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The doctoral project, directed and approved by the candidate's committee, has been accepted by the College of Graduate and Professional Studies of Abilene Christian University in partial fulfillment of the requirements for the degree.

Doctor of Nursing Practice

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The Effect of Care Coordination on Hemoglobin A1c for Type 2 Diabetes Patients

A doctoral project submitted in partial satisfaction

of the requirements for the degree of

Doctor of Nursing Practice

by

Lee Ann Hinsky, MSN, BSN, RN

February 2020

Dedication

I dedicate this project to Brad, my husband, for his never-ending love, support, and encouragement, for taking on all the household chores, for keeping me company through late nights of writing, and for keeping me supplied with fresh coffee and green tea. I could not have done it without him. I also dedicate this to Mom and Dad and to my four children and their spouses, Caitlin, Kyle, Alex, Nathan, Liz, Abigail, and Devin. They have been the best cheerleaders, constant prayer warriors, and they are my motivation to never stop learning and growing. Finally, I dedicate the ability to complete my doctoral degree and this project to my Lord and Savior, Jesus Christ. I placed my trust in Him and He directed my path.

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Abstract

The purpose of the study was to test the impact of care coordinator visits by primary care registered nurses on serum hemoglobin A1c (HbA1c) levels in patients with type 2 diabetes. In the study, the researcher compared 2 groups of type 2 diabetes patients—those who had care coordinator visits from registered nurses and those who did not—through retrospective data collection and analysis from the patients' electronic medical record from July 2018 through December 2018. An independent samples *t* test was used to compare the means of the intervention and control groups' change in HbA1c levels. The intervention and control groups did not differ in baseline HbA1c levels. Gender and age did not have a major impact on change in HbA1c levels. Change in HbA1c levels ranged from a decrease of 4.20 to 0 for the intervention and control groups differed significantly in change in HbA1c levels, *p* < .0001. The study results strongly demonstrated that registered nurse care coordination had a positive effect on HbA1c levels for type 2 diabetic patients in primary care.

Keywords: Type 2 diabetes, RN care coordinator, primary care, hemoglobin A1c

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Chapter 1: Introduction

Type 2 diabetes is a chronic disease with a prevalence that continues to grow in the United States. In 2015, the number of Americans diagnosed with diabetes rose to over 30 million. In addition, nearly 84 million more have been diagnosed with prediabetes (Centers for Disease Control [CDC], 2017b). If treatment is not sought, a prediabetic can become a diabetic in a few short years (Konchak, Moran, O'Brien, Kandula, & Ackermann, 2016). One of the major risk factors attributed to developing type 2 diabetes is obesity (Delahanty et al., 2015). The prevalence of obesity is growing as well. In the United States, the percentage of people considered to be obese increased from 30.5% in 1999 to 39.8% in 2015 (Hales, Carroll, Fryar, & Ogden, 2017). The growing number of obese persons in the United States is a major reason for the growth in type 2 diabetes diagnoses.

Hyperglycemia and insulin resistance are distinct characteristics of type 2 diabetes. The basic pathophysiology that leads to hyperglycemia includes increased carbohydrate consumption that increases glucose production and secretion by the liver, then decreased insulin secretion by the pancreas, followed by decreased glucose uptake by the muscles (Khardori, 2018). The longer hyperglycemia is left unchecked, the more the condition becomes resistant to treatment, which can lead to decreased beta cell function in the pancreas leading to diabetes (Skyler et al., 2017). This decreased beta cell function is expressed through hyperglycemia and insulin resistance.

The standard method for diagnosis of type 2 diabetes is through the assessment of serum glucose levels. Specifically, glycated hemoglobin (HbA1c) is recognized as the standard test for the diagnosis and monitoring of type 2 diabetes (Sherwani, Khan, Ekhzaimy, Masood, & Sakharkar, 2016). An HbA1c provides an accurate average of a patient's serum glucose level. Sherwani et al. (2016) explained that the "analysis of glycated hemoglobin (HbA1c) in blood

provides evidence about an individual's average blood glucose levels during the previous two to three months, which is the predicted half-life of red blood cells" (p. 95). Untreated or uncontrolled, elevated HbA1c leads to diabetes, and untreated diabetes leads to the risk of developing other disease processes such as heart disease, stroke, neuropathy, retinopathy, and kidney failure (Adriaanse, Drewes, Heide, Struijs, & Baan, 2016). Currently, diabetes is in the top ten leading causes of death (Stokes & Preston, 2017). Greater numbers of patients diagnosed and treated for type 2 diabetes can prevent comorbidities from developing and decrease the number of deaths attributed to diabetes.

Due to the growing prevalence, the expenditures to treat diabetes are also growing. According to the American Diabetes Association (ADA, 2018), "people with diagnosed diabetes, on average, have medical expenditures approximately 2.3 times higher than what expenditures would be in the absence of diabetes" (p. 1). According to the ADA (2018), in 2017 the cost of diabetes was \$327 billion, with \$237 billion of that going to direct health care costs. Of the \$237 billion to direct health care costs, \$102 billion went toward medications and \$90 billion was associated with lost productivity. These expenditures are an increase of \$82 billion from 2012 (ADA, 2018). The cost in dollars and lost productivity greatly burden insurers, employers, and society as a whole.

Through treatment programs that incorporate education in lifestyle management, type 2 diabetes can be a manageable, chronic disease (Delahanty et al., 2015). Psychosocial support and lifestyle changes of diet and exercise along with adherence to medication regimens make it manageable through blood sugar control (Nathan et al., 2015). The ADA (2017) asserted that assisting patients through diabetes self-management education (DSME) and diabetes self-management support (DSMS) are the methods by which the "cornerstone of diabetes

management, lifestyle management, and psychosocial care will be achieved" (p. 7). Health care providers partnering with patients to help them be the best they can be at self-management by way of DSME and DSMS programs greatly improves diabetes treatment.

Problem of Interest

As the prevalence of diabetes continues to grow, the mortality rate associated with diabetes is also increasing. The mortality rate with type 2 diabetes listed as the underlying cause from 2000 to 2016 was 37.7 % (Rodriguez et al., 2019). Lifestyle management is recommended as the essential method by which diabetes patients can learn to manage their disease (Delahanty et al., 2015). Learning to self-manage diabetes can be difficult as "it requires a person with diabetes to make a multitude of daily self-management decisions and perform complex care activities" (Powers et al., 2017, p. 40). In a study by Mensing et al. (2006), patients who participated with a registered nurse (RN) care coordinator for DSME and DSMS demonstrated to health care providers the impact this intervention had on improved patient self-management and improved HbA1c levels.

Background

Treatment for type 2 diabetes since 1960 has centered around the prescribing of oral hypoglycemic medications and insulin by a physician (Kahn, Cooper, & Del Prato, 2014). In addition to these medications, physicians have typically recommended lifestyle management through diet and exercise (Olokoba, Obateru, & Olokoba, 2012). The health care community has been addressing type 2 diabetes in response to the onset of the disease with little effort to partner with patients for prevention and self-management strategies (Konchak et al., 2016). There has also been a shortcoming where health insurance is concerned. Traditional fee-for-service models have not historically covered preventative treatment costs, and the value-based payers have not

fully developed their payment model to cover preventative or supportive programs (Konchak, Moran, O'Brien, Kandula, & Ackermann, 2016). Once it is known that a patient is prediabetic, it is possible to "prevent or delay the onset of diabetes through intensive lifestyle change and/or the use of select medications" (Konchak et al., 2016, p. 7). It is vital to the future of diabetes prevention and treatment to assist patients in developing self-determination for managing their disease process.

In 1978, the Diabetes Education Study (DIABEDS) was the beginning of supporting patients in self-determination (Mazucca et al., 1986). The study provided education to noninsulin-dependent diabetics, which included lectures, skills labs, and a behavioral component. This systematic program was provided to the intervention group. According to Mazucca et al. (1986), "the nursing staff dispensed written patient education materials, taught insulin injection technique, and reinforced physicians' orders regarding compliance with therapeutic regimens" (p. 2). The control group received only basic diet and medication education provided during an office visit. The outcome of the study was positive, with the patients who received DIABEDS demonstrating decreased hyperglycemia, better blood pressure, and greater weight loss (Mazucca et al., 1986). The conclusion was that the education improved self-care and improved patient outcomes (Mazucca et al., 1986, p. 10). In a study by Lorig and Holman (2003), self-management education was evaluated with the conclusion that "perhaps existing self-management programs that are effective can be more widely disseminated and more programs containing all the key self-management components can be developed" (p. 6).

