DIABETES TELE-HEALTH PROGRAM FOR HISPANIC VETERANS:

PROGRAM EVALUATION

by

David Alan Eisenbise

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As members of the DNP Project Committee, we certify that we have read the DNP Project prepared by David Alan Eisenbise entitled “Diabetes Tele-Health Program for Hispanic Veterans: Program Evaluation” and recommend that it be accepted as fulfilling the DNP Project requirement for the Degree of Doctor of Nursing Practice.

Marylyn M. McEwen, PhD, PHCNS-BC, FAAN  
Date: April 20, 2015

Mary Davis Doyle, PhD, RN, CPHQ  
Date: April 20, 2015

Eileen A. Owen-Williams, PhD, DNP, APRN, FNP-BC, CNM, AFN-BC  
Date: April 20, 2015

Final approval and acceptance of this DNP Project is contingent upon the candidate’s submission of the final copies of the DNP Project to the Graduate College.

I hereby certify that I have read this DNP Project prepared under my direction and recommend that it be accepted as fulfilling the DNP Project requirement.

DNP Project Director: Marylyn M. McEwen, PhD, PHCNS-BC, FAAN  
Date: April 20, 2015
STATEMENT BY AUTHOR

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SIGNED: __David Alan Eisenbise____________________
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Socrates, the father of Western philosophy, was once asked how to acquire wisdom. Socrates had the student walk with him into a nearby lake. Socrates then grabbed the man and plunged his head under the water. As the young man struggled for his life, Socrates continued to forcibly hold him under the water. Finally, Socrates let him up to breathe, and when the man, gasping for breath, asked why he nearly drowned him, Socrates replied, “When your desire for wisdom is as great as your desire to breathe, then you will find wisdom.” When I first heard this story from my father I realized that in order to learn and be successful in life I had to work for it in the same way one hungers for air when underwater. I also learned from this parable the value of mentors, without the various mentors in my life I likely wouldn’t be where I am today.

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Above all, I’d like to thank G-d in all of his glory. All is possible through his love.

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ABSTRACT

Background and Rationale: Rural Hispanic Veterans in the Southern Arizona region with type 2 diabetes mellitus (T2DM) are at risk for diabetes related complications. The Southern Arizona Veterans Administration Health Care System (SAVAHCS) care coordination home telehealth (CCHT) program serves as a useful tool in T2DM management in addition to services through primary care. CCHT has not been evaluated to determine effectiveness in this uniquely vulnerable demographic - rural Hispanic Veterans with T2DM in the Southern Arizona region.

Purpose: The purpose of this DNP project was to evaluate the effectiveness of a nurse managed and nurse ran program known as the SAVAHCS CCHT T2DM program in achieving successful diabetes self-management and related biological measures among male and female Hispanic veterans who reside in rural Arizona counties and receive their health care through SAVAHCS.

Project Aims: Aim I: Evaluate the effects of the SAVAHCS CCHT T2DM program among rural Hispanic veterans on the biological measure of glycosylated hemoglobin A1C (HbA1C) at three different time periods, initially at admission, three months after admission, and six months after admission. Aim II: Evaluate the effects of the SAVAHCS CCHT T2DM program among rural Hispanic veterans on the other quality measures of diabetes management including Body Mass Index (BMI), blood pressure (BP) and low density lipoprotein (LDL) cholesterol at three different time periods (see Aim I).

Methods: A descriptive study design was used to evaluate the SAVAHCS CCHT program. The Centers for Disease Control and Prevention (CDC) Framework for Program Evaluation in Public Health was used to examine the effectiveness of the tele-health program.
Data were collected from the Veterans Health Administration data warehouse. Biological measures were collected and analyzed at three different time points.

*Results:* Descriptive data analysis of the veterans (n=12) demonstrated minimal intervention improvement of 0.1 units on A1C (8.3% of veterans), BP (16.7%) and BMI (16.7%). Due to missing data the results may not be due to the CCHT program but to structure and process issues related to collection of reliable data. A more robust program evaluation is recommended.
CHAPTER I: INTRODUCTION

A doctorate of nursing practice (DNP) project is a demonstration of the scholar’s ability to “bridge the gap between the discovery of new knowledge and the scholarship of translation, application, and integration of this new knowledge in practice” (Waldrop, Caruso, Fuchs & Hypes, 2014, p. 300). The five criteria outlined for the DNP project: enhances, culmination, partnerships, implements, and evaluates will be met in the outlined program evaluation project (Waldrop et al., 2014). The DNP project described in this paper is a program evaluation of the Southern Arizona Veterans Administration Health Care System (SAVAHCS) care coordination home tele-health (CCHT) diabetes management program. Chapter I describes the practice problem of diabetes related health problems and provides recent overview of type 2 diabetes mellitus (T2DM) related trends. The chapter outlines the DNP project purpose and aims and definitions of important terms and concepts relevant to the DNP project. The chapter concludes with the significance of this project to nursing and advanced nursing practice.

