home visits with a value of 40.692 and a Pearson Chi-Square of p<.001, indicating statistical significance. All of this suggests a relationship between Caucasian men receiving less home visits and African-American women receiving more home visits, while patients with a lower level of ACRG severity receiving more home visits.

Table 6. Crosstab of Race, Gender, and ACRG with Home Visits

	Home Visit (yes)	Home Visit (no)	Total
African-American	282	1077	1,359
Proportion	20.8%	79.2%	100%
Caucasian	131	798	929
Proportion	14.1%	85.9%	100%
Total	413	1,875	2,288
Male	155	880	1,035
Proportion	14.9%	85.1%	100%
Female	278	1,098	1,376
Proportion	20.2%	79.8%	100%
Total	433	1,978	2,411
ACRG (62-66)	169	994	1,163
Proportion	14.5%	85.5%	100%
ACRG (71-76)	198	593	791
Proportion	25%	75%	100%
ACRG (81-85)	23	160	183
Proportion	12.5%	87.5%	100%
ACRG (92-96)	43	231	274
Proportion	18.6%	91.4%	100%
Total	433	1,978	2,411

Table 7 takes a closer look at the independent variable of age, which was also statistically significant. This crosstab looks at home visits and medication reconciliations compared with age that is broken down by categories. One key takeaway from this crosstab is that looking at the data proportionally, those patients in the older age groupings of 45-54 and 55-64 receive more home visits (28.4%) and (46%), than those in the younger age groupings. This also seems to persist with medication reconciliation. Patients in the older age groupings of 45-54 and 55-64 receive more medication reconciliations (29.1%) and (43.6%), than those in the younger age groupings. Running a chi-square to test significance found age and home visits with a value of 28.873 and a Pearson Chi-Square of $p<.001$, indicating statistical significance. Running age and medication reconciliation with a value of 16.535 and a Pearson Chi-Square of $p=.001$, indicating statistical significance. All of this suggests a relationship between older patients receiving more home visits and medication reconciliations than younger patients.

Table 7. Crosstab of Home Visit and Medication Reconciliation with Age

	Age (18-34)	Age (35-44)	Age (45-54)	Age (55-64)	Total
Home Visit (yes)	47	64	123	199	433
Proportion	10.8%	14.8%	28.4%	46%	100%
Home Visit (no)	405	336	531	706	1,978
Proportion	20.4%	17%	26.9%	35.7%	100%
Total	452	400	654	905	2,411
Medication Reconciliation (yes)	47	59	113	169	388
Proportion	12.1%	15.2%	29.1%	43.6%	100%
Medication Reconciliation (no)	405	341	541	736	2,023
Proportion	20%	16.9%	26.7%	36.4%	100%
Total	452	400	654	905	2,411

Preliminary Analysis

When using logistic regression there are several assumptions that apply. They are linearity, independence of errors, and absence of multicollinearity. The following section will include a discussion to determine if any of these assumptions hold true.

Because logistic regression assumes a linear relationship between the log odds of the dependent variable and any independent continuous variables, a test of this assumption is warranted in order to confirm its validity. The Box-Tidwell test was run using SPSS with 30-day readmission as the dependent variable while age, ACRG, and timing of home visit acted as the three continuous independent variables used within the study. The focal point of the Box-Tidwell test is to look at the interaction effect between each independent continuous variable to see if any are statistically significant with a p-

value <.05. If any of the interactions are significant then that indicates the main effect has violated the assumption of linearity of the logit. When reviewing the output in SPSS after running logistic regression the independent variable ACRG had a p-value of .129, age had a p-value of .945, and timing of home visit had a p-value of .636. In all three variables the interaction effect and the associated p-value was >.05 indicating they were not statistically significant. This means that the assumption of linearity of the logit to the dependent variable has not been violated.

The second assumption when using logistic regression is independence of errors. This assumption ensures the data is not related. This means that the distribution of errors is random and is not correlated to the errors in prior observations. An example of this would be using a data set where you measure the same person at different points in time. As discussed in the methodology section in Chapter three, one of the exclusionary criteria for the sample was to ensure that all observations were independent of one another. This was accomplished by eliminating all subsequent readmissions by the same patient and only focusing on the initial 30-day readmission. In addition, all 2,411 observations within the sample are unique Medicaid patients and not duplicates. Therefore, the assumption of independence of errors has not been violated.

The final assumption for logistic regression is absence of multicollinearity. Multicollinearity take place when two or more independent variables in a model are correlated and provide redundant information about the dependent variable. This can be tested by running a linear regression and using both the variance inflation factor (VIF) and tolerance scores that helps determine if multicollinearity exists among the

independent variables. VIF and tolerance indicates if an independent variable has a strong relationship with other independent variables.

Table 8. Multicollinearity Statistics

Variable	Tolerance	VIF
Home Visit	.639	1.564
Medication Reconciliation	.648	1.543
Gender	.988	1.012
Race	.986	1.014
Timing of Home Visit (days)	.966	1.035
ACRG	.990	1.010
Age (years)	.976	1.025

As a general rule of thumb a conservative threshold estimate of a VIF is a score not exceeding five, with a high threshold score not exceeding 10 (Alauddin & Nghiemb, 2010). In table 8 under the VIF column home visit has a score of 1.564, medication reconciliation is 1.543, gender is 1.012, race is 1.014, timing of home visit is 1.035, ACRG is 1.010, and age is 1.025. When looking at tolerance and the threshold as a general rule of thumb a value less than 0.1 may indicate the presence of multicollinearity (Lin, 2006). In table 6 under the tolerance column home visit has a score of .639, medication reconciliation is .648, gender is .988, race is .986, timing of home visit is .966, ACRG is .990, and age is .976. With the VIF and tolerance scores for all seven independent variables not exceeding the recommended thresholds the assumption of multicollinearity has not been violated.

Hypotheses Testing

Upon the completion of the preliminary analysis hypotheses testing was conducted to determine what association, if any, exists between the independent and dependent variables. The data was analyzed to determine if the null hypothesis for each research question could be rejected as a result of a statistical significant finding in the primary independent variables of interest which are: home visit, medication reconciliation, and timing of a home visit.

Null Hypothesis 1 and 2

Home visit and 30-day readmission

1. $H1_o$: There is no relationship between a home visit after hospital discharge and 30-day readmissions.

   $H1_a$: There is a relationship between a home visit after hospital discharge and 30-day readmissions.

Medication reconciliation and 30-day readmission

2. $H2_o$: There is no relationship between a medication reconciliation after hospital discharge and 30-day readmissions.

   $H2_a$: There is a relationship between a medication reconciliation after hospital discharge and 30-day readmissions.

Model 1

Multiple logistic regression was used with the dependent variable being binary and the independent variables being both categorical and continuous. The dependent variable is 30-day readmission and the independent variables of interest are home visit

and medication reconciliation. The other independent variables are gender, age, ACRG, and race. In model 1, outlined in Table 9 below, is a listing of the independent variables and their potential association with the dependent variable of 30-day readmission. The number of cases totaled 2,288 with 123 cases missing as a result of the independent variable race being included. The SPSS Omnibus Tests of Model Coefficients was used to check if the new model is an improvement over the base line model that includes only the constant (B_0) and not any independent variables. This test showed the chi-square as highly significant (chi-square=37.737, df =7, p<.000) so the new model is significantly better. The Model Summery in SPSS includes the Nagelkerke's R^2 which explains how much variation in the outcome is explained by the model. Only 3 percent of the variation is explained indicating a large portion of the variation is influenced by variables not included in the model. The Hosmer and Lemeshow goodness of fit test suggests the model is a good fit to the data as p=.233 (>.05). In the case of the Hosmer and Lemeshow's goodness of fit test a non-significant p-value is desirable. Looking first at home visit, which is a variable of interest, column B has a value of -1.118. Column B (i.e., log odds) is the coefficient (the slope value) of the regression equation and can be interpreted as the presence of a home visit reduces the estimated log odds of a 30-day readmission by -1.118. The Exp(B) column for home visit is the odds ratio and can be expressed by saying those who received a home visit are .327 less likely to have a 30-day readmission than those who did not receive a home visit.