In 2006, what was known as DIABEDS became diabetes self-management education (DSME), the foundation of care for diabetic patients (Mensing et al., 2006). The present and future treatment of diabetes has, at the core, DSME. As described by (Powers et al., 2017), "it is

the position of the ADA that all individuals with diabetes receive DSME/S at diagnosis and as needed thereafter" (p. 41). The "S" has been added after DSME to include support. DSMES has demonstrated value through decreasing cost of care by fewer hospital admissions and a decrease in comorbidities. Knowing that diabetes care now costs more than \$300 billion, it makes sense to promote DSMES programs throughout primary care in the United States as one of the strategies to decrease the cost of care for diabetes (Wong-Rieger & Rieger, 2013). In the view of Powers et al. (2017), it is strongly suggested "that all health care providers and/or systems develop processes to guarantee that all patients with type 2 diabetes receive DSMES services and ensure that adequate resources are available in their respective communities to support these services" (p. 42). Just as diabetes education and self-management methods evolved and improved, primary care practices must evolve and improve to robustly include DSMES as an integral part of medical practice.

RN care coordinators, functioning as the self-management educators within primary care, can be the vehicle by which DSMES is provided. RN care coordinators are nurses who have a bachelor's degree in nursing and have achieved advanced certification in care of specific patient populations. It was found by Grohmann, Espin, and Gucciardi (2017) that patients in the primary care setting had better engagement when the DSMES was integrated into the care team rather than a program at an off-site location. Some of the results of RN care coordination in primary care have been fewer emergency department visits, lower medication expenses, improved clinical quality indicators, improved patient perception of care, and increased patient self-confidence to manage their own care needs (American Nurses Association [ANA], 2012, p. 2). To achieve these results there are "four critical times to assess, provide, and adjust diabetes self-management education and support: (a) at diagnosis, (b) annual assessment of education,

nutrition, and emotional needs, (c) when new complicating factors influence self-management, and (d) when transitions in care occur" (Powers et al., 2017, p. 45). The RN care coordinator within the practice is in step with the type 2 diabetic patient at the four critical points of care listed above.

Moreover, there have been improvements in health insurance coverage for DSMES programs. Powers et al. (2017) reported that these programs now qualify for reimbursement with the Centers for Medicare and Medicaid Services and other health insurance providers. The National Standards for DSMES are used to determine reimbursement. Primary care practices providing DSMES are eligible for compensation for these services.

Purpose

The purpose of the project was to determine if adult primary care patients with type 2 diabetes, receiving regular education from a primary care RN care coordinator, showed improved serum HbA1c levels. Specifically, I examined the association between the independent variable of RN care coordinator visits, which has two conditions—"yes" visits and "no" visits—to the dependent variable of HbA1c levels.

Significance of the Study

The significance of the study can be found in improving clinical practice, in that practicing as care coordinators, RNs can function at the top of their license. Top of license functioning for an RN is found in the work of care coordination, needs assessment, education assessment, referrals management, location of community resources, and training in self-management strategies (Haas & Swan, 2014). Over half of all visits to primary care providers address chronic illness (Bauer & Bodenheimer, 2017). Chronic illness visits require more time, coordination of care, and patient education; therefore, the need exists to utilize RNs for the care

of chronically ill patients through care coordination (Anderson, Hilaire, & Flinter, 2012). The greater utilization of RNs functioning at the top of their license, assisting in care of patients with chronic illness, can help lighten the burden of primary care provider shortages and improve access to care (Bauer & Bodenheimer, 2017; Sullivan, 2017). The RN care coordinator can see the diabetic patient for follow-up visits and provide DSMES, opening up visits in the provider's schedule for other patients. In a summary of the value of RN care coordination, the ANA (2012) asserted that patients who had regular visits with an RN care coordinator demonstrated the following:

- reductions in emergency department visits;
- noticeable decreases in medication costs;
- reduced inpatient charges;
- reduced overall charges;
- significant increases in survival with fewer readmissions;
- lower total annual Medicare costs for those beneficiaries participating in pilot projects compared to control groups;
- increased patient confidence in self-managing care;
- improved quality of care; and
- increased safety of older adults during transition from an acute care setting to the home (p. 2).

The significance of the study is in demonstrating that top of license functioning by RN care coordinators, working with patients for DSMES, can lead to improved patient engagement and self-determination, which can result in improved clinical outcomes (ANA, 2012; Bauer & Bodenheimer, 2017). Improved clinical outcomes that can be achieved are improved glycemic

control, decreased medication costs, and increased overall quality of care. I specifically studied HbA1c levels as the indicator of improvement for patients with type 2 diabetes who see an RN care coordinator.

Nature of the Project

I chose a quantitative research method to study an association between two variables: the independent variable of RN care coordinator visits and the dependent variable of HbA1c. There were two groups in the independent variable: those who had visits with the RN care coordinator and those who did not. I was interested to see if there was an association between RN care coordinator visits and HbA1c levels in type 2 diabetic patients.

Patients with a chronic disease require greater education and care management to develop greater motivation to self-manage care (Welford, Murphy, & Casey, 2012). The project was proposed to determine if regular visits with an RN who is coordinating care and providing education would improve patient self-management, and thereby improve patients' HbA1c levels.

PICOT Question

The PICOT question investigated in this study was the following: For adult primary care patients with type 2 diabetes, do HbA1c levels improve with RN care coordinator visits compared to HbA1c levels for patients who do not have visits with the RN care coordinator?

- P The patient population was adult primary care patients, ages 18 to 75, with type 2 diabetes.
- I The intervention was visits with an RN care coordinator who was providing DSMES.
- C The comparison was to patients who did not have visits with an RN care coordinator.
- O The outcome was improved serum HbA1c levels.
- T The time period was July 1, 2018 to December 31, 2018.

Hypothesis

The hypothesis for this study was that there would be a statistically significant difference in HbA1c levels, as measured by an independent samples *t* test, between patients who saw an RN care coordinator and those who did not. The null hypothesis was that there would be no statistical difference in HbA1c, as measured by the independent samples *t* test, between patients who saw an RN care coordinator and those who did not. The hypothesis was that patients who had visits with an RN care coordinator would demonstrate a clinical outcome of improved serum HbA1c.

Theoretical Framework

The theoretical framework underpinning this study is the self-determination theory (SDT). SDT is the basis for the study of human motivation and nature (Deci & Ryan, 2019). When the simple, emotional need for self-sufficiency, ability, and understanding are present in an encouraging, constructive setting, external influences can prompt internal motivation (Williams, Freedman, & Deci, 1998). Patients move along a continuum from being non-selfdetermined to becoming self-determined. On the non-self-determined end of the continuum, patients have no drive or influence to change behavior. As they move along the continuum, there are external drivers that work as an outside influence to prompt or motivate a patient to change. Visits with the RN care coordinator serve as an external driver to assist a patient in achieving greater understanding and ability in self-managing their diabetes.

Definitions

Chronic disease. These are diseases or illnesses that cause bad health and are not acute, last longer than 12 months, and for which a patient must seek health care interventions on a regular basis. Diabetes is in the top three in the CDC list of chronic diseases (CDC, 2017a).

Diabetes self-management education (DSME). The provision of education for a patient to learn the tasks and understanding needed to care for oneself in managing diabetes (Powers et al., 2017).

Patient engagement. When a patient chooses to use his knowledge and skills to participate with his health care team for disease prevention and management (Deci & Ryan, 2019).

Prediabetes. A situation in which a patient's blood glucose is above normal but not yet elevated enough to be diagnosed with diabetes (CDC, 2017b).

RN care coordinator. A care coordinator functions to meet patient's needs, honoring their wants in relation to health care provision, education, and collaboration along with the purposeful coordination across the continuum of care (ANA, 2012).

Self-determination theory. A context by which to study human incentive and the behavior that motivates to action. It is a framework to assess internal and external influences that motivate a person to action (Deci & Ryan, 2019).

Type 2 diabetes. A chronic disease in which the pancreas produces insulin, but beta cells become resistant causing the pancreas to produce more insulin, eventually wearing out the pancreas (ADA, 2017).

Scope and Limitations

The study took place in a large, multiclinic, primary care physician's practice in northeast Indiana. The study included a random sample of a minimum of 35 patients in both groups for a medium effect size. The sample size was derived from a power analysis utilizing a G*Power calculator (Faul, Erdfelder, Buchner, & Lang, 2009). The study consisted of both male and female patients between the ages of 18 and 75 with a diagnosis of type 2 diabetes and a starting HbA1c range of 6.5% to 10.5% (ADA, 2017). The range was chosen so that there was a better chance of comparing like groups. The study would have less validity if one group had mostly lower HbA1c levels, and the other group had higher HbA1c levels. This range allowed for more homogenous groups by eliminating outliers to compare HbA1c levels as the outcome of care coordinator visits and no care coordinator visits. The patients may or may not have had comorbidities. Ideally, those who had visits with the RN care coordinator would have had at least two visits after their starting HbA1c level was assessed.

Summary

Diabetes is a growing problem in the United States, so much so that it has been referred to as an epidemic (Delahanty et al., 2015). There are 30 million Americans diagnosed with diabetes and another 84 million with prediabetes (CDC, 2017b). Obesity is a major contributing influence to developing type 2 diabetes, and the prevalence of obesity reached 39% in 2015 in the United States (Hales et al., 2017). The cost to treat diabetes grew to \$327 million in 2017 (ADA, 2018), and proper diagnosis, treatment, and patient self-management strategies are paramount to fighting this epidemic (ADA, 2017). The preferred method of diagnosing diabetes is testing HbA1c levels (Sherwani, Khan, Ekhzaimy, Masood, & Sakharkar, 2016). The best treatment plans include RN care coordination in primary care practices where patients receive education and assistance to self-manage their diabetes (Powers et al., 2017).