Practice Problem

The increasing prevalence of T2DM and related complications, particularly among Hispanic veterans in rural communities, is a major problem facing our nation (American Diabetes Association [ADA], 2013). The annual cost of diabetes and diabetes related complications has risen from 174 billion in 2007 to 245 billion in 2012 (ADA, 2013). Diabetes is a serious life-threatening disease that has reached epidemic proportions in the United States (U.S.) (ADA, 2013). Nearly 26 million Americans have the disease and another 79 million have pre-diabetes, a state of health that puts them at very high risk of soon being diagnosed with diabetes (ADA, 2013). Furthermore, the cost of diabetes care is increasing at a higher rate than overall production costs, it is estimated that one out of every 10 health care dollars is being spent
directly on diabetes and its associated complications (ADA, 2013). Diabetes is considered the primary driver of increased health care costs secondary to the increasing prevalence of diabetes in the U.S. population (ADA, 2013).

The prevalence of T2DM among U.S. Hispanics is higher than that of its non-Hispanic counterpart. U.S. Hispanics, in general, have a higher T2DM prevalence rate of 17% compared to non-Hispanic whites whose prevalence rate is 10.2% (ADA, 2014c; Utz, 2008). For patients in rural areas, the problems of T2DM and T2DM related complications are compounded by challenges related to access to care (Utz, 2008). Additional risk factors that make this population uniquely vulnerable can be linked to genetics, poverty, age, barriers to health care access, and transportation issues (O’Brien & Denham, 2008; Utz, 2008). Additional details on various T2DM health disparities among Hispanics will be discussed further in chapter two.

Telemedicine is one strategy for meeting the needs of vulnerable rural populations. According to the United States Department of Health and Human Resources (n.d.a) “telehealth is the use of electronic information and telecommunications technologies to support long-distance clinical health care, patient and professional health-related education, public health, and health administration” (p. 1). The various technologies that are used in tele-health include but are not limited to videoconferencing, the internet, store-and-forward imaging, streaming media, terrestrial communication and wireless communication. A variety of technologies have been used including but not limited to videoconferencing, store-and-forward media, the internet, streaming media, and terrestrial and wireless communications (United States Department of Health and Human Resources, n.d.a).

A few studies have shown the potential benefits of implementing tele-health programs to individuals with T2DM in rural areas (Shea et al., 2009). While the literature review regarding
T2DM tele-health programs for rural Hispanic veterans yielded no results at this time, similar vulnerable populations who have participated in tele-health programs can be studied with this methodology. These studies have demonstrated significant improvements in HbA1C as well as minor improvements in other objective measures such as blood pressure, hospitalization rates, and cholesterol levels (Dy, Morin, & Weinstock, 2013; Fitzner & Moss, 2013; Kesavadev, Shankar, Pillai, Krishnan & Jothydev, 2012; Klobucar, Hibbs, Jans & Adams, 2012; Marcolini et al., 2013; Shea et al., 2009; Trief et al., 2013). More about the usefulness of tele-health for rural vulnerable populations will be discussed in the next chapter.

The primary outcome for adequate T2DM management is to have a hemoglobin A1C level of less than 7% (ADA, 2014d; ADA, 2009). An A1C of 7% or less has been shown to decrease microvascular and neuropathic conditions associated with poor T2DM management such as renal failure, neuropathy, and retinopathy (ADA, 2009). Therefore the primary quality measure of the SAVAHCS T2DM CCHT program is HbA1C. However, in accordance to the ADA diabetes standards of care, other quality measures for diabetes management should be evaluated as to further reduce the patient’s risk of future microvascular and macrovascular complications (ADA, 2014d). Diabetes management requires a comprehensive management strategy that not only addresses glycemic control but other concomitant risk factors (ADA, 2014d). This is why, for example, the threshold for pharmacologic intervention on lipid levels is lower in clients with diabetes. The other quality measures of blood pressure (BP), body mass index (BMI) and low-density lipoprotein (LDL) cholesterol have been selected for this program evaluation as they are measured by the CCHT program and improving these measures decreases associated diabetes complications such as heart attack and stroke (ADA 2014d; 2009; Black &
Hawks, 2009). For the purposes of this Doctorate of Nursing Practice project, the evaluation of diabetes management encompasses the biological measures of HbA1C, BP, BMI and LDL.

**Background and Significance**

The increased incidence and prevalence of diabetes is costly. Of those living with diabetes, the vast majority, 90 - 95%, have T2DM (ADA, 2014). The decreased productivity, disability, and associated medical costs surrounding diabetes total some 245 billion dollars a year, this is a sharp increase from 174 billion a year back in 2007 (ADA, 2013).

T2DM, if uncontrolled, can have many destructive effects on the body. The complications of prolonged hyperglycemia in unmanaged T2DM can be disseminated into two categories; microvascular and macrovascular diseases. Microvascular diseases caused by diabetes include peripheral neuropathy, autonomic neuropathy, proximal neuropathy, focal neuropathy, retinopathy which can potentially cause blindness, and end-stage renal failure. Macrovascular diseases caused by diabetes include peripheral artery disease, coronary artery disease, and stroke (Black & Hawks, 2009). These macrovascular problems are among the major contributors to the elevated morbidity and mortality rates among people with T2DM (Black & Hawks, 2009). The American Heart Association (2013) notes that at least 65% of individuals with diabetes die from some form of heart disease or stroke. Furthermore, higher rates of morbidity from amputations, gangrene, and pulmonary artery disease are found in individuals diagnosed with T2DM as compared to individuals not diagnosed with T2DM, in fact, more than 55% of major amputations in patients with lower extremity occlusive disease are related to the pathophysiological effects of T2DM (Black & Hawks, 2009; Halter et al., 2014). The decreased net tissue perfusion caused by the complications of T2DM also decreases the ability of white
blood cells to enter infected areas thus increasing the person’s susceptibility for infections like cellulitis and sepsis (Weintrob & Sexton, 2014).