Table 9. Model 1 (With Race)

	B	S.E.	Wald	df	Sig.	Exp (B)	95% C.I. for Exp(B) Lower	Upper
Gender	-.284	.124	5.251	1	.022**	.753	.591	.960
Age	-.011	.005	4.912	1	.027**	.989	.980	.999
Medication Reconciliation	-.346	.314	1.214	1	.271	.707	.382	1.310
ACRG	.017	.006	8.927	1	.003*	1.018	1.006	1.029
Race	.099	.125	.632	1	.427	1.105	.864	1.412
Home visit	-1.118	.371	9.081	1	.003*	.327	.158	.676
HomeVisit*Medication Reconciliation	1.040	.525	3.923	1	.048**	2.830	1.011	7.924
Constant	-2.402	.498	23.247	1	.000*	.091	--	--

*significant at the 0.01 level **significant at the 0.05 level

The confidence interval for Exp(B) column is interpreted by saying there is a 95 percent confidence level that the lower limit of the odds ratio is .158 and the upper limit is .676. Focusing on the significance test of the estimated coefficient we look at both the S.E. column that at .371 is the standard error of the estimates of the coefficient, and the Wald column that has a value of 9.081 and is the test statistic. The Sig. column has a p-value of .003 that indicates home visits are making a statistically significant contribution to the model as a result of meeting the significance threshold of $p<.05$. Because the p-value is statistically significant we can reject the null hypothesis and infer that controlling

for all the other variables in this model there is a relationship between a home visit after hospital discharge and 30-day readmissions.

The other independent variable of interest, medication reconciliation, has a column B with a value of -.346. Column B can be interpreted as the presence of a medication reconciliation reduces the estimated log odds of a 30-day readmission by -.346. The Exp(B) column for medication reconciliation can be expressed by saying those who received a medication reconciliation are .707 less likely to have a 30-day readmission than those who did not receive a medication reconciliation. The confidence interval for Exp(B) column is interpreted by saying there is a 95 percent confidence level that the lower limit of the odds ratio is .382 and the upper limit is 1.310. Focusing on the significance test of the estimated coefficient we look at both the S.E. column that at .314 is the standard error of the estimates of the coefficient, and the Wald column that has a value of 1.214 and is the test statistic. The Sig. column has a p-value of .271 that indicates medication reconciliation is not making a statistically significant contribution to the model as a result of not meeting the significance threshold of $p<.05$. Because the p-value is not statistically significant we cannot reject the null hypothesis. The inability to reject the null hypothesis means controlling for all the other variables in this model there is no relationship between a medication reconciliation after hospital discharge and 30-day readmissions.

The independent variables within the model that have statistical significance at $p<.05$ are gender ($p=.022$), age ($p=.027$), and ACRG ($p=.003$). Looking at the odds ratio for gender, a female is .753 less likely than a male to have a 30-day readmission. For every one unit (year) increase in age you are .989 less likely to have a 30-day

readmission, and for every one unit (score) increase in ACRG you are 1.018 times more likely to have a 30-day readmission. In addition to the independent variables mentioned above, the interaction effect variable of home visit and medication reconciliation was also statically significant at a p-value of .048. The only independent variable within the model that wasn't statistically significant at p<.05 was race (p=.427).

Model 2

Because race was not statistically significant in model 1 it was eliminated to see what relationship its absence would have on statistical significance for the independent variables of interest, which are home visit and medication reconciliation. All of the same parameters were used for Model 2 except the exclusion of race. Unlike in Model 1 where there was only 2,288 cases, Model 2 had 2,411 cases which meant no missing cases were present since race was excluded. The Omnibus Tests of Model Coefficients was used which showed the chi-square as highly significant (chi-square=33.500, df =6, p<.000) indicating the new model as significantly better. The Nagelkerke's R^2 value showed only 2.5 percent of the variation in the outcome is explained by the model. This is similar to Model 1 where a large portion of the variation is influenced by variables not included in the model. Also similar to Model 1 is the The Hosmer and Lemeshow goodness of fit test, which indicated the model is a good fit to the data as p=.407 (>.05). As a reminder, in the case of the Hosmer and Lemeshow's goodness of fit test a non-significant p-value is desirable.

Table 10. Model 2 (Without Race)

	B	S.E.	Wald	df	Sig.	Exp (B)	95% C.I. for Exp(B) Lower	Upper
Gender	-.247	.121	4.178	1	.041**	.781	.616	.990
Age	-.010	.005	4.372	1	.037**	.990	.981	.999
Medication Reconciliation	-.437	.312	1.962	1	.161	.646	.350	1.191
ACRG	.017	.006	8.941	1	.003*	1.017	1.006	1.028
Home visit	-.856	.320	7.142	1	.008*	.425	.227	.796
Home Visit*Medication Reconciliation	.820	.490	2.807	1	.094	2.271	.870	5.927
Constant	-2.398	.479	25.102	1	.000*	.091		

*significant at the 0.01 level **significant at the 0.05 level

When looking at home visit in Table 10 column B has a value of -.856. Column B (coefficient) can be interpreted as the presence of a home visit reduces the estimated log odds of a 30-day readmission by -.856. The Exp(B) column which as the odds ratio can be expressed by saying those who received a home visit are .425 less likely to have a 30-day readmission than those who did not receive a home visit. The confidence interval for Exp(B) column is interpreted by saying there is a 95 percent confidence level that the lower limit of the odds ratio is .227 and the upper limit is .796. Focusing on the significance test of the estimated coefficient we look at both the S.E. column that at .320 is the standard error of the estimates of the coefficient, and the Wald column that has a value of 7.142 and is the test statistic. The Sig. column has a p-value of .008 that

indicates home visits are making a statistically significant contribution to the model as a result of meeting the significance threshold of p<.05. Because the p-value is statistically significant we can reject the null hypothesis and infer that controlling for all the other variables in this model there is a relationship between a home visit after hospital discharge and 30-day readmissions.

The other independent variable of interest, medication reconciliation, has a column B with a value of -.437. Column B (coefficient) can be interpreted as the presence of a medication reconciliation reduces the estimated log odds of a 30-day readmission by -.437. The Exp(B) column for medication reconciliation can be expressed by saying those who received a medication reconciliation are .646 less likely to have a 30-day readmission than those who did not receive a medication reconciliation. The confidence interval for Exp(B) column is interpreted by saying there is a 95 percent confidence level that the lower limit of the odds ratio is .350 and the upper limit is 1.191. Focusing on the significance test of the estimated coefficient we look at both the S.E. column that at .312 is the standard error of the estimates of the coefficient, and the Wald column that has a value of 1.962 and is the test statistic. The Sig. column has a p-value of .161 that indicates medication reconciliation is not making a statistically significant contribution to the model as a result of not meeting the significance threshold of p<.05. Because the p-value is not statistically significant we cannot reject the null hypothesis. The inability to reject the null hypothesis means controlling for all the other variables in this model there is no relationship between a medication reconciliation after hospital discharge and 30-day readmissions.

The other independent variables within the model that has statistical significance of p<.05 are gender (p=.041), age (p=.037), and ACRG (p=.003). Looking at the odds ratio for gender, a female is .781 less likely than a male to have a 30-day readmission. For every one unit (year) increase in age you are .990 less likely to have a 30-day readmission, and for every one unit (score) increase in ACRG you are 1.017 times more likely to have a 30-day readmission. Unlike in Model 1, the interaction effect of home visit and medication reconciliation is not statistically significant with a p-value of .094.

Null Hypothesis 3

Timing of home visit and 30-day readmission

3. $H3_o$: There is no relationship between the timing of the home visit after hospital discharge and 30-day readmissions.

   $H3_a$: There is a relationship between the timing of the home visit after hospital discharge and 30-day readmissions.

Model 3

The final null hypothesis addresses the relationship between the timing of a home visit on 30-day readmissions. The number of cases was significantly reduced on account of the fact that only 433 home visits were conducted within the data set. This resulted in 1,978 missing cases within the model. The only independent variable excluded from the model was home visit since this model was using the number of days for a home visit. The Omnibus Tests of Model Coefficients was used which showed the chi-square as not significant (chi-square=11.759, df =6, p=.068) indicating the new model is not significantly better. The Nagelkerke's R^2 value showed only 6.6 percent of

the variation in the outcome is explained by the model. Although still low, model 3 does explain more variation in the outcome then the two previous models. The Hosmer and Lemeshow goodness of fit test suggested the model is a good fit to the data as p=.493 (>.05). In the case of the Hosmer and Lemeshow's goodness of fit test a non-significant p-value is desirable. When looking at Table 11 we see the independent variable of interest, timing of home visit, with a column B value of -.022. Column B (coefficient) can be interpreted as the timing of a home visit reduces the estimated log odds of a 30-day readmission by -.022. The Exp(B) column which as the odds ratio can be expressed by saying for every one unit increase in days you are .978 less likely to have a 30-day readmission. The confidence interval for Exp(B) column is interpreted by saying there is a 95 percent confidence level that the lower limit of the odds ratio is .914 and the upper limit is 1.047. Focusing on the significance test of the estimated coefficient we look at both the S.E. column that at .035 is the standard error of the estimates of the coefficient, and the Wald column that has a value of .408 and is the test statistic. The Sig. column has a p-value of .523 that indicates the timing of a home visit is not making a statistically significant contribution to the model as a result of meeting the significance threshold of p<.05. Because the p-value is not statistically significant we can reject the null hypothesis and infer that controlling for all the other variables in this model there is no relationship between the timing of a home visit after hospital discharge and 30-day readmissions.