My purpose in the study was to investigate the effect of RN care coordinator visits on HbA1c levels for adult primary care patients with type 2 diabetes in comparison to patients with type 2 diabetes who did not have visits with an RN care coordinator. If an association was found between patients' HbA1c levels and RN care coordinator visits, further discussion about the use of RN care coordinators within primary care should take place.

Chapter 2: Literature Review

This chapter presents a review of the literature relevant to the problem of interest. The problem of interest was the following: For adult primary care patients with type 2 diabetes, did HbA1c levels improve with RN care coordinator visits compared to HbA1c levels for patients who did not have visits with the RN care coordinator? The categories I investigated for the literature review were type 2 diabetes prevalence, type 2 diabetes diagnosis, cost of diabetes, RN care coordinators, self-management, and the self-determination theory (SDT).

A search was completed using Abilene Christian University's (ACU's) library database. The library search produced results from CINAHL, OVID, Elsevier, and Medline. The key phrases for the searches were *type 2 diabetes prevalence*, *type 2 diabetes diagnosis*, *HbA1c*, *cost of diabetes care*, *primary care RN care coordinators*, *self-determination theory*, and *patient disease self-management*. The limits placed on the search were full text, peer-reviewed, 2012– 2019, and the English language. More than 800 articles were found in the literature search, and I narrowed this down to 50 for use in the project.

Type 2 Diabetes Prevalence

Type 2 diabetes affects over 30.3 million U.S. adults (CDC, 2017b). It is reported that of those with diabetes, approximately 25% are suspected to be undiagnosed because many do not seek treatment (CDC, 2017b). In addition to the more than 10% of Americans diagnosed with diabetes, an estimated 84 million more people have prediabetes (Rowley, Bezold, Arikan, Byrne, & Krohe, 2017). The increased prevalence of diabetes and prediabetes in the United States occurs across all ethnic groups, ages, and genders. While all populations have been affected by the increase in diabetes, Khardori (2018) predicted that ethnic minorities and lower income populations will be affected in greater numbers. In a study of lifetime diabetes risk, it was

determined that an American born in the year 2000 would have a nearly 40% chance of developing the disease in his or her lifetime (Gregg et al., 2014). With over 30 million Americans diagnosed with diabetes, and the expectation for that number to increase, Delahanty et al. (2015) suggested that type 2 diabetes has become an epidemic. While type 2 diabetes is not an infectious disease, calling it out as an epidemic is appropriate as it is spreading rapidly and affecting a large number of people.

The increase in obesity is a contributing factor to the growing prevalence of diabetes. The number of Americans diagnosed with diabetes increased by 9.3% from 1999 to 2015 (Hales et al., 2017). There are several studies that reported a connection between obesity and developing type 2 diabetes. Obesity is one of the main contributing risk factors leading to a diabetes diagnosis (Nathan et al., 2015). Those who are obese are at risk of developing type 2 diabetes seven times more than those who are not obese (Snowdon-Carr, 2016). Khardori (2018) argued that the near 40% predicted increase in adults developing diabetes has, at the core, obesity as the causative factor. Obesity rates were higher among ethnic minorities and people living in lower income neighborhoods (Hales et al.; Ludwig et al., 2011). People in lower income areas have less access to healthy foods and rely on cheaper, processed foods that lead to weight gain. The evidence in the literature points to obesity as a primary risk factor for developing type 2 diabetes.

The prevalence of type 2 diabetes and prediabetes continues to grow along with the prevalence of obesity. Diabetes affects all populations in the United States with higher rates among ethnic minorities and lower income populations. To understand the prevalence of diabetes, it is necessary to understand how diabetes is diagnosed.

Type 2 Diabetes Diagnosis and Monitoring

It is necessary for health care providers to identify patients who present with symptoms of diabetes and to use the recommended method of diagnosis. Patients with type 2 diabetes typically present with an elevated blood glucose and a resistance to insulin along with possible symptoms of polyuria, polydipsia, weight loss, changes in vision, yeast infections, and numbress in the feet (ADA, 2017). Fasting blood glucose and HbA1c level are the recommended diagnostic tests for patients who present with these symptoms (Diabetes Prevention Program Research Group, 2015). The benefit of the HbA1c test is that it shows a patient's blood glucose level over the previous three months. A fasting blood sugar result is a patient's level at a snapshot in time. Patients who are obese or overweight with presenting symptoms should receive the recommended tests. It is recommended by the ADA (2017) that testing be done for patients who are asymptomatic if they are overweight or obese and have a minimum of two additional indicators of diabetes or prediabetes risk. Additional indicators for diabetes risk include having a parent or sibling with diabetes, being an ethnic minority, being a woman who had gestational diabetes or polycystic ovaries, hypertension, cardiovascular disease, hyperlipidemia, and a sedentary lifestyle (ADA, 2017). The criteria for diagnosing type 2 diabetes with fasting blood glucose and/or HbA1c is a "fasting blood glucose of 126 mg/dl or higher or a HbA1c greater than or equal to 6.5%" (ADA, 2017, p. 6). Overall, the accepted standard diagnostic tests for patients who present with diabetes or prediabetes symptoms are HbA1c and fasting blood glucose.

In addition to diagnosing type 2 diabetes, following a patient's HbA1c level was found to be useful for monitoring, predicting, and managing diabetes complications (Diabetes Prevention Program Research Group, 2015; Laiteerapong et al., 2017). Furthermore, Qaseem et al. (2018) found that utilizing HbA1c for glycemic management resulted in a reduction in microvascular complications such as retinopathy, neuropathies, and nephropathy. Closely monitoring a patient's HbA1c level leads to improved blood glucose management.

There is cause for concern when trying to manage HbA1c levels too tightly. Regular monitoring practice for diagnosed diabetes calls for managing HbA1c levels at 7.0% to 7.9%, while rigorous monitoring calls for levels less than 6.0% (Qaseem et al., 2018). When the more rigorous levels were applied, patients experienced untoward effects such as hypoglycemic episodes, edema, and even weight gain (Qaseem et al., 2018). According to Colayco, Niu, McCombs, and Cheetham (2011), rigorous treatment to keep HbA1c levels below 6% and allowing HbA1c levels to remain uncontrolled at over 8% exposed patients to increased danger for cardiac complications. Therefore, the American College of Physicians stated the goal should be to maintain HbA1c levels between 7% and 8% for the majority of patients (Qaseem et al., 2018). While many providers may believe it is better to tightly manage a diabetic patient's HbA1c, these studies suggest that managing too tightly can have a negative outcome for the patient.

To summarize, HbA1c level is the accepted standard of care in diagnosing and monitoring type 2 diabetes (ADA, 2017). A level that is equal to or above 6.5% is the criteria for diagnosing type 2 diabetes. Uncontrolled diabetes is reflected in fluctuating HbA1c levels. Tight control of HbA1c levels below 6.5% has demonstrated worsening outcomes. Clinicians should work with patients to determine the optimal baseline HbA1c level and plan treatment accordingly. Early diagnosis using HbA1c and steady maintenance of HbA1c levels provides for the best patient outcomes.

Cost of Diabetes

There is a tremendous cost associated with diabetes. The overall estimated expenditures in the United States toward diagnosed diabetes in 2017 were \$327 billion (ADA, 2018). The \$327 billion was divided between the cost of direct medical treatment, \$237 billion, and the cost of lost productivity, \$90 billion (ADA, 2018). In 2012, medical spending toward diabetes in the United States was \$245 billion, demonstrating a rise in cost by 26% from 2012 to 2015. This rise in cost was due to the growing prevalence of diabetes and rising costs of treatment and medications. The medical costs for those diagnosed with diabetes are 2.3 times higher than those who do not have diabetes (CDC, 2017a). The medical costs associated with diabetes patients represent an average of \$16,752 per year for hospital care, medications, supplies, and office visits (ADA, 2018). If the diabetes epidemic is not managed, it is estimated that expenditures will reach \$622 billion by the year 2030 (Rowley et al., 2017). However, if the escalation in expenditures for diabetes continues to increase 26% every three years, expenditures could reach to nearly \$670 billion by the year 2030. Diabetes comes with a tremendous cost and is an out-of-control financial burden to U.S. society.

The high financial costs associated with diabetes attest to the significant burden of the disease. The financial burden of diabetes is quantifiable, yet there are other burdens that have not been quantified, such as the time and energy given by nonprofessional caregivers and the pain and loss endured by those with the disease (ADA, 2018). Tremendous effort in managing diabetes by both diabetics and health care providers is required to put a stop to the epidemic and the ever-expanding societal burden.

Through resourceful measures in primary diagnosis, improved prediabetes management, and improved overall diabetes self-management, researchers have argued that the epidemic could be stopped (Rowley et al., 2017). Alvarez, Greene, Hibbard, and Overton (2016) concluded that the primary care setting affords the optimal environment for this effort to take place by providing DSMES. Primary care practices, where patient self-management is educated and supported, demonstrate improved clinical patient outcomes and lower diabetic care costs.