In 2011, about 49,677 adults began treatment for kidney failure due to diabetes and 228,924 adults were on chronic dialysis due to unmanaged diabetes (ADA, 2014b). In 2010, about 73,000 non-traumatic lower-limb amputations were performed in adults who were diagnosed with diabetes (ADA, 2014b). In 2010, after adjusting for population age differences, hospitalization rates for heart attack were 1.8 times greater in those adults with diabetes compared to those adults without diabetes and hospitalization rates for stroke were 1.5 times greater (ADA, 2014b). By better managing and reversing T2DM, adults are less likely to experience these diabetes-related complications (Black & Hawks, 2009).

Diabetes disproportionately affects ethnic minorities like Hispanic/Latino Americans (Chow, Foster, Gonzalez & McIver, 2012). The Hispanic population has historically not only been at increased risk for developing T2DM over the course of their lifetime but is at heightened risk for acquiring the aforementioned diabetes-related complications (American Association of Clinical Endocrinologists [AACE], 2008; ADA, 2014c). The risk of diabetes is 66% higher among Hispanic Americans than among non-Hispanic Caucasian Americans (Chow et al., 2012). It is also estimated that over 44% of Hispanics with T2DM have more than one diabetes-related complication (AACE, 2008). Life-threatening complications such as coronary heart disease, stroke, and congestive heart failure occur in 22.8% of Hispanics with diabetes versus 2.2% in those without diabetes (AACE, 2008). Hispanics are 1.7 times more likely to develop end stage renal disease related to diabetes and are 1.5 times more likely to die from diabetes when compared to their white counterpart with diabetes (Chow et al., 2012; United States Department of Health and Human Resources Office of Minority Health, 2012).
The Hispanic population in the U.S. was estimated to be 46.8 million in 2010 (Gonzalez-Barrera & Lopez, 2013). Among veterans in Arizona, 62,000 of the 532,000 total veteran populations self-identify as Hispanic or Latino (United States Department of Veteran Affairs, 2014). The largest subgroup in the Hispanic population are those of Mexican-origin; approximately two-thirds (64%) of Hispanics self-identify of being of Mexican origin (Gonzalez-Barrera & Lopez, 2013). A large proportion (64%) of Hispanics who self-identify as being of Mexican-origin, live in the border states of California, Texas, Arizona and New Mexico (Gonzalez-Barrera & Lopez, 2013). Persons of Hispanic origin who live in the 2000 mile long U.S.-Mexico border region are disproportionately affected by diabetes. The last large study reviewing diabetes prevalence about a decade ago revealed that approximately 1.2 of the 7.5 million people living in this border region have diabetes (Pan American Health Organization, 2004). Estimates are that an additional 645,000 (14%) of the U.S. Hispanic border population have pre-diabetes (PAHO, 2007). Additionally, Mexican American border residents are more than twice more likely to experience complications of uncontrolled diabetes than non-Hispanic, non-border residing white adults (de Heer et al., 2013). The mortality rate from the morbidities associated with uncontrolled diabetes in the U.S.-Mexico border region is also 50% higher than the rest of the U.S. (de Heer et al., 2013). Not only are Hispanics at higher risk for acquiring T2DM and T2DM related complications than their white counterpart, but they are also at heightened risk secondary to their geolocation in the U.S. For these reasons, Hispanic veterans in the border region are indeed a vulnerable population in the context of this chronic condition.

One proposed solution to reaching vulnerable populations like rural Hispanics has been through improved technology such as tele-health. Tele-health communication technology allows health care providers to have a further reach, expanding into rural regions that have otherwise
been outside the auspices of important health care services like T2DM management (Shea et al., 2009; Trief et al., 2013). However, these programs need to be assessed for their effectiveness on ensuring that adequate T2DM management is being met.

To better manage chronic health issues like T2DM, healthcare providers must utilize a well-defined infrastructure to coordinate and aptly apply research supported interventions in their clinical setting (Parchman & Kaissi, 2009). Evaluating an organized system that addresses diabetes quality indicators such as BP, BMI, LDL and HbA1C, can reduce further micro- and macro-vascular complications, as well as decrease the associated costs of these complications by identifying areas needing improvement and refining interventions (ADA, 2014a; ADA, 2014d).

Tele-health programs must especially evaluate their care since they are oftentimes serving rural populations where incidence of diabetes related complications are higher (Utz, 2008). Therefore, tele-health delivery systems like the CCHT program at SAVAHCS must be evaluated using these quality measures as to inform the staff and potentially refine interventions necessary for improving diabetes management.