Table 11. Model 3 (Timing of Home Visit)

	B	S.E.	Wald	df	Sig.	Exp (B)	95% C.I. for Exp(B) Lower	Upper
Gender	-.742	.371	4.001	1	.045**	.476	.230	.985
Age	-.011	.017	.439	1	.508	.989	.957	1.022
Medication Reconciliation	.661	.428	2.385	1	.122	1.936	.837	4.477
ACRG	.027	.020	1.865	1	.172	1.027	.988	1.067
Timing of Home visit	-.022	.035	.408	1	.523	.978	.914	1.047
Race	.517	.386	1.789	1	.181	1.677	.786	3.577
Constant	-3.930	1.767	4.947	1	.026**	.020		

*significant at the 0.01 level **significant at the 0.05 level

The only statistically significant independent variable within the model is gender p=.045. Looking at the odds ratio for gender, a female is .476 less likely than a male to have a 30-day readmission. All the other independent variables within the model are not statistically significance at a p-value of .05. These included age p=.508, ACRG p=.172, medication reconciliation p=.122, and race p=.181. As in model 2 race was excluded from the statistical analysis however it produced no change in the outcome. The only change in terms of statistical significance was gender. Gender went from a statistically significant p-value of .045 with race in the model to a p-value of .051 without race in the model. All the other independent variables were not statistically significant with race excluded from the model.

Summary of Research Findings

This chapter included descriptive characteristics of the data including frequency tables for the categorical variables and histograms graphs for the continuous variables. Logistic regression assumptions were addressed with linearity of the logit, independence of errors, and absence of multicollinearity not being violated. The null hypothesis 1 was rejected as home visits were found to be statistically significant in both Model 1 p=.003 and Model 2 p=.008. Null hypothesis 2 was not rejected as medication reconciliation was not statistically significant in Model 1 p=.271 or in Model 2 p=.161. Looking at the other independent variables, gender was statistically significant in Model 1 p=.022 and Model 2 p=.041. Similarly, age was statistically significant in Model 1 p=.027 and Model 2 p=.037, while ACRG was also statistically significant in both Model 1 p=.003 and Model 2 p=.003. Race, however, was not found to be statistically significant in Model 1 p=.427. An interaction effect encompassing the variables home visit and medication reconciliation was found to be statistically significant p=.048 in model 1 but not in model 2 p=.094. And lastly, the null hypothesis 3 could not be rejected as the timing of a home visit variable was not statistically significant p=.523. The only variable within Model 3 that had statistical significance was gender p=.045. In Chapter V the conclusions and recommendations section of the study will be discussed.

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

Chapter 5 will focus on the overall conclusions and recommendations that are put forth as a result of the research findings of this study. More specifically, this section will provide a justification for reporting on Model 2 instead of Model 1, describe how the findings fit into the larger literature, recommendations for further study, program and policy issues, limitations of the study, and parting conclusions.

Justification for Reporting on Model 2

In this study the following three research questions were examined, which are (a) the relationship between a home visit after hospital discharge and 30-day Medicaid readmissions, (b) the relationship between a medication reconciliation after hospital discharge and 30-day Medicaid readmissions, and (c) the relationship between the timing of a home visit after hospital discharge and 30-day Medicaid readmissions. Using the theoretical framework of logistic regression allowed for the individual analysis of each independent variable of interest, while controlling for several other independent variables.

Two models were analyzed with the only difference between the two being the exclusion of race in model 2. The independent variables included in both models were medication reconciliation, gender, age, and ACRG. It was decided to run two models because of the fact that race in model 1 was not statistically significant with a p-value of .427. In addition to the fact that race was not statistically significant it also contained only 2,317 cases. This resulted in 94 cases being classified as missing which removed cases across all the variables within the data set (as you may recall in Chapter IV, 29

cases consisted of other races that did not have enough volume to include in the data set. Therefore, they were omitted in SPSS which resulted in 123 cases being excluded within race). After running model 2 through SPSS's logistic regression function, the only difference in terms of statistical significance was the interaction effect of home visit and medication reconciliation. In model 1 it was statistically significant and in model 2 it was not. This led to the question of which model to believe in terms of validity? Should the interaction effect be interpreted and discussed in model 1 where it was statistically significant or not interpreted and discussed in model 2 where it was not statistically significant? After reflection it was decided to focus on model 2 for the summary and implication of findings portion in chapter 5. The rationale for this encompassed several reasons. First, as already stated, race was not statistically significant in model 1 and removing it made sense to better refine the model. This study's main focus is on the home visit and medication reconciliation. Because race was not statistically significant it was not meaningfully contributing to the model, therefore essentially immaterial to the analysis. Focusing on home visits and medication reconciliation without race in the model seemed justified in helping to reduce noise around the analysis. Secondly, race had 94 missing cases that impacted all the variables within the data set by reducing the number of cases overall by 3.9 percent. Within these 94 cases also contained 13 readmissions which accounted for four percent of my dependent variable outcome. In addition to the missing cases race included 29 cases with three of the categories represented, which were American Indian or Alaska Native (20), Asian (8), and Pacific Islander or Native Hawaiian (1). The lack of frequency prevented these race categories from being included in the data set which essentially made the variable of race contain

only African-American and Caucasian cases. This reality resulted in a smaller sample size and might have biased the study with the exclusion of these races. Thirdly, removing race essentially left the explained variation percentage in the model unchanged, and the Hosmer and Lemeshow Goodness of Fit test had a higher p-value suggesting the data was a better fit with race removed. And lastly, the intention of the outcome was to achieve a parsimonious model that accomplishes a desired level of explanation with the fewest possible independent variables. For all these reasons, removing race as a variable seemed the most simplistic solution while increasing model validity.

Summary of the Findings and How It Fits Into the Larger Literature

The first null hypothesis of the study centered on the research question addressing the relationship between a home visit after hospital discharge and 30-day readmissions. The independent variable of interest was home visits and with a p-value of .008. The study results concluded that CCNC's transitional care home visits make a statistically significant contribution to the model as a result of meeting the significance threshold of $p<.05$. Because the p-value is statistically significant we can reject the null hypothesis and infer that controlling for all the other variables in the model there is a relationship between a CCNC transitional care home visit after hospital discharge and 30-day readmissions. This relationship reduces 30-day readmissions, which aligns with other published literature touting the benefits of home visits reducing 30-day readmissions. In a 2016 study looking at hospitalizations in North Carolina, between July 2010 and December 2012 there were 7,468 discharges that received a home visit from a care manager. This was compared to 27,706 discharges who received other

transitional care interventions not including a home visit. The outcomes indicated a statistically significant reduction in the odds of a 30-day readmission ($p<0.001$) for those who received a home visit within 30 days of hospital discharge versus those who did not (Jackson, Kasper, Williams, & DuBard, 2016). However, there is also conflicting outcomes from prior research such as a randomized controlled trial that started in 2003 and ran through 2005. This study focused on community nurses and their impact on 30-day readmissions. Each arm of the study consisted of 166 patents with the intervention group receiving a home visit within 30 days of discharge. The results indicated that there was not a statistically significant reduction in 30-day readmissions among the intervention group compared to the control group ($p=0.648$) (Wong et al., 2008).

From an academia perspective the implications will help reinforce the efficacy of home visits within the limited literature, which up until now outcomes have been mixed. The outcomes that have been published to date focus almost exclusively on Medicare 30-day readmissions as a result of the ACA and readmission penalties that exist. This study will help offset this imbalance so Medicaid best practices and guidelines can be established to improve patient outcomes. From a policymaker perspective this information will help reinforce the value of home visits within the transitional care process. This will be something for legislators to consider when appropriating funds for pilot programming as they struggle to balance state revenues with growing Medicaid expenditures. The fact that those who received a home visit within the study are 42.5 percent less likely to experience a 30-day readmission that those who didn't receive a home visit signals strong evidence of the efficacy of the CCNC transitional care intervention. This intervention could possibly give administrators and executives an

operational and financial advantage in running their health care organizations in the value-based environment of lower cost and better care.