RN Care Coordinators

There is a current and growing problem within primary care: The number of primary care providers is decreasing (Bauer & Bodenheimer, 2017; National Advisory Council on Nurse Education and Practice [NACNEP], n.d.). Primary care is the patient's key access to care, to chronic care management, and where the path across the continuum of care can be managed (Bauer & Bodenheimer, 2017). At the same time, the number of patients who require care for chronic disease has increased. Only 25% of visits to primary care are for acute problems, while 75% of visits are related to chronic care (Bauer & Bodenheimer, 2017). With the increase in chronic care needs and the decrease in primary care providers, RNs are in the best position to meet the need for chronic care. Presently in the United States there are more than three million RNs, with an expected increase to four million by 2025 (National Center for Health Workforce Analysis, 2013). It is estimated that only 25% of these RNs are employed in primary care (National Center for Health Workforce Analysis, 2013). The number of nurses available to work in primary care is expected to increase.

To best utilize nursing resources and nursing responsibilities, the number of RNs in primary care will need to increase (Smolowitz, Speakman, Wojnar, & Whelan, 2014). According to Anderson, Hilaire, and Flinter (2012), RNs were not functioning at the top of their license in primary care roles. In their study, Anderson et al. (2012) discovered that 85% of the RN's work during a shift in a primary care clinic was spent on tasks that an unlicensed coworker could perform. Care coordination, needs assessments, education assessments, referral management, resource location, and self-management education are all top of license functions for an RN (Haas & Swan, 2014). Bodenheimer and Bauer (2016) found that diabetes patients working with RN care coordinators demonstrated improved clinical outcomes of blood pressure and blood sugar regulation. RNs are positioned to increase their role in primary care through chronic care management, titration of medication utilizing protocols, and as nurse leaders coordinating a team to care for chronic patients (Bodenheimer & Bauer, 2016). The RN skill set is best utilized in the care coordinator capacity and is of benefit to the RN, the patient, and the primary care practice.

Education and training in schools of nursing are deficient in training nurses to care for patients in ambulatory care. Most schools of nursing do not provide for an ambulatory care curriculum or clinical training. According to the American Academy of Ambulatory Care Nursing (2017), schools of nursing have focused RN training on inpatient care, thinking most RNs will start their career in the hospital. RNs finish nursing school without an ambulatory care skill set (American Academy of Ambulatory Care Nurses [AAACN], 2017). The NACNEP (n.d.) recommended that federal funding should be increased to allow for nurse residency programs in primary care and to improve primary care nurse education. The federal government has recognized the need to improve RN training for the ambulatory care setting, although the schools of nursing have been slow to include an ambulatory care curriculum.

The chronic care need continues to grow within the primary care setting. The RN skill and ability is distinctive and necessary to provide care coordination, assist chronic care patients in self-management, lighten the burden of the provider shortage, and improve access and clinical outcomes for patients.

Self-Management

Diabetes is a chronic disease that can be challenging for patients to self-manage. In order to assist patients in the ability to manage their disease, it is necessary to move from a physiciancentric model to a patient-centric model of care (Alvarez, Green, Hibbard & Overton, 2016). Diabetic patients must learn to make difficult decisions each day as they navigate through their disease. Through treatment programs that incorporate education in lifestyle supervision, type 2 diabetes can be manageable (Delahanty et al., 2015). DSMES should be the primary program for diabetes care, lifestyle management, and psychosocial care for all diabetic patients (ADA, 2017). According to Powers et al. (2017), DSMES is the method health care providers should use to educate, train, coach, and provide ongoing encouragement for patients to self-manage their disease. It incorporates emotional support, nutrition education, and self-management education. There are four key times to interact with a patient and provide DSMES: "with a new diagnosis of type 2 diabetes, annually for health maintenance and prevention of complications, when new complicating factors influence self-management, and when transitions in care occur" (Powers et al., 2017, p. 44). DSMES programs are best embedded into primary care practices rather than an external outpatient program. RNs in primary care practices can be trained in providing DSMES and function in a care coordinator/educator capacity with diabetic patients. Once trained and certified in DSMES, primary care practices can bill for these services and receive compensation from Medicare and Medicaid (ADA, 2017). Many private insurance plans now cover these services, an indication that both public and private insurance providers realize the need to improve a patient's capability to self-manage their diabetes.

There is evidence in positive patient outcomes that DSMES programs are effective. According to Wong-Rieger and Rieger (2013), patients who received DSMES versus basic nutrition and exercise education demonstrated decreased HbA1c levels, decreased stress, and an overall improved ability to stick to a plan. The ADA (2018) also reported improved HbA1c levels, decreased hospitalizations, and lower cost of care for patients who participated in a DSMES program.

DSMES programs are a key element in the chronic care management of diabetes. Primary care is the best location for them to take place alongside care coordination. Health care providers can partner with patients, helping them be the best they can be at self-management by way of these programs.

Self-Determination Theory

The theoretical framework for this study is the self-determination theory (SDT), the basis for the understanding of human motivation and human nature. This theory was chosen as it discerns the degree to which a person exhibits self-determined functioning, similar to the optimal state of patient functioning in DSMES—to get patients to a self-managed, autonomous, self-determined state with their disease, so they follow their diet, exercise, take medications, and check their glucose. Deci and Ryan's (2019) SDT helps healthcare providers understand internal and external motivating influences that cause a person to take action. The self-determination continuum as developed by Ryan and Deci (2000) displays the progression from being non-self-determined to self-determined with the corresponding internal and external categories of motivation. The continuum also shows the sources of motivation along with what regulates that motivation. Core motivation toward action occurs when the motivation is due to the joy or gratification of learning or knowing something. External regulation occurs when motivation toward action is driven by outside causes such as approval, reward, reprimand, or avoidance.

Integrated regulation is the most self-governing kind of external motivation and occurs when a behavior is completely incorporated into a person's principles and beliefs.

Williams et al. (1998) found that when the simple, emotional need for self-sufficiency and understanding was present in an encouraging, constructive setting, external influences can prompt internal motivating actions. RN care coordinator visits along with DSMES serve to assist a patient in achieving greater understanding and ability in self-managing their diabetes. Williams et al. (1998) also found that patients who perceived they had greater self-sufficiency and the support of self-sufficiency from their provider had improved clinical outcomes. SDT is evident when patients become empowered to self-manage their diabetes with resulting improved clinical outcomes.

Summary

The literature review serves to demonstrate the need for the study. The goal for the study was to assess an intervention that could improve an outcome for type 2 diabetic patients. The literature review supports the need for the study through the documented evidence of the growing prevalence of diabetes and its poor management.

Patients with type 2 diabetes have elevated blood glucose levels and a resistance to insulin. They cannot effectively increase insulin secretion to overcome the insulin resistance which over time, left untreated or poorly managed, becomes more severe and problematic to treat (Skyler et al., 2017). Diabetes is linked to comorbidities such as heart disease and stroke (CDC, 2017a). It is the leading cause of kidney failure, neuropathies leading to lower extremity amputations, retinopathies leading to blindness, and it is currently listed among the top ten leading causes of death (CDC, 2017a). In 2014, there were 7.2 million patients dismissed from inpatient care who had a diabetes diagnosis, either as the reason for the admission or as a

contributing factor to the reason for admission (CDC, 2017a). Most of these patients are discharged to primary care for ongoing management of their diabetes.

There is a tremendous cost associated with diabetes. In 2017, the total estimated cost of diagnosed diabetes was \$327 billion that included \$237 billion toward direct medical costs and \$90 billion in lost productivity (ADA, 2018, p. 1). This figure is an increase of 26% from 2012, and 25% of those costs were spent on people with diagnosed diabetes (ADA, 2018). Medical costs for those with diabetes, about \$16,750 annually, are more than two times higher than medical expenses for people without diabetes (CDC, 2017a). These expenses represent hospital care, medications, supplies, and office visits. These numbers demonstrate that the burden of type 2 diabetes is great.

Lifestyle, behavioral change, and glucose-lowering medication regimens are the standard of treatment prescribed for those with type 2 diabetes (Konchak, Moran, O'Brien, Kandula, & Ackerman, 2016). This method of treatment requires a patient to self-manage their diabetes, which can be difficult as "it requires a person with diabetes to make a multitude of daily self-management decisions and perform complex care activities" (Powers et al., 2017, p. 40). The first step in self-management for adherence and lifestyle change is education. The primary care RN is well-suited to provide this education and coordinate treatment. DSMES programs along with RN care coordination within primary care are proven methods to assist patients in self-management. With the application of the self-determination theory, diabetes patients find the motivation to self-manage their disease process, manage their lifestyle, and improve their health.

Chapter 3: Research Method

The purpose of the study was to examine if adult primary care patients with type 2 diabetes who received regular education visits with a primary care RN care coordinator showed improved serum HbA1c levels. RN care coordinators are required to have a bachelor's degree in nursing, three to five years' experience, three years' experience in case management, experience teaching in self-management, and must get certified as a diabetes educator within two years of hire. The care coordinators in the study's organization provided a resource handbook for patients at their first visit to utilize during their future visits and at home (see Appendix A).