**Scope of the Problem**

T2DM is one of the most prevalent and problematic diseases affecting the U.S. As previously mentioned in this chapter, the CDC states that nearly 26 million Americans have T2DM and another 79 million have pre-diabetes (CDC, 2013). These estimates are expected to increase by approximately 1.9 million people per year secondary to our nation’s growing obesity problem (ADA, 2014). It has been estimated that by the year 2050, 12% of the population will have some form of diabetes (ADA, 2008). As outlined in the background and significance section, one can anticipate that with the growing percentage of adults with diabetes so too will the rate of diabetes related complications and their associated costs.
**Project Purpose**

As the incidence of type 2 diabetes increases in the future, it is imperative that auxiliary support services improve the development and management of efficient health delivery systems whereby nurse practitioners can deliver the quality care necessary to reduce chronic disease progression. Evaluating these programs in a comprehensive manner that examines vulnerable populations is important to ensure quality measures are being met, to avoid these subgroups being overshadowed by the results of the majority of people served by a tele-health program. To ensure quality measures are being met and that vulnerable subgroups are also being adequately served in chronic disease management programs, a viable model and means of evaluating such processes is essential.

The purpose of this DNP project was to evaluate the effectiveness of a nurse managed and nurse ran program known as the SAVAHCS CCHT T2DM program in achieving successful diabetes self-management and related biological measures among male and female Hispanic veterans who reside in rural Arizona counties and receive their health care through SAVAHCS.

- **Aim I**: Evaluate the effects of the SAVAHCS CCHT T2DM program among rural Hispanic veterans on the biological measure of glycosylated hemoglobin A1C (HbA1C) at three different time periods (initially at admission, three months after admission, and six months after admission into the program).

- **Aim II**: Evaluate the effects of the SAVAHCS CCHT T2DM program among rural Hispanic veterans on the other quality measures of diabetes management including Body Mass Index (BMI), blood pressure (BP) and low density lipoprotein (LDL) at three different time periods (initially at admission, three months after admission, and six months after admission into the program).
Pathophysiology

Diabetes is a chronic progressive disease whereby the body loses its ability to metabolize carbohydrates, fats and proteins thus leading to pathological hyperglycemia (Black & Hawks, 2009; McCulloch & Robertson, 2014a). Diabetes is characterized by body’s resistance to insulin or the body’s inability to produce sufficient amounts of insulin (Black & Hawks, 2009). There are four classifications of diabetes: pre-diabetes, gestational diabetes, type 1 diabetes mellitus (T1DM) and type 2 diabetes mellitus (T2DM). In pre-diabetes, the patient’s blood glucose levels are above normal limits but are not at levels elevated enough to be sufficiently diagnosed with T2DM. Gestational diabetes mellitus is where blood glucose is abnormally elevated during pregnancy. Type 1 diabetes is where the body cannot produce insulin due to destruction of pancreatic beta cells from autoimmune attack (Black & Hawks, 2009). T2DM is a multifaceted pathophysiological process whereby the pancreatic beta cells become more resistant to glucose elevation (Black & Hawks, 2009).

The emphasis of this paper is in regards to the most common type of diabetes, T2DM (McCulloch & Robertson, 2014b). The pathogenesis of T2DM is multifaceted with a broad spectrum of environmental and genetic causes so identifying the exact cause of diabetes in an individual patient is challenging (McCulloch & Robertson, 2014a). The main pathophysiological processes of T2DM consist of insulin resistance, impaired insulin processing, and decreased insulin secretion.

Insulin resistance is one of the best predictors of T2DM (McCulloch & Robertson, 2014a). Increases in age and weight can lead to higher levels of secreted adipocytes which decrease the body’s peripheries to recognizing when insulin is required to reduce levels of elevated glucose (McCulloch & Roberson, 2014a). There is also a predicted genetic component
to this phenomenon as progressive decrease in insulin sensitivity was more commonly found in those with a family history of T2DM (McCulloch & Robertson, 2014a).

Impaired insulin processing refers to the process by which proinsulin is processed into insulin in the beta cells of the pancreas (Black & Hawks, 2009). In T2DM, proinsulin is not appropriately converted into insulin, either the beta cells are not sensitive to the uptake of proinsulin or that it takes longer for proinsulin to mature to the point where they can be utilized (McCulloch & Robertson, 2014a).

Decreased insulin secretion refers to the pancreas’ inability to release enough insulin to meet the demands of the blood glucose levels in the body (Black & Hawks, 2009; McCulloch & Munshi, 2014a). There is a genetic involvement to this process; alterations in the genome loci which are responsible for pancreatic development and insulin synthesis can increase future risk for T2DM. Genome loci TCF7L2, ALC16A11, SLC30A8, HHEXIIDE, and KCNJ11 are involved in beta cell development and insulin synthesis; abnormalities in these genomes contribute significantly to lifetime risk (2014a). A few of these genome abnormalities are found in Hispanic populations and may partly explain the heightened risk for T2DM incidence in Hispanic veterans (Williams et al., 2014).

Type 2 diabetes is often accompanied by other chronic health conditions such as hypertension, obesity, and dyslipidemia (McCulloch & Robertson, 2014a). The lipid panel in the individual with T2DM is likely to have high serum low-density-lipoprotein (LDL), low serum high-density-lipoprotein (HDL), and elevated triglycerides (McCulloch & Robertson, 2014a). This constellation of chronic conditions that are typically associated in adults with T2DM is referred to as the metabolic syndrome (Black & Hawks, 2009; DeFronzo, & Ferrannini, 1991). The pathological effects of these conditions are intertwined. Hyperinsulininemia as a result of
insulin resistance may increase free fatty acid levels, cause oxidative stress and increase inflammatory cytokine release from lipid breakdown which can lead to dyslipidemia, obesity, and hypertension found in metabolic syndrome (McCulloch & Robertson, 2014a; DeFronzo & Ferrannini, 1991). Inversely, increased body weight can increase peripheral resistance to insulin-mediated glucose uptake and decrease the sensitivity of the beta-cells to glucose (McCulloch & Robertson, 2014a; DeFronzo & Ferrannini, 1991). Theoretically, one condition could cause the other. These conditions in the metabolic syndrome, greatly increases the affected individuals risk for serious micro and macrovascular complications like coronary artery disease and stroke (Black & Hawks, 2009; McCulloch & Robertson, 2014a). Therefore, assessing and managing objective measures for metabolic syndrome like those mentioned in Aim II, BMI, LDL, and BP are warranted as only treating glycemic control alone in diabetes does not ultimately reduce risk of coronary events (ADA, 2014d; Garber et al., 2013).