The second null hypothesis of the study centered on the research question addressing the relationship between medication reconciliation after hospital discharge and 30-day readmissions. The independent variable of interest was medication reconciliation and with a p-value of .161. The study results concluded that medication reconciliation did not make a statistically significant contribution to the model as a result of meeting the significance threshold of $p<.05$. Because the p-value is not statistically significant we cannot reject the null hypothesis and infer that controlling for all the other variables in the model there is no relationship between a medication reconciliation after hospital discharge and 30-day readmissions. Looking at prior studies reinforcing these results is a University of Michigan study between 2006 and 2007 where 358 patients received a pharmacist led discharge protocol that included a medication reconciliation. Conversely, the control arm of the study of 366 participants received usual care at discharge. Outcomes of the study revealed that a reduction in 30-day readmissions was not statistically significant $p=0.17$ between the intervention and control groups (Walker et al., 2009). In direct contrast to the outcome of this study are prior studies showing that medication reconciliation does reduce 30-day readmissions. In a study from September 2009 through February 2010 in Washington State, 494 patients were enrolled in an integrated group practice called Group Health. The intervention arm of 243 people received a pharmacist phone call within seven days of discharge where a medication reconciliation was performed. The control group did not receive a phone call.

The outcomes showed a statistically significant reduction p=0.04 in readmissions among the intervention group (Kilcup, Schultz, Carlson, & Wilson, 2013.)

Because of the inconsistencies within the literature review on the relationship of medication reconciliation and 30-day readmissions, and the contradiction that exists between this study's outcomes and statistically significant outcomes, it might bode well for policymakers to cherry pick the elements that have tasted success and pilot test them within their respective communities. This could help policymakers reconcile disparate results by aggregating what has worked in various studies and apply it to their own interventions. Ultimately, the implications of these results will help inform policymakers of the impact that medication reconciliation plays within the transitional care process. Understanding what skill sets and experience are needed for health care professionals are crucial in workforce development and the management of populations. For those leaders "on the ground", such as administrators and executives, it might be better served investing limited resources towards care managers and not pharmacists or pharmacist technicians to reduce 30-day readmissions. Because the home visit was statistically significant and medication reconciliation was not statistically significant, a nurse or social worker, instead of a pharmacist, may be the best investment for the highest return in reducing 30-day readmissions. Future researchers would need to aim to clarify the discrepancies in medication reconciliation outcomes and one way to do this is by examining what influences are impacting outcomes in different environments. For example, why does post-discharge phone calls by a pharmacist work in Washington State but not in Michigan, as the studies on the previous page explain? Understanding through researching these differences could pay dividends in identifying the highest

return in reducing 30-day readmissions. Although there is disappointment that a medication reconciliation was not statistically significant, it is encouraging to see the odds ratio indicate a .646 reduction in 30-day readmissions among those who received a medication reconciliation. There is also the descriptive analysis of readmission rates in Table 5 that indicates a lower readmission rate for patients who receive a medication reconciliation versus those who don't receive anything after discharge. Providing an alternate interpretation, you could conclude this is a positive trend and may be considered promising for further study even though the relationship is not statistically significant and the null hypothesis cannot be rejected as false. To further reinforce the need for additional analysis, this study only had 388 verified medication reconciliation encounters out of a data set of 2,411 encounters. This demonstrates that most of the patients did not receive the intervention of a medication reconciliation. With an increase of the intervention sample size it may be possible to stabilize the outcome to better understand the impact of a medication reconciliation on 30-day readmissions.

The third null hypothesis of the study centered on the research question addressing the relationship between the timing of a home visit after hospital discharge and 30-day readmissions. The independent variable of interest was timing of a home visit with a p-value of .523. The study results concluded that timing of a home visit did not make a statistically significant contribution to the model as a result of meeting the significance threshold of $p<.05$. Because the p-value is not statistically significant we cannot reject the null hypothesis and infer that controlling for all the other variables in the model there is no relationship between timing of a home visit after hospital

discharge and 30-day readmissions. All the other independent variables were not statistically significant in model 3, except gender (p=.045).

Prior research has been inconclusive regarding the exact number of days in which a home visit should be conducted to reduce 30-day readmissions. There have been guidelines put forth with a recommended range of 48-72 hours for getting into the home of high-risk patients (Bisognanop & Boutwell, 2009). However, because prior studies have been mixed in showing statistical significance around the timing of home visits in reducing 30-day readmissions, recommendations have been based on expert opinion and has not been acknowledged as best practice within the literature. This study concluded that the timing of a home visit is not statistically significant in reducing readmissions among high-risk patients as much as the very act of just performing a home visit after discharge. The outcome of this study reflects the nebulous results within the literature as to when the optimal timing of a home visit should be conducted and fails to clarify for policymakers and administrators the optimal time to deploy resources to impact the highest risk populations.

The independent variables within model 2 that showed statistical significance were gender (p=.041), age (p=.037), and ACRG (p=.003). Looking at the odds ratio for gender, a female is .781 less likely than a male to have a 30-day readmission. The frequency distribution in table 4 revealed a majority of women (57.1%) in the study compared to men (42.9%). These numbers reflect similar ratios of enrollment at the state level in NC Medicaid. Despite the prevalence of women enrolled in NC Medicaid men still accounted for the majority of 30-day readmissions. This aligns with prior research where male patients had a higher rate of hospital utilization within 30 days of

discharge than female patients (Woz, Mitchell, Hesko, Paasche-Orlow, & Greenwald, 2012). Looking at the odds ratio for age, for every one unit (year) increase in age you are .990 less likely to have a 30-day readmission. Looking at the odds ratio for ACRG, for every one unit (score) increase in ACRG you are 1.017 times more likely to have a 30-day readmission. This is reasonable when you understand that the ACRG score is a proxy for patient acuity based off of the number of chronic conditions a patient may have. The higher the ACRG score, and hence the higher the acuity, the more likely you are to have a 30-day readmission.

Limitations of the Study

One of the main limitations of this study is that it was observational in nature. Because of this cause and effect cannot be assumed. The inability to randomly assign patients to intervention and control groupings limited the opportunity to control for both known and unknown variables. Because of this, pre-existing differences between the patients could have influenced the outcomes versus the intervention defining the outcome.

In addition to the observational nature of this study, dealing with secondary data also provided inherit limitations that could have created bias in the outcomes. Administrative claims can mask the true complexity of the data by limiting the comprehensiveness of it. When looking at ACRG scores and trying to predict acuity, socially-based risk factors such as health literacy and functional status are not captured (Jackson, Shahsahebi, Wedlake, & DeBard, 2015).

Another limitation was that the study only covered 27 counties in eastern NC. Because of the relatively small geographical footprint and sample size it cannot be

generalized to a larger population of Medicaid recipients in terms of its outcomes. Future studies should include larger sample sizes that can achieve generalization.

Lastly, the study had to rely on care management documentation regarding the variables of interest within the analysis, which included home visits, medication reconciliation, and timing of a home visit. The accuracy of these data points was wholly dependent upon the care manager's veracity in documenting all interventions when it came to home visits and medication reconciliation. Human error must be factored in to the outcomes when considering these variables.

Recommendations for Further Study

Taking a closer look at the data reveals information that would be areas of further research. The first is the fact that 82 percent of patients did not receive a home visit and 83.9 percent did not receive a medication reconciliation. With the researcher being the executive director of a population health network who is tasked with managing high-risk Medicaid patients, he understands the perception of not intervening on such a high number of patients could in many policymakers eyes seem unproductive and possibly a waste of resources. However, understanding the barriers to engaging high-risk patients does not necessarily mean this is the case, and for that reason it might be an area worth researching in the future. Care managers face barriers such as wrong phone numbers, unreceptive engagement attitudes, and transient housing situations when trying to engage high-risk patients for care management. This results in the deferring of a patient after three unsuccessful attempts and moving on to another. Care management documentation also plays a role when quantifying engagement statistics such as home visits and medication reconciliations. Inaccurate documentation projects

the perception of less work taking place than reality may hold to be true. For example, partial medication reconciliations could be taking place within the home or by phone, but because all of the criteria needed to count a medication reconciliation is not met, it is not counted “in the numbers”. With that being said, the issue of engagement does persist within the CCNC transitional care model and could become a policy talking point because of the state funding the researcher receives for his network activities. Looking at Table 6 you begin to see a picture of the potential weak spots where engagement is failing. When comparing proportional percentages, Caucasian males seem less likely to engage in home visits than African-American females. Even among ACRG’s you see a higher percentage of mild to moderate acuity level patients receiving more of the home visits than the severely acute level patients. Turning to age in Table 7 you begin to see a pattern of older patient’s receiving a higher percentage of home visits and medication reconciliations than their younger counterparts. Further strategies must be developed to alleviate these issues and increase engagement among the CCNC high-risk population.