I studied two groups of type 2 diabetes patients through retrospective data collection and analysis from the patients' electronic medical record (EMR). The benefits of a retrospective study were the great deal of medical information available for review with little investment and the ability to review records with a low risk of harm (Gregory & Radovinsky, 2012). The health care system in northeastern Indiana where the study took place has a large diabetic population with a robust diabetes registry, which pulls information from the patients' EMR.

Project Design

I chose a quantitative research design to observe an association between two variables: the independent variable of RN care coordinator visits and the dependent variable of HbA1c. I tracked two groups in the independent variable: those who had visits with the RN care coordinator and those who did not. I analyzed the HbA1c levels of the two groups to determine if there was an association between RN care coordinator visits and HbA1c levels in type 2 diabetic patients. The goal was for the HbA1c level to be recorded for the patients who were to receive care coordinator visits before meeting with an RN care coordinator and then again after each subsequent visit. The HbA1c levels of the participants who received no visits were also recorded over the same time period.

Data Collection

Retrospective data were gathered through EMR abstraction from patient visits from July 2018 through December 2018. The criterion for abstraction was patients with a type 2 diabetes diagnosis based on the International Classification of Diseases, Tenth Revision, Clinical Modification 10 (ICD-10-CM) code of E11. The additional demographic data collected were gender, ethnicity, and age. Data were also collected listing the diabetic medications the patients were prescribed, if any, and comorbidities. The subjects were a random sample of the diabetic patients who fit the inclusion and exclusion criteria. The list of patients was provided to me by analysts in the hospital's departments of population health and business intelligence and was provided with the patient identifiers removed.

Instrument/Measurement Tool

Data were collected from the organization's EMR. The instrument used for data management was a spreadsheet. Data were collected, recorded, and collated into the categories of study number, care coordinator visits, no care coordinator visits, dates, demographics as stated above, height, weight, medications, blood pressure, comorbidities, and HbA1c levels before and after visits (see Appendix B).

Management and Analysis Plan

I used an independent samples t test as the method of statistical analysis to study the two groups. I used the t test to compare the two variables of visits and no visits or the two independent groups as recommended by Kim (2015). I analyzed the results to see if the means were significantly different from one another or if they were similar. If the means were significantly different, the result could suggest that the variable being manipulated—patients with RN care coordinator visits—had an effect on HbA1c levels.

Methodology

The question of interest was the following: For adult primary care patients with type 2 diabetes, did HbA1c levels improve with RN care coordinator visits compared to HbA1c levels for patients who did not have visits with the RN care coordinator? I chose a quantitative design method because the study examined the association of the independent variable of RN care coordinator visits on the dependent variable of HbA1c levels in diabetic patients. Quantitative research ought to validate or reject a hypothesis and remove any prejudices a researcher may have about the outcome (Welford, Murphy, & Casey, 2012). A quasi-experimental design was the type of quantitative research used in the study. This design allowed me to look at the relationship between two variables: the RN care coordinator visits (independent variable), and the HbA1c levels (dependent variable). I did not assign patients to one group or the other and did not influence the independent variable. The HbA1c levels of the visits group was compared to that of the no visits group. According to Bonnel and Smith (2018), the quantitative, quasiexperimental design was a good choice as the study population was well-defined and accessible. The sample population size was greater than 30, and there was enough detail in the design for it to be repeated. This study that assessed the outcome of an intervention for type 2 diabetes patients met the guidelines necessary for a quantitative, quasi-experimental design.

The limitations of the study were incorrect or omitted data from the EMR; also, I could not ask clarifying questions and had no control over the data reported in the EMR. The primary care clinics within the study setting did not have standard protocols for RN care coordinator visit referrals. There was a potential for missed RN care coordination visits due to various factors that
could have resulted in fragmentation of care. It was possible a patient did not have two visits within the six months of chart review. A small sample size could have been another study limitation; however, there was a sufficient population of type 2 diabetes patients for this study.

Feasibility and Appropriateness

I explored the feasibility of the study with the DNP chair, the organization's primary care chief medical officer (CMO), and the diabetic care program director. It was determined there was a large enough data base of distinct, type 2 diabetic patients in the institution's EMR who were seen within primary care in 2018 to have a sample size of at least 35 patients in each category of visits. This sample size allowed for an expected even distribution in the data analysis. The hospital's business intelligence analyst also helped to determine the feasibility of the ability to choose patients based on visits or no visits with the data points of RN care coordinator and HbA1c levels. To confirm appropriate sample size, I completed a power analysis utilizing the G*Power program (Faul, Erdfelder, Buchner, & Lang, 2009) with an alpha of 0.5 and an effect of 0.8 for a medium to large effect (see Appendix C).

The appropriateness of the study was defined by a comparison of the methodology and design to the study itself. I further confirmed appropriateness by assessing the intervention that could be utilized for patients in the future based on the research outcomes. The study design was appropriate and was a random sample rather than a convenience sample chosen by me, which would have been biased. Another indication of the appropriateness was that I based the analysis of the intervention on an individual outcome for a single patient; the intervention could be applied upstream to more patients if it was found to be a beneficial intervention.

Institutional Review Board (IRB) Approval Process

I completed ACU's Protecting Human Research Subjects training module, and I received a certificate of passing. I defended the proposal with the DNP committee and gained approval to submit the proposal to ACU's IRB. IRB approval was obtained, and I was able to begin work with the institution where the study took place (see Appendix D). The institution required the Collaborative Institutional Training Initiative (CITI) program to be completed. Specifically, I completed the modules of "Human Subjects Research" and "Responsible Conduct of Research" and obtained certificates of passing. The study proposal then had to pass through the institution's Nursing Research and Evidence-Based Practice Committee (NREBPC). The NREBPC approved the study to move forward to the institution's IRB. The proposal was presented to the institution's IRB, and permission to commence the study was granted (see Appendix E).

I obtained support for the project from the vice president of clinical operations (see Appendix F). In addition to project support, I obtained an approved Clinical Site Affiliation Agreement signed by the institution's senior vice president of primary care (see Appendix G). This agreement was submitted to the ACU representative for approval.

Interprofessional Collaboration

I collaborated with ACU faculty and with several departments in the institution where the study took place. Project coursework allowed me to actively interact with the program course faculty. There was consistent interaction and feedback about the study with the DNP program committee chair and two other committee members who all are a part of the ACU faculty. I also discussed the project with the CMO for primary care and the diabetic care program director where the study took place. Additionally, collaborative meetings took place with the director of population health and the population health project leader to discuss the type 2 diabetes

population and to gain an idea of the data that were available for the study. The population health project leader along with the business intelligence analyst extrapolated the data for the study applying the inclusion criteria. The NREBPC met and has continued to meet monthly to review nursing research proposals, disseminate nursing research outcomes, and train the institution's nurses in evidence-based practice and nursing research. I met with and became a member of this committee. I will continue to meet monthly to participate in the nursing research process at the institution. The collaborative efforts with ACU faculty and the departments within the institution have been constructive to the development of the project.

Practice Setting

The study took place in a large, not-for-profit, community-based health care system with over 200 primary care providers in northeastern Indiana who serve a population of more than 820,000 people. The health care system provided care to more than 59,000 unique diabetic patients over a six-month period in 2018 based on data provided by the diabetic care program director. These 59,000 patients generated 266,776 office visits with the majority of visits in primary care. The health care system utilizes a population health management strategy that includes RN care coordinators.

Target Population

The study included both male and female patients between the ages of 18 and 75 with a diagnosis of type 2 diabetes and a starting HbA1c range of 6.5% to 10.5% (ADA, 2017). The patients were from the primary care setting in the chosen health care system. The study design allowed for a random sample of a minimum of 35 in the control group (no coordinator visits) and a minimum of 35 in the intervention group (coordinator visits) for a medium effect size. The

patients may or may not have had comorbidities. The goal was for those who had visits with the RN care coordinator to have had at least two visits after their starting HbA1c level was assessed.

Inclusion Criteria

Inclusion criteria for the study consisted of patients who had an ICD-10-CM diagnosis of type 2 diabetes and were patients in primary care at the study location. I included those with and without comorbidities. The patients included in this study were seen in the primary care practice from July 2018 through December 2018. The included patients' baseline HbA1c levels were from 6.5% to 10.5%. I included patients who were prescribed oral diabetic medications and/or insulin. The patients were those who had visits with the RN care coordinator and those who did not during the above specified time range.

Exclusion Criteria

I excluded patients from the study who did not have an ICD-10-CM diagnosis of type 2 diabetes. Also, patients under the age of 18 years and older than 75 years were not a part of the study. In order to have a more level comparison of patients in both the visits group and the no visits group, I excluded those patients whose HbA1c level was outside the starting range of 6.5% to 10.5% and those who were admitted to the hospital anytime from July 2018 to December 2018. Last, patients who routinely sought care for their diabetes through the specialty practice of endocrinology rather than primary care were excluded.