**Definition of Terms**

- **Border Region:** The term border region refers to the 2000 mile geographic space that extends across the border between the geopolitical nations of Mexico and the United States of America. Within this geographic region there are four U.S. states and six Mexican states; a total of 44 counties in the U.S. and 80 municipalities in Mexico (United States – Mexico Border Health Commission, n.d.). This is a “dynamic region that is medically underserved with a population that has pressing health and social conditions, higher uninsured rates, high rates of migration, inequitable health conditions and a high rate of poverty” (United States – Mexico Border Health Commission, n.d., p.1). For the purposes of this paper, the focus will be on the four Arizona counties; Yuma, Pima, Santa Cruz and Cochise (Appendix A).
• **Quality**: Quality is defined as the “degree to which health care services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge (Mitchell, 2008, p. 1). Good quality health care is providing the right care to patients using appropriate services in a proficient manner using adequate communication skills (Shojania et al., 2004). Measuring quality should be focused on multiple quantitative and qualitative factors that focus on improving glycemic control and/or provider adherence (Shojania et al., 2004).

• **Outcome Measures**: Outcome measures are the primary criteria for any program evaluation. Outcome measures answer the question whether or not a specific program is actually helping an individual or defined population who utilizes the programs services. Outcome measures are generally based on quantitative measures of a patient’s health status. Some examples of outcome measures can include but are not limited to: vital signs, certain lab values, avoidable hospitalizations, avoidable complications and radiographic findings (Agency for Healthcare Research and Quality, 2014). Selecting and evaluating such outcome measures are central to assessing the quality of care provided by any particular health care program (Agency for Healthcare Research and Quality, 2014).

• **Program Evaluation**: Program evaluation is the “systematic collection of information about the activities, characteristics and outcomes of programs to make judgments about the program, improve program effectiveness, and/or inform decisions about future program development” (CDC, 2012, p.1). Findings from the evaluation method should serve a useful purpose that can help make decisions about program implementation and to improve program effectiveness (CDC, 2012).
• **Process Evaluation**: Process evaluations look at how well a program is being implemented as originally designed (CDC, 2009). Process evaluations also provide the framework whereby one can describe program operations and assess the strengths and weaknesses of a particular program (CDC, 2009; National Center for Justice Planning (NCJP), n.d.; Rossi, Lipsey & Freeman, 2004). The process evaluation can provide insight into the questions of how and why a program succeeds or fails at meeting its objectives (CDC, 2009; NCJP, n.d.). The evaluation of the CCHT program plans to include process and outcome evaluation components. While process evaluations can be performed independently, doing them in conjunction with an outcome evaluation can provide a richer description of the program for targeted improvement and replication for other health programs (Bierman, 2006).

• **Outcome Evaluation**: Outcome evaluations focus on program success and accomplishments, then aim to answer the question on whether or not a program is achieving its goals and objectives (NJCP, n.d.; Rossi, Lipsey, & Freeman, 2004). An outcome is a condition that an intervention is expected to change (Rossi, Lipsey, & Freeman, 2004). For the purposes of this paper it the outcome will be aimed at diabetes management and other diabetes-related outcomes BP, BMI, and LDL. The types of outcomes of interest to this project are proximal, intermediate, and distal outcomes (Rossi, Lipsey, & Freeman, 2004). Proximal outcomes are the immediate effects of participation in a program; some examples of this may include self-care motivation and knowledge regarding diabetes related skills (Rossi, Lipsey & Freeman, 2004). Intermediate outcomes may include health behavior change and early indicators of improved diabetes management such as improvement in HbA1C and cholesterol. Distal
outcomes are the long term outcomes that result from the changes made from the proximal and intermediate outcomes (Rossi, Lipsey, & Freeman, 2004). Examples of distal outcomes for the diabetes tele-health program may include reversal of diabetes, reduction in BMI, and prevention of various micro and macrovascular complications such as neuropathy, retinopathy and coronary artery disease.

The CCHT program alone is not the only factor affecting the participant’s outcome. This is why outcome evaluation cannot be directly linked to participative changes made from a particular diabetes tele-health intervention. As to increase the credibility of the CCHT auxiliary program, the outcome measures should be based on realistic expectations and articulations in this vulnerable population (Rossi, Lipsey & Freeman, 2004). This will be discussed in further detail in chapters two and three when discussing appropriating the CDC Framework for Public Health Program Evaluation model for assessing the effectiveness of the CCHT program.