When looking at previous research you begin to see differences between this study and prior studies. Many of the studies listed in Table 1 were in urban environments, whereas this study was conducted in a 27 county region in rural eastern NC. The geography could very well be acting as a study limitation when you start examining the engagement rates among transitional care programming. Patients living in rural landscapes live further apart many times and can be more difficult to engage than those in urban environments. This carries weight for policymakers in addressing access and quality of care issues for patients living in rural areas. This study was unique in its focus on a rural geography which made it fundamentally different from prior

studies. This should be an area of future research where a broader population sample needs to be included so enough patients can be engaged to generate the volume of home visits and medication reconciliations to support the research aims.

Another area of further research would be the lack of variation that the models explained for the dependent variable of 30-day readmission. Model 2 explained just 2.5 percent of the dependent variable, which is 30-day readmission. Although prior research suggests most risk modeling is a poor predictor of readmissions and you should not take the results too seriously, there is a lot to glean from this data set (Kansagara et al., 2011). For example, when looking at race 56.4 percent of the data set was African-American and only 38.5 percent was Caucasian. This is significant because 2015 data shows the racial makeup of NC Medicaid at 46 percent Caucasian and only 31 percent African-American. This suggests when looking at high-risk Medicaid patients you find a disproportionate number of African-Americans compared to Caucasians. Because high-risk patients suffer from a higher rate of chronic conditions that are many times brought on by years of exposure to social determinates of health, it is logical to assume this exposure might be the hidden component driving readmissions within this model, which Medicaid administrative claims cannot detect. Transportation issues, lack of housing, food instability, and domestic violence are the social barriers impeding access and driving readmissions in many cases for African-Americans and Caucasians and must be addressed at a policy level. This is acerbated by the fact that we lack better documentation systems that can capture social determinants of health information and feed it into risk models to better target those patients needing intervention. Although race was not statistically significant for this analysis of 30-day readmissions, the data

does suggest a higher prevalence of African-Americans with the CCNC transitional care code compared to Caucasians when looking at statewide NC Medicaid enrollment.

Another example for further research would be gender. When looking at the data set 57.1 percent are female and 42.9 percent are male, which mirrors statewide NC Medicaid enrollment. However, when looking at 30-day readmissions a female is .781 (78%) less likely than a male to experience one. When you begin to realize that Table 6 indicates females receive 20.2 percent of home visits and males only receiving 14.9 percent, the question arises as to what factors might be influencing women as more receptive to home visits than men. Knowing home visits are statistically significant in reducing 30-day readmissions, further researching men's perceptions of home visits might open additional opportunities to examine strategies for increased engagement. The higher readmission rate could also suggest higher acuity among men than women and can be seen to some extent when looking at the ACRG's of both. Referencing ACRG's in Table 2, when looking at the total data set of male versus female, you find only 17 percent of women in the ACRG range of 80's or 90's compared to 20 percent of men in the 80's or 90's. The researcher is the executive director of a network managing high-risk Medicaid patients and knows the issues that affect men, and to a lesser extent women, such as chronic pain and substance abuse, which many times are acerbated by housing and domestic violence problems. When factoring in race and gender you start to paint a picture of a high-risk Medicaid patient. This is important from a policy perspective by directing resources to those in most need of transitional care interventions.

Age is another area of further research that the data suggests could be of benefit to pursue. The odds ratio in Model 2 indicates for every one year increase in age you are .990 less likely to have a 30-day readmission. As mentioned earlier in Table 7, for those patients between the ages of 45-65, the majority of home visits and medication reconciliations were given. For home visits 322 out of 433 were in this age grouping while medication reconciliations had 282 out of 388 in this age grouping. Although the absolute number of 30-day readmissions were higher in the 45-65 age grouping, from a proportional percentage perspective they were lower than the 18-44 age grouping experienced. In the 45-64 age grouping there was a 12.5 percent 30-day readmission rate, compared to the 18-44 grouping that had a 15.1 percent 30-day readmission rate. The prevalence of home visits and medication reconciliations among the Medicaid patients in the higher age brackets could have been a factor in a lower 30-day readmission rate. It is also why the odds ratio indicated for every one year increase in age you are .990 less likely to have a 30-day readmission.

Further research around medication reconciliation would be useful to better understand its association with home visits. Although it was not statistically significant within this study, it did show unusual patters in its relationship with home visits when looking at table 5 and the descriptive analysis of readmission rates. Patients that received only a home visit without a medication reconciliation experienced lower readmissions rates (6.62%) than patients who received both a home visit and medication reconciliation (9.36%). This pattern seems counterintuitive on both an anecdotal and practical level and may be beneficial to examine further. However, table 5 also suggests that when a patient receives a medication reconciliation, whether that is

in conjunction with a home visit (9.36%) or not (9.91%), the readmission rate is lower than if the patient doesn't receive anything after discharge (14.86%). Although you must be careful reading too much into Table 5 with so little variation (2.5%) being explained within the model, it does indicate there might be value in additional analysis around medication reconciliation and 30-day readmissions.

Timing of home visit is an area that has had limited prior research and could benefit from further study. Within this analysis it is clear home visits have a relationship with 30-day readmissions among high-risk Medicaid patients. However, getting to a better understanding of the timing of these home visits will help improve patient outcomes while deploying limited resources more efficiently. Although timing of a home visit is not statistically significant within this analysis, the data set did show that 66 percent of all the home visits were conducted within seven days of discharge. Because the researcher acts as the executive director of a care management network he knows the importance of getting into the home early and often after hospital discharge. Taking into account this anecdotal experience and that 66 percent of home visits occurred within seven days of discharge, it is possible to conjecture a timing relationship influencing the statistical significance of the home visit within the study. Building on this by increasing the knowledge base will hopefully generate best practices around timely post-discharge follow-up, and help align patient needs with available "boots on the ground" resources.

Although this study resulted in a statistically significant result with CCNC transitional care home visits reducing 30-day readmissions, it did not attempt to break down the individual pieces of a home visit, beyond medication reconciliation, to see

what activities produce the most benefit. Inside of a home visit includes tasks such as comprehensive health assessments, patient education, and screenings for depression and substance abuse. Teasing out these pieces will help inform the knowledge base regarding what efforts have value in reducing 30-day readmissions within transitional care models.

Lastly, in the same vein of better understanding the components of a home visit that brings the most value, an increased understanding around what type of training a care manager should have would be of interest as well. Within this study care managers encompassed several backgrounds including RN's and social workers. Comparing these skill sets and the impact each bring in reducing 30-day readmissions would be an area of further research that could be impactful in improving patient outcomes.

Program and Policy Issues

This study carries practical weight for both payers and agencies looking to provide better care for high-risk Medicaid patients while reducing 30-day readmissions. This study showed that CCNC home visits within the transitional care model has a relationship with 30-day readmissions, demonstrated by a statistical significant p-value of .008. This is supported by prior research where the CCNC transitional care intervention was shown to reduce 30-day readmissions by 10 percent (Jackson et al., 2015). Agencies and payers, especially those operating in rural environments, would do well to consider adopting this model for implementation as it's shown to work among high-risk Medicaid patients. Policymakers should consider appropriating funds for programs that adopt the CCNC transitional care model.

This study demonstrated that a female is .781 (78%) less likely than a male to have a 30-day readmission even though females accounted for 57.1 percent of the study sample. This aligns with prior research where male patients had a higher rate of hospital utilization within 30 days of discharge than female patients (Woz, Mitchell, Hesko, Paasche-Orlow, & Greenwald, 2012). Females were also shown to have a higher proportional percentage of home visits (20.2%) than males (14.9%). This reinforces the mindset that males could be less receptive to home visits and therefore more likely to suffer a 30-day readmission. This has relevancy for agencies, payers, and policymakers by highlighting the disproportionate readmission rates among men when compared to women, and the possible influential factor of home visit engagement rates being higher for women than men. This could help associate increased home visits with lower readmission rates for women and help direct resources for better 30-day readmission outcomes among men.