Risk and Benefit

IRB approval was obtained from both ACU and the health care organization. I observed protection for human subject requirements. The study was a retrospective review of data from the EMR with minimal risk to human subjects. Individual consents were not required. I protected confidentiality by coding patient identifiers with a unique study number by the analyst before sending the data to the principal investigator. A record linking the coding log was kept in a separate file. All data gathered were kept by the principal investigator in a secure, password-protected digital file. The study data will be maintained for five years and then will be destroyed. **Timeline**

The proposal defense was held March 21, 2019. The DNP committee approved the proposal and sent it to ACU's IRB. The ACU IRB approved the study proposal. I was required to take and pass the CITI courses, which I completed in June 2019. I then presented and defended the proposal with the institution's NREBPC as required for any nursing research conducted within that organization in July 2019. With the approval of this committee, the study proposal was sent to the institution's IRB. I obtained final IRB approval from the organization on August 23, 2019, and the study began. There were some technical challenges with the online process to present the study proposal to the organization's IRB, causing delays. I collected the data in August 2019 and completed the analysis in September 2019 (see Appendix H).

Summary

My goal in this study was to see if there was an association between RN care coordinator visits and HbA1c levels through the application of the quantitative research design methodology. I collected retrospective data from the EMR for patients with type 2 diabetes who were seen in primary care over a six-month period in 2018. The patients consisted of two groups: those who saw the RN care coordinator and those who did not. I applied an independent samples *t* test analysis to the data to see if there was a significant difference between the means. If a significant difference was found, it could be said that the RN care coordinator visits had an effect on patients' HbA1c levels. If no significant difference was found, the null hypothesis could not be rejected.

I obtained IRB approval from both ACU and the institution. The nature of the study was low risk for harm to human subjects. Patients were de-identified by removing name, date of birth, and medical record number and by assigning a study number. Data were protected and kept confidential.

Diabetes is an epidemic in the United States; 30 million Americans have the disease. Patient self-management of the disease through education and support is an effective means of combating and controlling diabetes (Powers et al., 2017). RN care coordinators in primary care are in the best position to provide DSMES. My goal in the study was to observe if there was a measurable, statistical significance in the intervention of RN care coordinator visits for diabetic patients.

Chapter 4: Results

Purpose of the Project

The purpose of the study was to see if RN care coordinator educational visits had an impact on HbA1c levels in patients with type 2 diabetes in primary care. The hypothesis for the study was that a statistically significant difference in HbA1c levels would be observed between patients who saw an RN care coordinator and those who did not. I chose a quantitative design to study the impact of the independent variable of RN care coordinator visits on the dependent variable of HbA1c levels in diabetic patients. I studied two groups of type 2 diabetes patients through retrospective data collection and analysis from the patients' EMR. The HbA1c means of the control group and the intervention group were compared through the application of an independent samples *t* test statistical analysis.

Demographics

There were 3,314 distinct patients with a diagnosis of type 2 diabetes who were seen in primary care from July 2018 to December 2018. The determined inclusion and exclusion criteria were applied to both groups: those who had visits with the RN care coordinator and those who did not. Many patient records had missing HbA1c data, further excluding those patients from the study. Once I applied all criteria, the sample size for the intervention group—those who saw the RN care coordinator—was 62 patients. Patients meeting the inclusion criteria who did not see the RN care coordinator, the control group, were randomly selected into the sample using sampling software at a 1:1 ratio with the number of patients who had visits with the RN care coordinator. The sample met the necessary sample size according to power analysis results. The total sample size was 124 patients: 64 women and 60 men. The distribution of women and men between the two groups was nearly even (see Figure 1).



Figure 1. A bar chart illustrating demographics by gender.

The mean age in the control group was 56 years and 58 years in the intervention group. Ethnicity within both groups was less than 2% Hispanic or Latino. The comorbidities diagnosed in the groups were hypertension, coronary artery disease, and obesity. The most frequently occurring comorbidity in both groups was hypertension (see Figure 2).





Diabetic medication prescription was also abstracted from the EMR of the study groups. Eight percent of the control group and 24% of the intervention group were prescribed a medication to treat diabetes.

Data Analysis

Descriptive statistics were computed for a quantitative data analysis. Assistance with data analysis and analytic software was provided by the study organization's senior research scientist. To test equivalence between the groups' initial HbA1c levels, independent samples *t* tests were used to compare the visits and no-visits groups. Additionally, age and gender were tested for possible influence on change in HbA1c levels using independent samples *t* test and zero-order correlational analyses.

Change in HbA1c was calculated by subtracting the first HbA1c value from the last HbA1c value; therefore, a decrease in HbA1c over time was indicated as a negative value. An overall mean score was calculated after computing the change in HbA1c for each group. An independent samples *t* test was used to compare the means of the intervention and control groups' change in HbA1c. The data analysis for this study was created using SAS 9.4 software. **Results**

The sample characteristics are shown in Table 1. The intervention group, those who had RN care coordinator visits, and the control group, those who did not have visits, did not differ in initial or baseline HbA1c levels. Age and gender did not have a significant impact on change in HbA1c levels.

Table 1

Sample Characteristics

Characteristic	Control	Intervention	Total Sample
Characteristic	<i>n</i> = 62	<i>n</i> = 62	<i>N</i> = 124
Female $(n, \%)$	28 (43.75)	36 (56.25)	64 (51.61)
Male (<i>n</i> , %)	34 (56.67)	26 (43.33)	60 (48.39)
Age (M, SD)	56.45 (12.09)	58.23 (11.52)	57.34 (11.79)
Initial HbA1c (M, SD)	8.19 (1.19)	7.77 (1.22)	7.78 (1.10)
Change in HbA1c (<i>M</i> , <i>SD</i>)	0.02 (0.38)	-0.62 (0.96)	-0.03 (0.79)

Note. SD = standard deviation. Control = no RN visit group, Intervention = RN visit group.

The change in HbA1c levels ranged from a decrease of 4.20 to no change or zero for the intervention group and a decrease of 1.20 to an increase of 2.10 for the control group. The results validated that the intervention and control groups differed significantly in change in HbA1c levels, t(79.97) = 4.90, p < 0.0001. The *p*-value, or significance, and 95% CI of the difference are reported in Table 2. The *p*-value informs of the likelihood of finding an observable difference between the samples if the null hypothesis was accepted. A statistically significant *p*-value is less than 0.05 (Kellar & Kelvin, 2013). The null hypothesis was rejected as the analysis demonstrated there was a significant statistical difference in HbA1c as measured by the independent samples *t* test between patients who saw an RN care coordinator and those who did not.

Table 2

	Mean difference	Standard error	95% CI	t	df	Significance
t test	-0.640	0.131	-0.899 to -0.380	-4.881	122	<i>p</i> < 0.0001

Statistical Analysis of HbA1c Change Difference

Limitations

To complete the study, analyze and document the results, and make recommendations in a timely manner, I chose a limited scope for the study. Given the favorable outcome of improved HbA1c for patients who saw the RN care coordinator, other clinical outcomes such as improved blood pressure, BMI, and adherence to a treatment plan should be studied. Another limitation of the scope was the six-month time frame of chart review. Perhaps there would have been a greater volume of data points of HbA1c results and RN care coordinator visits if I had studied a year's worth of data in retrospective chart review. While the scope was limited, results were significant for positive clinical outcomes and will serve to inform clinical practice and further research.

Summary

The PICOT question investigated for this study was the following: For adult primary care patients with type 2 diabetes, did HbA1c levels improve with RN care coordinator visits compared to HbA1c levels for patients who did not have visits with the RN care coordinator? The results of the data analysis demonstrated that RN care coordinator visits for patients with type 2 diabetes had a positive impact on HbA1c results. The data validated the hypothesis that there would be a statistically significant difference in HbA1c levels as measured by an independent samples *t* test between patients who saw an RN care coordinator and those who did not.

Chapter 5: Discussion, Conclusions, and Recommendations

The purpose of this project was to study patients who had visits with the RN care coordinator as a part of their type 2 diabetes treatment and to assess the clinical outcome of HbA1c results. The hypothesis that the study results would demonstrate a clinical outcome of improved serum HbA1c for patients who had visits with an RN care coordinator was supported. The results of this study will inform current clinical practice and future research.

Interpretation and Inference of the Findings

The PICOT question elements for the study are listed below and a discussion of how the study met the PICOT elements follows.

- P The patient population was adult primary care patients ages 18 to 75 with type 2 diabetes.
- I The intervention was visits with an RN care coordinator who provided DSMES.
- C The comparison was to patients who did not have visits with an RN care coordinator.
- O The outcome was improved serum HbA1c levels.

T - The time period of the study was July 1, 2018, to December 31, 2018.