Significance to Nursing Practice

The prevalence and incidence of T2DM is rapidly increasing (ADA, 2014b) and many health authorities view tele-health as a viable option for combating the T2DM epidemic (Franc et al., 2011). T2DM is now considered a national epidemic, affecting a minimum of 26 million US citizens (ADA, 2013). Hispanics are one of the most affected racial groups (Romero, Romero, Sclay, Ogden & Dabelea, 2012); therefore the likelihood of the advanced practice nurse working with a Hispanic individual with T2DM is great. As an advanced practice nurse it is his or her duty to help their patients achieve the greatest level of overall wellness possible; including those with chronic illness such as T2DM. In order to achieve a level of wellness in the client with chronic T2DM, the nurse practitioner needs to utilize multiple strategies to help the client reach quality indicators that indicate optimal T2DM management. These indicators include
hemoglobin A1C, blood pressure, weight, and cholesterol. Furthermore, the advanced practice nurse should oversee if the client is regularly checked for these indicators and when follow-up is necessary (ADA, 2014a; 2014d; 2009). If tele-health programs continue to demonstrate glycemic control in vulnerable populations without viable access to adequate health care services, tele-health will likely become a more common part of the family practitioners workplace (Shea et al., 2009; Franc et al, 2011; Utz, 2008).

Chronic disease management and culturally competent nursing are essential competencies for nursing at the doctorate of nursing practice level (American Association of Colleges of Nursing, 2006). The evaluation of the CCHT program in terms of managing diabetes in rural Hispanic veterans will not only provide useful information for the stakeholders of the program, but may reveal a valuable reference resource for other tele-health programs across the country. Reviewing a program’s success with its high risk subgroups is important as the data of these subgroups can be lost in the evaluation of the program as a whole (Hamar et al., 2013; Issel, 2013). Dissemination of information about the program may also inspire other advance practice nurses across the country to utilize advancing technology to evaluate and improve patient health outcomes while still maintaining cultural humility.

Summary

This chapter discussed the practice problem, background and significance of diabetes, the scope of the problem, important definitions, and the significance of this problem to advanced practice nursing. T2DM is a growing problem in the United States. T2DM contributes to a disproportionate health burden among rural Latinos who reside in the U.S.-Mexico border region who are affected by the complications of diabetes. If T2DM is uncontrolled it has destructive effects on the body from neuropathies, kidney failure and death. To better control T2DM in this
vulnerable population, it is important that auxiliary support services, like tele-health, be better at developing and managing efficient health delivery systems whereby nurse practitioners can deliver the quality care necessary to reduce T2DM related complications. Evaluating these programs in a comprehensive manner that examines vulnerable populations is important to ensure quality measures are being met, especially in distinct subgroups whose management may be overshadowed by the results of the majority of people served by a tele-health program.
CHAPTER II: LITERATURE REVIEW

This chapter will review the background of the DNP project in detail as well as tele-health in relation to diabetes management. Literature review findings regarding Hispanics, older adults and the DNP role in diabetes management will be synthesized. Conceptual models used for program evaluation will be discussed briefly, namely the Chronic Care Model. The Center for Disease Control and Prevention’s Framework for Program Evaluation in Public Health that will be used in the DNP project methodology will be described. The chapter will conclude with a fundamental synopsis of the theoretical foundation that will be used to prelude the methodology chapter.

Literature Review Process

A comprehensive literature review was conducted to fully conceptualize issues related to diabetes management in rural Hispanic veterans who live along the US-Mexico border region. Various database resources were used in the literature review process such as UpToDate, PubMed, the Cochrane Library and the Cumulative Index of Nursing and Allied Health Literature (CINAHL). These resources were searched using a combination of various keywords and related terms such as veterans, T2DM, rural health, tele-health, program evaluation, assessment and management. The combined searches yielded over 300 different articles. Articles were excluded from the literature review if they were published before 2008; however, exceptions were made for seminal articles related to core concepts and foundational theory that is not otherwise available in more recent literature. Other exclusion criteria included articles not written or translated into the English language or had a level of evidence of VII or lower on Melnyk’s hierarchy of research evidence. Melnyk’s hierarchy of research is a methodological categorization of literature that grades their relevance to patient care via the articles quality of
design, validity and applicability (Fineout-Overholt, Melnyk, Stillwell & Williamson, 2010). The rationale for excluding articles at a level of evidence of VII or lower is that these articles are expert opinion and background studies that do not utilize scientific methodology that can substantiate relevant phenomenon. Articles were not included in the literature review if they did not meet the aforementioned exclusion. A total of 33 articles were included in the review and 276 articles were excluded. The information from these articles has been synthesized and reported in the following sections.

**Tele-health and Diabetes Management**

Telemedicine has been theorized to significantly improve glycemic control and have slight improvements in objective measures such as blood pressure, hospitalization rates, and cholesterol levels and have slight improvements in subjective measures such as diabetes-related knowledge and patient’s sense of overall wellness (Agboola, Hale, Masters, Kvedar & Jethwani, 2014; Darkins et al., 2008; Dy, Morin, & Weinstock, 2013; Fitzner & Moss, 2013; Kesavadev et al., 2012; Klobucar et al., 2012; Marcolino, Maia, Alkmim, Boersma & Ribeiro, 2013; Shea et al., 2009; Trief et al., 2013). Tele-health is also useful for secondary and tertiary screening, as tele-health can effectively detect diabetes-related complications in the earlier stages, increasing the patients’ chances for better outcomes (Kirkizlar et al., 2013).