Although race was not statistically significant it did provide insight for the analysis. The data set was 56.4 percent African-American and 38.5 percent Caucasian while 2015 data shows the racial makeup of NC Medicaid at 46 percent Caucasian and only 31 percent African-American. Interestingly, African-Americans proportionately received 20.8 percent of home visits while Caucasians received only 14.1 percent. This suggests a couple of things. First, African-Americans are disproportionately represented among high-risk patients in relation to their percentage of the overall NC Medicaid population. And secondly, African-Americans might be more receptive to home visits than Caucasians. For payers and agencies this might provide awareness around social determinants of health that could disproportionately be influencing the acuity of African-

Americans versus Caucasians. This awareness could result in policymakers appropriating funds to better address these determinates of health. It could also highlight the propensity for women to engage care managers in the home versus men, and propel strategies forward in addressing this issue.

Looking at the odds ratio for ACRG in Table 10, for every one unit (score) increase in ACRG you are 1.017 times more likely to have a 30-day readmission. To further reinforce this, patients with the lower acuity level ACRG score of 71 through 76 seemed to get a higher percentage (25%) of home visits than those in the higher level acuity ACRG scores of 81 through 96. Because ACRG's are directly related to acuity and the number of chronic conditions a patient suffers, this impacts agencies and payers by highlighting the importance of stratifying the population to identify the highest-risk patients for intervention.

As payers, agencies, and policymakers weigh how to allocate resources to intervene on the highest risk patents, identifying the right type of patient to intervene with a home visit after hospital discharge will be crucial. These recommendations, based on the outcomes of this study, should give insight for stakeholders looking to reduce 30-day readmissions while improving the quality of care.

Conclusions

Ultimately, value-based care will continue to evolve with significant pressure exerted on health care stakeholders to reduce costs while improving patient outcomes. 30-day readmissions has emerged as a litmus test for quality of care in today's health care environment. Organizations that can provide robust transitions of care that reduces the likelihood of high-risk Medicaid patients returning to the hospital within 30 days will

be well-positioned to thrive in this new environment. This study has helped do this by demonstrating statistical significance in reducing the odds of a readmission for those high-risk Medicaid patients receiving a CCNC transitional care home visit. Although medication reconciliation and the exact timing of a home visit ended up not being statistically significant on 30-day readmissions, they did show value for further research. Other areas of note were the statistical significance between age, gender, and ACRG's on the relationship with 30-day readmissions. The highlighted disproportionate rates that women have over men in accepting home visits and suffering fewer 30-day readmissions. The additional insight into how African-Americans seem more receptive to home visits than Caucasians when looking at the proportional percentage rates. And finally, ACRG's, acting as a proxy for patient acuity, being statistically significant in predicting 30-day readmissions as risk scores increased. Hopefully this study will further refine the process of transitional care interventions by pairing our finite resources with optimal patient outcomes.

REFERENCES

Agency for Healthcare Research and Quality (2014). *Re-engineered discharge (RED) toolkit.* Rockville, MD. Retrieved from https://www.ahrq.gov/professionals/systems/hospital/red/toolkit/index.html.

Alauddin, M. (2010). Do instructional attributes pose multcollinearity problem? An empirical exploration. *Economic Analysis & Policy,* 40(3), 351 – 361.

Apkon, M., & Friedman, J. (2014). Planning for effective hospital discharge. *Journal of the American Medical Association,* 168(10), 890 – 892.

Aspenson, M., & Hazaray, S. (2012). The clock is ticking on readmission penalties. *Healthcare Financial Management,* 66(7), 58 – 63.

Baicker, K., & Finkelstein, A. (2011). The effects of Medicaid coverage – Learning from the Oregon experiment. *The New England Journal of Medicine,* 365(8), 683 – 685.

Bindman, A. B., Blum, J. D., & Kronick, R. (2013). Medicare's transitional care payment – A step toward medical home. *The New England Journal of Medicine,* 368(8), 692 – 694.

Bisognano, M., & Boutwell, A. (2009). Improving transitions to reduce readmissions. *Frontiers of Health Services Management,* 25(3), 4 – 10.

Bixby, M. B., & Naylor, M. D. (2010). The Transitional Care Model (TCM): Hospital discharge screening criteria for high risk older adults. *Medsurg Nursing,* 19(1), 62-63.

Blue, L., Lang, E., McMurray, J. J., Davie, A. P., McDonagh, T. A., Murdoch, D. R., Petrie, M. C., Connolly, E., Norrie, J, Round, C. E., Ford, I, & Morrison, C. E. (2001). Randomized controlled trial of specialist nurse intervention in heart failure. *British Medical Journal,* 323, 715 – 718.

Boutwell, A.E. (2010). Discharge planning and rates of readmissions. *The New England Journal of Medicine,* 362, 1244-1245.

Brawley, O. W. (2011). The American Cancer Society and the American health care system. *The Oncologist,* 16, 920 – 925.

Bruning, K., & Selder, F. (2011). From hospital to home healthcare: The need for medication reconciliation. *Home Healthcare Nurse,* 29(2), 81 – 90.

Byrne, J. (2014). Medicaid enrollees challenge budgets: States expecting the woodwork effect. *Managed Healthcare Executive,* 24(2), 14 – 16.

CCNC network county map. (2013, March). Retrieved from https://www.communitycarenc.org/ccnc-network-nc-county-maps/.

Coleman, E. A., & Boult, C. (2003). Improving the quality of transitional care for persons with complex care needs. *Journal of the American Geriatrics Society,* 51, 556 – 557.

Coleman, E. A., Min, S., Chomiak, A., & Kramer, A. M. (2004). Posthospital care transitions: Patterns, complications, and risk identification. *Health Services Research,* 39(5), 1449 – 1469.

Coleman, E. A., Parry, C., Chalmers, S., & Min, S. (2006). The Care Transitions Intervention: Results of a randomized controlled trial. *Archives of Internal Medicine,* 166(17), 1822 – 1828.

Coleman, E. A., Smith, J. D., Frank, J. C., Min, S., Parry, C., & Kramer, A. M. (2004). Preparing patients and caregivers to participate in care delivered across settings: The Care Transitions Intervention. *Journal of the American Geriatrics Society,* 52(11), 1817 – 1825.

Coller, R. J., Klitzner, T. S., Lerner, C. F., & Chung, P. J. (2013). Predictors of 30-day readmission and association with primary care follow-up plans. *The Journal of Pediatrics,* 163, 1027 – 1033.

Community Care of North Carolina (2015). *Care management standardized plan* (3rd ed.). Raleigh, NC.

Dalby, D. M., Sellors, J. W., Fraser, F. D., Fraser, C., Ineveld, C., & Howard, M. (2000). Effect of preventive home visits by a nurse on the outcomes of frail elderly people in the community: a randomized controlled trial. *Canadian Medical Association Journal,* 162(4), 497 – 500.

Dickson, V. (2014). Benefits unclear as states rush into Medicaid managed care. *Modern Healthcare,* 44(27), 20 – 22.

Dickson, V. (2015). Innovation by necessity: Medicaid emerges as aggressive laboratory for delivery-system reform. *Modern Healthcare,* 45(36), 20 – 22.

Doctoroff, L., & McNally, D. (2014). Handoffs in hospital medicine. *Hospital Medicine Clinics,* 3(1), e1 – e14.

DuBard, C. A. (2013). Improving the quality of care for Medicaid patients with chronic diseases: Community Care of North Carolina. *North Carolina Medical Journal,* 74(2), 142 – 147.

DuBard, C. A., Cockerham, J., & Jackson, C. (2012). Collaborative accountability for care transitions: The Community Care of North Carolina Transitions Program. *North Carolina Medical Journal,* 73(1), 34 – 40.

DuBard, C. A., Jacobson Vann, J. C., & Jackson, C. T. (2015). Conflicting readmission rate trends in a high-risk population: Implications for performance measurement. *Population Health Management,* 18(5), 351 – 357.

Edlin, M. (2014). Readmissions decline in wake of CMS program: Medication reconciliation remains key. *Managed Healthcare Executive,* 24(10), 23.

Erickson, A. K. (2013). Project RED: Re-engineering the discharge process. *Pharmacy Today, 19(1),* 8.

Field, T. S., Ogarek, J., Garber, L., Reed, G., & Gurwitz, J. H. (2014). Association of early post-discharge follow-up by a primary care physician and 30-day rehospitalization among older adults. *Journal of General Internal Medicine,* 30(5), 565 – 571.