The data for the study were abstracted from the organization's EMR for patients who were between the ages of 18 and 75 with a type 2 diabetes diagnosis. There was a large enough sample to analyze data for both patients who had visits with the RN care coordinator who provided DSMES and those who did not have visits from July 2018 to December 2018. There was actually a large type 2 diabetic patient population within the study's organization. Due to the amount of data missing in the EMR, however, I excluded many of the records from the study. I assessed the HbA1c levels as a baseline result and as a final result and calculated the change in the levels. The study demonstrated through data analysis that the improvement in HbA1c levels for patients who had visits with the RN care coordinator was significant, p = < 0.0001. The inference can be made that patients were better able to realize self-determination through RN care coordinator visits with diabetic patients. SDT was the theoretical framework for the study (Deci & Ryan, 2019). By applying the work of DSMES (Powers et al., 2017), an external influence, in the RN visits, perhaps these patients were better able to gain an understanding to better manage their diabetes, which then prompted internal motivating actions (Williams, Freedman, & Deci, 1998). The RN care coordinator visits served to assist patients in achieving a greater ability in self-managing their diabetes as evidenced by the improved HbA1c levels. Overall, the patients who did not have visits with the RN care coordinator did not demonstrate an ability to self-manage their diabetes. While there were some patients whose HbA1c levels improved in the control group, the majority stayed the same or worsened. The study results clearly demonstrated that HbA1c levels improved for patients in primary care who had visits with the RN care coordinator.

Implications of Analysis for Leaders

The results of this project provide nursing leaders with evidence that demonstrate the value and the need for RN care coordination in the primary care setting. The implication is that the results of improved outcomes achieved by the type 2 diabetic patients through RN care coordination can be extrapolated to other chronic care conditions. Maintaining patients in primary care, when appropriate, for chronic care management is patient-centered, cost-effective, and allows for greater continuity of care (Grohmann, Espin, & Gucciardi, 2017). Nursing leaders ought to lead in the development of a primary care model of RN care coordination that is accessible to all patients (Scholz & Minaudo, 2015).

Through the study gaps in care were found, as evidenced by the lack of a standard referral to care coordination, the lack of a standard for assessing HbA1c levels, and the lack of a

standard for follow-up appointments for type 2 diabetic patients. These gaps were identified through missing data and documentation in the EMR and the lack of evidence of a protocol or policy for type 2 diabetic patient standard of care. The value of the RN care coordinator role is to be the professional functioning at the top of license who can bridge the gaps in care for the complex patient in primary care. According to the Triple Aim Initiative from the Institute for Healthcare Improvement, delivery of health care should include developing the well-being of populations, improving the patient experience, and decreasing health care costs (Whittington, Nolan, Lewis, & Torres, 2015). The RN care coordinator role can assist in meeting all three tenets of the Triple Aim for chronic care patients in the primary care setting. The results of this project can serve as the catalyst for the study organization's nursing leadership to further explore the development of a model for RN care coordination in the primary care setting.

EBP Findings and Relationship to DNP Essentials

Essential I: Scientific underpinnings. The DNP graduate is equipped to utilize nursing discipline and theories to critically assess current practice as well as new practices (AACN, 2006). In this study, the literature review assisted in assessing the current practice of care for type 2 diabetic patients. The study results, scientific theory, and the knowledge of the health of populations will inform the development of a model of care for type 2 diabetic patients and perhaps other chronic care models.

Essential II: Organizational and systems leadership. DNP nursing leadership at the organization and system levels is a crucial element in the ability of the DNP graduate to positively affect patient care (AACN, 2006). Learning at the doctoral level provides the DNP with knowledge and ability in organizational and systems leadership to assess the care of populations and implement care models to address population health and health inequalities. As

applied to the outcome of this study, the DNP graduate can utilize organizational and systems leadership strategies to evaluate an RN care coordinator program. Drawing from an understanding of safety, quality, process improvement, corporate, finance, health policy, and the provision of clinical care, the DNP graduate is prepared to lead initiatives at the systems level, such as the implementation of a model for RN care coordination in primary care (ANA, 2012).

Essential III: Clinical scholarship and analytic methods. The DNP graduate is equipped to review literature in search of evidence to inform the need to improve or change clinical practice (AACN, 2006). This study validated that the literature supports the function of an RN care coordinator, the self-determination theory in patient motivation to change, and chronic care management for patients in primary care (Deci & Ryan, 2019; Grohmann, Espin, & Gucciardi, 2017; NACNEP, n.d.). The analysis of the study data along with the review of the literature can lead to the design and implementation of practice guidelines for RN care coordination.

Essential IV: Information systems and patient care technology. The DNP graduate is equipped with the ability to use information technology to improve the quality of patient care, implement and monitor process improvement, and to evaluate care (AACN, 2006). Results of this study relied on the ability to abstract data from the EMR and to use technology to analyze the data. Further research should be conducted to evaluate technology available to the RN and the patient to utilize for DSMES and care management.

Essential V: Health care policy. The results of the study demonstrated the need to develop policy at the systems level and clinic level for standards of care for the type 2 diabetic patients. The DNP graduate is able to analytically view policy from the viewpoint of the patient, provider, and other health care stakeholders (AACN, 2006). The DNP graduate must also be able

to interact with public policymakers and promote policies that address the health of populations.

Essential VI: Interprofessional collaboration. The DNP graduate is equipped to function on multidisciplinary teams along with patients and families to lead improvements in nursing practice (AACN, 2006). The results of this study could lead to the implementation of an RN care coordinator practice model requiring the skill of leading an interprofessional team in working together to develop the model.

Essential VII: Clinical prevention and population health. The DNP graduate has knowledge to assess the determinants of health and the incidence and distribution of diseases. This knowledge allows the DNP graduate to be instrumental in work to improve the health of populations (AACN, 2006). The goal of the study was to realize improved outcomes for the population of type 2 diabetic patients. The results of the study should be assessed to extrapolate to other health populations.

Essential VIII: Advanced nursing practice. The graduate from a DNP program is equipped to complete evaluations of well-being and disease and to apply nursing interventions that are grounded in the disciplines of health care (AACN, 2006). The DNP graduate is able to concentrate nursing practice within a larger construct of overall nursing care utilizing developed assessment abilities within the complete care continuum. This study will inform nursing practice of the need to utilize advanced knowledge to plan for the care of patients across the care continuum while addressing the needs of complex care within primary care.

Recommendations for Future Research and Clinical Practice

Future research should include an analysis of the effect of RN care coordination on other clinical outcomes for type 2 diabetic patients such as blood pressure, BMI, and adherence to medication treatment. Another recommendation is to extend the study to analyze the effect of

care coordination beyond a six-month time period. This might allow for more data points and to see if time is a factor in a positive or negative outcome. A study on payment for the services of an RN care coordinator by the Centers for Medicare and Medicaid Services and private insurance would help to inform the business case for the development of an RN care coordinator program. Qualitative research to assess the patient perception and experience of the RN care coordinator program is another recommendation for further research. Finally, consideration should be given for research to be conducted to assess the RN care coordination effect on other chronic care patient populations such as those with CAD, lung disease, and renal disease.

Summary

Care for the chronically ill patient is complex. Primary care is the patient's main access to care, to chronic care management, and where the path across the continuum of care can be managed (Bauer & Bodenheimer, 2017). RN care coordination in primary care demonstrated improved clinical outcomes, improved quality of care, and an improved ability for patients to self-manage their disease processes (ANA, 2012). The goal of this study was to assess the effect of RN care coordination on type 2 diabetes patients who seek care in primary care. The study results strongly demonstrated that RN care coordination had a positive effect on HbA1c levels for type 2 diabetic patients in primary care.

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Appendix A: Diabetes Management Patient Handbook Table of Contents

Diabetes Patient Education Handbook Table of Contents

Welcome

Tab1-Daily Education Plan

Diabetes Education plan and teach back
 checklist

Tab 2 – About Me

- My Information: physician/specialty names and contact numbers
- Action plan/stop light/calendar
- · My health journal

Tab 3 - Body Part

- · Specific anatomy The Pancreas
- How does it work

Tab4-DiseaseProcess

- What is Diabetes Type 1 & Type 2
- How am laffected
- Signs/Symptoms
- Causes
- Risk factors
- · Severity classifications

Tab 5 -Tests, Procedures and Treatments

- · Standards of Care
- · Diagnostic tests Blood Glucose & A1C
- Using a food and blood glucose log

Tab 6 - Life Style Changes

- · Call your provider if...
- Coping
- Exercise
- Foot care
- Smoking cessation
- · Environmental condition
- Proper rest and sleep

Tab7-DietEducation

- · Healthy eating meal planning
- · Food groups breakdown
- · Food allergies- specific to patient
- · Food label reading
- Food substitutes (salt, cholesterol, processed sugar)

Tab8-Medication Education

- Oral Anti-Diabetic Medications
- Insulin
- · Taking medicine safely
- · Medication delivery device
- · Managing sharps

Tab9-Resources

- · Community resources
- · Smartphone Apps
- · Medication assistance
- Insurance
- · Outpatient services
- Websites

Tab 10 – After Visit Summary and Appointments

- Utilize this tab to keep documents and records from office visits and other appointments.
- Admission information
- Allergies
- · Follow up appointments
- Instructions
- · Medication summary
- · Education documentation
- · Concerns and recommendations
- · Belongings record
- · Website access information
- · Emergency 9-1-1