Before delving into the various articles exploring tele-health’s impact on diabetes management, one should be aware of the differences between secondary and tertiary screening involved in diabetes management. Secondary prevention refers to the interventions taken to halt or slow the progression of a disease like diabetes (Jones, 2013). These interventions can limit the potential for injury and long-term disability that can be associated with unmanaged T2DM. Tertiary prevention refers to managing the complications associated with long-term health
problems like diabetes (Jones, 2013). Adults who have had diabetes for an extended period are likely to have associated hypertension and renal damage. Proper tertiary prevention interventions can reduce further injury and in some cases rehabilitate the body to a state prior to the initial injury (Black & Hawks, 2009). The tele-health programs discussed in the literature utilize secondary and tertiary prevention interventions in their goal to reduce morbidity and mortality in the population they are working with (Halter et al., 2014; Weintrob & Sexton, 2014).

One large randomized control trial (RCT) (n = 1,665) recruited a diverse group of older, ethnically diverse (35% Hispanic), federally designated medically underserved adults with diabetes residing the Northeastern United States (Shea et al., 2009). The purpose of the study was to examine the effectiveness of a tele-health intervention to achieve clinical management goals in this population. Participants with uncontrolled T2DM were randomly assigned to either a control group which consisted of frequent clinic visits and management in accordance with current T2DM management guidelines or assigned to the treatment group which received a home tele-health unit for scheduled check-ins which would be looked over by a health care provider for evaluation. Outcome measures of cholesterol, blood pressure, and HbA1C were evaluated at one and five years into the program. The study revealed that the tele-health treatment group had a statistically significantly lower HbA1c than that of the control group via a two-tailed t-test (p < 0.05), differences between cholesterol and blood pressure however were negligible. Based on the findings from the RCT, tele-health is a recommended modality for better blood sugar control in this population. The advantages of this study in terms applicability to the DNP project is that it examined a similar population which are underserved, impoverished, in rural areas and have a moderate Hispanic sample (35%). The disadvantages being that the population is limited to the Northeast U.S. so generalizability to the U.S.-Mexico border region may be negligible. Another
issue was the low attrition rate (52%) affecting the treatment arm more so than the control arm. A relatively high attrition rate can calculate to the statistics defining the differences between groups instead of between variables. Nevertheless, this study demonstrates the great potential tele-health programs have in improving intermediate and distal T2DM management related outcomes like HbA1C and cholesterol (Shea et al, 2009).

Another applicable RCT similarly evaluated objective measures in diabetes management however, this study they looked specifically at veterans. The purpose of the study was to examine the effectiveness of a tele-health intervention in achieving diabetes management within the recruited veteran population. The veterans were randomly assigned to clinic supervision with monthly telephone calls from a diabetes nurse educator to help the veteran with general health conditions, status of glycemic control, blood pressure, and weight from daily logs maintained by participants in compliance with a prescribed diabetic regimen (Stone et al, 2010). The treatment group received a telemonitoring device that permitted continuous home messaging reminders and education to log blood sugars, weight and blood pressure into the system; high-risk reports from these values were then evaluated by a nurse practitioner (Stone et al., 2010). HbA1C was statistically significantly lower in the telemedicine group via a 2-tailed t-test at three and six month marks (p = 0.02). There was a significant reduction in cholesterol as well for the telemedicine group (p = 0.07 at 3 months, p = 0.09 at 6 months). All other categories such as blood pressure and weight yielded no significant difference between the treatment and control group (Stone et al., 2010). This study further demonstrates that tele-health is effective for blood sugar control. This study reviewed the advantage of T2DM management in the veteran population, the disadvantage being that it took place in the Southeast and a minimal amount of Hispanic veterans participated (less than 1%), therefore generalizability is limited.
Klobucar et al., (2012) also performed a program evaluation investigating diabetes management outcomes of veterans enrolled in a CCHT program in Iowa City, Iowa. The caveat to this study is that the veterans in the treatment arm also had case-management following the CCHT program. The case manager would call the veteran regarding abnormal outputs from the tele-buddy device and make contact with the primary care provider if necessary. This is similar to the SAVAHCS CCHT program with the exception of having a tele-health RN in the role of the case manager in the Klobucar et al. (2012) study. This study had similar results to that of the previously mentioned articles. The A1C was statistically different in the tele-health group compared to the control group at three months thru 36 months into the study (95% CI; p < 0.001). This study did not look at other diabetes management qualifiers like blood pressure and lipids. The disadvantage of this study is that it cannot be generalized to the Hispanic population as the demographic information was not reported in this article.

Several systematic reviews on tele-health/telemedicine applications have been done evaluating the effectiveness of tele-health programs as well. Marcolino et al. (2013) performed a systematic review and meta-analysis of randomized controlled trials assessing the impact of tele-health interventions on changes in HbA1C, blood pressure, LDL cholesterol and body mass index. The researchers in this article reviewed 13 randomized controlled trials which came from the electronic databases MEDLINE, Cochrane Central Register of Controlled Trials and LILACS (Marcolino et al., 2013). The results showed a statistically significant decrease in HbA1C, with a mean difference of -0.44% less than the usual diabetes care group (Marcolino et al., 2013). The tele-health programs showed a mean difference of a 6.6 mg/dL reduction in LDL cholesterol and a mean deduction of 1.6 mmHg is systolic blood pressure and a 1.1 deduction in diastolic blood pressure in comparison to usual care however these were not found to be statistically significant.
at a 95% confidence interval (Marcolino et al., 2013). The review of the 13 randomized controlled trials also showed a slight improvement in BMI among the tele-health interventions but not at a statistically significant level (Marcolino et al., 2013).