Fillmore, H., DuBard, A., Ritter, G. A., & Jackson, C. T. (2014). Health care savings with the patient-centered medical home: Community Care of North Carolina's experience. *Population Health Management,* 17(3), 141 – 148.

Fugi, K. T., Abbott, A. A., & Norris, J. F. (2012). Exploring care transitions from patients, caregiver, and health-care provider perspectives. *Clinical Nursing Research,* 22(3), 258 – 274.

Gardner, R., Li, Q., Baier, R., Butterfield, K., Coleman, E., & Gravenstein, S. (2014). Is implementation of the care transitions intervention associated with cost avoidance after hospital discharge? *Journal of General Internal Medicine,* 29(6) 878 – 884.

Gilmer, T., & Hamblin, A. (2010). Hospital readmissions among Medicaid beneficiaries with disabilities: Identifying targets of opportunity. *Center for Health Care Strategies,* 1 – 10.

Grabowski, D. C. (2012). Care coordination for dually eligible Medicare-Medicaid beneficiaries under the Affordable Care Act. *Journal of Aging and Social Policy,* 24(2), 221 – 232.

Greysen, S. R., Schiliro, D., Curry, L., Bradley, E. H., & Horwitz, L. I. (2012). "Learning by doing" – Resident perspectives on developing competency in high-quality discharge care. *Journal of General Internal Medicine,* 27(9), 1188 – 1194.

Guterman, S., Davis, K., Stremikis, K., & Drake, K. (2010). Innovation in Medicare and Medicaid will be central to health reform's success. *Health Affairs,* 29(6), 1188 – 1193.

Hammond, S. (2015). Staying home after discharge: Nurse-led versus physician-led transitional care models. *Nurse Leader, 13(3),* 66 – 71.

Hardman, B., & Newcomb, P. (2015). Barriers to primary care hospital follow-up among older adults in rural or semi-rural communities. *Applied Nursing Research,* 29, 222 – 228.

Hari, M., & Rosenzweig, M. (2012). Incidence of preventable postoperative readmissions following pancreaticoduodenectomy: Implications for patient education. *Oncology Nursing Forum,* 39(4), 408 – 412.

Hirschman, K. B., Shaid, E., McCauley, K., Pauly, M. V., & Naylor, M. D. (2015). Continuity of care: The Transition Care Model. *The Online Journal of Issues in Nursing,* 20(3), Manuscript 1.

Hoban, S. (2012). Medication reconciliation: Long term management care. *Long-Term Living,* 61(5), 12-14.

Hoisington, A. (2012). Medication reconciliation drives readmission reduction strategy. *Managed Healthcare Executive*, 22(12), 12.

Jack, B. W., Chetty, V. K., Anthony, D., Greenwald, J. L., Sanchez, G. M., Johnson, A. E., Forsythe, S. R., O'Donnell, J. K., Passche-Orlow, M. K., Manasseh, C., Martin, S., & Culpepper, L. (2009). A reengineered hospital discharge program to decrease rehospitalization: A randomized trial. *Annals of Internal Medicine,* 150(3), 178 – 188.

Jackson, C., Kaspar, E.W., Williams, C., & DuBard, C. A. (2016). Incremental benefit of a home visit following discharge for patients with multiple chronic conditions receiving transitional care. *Population Health Management,* 19(3), 163 - 170.

Jackson, C., DuBard, C. A., Swartz, M., Mahan, A., McKee, J., Pikoulas, T., Moran, K., & Lancaster, M. (2015). Readmission patterns and effectiveness of transitional care among Medicaid patients with schizophrenia and medical comorbidity. *North Carolina Medical Journal*, 76(4), 219 – 226.

Jackson, C., Trygstad, T. K., DeWalt, D. A., & DuBard, C. A. (2013). Transitional care cut hospital readmissions for North Carolina Medicaid patients with complex chronic conditions. *Health Affairs,* 32(8), 1407 – 1415.

Jackson, C., Shahsahebi, M., Wedlake, T., & Dubard, C.A. (2015). Timeliness of outpatient follow-up: An evidence-based approach for planning after hospital discharge. *Annals of Family Medicine*, 13(2), 115-122.

Jha, A. K., Orav, E. J., Epstein, A. M. (2009). Public reporting of discharge planning and rates of readmissions. *The New England Journal of Medicine,* 361(27), 2637-2645.

Jones, C. E., Hollis, R. H., Wahl, T. S., Oriel, B. S., Itani, K. M. F., Morris, M. S., & Hawn, M. T. (2016). Transitional care interventions and hospital readmissions in surgical populations: A systematic review. *The American Journal of Surgery,* 212(2), 327 – 335.

Kansagara, D., Englander, H., Salanitro, A., Kagen, D., Theobald, C., Freeman, M., Kripalani, S. (2011). Risk prediction models for hospital readmission: A systematic review. *The Journal of the American Medical Association*, 306(15), 1688-1698.

Kashiwagi, D. T., Burton, M. C., Kirkland, L. L., Cha, S., & Varkey, P. (2012). Do timely outpatient follow-up visits decrease hospital readmission rates? *American Journal of Medical Quality,* 27(1), 11 - 15.

Kearney, G. D., Rafferty, A. P., Hendricks, L. R., Allen, D. L., & Tutor-Marcom, R. (2014). A cross-sectional study of stressors among farmers in eastern North Carolina. *North Carolina Medical Journal,* 75(6), 384 – 392.

Kilcup, M., Schultz, D., Carlson, J., & Wilson, B. (2013). Postdischarge pharmacist medication reconciliation: Impact of readmission rates and financial savings. *Journal of the American Pharmacists Association*, 53(1), 78-84.

Kind, A. J. H., Jensen, L., Barczi, S., Bridges, A., Kordahl, R., Smith, M. A., & Asthana, S. (2012). Low-cost transitional care with nurse managers making mostly phone contact with patients cut rehospitalization at a VA hospital. *Health Affairs,* 31(12), 2659 – 2668.

Koehler, B. E., Richter, K. M., Youngblood, L., Cohen, B. A., Prengler, I. D., Cheng, D., & Masica, A. L. (2009). Reduction of 30-day postdischarge hospital readmission or emergency department (ED) visit rates in high-risk elderly medical patients through delivery of a targeted care bundle. *Journal of Hospital Medicine,* 4(4), 211 – 218.

Kornburger, C., Gibson, C., Sadowski, S., Maletta, K., & Klingbeil, C. (2013). Using "teach-back" to promote a safe transition from hospital to home: An evidence-based approach to improving the discharge process. *Journal of Pediatric Nursing,* 28(3), 282 – 291.

Kreimer, S. (2015). Off the rounds: Making care transitions work as an outpatient-only physician. *Medical Economics, 92(13),* 40 – 43.

Krieger, J. (2009). Home visits for Asthma: We cannot afford to wait any longer. *Archives of Pediatrics and Adolescent Medicine,* 163(3), 279 – 282.

Krieger, J. W., Philby, M. L., & Brooks, M. Z. (2011). Better home visits for Asthma: Lessons learned from the Seattle-King County Asthma Program. *American Journal of Preventive Medicine,* 41(2S1), S48 – S51.

Kripalani, S, LeFevre, F., Phillips, C. O., Williams, M. V., Basaviah, P., & Baker, D. W. (2007). Deficits in communication and information transfer between hospital-based and primary care physicians. *Journal of the American Medical Association,* 297(8), 831 – 841.

Lattimer, C. (2012). Practices to improve transitions of care: A national perspective. *North Carolina Medical Journal,* 73(1), 45 – 47.

Lavelle, D., Zeitoun, J., Stern, M., Butkiewicz, E., Wegner, E., & Reinisch, C. (2016). Diabetes self-management education in the home. *Cureus,* 8(7), e710.

Lin, F. (2006). Solving multicollinearity in the process of fitting regression model using the nested estimate procedure. *Quality & Quantity,* 42, 417 – 426.

Markanda, M. T. (2012). Care transitions: An essential part of the delivery of health care. *North Carolina Medical Journal,* 73(1), 65-66.

Monical, K. (2013). Benefiting from the changing nature of home visits. *Health Management Technology,* 34(5), 24.

Munoz, E, Munoz, W., & Wise, L. (2010). National and surgical health care expenditures, 2005 – 2025.*Annals of Surgery,* 251(2), 195 – 200.