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Appendix	B:	Data	Coll	lection	Tool
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Appendix C: G*Power Calculator for Sample Size

(Faul et al., 2009)

Appendix D: ACU IRB Approval

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ABILENE CHRISTIAN UNIVERSITY Educating Students for Christian Service and Leadership Throughout the World Office of Research and Sponsored Programs 320 Hardin Administration Building, ACU Box 29103, Abilene, Texas 79699-9103 325-674-288 April 29, 2019
Lee Ann Hinsky
Department of Nursing Practitioner
Abilene Christian University
Dear Lee Ann,
On behalf of the Institutional Review Board, I am pleased to inform you that your project titled "The Effect of Care Coordination on Hemoglobin A1c for Type 2 Diabetes Patients",
(IRB#) is exempt from review under Federal Policy for the Protection of Human Subjects as: Non-research, and Non-human research Based on: The research does not involve interaction or intervention with living individuals, and the information being collected is not individually identifiable [45 CFR 46.102(f)(2)]
If at any time the details of this project change, please resubmit to the IRB so the committee can determine whether or not the exempt status is still applicable.
I wish you well with your work.
Sincerely,
Megan Roth
Megan Roth, Ph.D. Director of Research and Sponsored Programs

Our Promise: ACU is a vibrant, innovative, Christ-contered community that engages students in authentic spiritual and intellectual growth, equipping them to make a real difference in the world.

Appendix E: Institution IRB Approval



Appendix F: Support Letter

February 5, 2019

To Whom It May Concern:

This letter is written confirmation of my intended support for the project proposed by Lee Ann Hinsky, DNP candidate attending Abilene Christian University, regarding the effect of RN care coordinator visits on HbA1c levels for patients with type 2 diabetes in primary care.

I understand this study will be a retrospective look at data for patients who see a primary care provider within the as from before Lee Ann begins the study. I am confident the project outlined, the implementation, and the analysis will provide useful information for primary care providers, Population Health and our diabetic patients.

It is my privilege to support Lee Ann in her initiative to develop this project and to complete the study within

Sincerely,

Appendix G: Clinical Site Affiliation Agreement

CLINICAL SITE AFFILIATION AGREEMENT WITH Abilene Christian University - Dallas (OPTIONAL-IF NEEDED BY FACILITY)

This Clinical Affiliation Agreement (the "Agreement"), is entered into by and between Abilene Christian University - Dallas ("University") of Dallas, Texas and ("Facility"). University and Facility agree to the following:

PURPOSE

University has an Online Doctor of Nursing Practice ("**Program**") through which University provides its students academic experience. University desires for Facility to provide certain students of University with clinical experience through Facility, and Facility is willing to provide such experience.

1.0 RESPONSIBILITIES OF UNIVERSITY

University shall:

a) provide qualified teachers at University to teach the pre-requisite core curriculum and support courses in the Program;

b) provide administrative functions for each student in the Program which are the same functions as provided all other students at University;

c) provide a faculty member to be available for supervision while students are at Facility to supervise students participating in the Program. The faculty member will (i) be a registered nurse (RN) and/or advanced practice registered nurse (APRN) or other licensed medical doctor and (ii) be currently licensed by the State Board of Examiners for nursing or medicine (or other regulatory board allowing for the supervision of nurses, including those with advanced practice privileges) for the state in which the facility is located, (iii) be clinically competent; and (iv) carry liability insurance and provide evidence of same to University.

d) instruct students to abide by Facility's policies and guidelines. Information regarding Facility's applicable policies and guidelines will be available at the time of student orientation at Facility;

e) if applicable, provide Facility with the appropriate forms to be used in evaluating the performance of students in the program;

f) provide to Facility at least one month prior to students arriving at Facility a letter outlining the needs of the students, names of students and supervising faculty member, and length and dates of clinical experience;

Revised VER SP 2018

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g) consider promptly any complaints made by Facility against a student and participate in joint problem solving. Client safety and welfare shall be the primary concern. Student issues will be documented by the Facility and provided to the designated Faculty member and/or other representative of University. Facility, in its sole discretion, may require permanent withdrawal of any student from Facility at any time for cause;

2.0 **RESPONSIBILITIES OF FACILITY**

Facility shall:

- a) provide cooperation to promote success of the Program;
- b) provide work space for students at the Facility;

c) as available, provide suitable clinical experience situations as prescribed by the curriculum provided by University;

d) upon request by University, formally evaluate performance of students in the Program using the form(s) provided by University;

- e) retain responsibility for client care;
- to the extent allowed by law, assume no professional or financial liability for injury to students or faculty except that which might occur as a member of the public;
- g) provide access to acute emergency care at student's expense in the event of an accident or injury to a student on Facility's campus;
- h) Provide an orientation of Facility and assigned client care areas to student;

3.0 RESPONSIBILITIES OF UNIVERSITY AND FACILITY

University and Facility shall:

a) understand there will be no exchange of monies between the University and the Facility for this Program;

b) revise or modify this Agreement in writing if both parties agree to the revisions or modifications; and

c) comply with all applicable federal and state laws, rules and regulations.

4.0 TERM AND TERMINATION

This Agreement shall remain in effect for one (1) year beginning 2-25-20/9 and ending 2-35-2020 unless sooner terminated as provided herein. This Agreement may be terminated by either party upon thirty (30) days written notice to the other party by certified mail, return receipt requested. The termination shall not take effect until

Revised VER SP 2018 24 students who are enrolled at the time such notice is given have completed the courses in which they are enrolled.

5.0 NOTICE

Any notice, request or other communication required to be delivered under this Agreement shall be in writing and shall be deemed to have been given or made if delivered personally, by overnight delivery service, by United States mail, to the parties at the following addresses, or at such other addresses as shall be specified in writing by either of the parties to the other in accordance with the terms and conditions of this subsection:



If to University:

Abilene Christian University - Dallas Attn: Dr. Tonya McGee DNP Program Director 16633 North Dallas Parkway, Ste 800 Addison, TX 75001

6.0 STATUS OF STUDENTS

University and Facility understand and agree that while faculty and students are participating in the Program, faculty and students are not employees of Facility. Accordingly, faculty and students are not entitled to any of the rights or benefits established for Facility's employees, such as salary, vacation, sick leave with pay, paid holidays, insurance, and/or worker's compensation coverage.

7.0 MISCELLANEOUS

- 7.1 <u>Non-discrimination</u>. University and Facility shall not unlawfully discriminate in their respective performance of this Agreement.
- 7.2 <u>Entire Agreement</u>. This Agreement constitutes the entire agreement between the parties and supersedes any and all prior and contemporaneous oral or written understandings. This Agreement may not be altered, amended or modified except by a written document executed by both parties.

7.3 <u>Governing Law and Venue</u>. This Agreement shall be governed by, construed and enforced in accordance with the substantive laws of the State of Texas (but not including its conflict of laws rules if and to the extent such rules would apply the substantive laws of another jurisdiction). Venue for litigation of any dispute arising under this agreement or any

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lawsuit to enforce or interpret this Agreement shall be in an appropriate court located in Taylor County, Texas. The parties agree that Taylor County is the county in which performance of this Agreement shall take place.

7.4 <u>Severability</u>. Should any clause or provision of this Agreement be held or ruled unenforceable or ineffective by a court of law, such a ruling will in no way affect the validity or the enforceability of any other clause or provision contained herein.

7.5 <u>No Waiver</u>. No waiver by University or Facility of any breach of any term, provision or condition contained in this Agreement, or the failure to insist upon strict performance thereof shall be deemed to be a waiver of such term, provision or condition as to any subsequent breach thereof or a waiver of any other term, provision or condition contained in this Agreement. The exercise of any right or remedy hereunder shall not be deemed to preclude or affect the exercise of any other right or remedy provided herein.

7.6 <u>Confidentiality</u>. University acknowledges that the intent of federal and state privacy laws, is to assure that Confidential Information, will remain confidential and will be used only by those with appropriate authority as necessary to fulfill the purpose of this Agreement. University acknowledges that students, faculty and other University representatives may access Confidential Information during the performance of their function under this Agreement. As such, University represents and warrants that its agents, employees and representatives (collectively hereinafter "Representatives") will maintain such information as confidential and will not disclose such information to third parties or other Representatives of University, who do not require the information in order to fulfill this Agreement, except as permitted by law or order of the court. Should University, through its Representatives, for any reason otherwise disclose the information, University will immediately notify Facility. University warrants that it will train all Representatives concerning this provision of the Agreement.

EFFECTIVE the date set forth above. Executed as of the dates below, by and between University and Facility through their duly authorized officers, thereby binding themselves, their successors and assigns and representatives for the faithful and full performance of the terms and provisions of this Agreement.

Date:

Facility Representative	
Printed Name:	
Date: 2/8/19	

ACU Represen	tative	
Printed Name:	Stephen Johnson, Th.D.	

L/Legal01/FORMS/2006STD/Affiliation/Clinical Affiliation-04-cln-1-06

Signature: Kadlogu

Email: copej@acu.edu

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Appendix H: Project Timeline

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