Naylor, M. D., Aiken, L. H., Kurtzman, E. T., Olds, D. M., & Hirschman, K. B. (2011). The importance of transitional care in achieving health reform. *Health Affairs,* 30(4), 746 – 754.

Naylor M. D., Brooten, D., Campbell, R., Jacobsen, B. S., Mezey, M. D., Pauly, M. V., & Schwartz, J. S. (1999). Comprehensive discharge planning and home follow-up of hospitalized elders. *Journal of the American Medical Association,* 281(7), 613 – 620.

Naylor, M. D., Brooten, D. A., Campbell, R. L., Maislin, G., McCauley, K. M., & Schwartz, J. S. (2004). Transitional care of older adults hospitalized with heart failure: A randomized, controlled trial. *Journal of the American Geriatrics Society,* 52(5), 675 – 684.

Naylor, M. D., & Sochalski, J. A. (2010). Scaling up: Bringing the Transitional Care Model into the mainstream. *The Commonwealth Fund,* 103, 1 – 11.

Neff, D. F., Madigan, E., & Narsavage, G. (2003). Transitional Home Care Model: Achieving positive outcomes for patients with COPD. *Home Healthcare Nurse,* 21(8), 543 – 550.

North Carolina Institute of Medicine (2013). Examining the impact of the Patient Protection and Affordable Care Act in North Carolina: Medicaid expansion option (policy brief).

Oberlander, J. (2014). Unraveling Obamacare – Can Congress and the Supreme Court undo health care reform? *The New England Journal of Medicine,* 371(26), 2445 – 2447.

Olsen, L. K. (2012). Medicaid, the states, and health care reform. *Political Science,* 34(1), 37 – 54.

Ornstein, K., Smith, K. L., Foer, D. H., Lopez-Cantor, M. T., & Soriano, T. (2011). To the hospital and back home again: A nurse practitioner-based transitional care program for hospitalized homebound people. *Journal of the American Geriatrics Society,* 59, 544 – 551.

Perry, A., & Stevens, A. B. (2012). How do we make the business case for transitions? *Journal of the American Society on Aging,* 36(4), 71 – 77.

Polinski, J. M., Moore, J. M., Kyrychenko, P., Gagnon, M., Matlin, O. S., Fredell, J. W., Brennan, T. A., & Shrank, W. H. (2016). An insurer's care transition program emphasizes medication reconciliation, reduces readmissions and costs. *Health Affairs,* 35(7), 1222 – 1229.

Putnam, K. (2016). Patient education for prevention of readmissions. *Association of PeriOperative Registered Nurses Journal,* 103(2), 10 – 12.

Rennke, S., Nguyen, O. K., Shoeb, M. H., Magan, Y., Wachter, R. M., & Ranji, S. R. (2013). Hospital-initiated transitional care interventions as a patient safety strategy. *Annals of Internal Medicine,* 158(5), 433 – 441.

Rennke, S., & Ranji, S. (2015). Transitional care strategies from hospital to home: A review for the neurohospitalist. *The Neurohospitalist,* 5(1), 35 – 42.

Sanchez, G. M., Douglass, M. A., & Mancuso, M. A. (2015). Revisiting Project Re-Engineered Discharge (RED): The impact of a pharmacist telephone intervention on hospital readmission rates. *Pharmacotherapy,* 35(9), 805 – 812.

Schiff, J. (2016). Customizing transitional care for North Carolina Medicaid patients. *Modern Healthcare,* 46(17), 28.

Schnipper, J. L., Kirwin, J. L., Cotugno, M. C., Wahlstrom, S. A., Brown, B. A., Tarvin, E., Kachalia, A., Horng, M., Roy, C. L., McKean, S. C., & Bates, D. W. (2006). Role of pharmacist counseling in preventing adverse drug events after hospitalization. *Archives of Internal Medicine,* 166(5), 565-571.

Setter, S. M., Corbett, C. F., & Neumiller, J. J. (2012). Transitional care: Exploring the home healthcare nurse's role in medication management. *Home Healthcare Nurse,* 30(1), 19 – 26.

Shugarman, L. R., & Whitenhill, K. (2011). The Affordable Care Act proposes new provisions to build a stronger continuum of care. *Journal of American Society on Aging,* 35(1), 11 – 18.

Smith, M., Giuliano, M. R., & Starkowski, M. P. (2011). In Connecticut: Improving patient medication management in primary care. *Health Affairs,* 30(4), 646 – 654.

Snyderman, D, Salzman, B., Mills, G., Hersh, L., & Parks, S. (2014). Strategies to help reduce hospital readmissions: the risk assessment tools, medication reconciliation steps, and discharge script provided here can help you keep your patients from going back into the hospital. *Journal of Family Practice,* 63(8), 430-438.

Soong, C., Kurabi, B., Wells, D., Caines, L., Morgan, M. W., Ramsden, R., & Bell, C. M. (2014). Do post discharge phone calls improve care transitions? A cluster-randomized trial. *PLoS ONE,* 9(11), 1 – 6.

Steiner, B. D., Denbam, A. C., Ashkin, E., Newton, W. P., Wroth, T., & Dobson, L. A. (2008). Community Care of North Carolina: Improving care through community health networks. *Annals of Family Medicine,* 6(4), 361 – 367.

Tan-McGrory, A., & Betancourt, J. (2014). Addressing language barriers and improving quality of transitions and discharge. *Israel Journal of Health Policy Research, 3(1), 31-32.*

Tang, N., Fujimoto, J., & Karliner, L. (2014). Evaluation of a primary care-based post discharge phone call program: Keeping the primary care practice at the center of post-hospitalization care transition. *Journal of General Internal Medicine,* 29(11), 1513 – 1518.

Traynor, K. (2011). Home-based medication management system looks to future. *American Journal of Health-System Pharmacy,* 68(12), 1059 – 1060.

Trudnak, T., Kelley, D., Zerzan, J., Griffith, K., Jiang, H. J., & Fairbrother, G. L. (2014). Medicaid admissions and readmissions: Understanding the prevalence, payment, and most common diagnoses. *Health Affairs,* 33(8), 1337 – 1344.

Vedel, I., & Khanassov, V. (2015). Transitional care for patients with congestive heart failure: A systematic review and meta-analysis. *Annals of Family Medicine,* 13(6), 562 – 571.

Verhaegh, K. J., MacNeil-Vrooman, J. L., Eslami, S., Geerlings, S. E., De Rooij, S. E., Buurman, B. M. (2014). Transitional care interventions prevent hospital readmissions for adults with chronic illnesses. *Health Affairs,* 33(9), 1531 – 1539.

Volland, P. J., Schraeder, C., Shelton, P., & Hess, I. (2012). The transitional care and comprehensive care coordination debate. *Journal of the American Society on Aging,* 36(4), 13 – 19.

Voss, R., Gardner, R., Baier, R., Butterfield, K., Lehrman, S., & Gravenstein, S. (2011). The Care Transitions Intervention: Translating from efficacy to effectiveness. *Archives of Internal Medicine,* 171(14), 1232 – 1237.

Walker, P. C., Bernstein, S. J., Tucker-Jones, J. N., Piersma, J., Kim, H., Regal, R. E., Kuhn, L, & Flanders, S. A., (2009). Impact of a pharmacist-facilitated hospital discharge program. *Archives of Internal Medicine,* 169(21), 2003 – 2010.

Walker, T. (2012). Readmission rates drop with better med reconciliation and therapy management. *Drug Topics,* 156(10), 29-30.

Willis, J. S., Hoy, R. H., & Jenkins, W. D. (2011). In-home medication reviews: A novel approach to improving patient care through coordination of care. *Journal of Community Health,* 36(6), 1027-1031.

Wilson, J. F. (2009). Will all health care reform lead back to Medicaid? *Annals of Internal Medicine,* 150(2), 149 – 151.

Wong, F. K. Y, Chow, S., Chung, L., Chang, K., Chan, T., Lee, W., & Lee, R. (2008). Can home visits help reduce hospital admissions? Randomized controlled trial. *Journal of Advanced Nursing,* 62(5), 585 – 595.

Woz, S., Mitchell, S., Hesko, C., Paasche-Orlow, M., & Greenwald, J. (2012). Gender as risk factor for 30 days post-discharge hospital utilisation: a secondary data analysis. BML Open, 2(2), 1-7.

Xing, J, Goehring, C., & Mancuso, D. (2015). Care coordination program for Washington state Medicaid enrollees reduced inpatient hospital costs. *Health Affairs,* 34(4), 653 – 661.