The culmination of the research in this field, reveals that tele-health programs are effective at decreasing HbA1C, the primary outcome measure for appropriate glycemic control (Dy, Morin, & Weinstock, 2013; Fitzner & Moss, 2013; Kesavadev et al., 2012; Marcolini et al., 2013; Shea et al., 2009; Stone et al., 2010; Trief et al., 2013). However, tele-health has not consistently proven to be effective at measuring other quality indicators of appropriate diabetes management such as weight, blood pressure, and cholesterol levels. The articles recommend a more involved, focused, approach on diet and exercise as medication adjustment alone is not enough to control these secondary and tertiary quality indicators (Shea et al, 2009; Stone et al., 2010). Since the veteran demographic is of older age (majority 65 years of age and older), it is recommended to also research the critical thinking and applied diabetes management in this population (Stone et al., 2010). As will be discussed further in the considerations of the older adult section, diabetes management goals vary based on the individual factors like age, frailty, and if they are receiving palliative/hospice care.

Despite the rising prevalence of T2DM and T2DM related complications in Hispanic veterans, there are limited data looking at the effectiveness of tele-health interventions in this vulnerable population. Lack of having an adequate representative sample from this population leaves the generalizability of the presented literature review to be questionable. Reviewing studies with small homogenous samples limits the generalizability, applicability and adaptability of these studies to reviewing the population of interest enrolled in the CCHT program.
Considerations in the Hispanic Population

From the above literature review a few considerations should be noted when evaluating quality indicators in the Hispanic population. As previously noted, Hispanics are at increased risk for T2DM related complications secondary to increased rates of sedentary activity, obesity, and genetic risk when compared to their white counterpart (Chow et al., 2012; AACE, 2008). While nothing can be done about precipitating genetics there is much that can be done and should be considered when evaluating modifiable variables like diet, exercise, and medication adherence. In regards to these modifiable variables, there are concerns one should be mindful of cultural factors, transportation issues, education level and socioeconomic status (Lopez et al., 2014; Osborne et al., 2011).

A nationwide survey with 6.9% of Hispanics revealed Hispanics to be the least likely to be adherent to their medication regimen for diabetes (Lopez et al., 2014). Multiple articles have also confirmed this challenge and note cost, education, and transportation issues to be of the major contributors to poor medication adherence in the Hispanic subgroup (Adams et al., 2008; Osborn et al., 2011; Piette, Heisler, Harand, & Juip, 2010).

Lifestyle modifiers like diet and exercise are encouraged as important skills for diabetes self-management behaviors, however, self-management education may not be the most effective modality for Hispanic veterans. It is well documented that self-management behaviors can help to prevent or delay the complications of T2DM (AADE, 2010). However, integrating diabetes self-management behaviors like diet and exercise into everyday living is more challenging for Hispanics living in the border region when compared to other U.S. Hispanics (McEwen, Rentfro & Vincent, 2009). Other health-seeking behaviors related to diabetes management such as regular foot exams is also lower among Hispanic adults residing in the border region (McEwen,
Lin, & Pasvogel, 2013). A recent community based participatory research study with Mexican American adults in the AZ-Mexico border region explored a promising family support intervention; shifting from traditional self-management behaviors to family interventions can lead to better T2DM management through a shared commitment among Mexican American family members (McEwen & Murdaugh, 2014).

There are a variety of logistical and economical barriers as well. In this study, some of these barriers are mitigated by receiving benefits from the Veteran Affairs administration such as pharmaceutical coverage and health insurance. However, other barriers that may affect Hispanic veterans and their family may include lack of continuity of care, seasonal employment, difficulty obtaining diabetes management resources such as insufficient Spanish speaking certified diabetes educators (CDEs) and living in an environment that does not encourage healthy eating or physical activity (US-Mexico Border Health Commission, 2013).

Another consideration is the existence of a unique border culture that is often marginalized from mainstream society (McEwen, Rentfro, & Vincent, 2009). While veterans may be more acculturated to U.S. society than other Hispanic adults residing in the U.S.-Mexico border region, their family may not be acculturated and the family plays a major role in the decision making (McEwen, Pasvogel, Gallegos & Barrera, 2010). Culturally humble health care providers should incorporate the cultural value of family, or *familismo*, as this Mexican cultural value is a more effective means of addressing T2DM related management behaviors in this population (McEwen & Murdaugh, 2014; McEwen et al., 2010). Including culturally appropriate T2DM related health education is necessary to reach health outcomes for individuals who identify within an ethnic minority group (Attridge, Creamer, Ramsden, Cannings-John & Hawthorne, 2014).
**Considerations in the Rural Arizona-Sonora Border Region**

The United-States shares an approximately 2000 mile long border with Mexico, the 44 counties that reside in this geopolitical region is known as the U.S.-Sonora border region (United States – Mexico Border Health Commission, 2010). The border region fares well on several leading health indicators such as child health, heart disease and stroke (United States – Mexico Border Health Commission, 2010). However, the border population is disproportionately affected by certain chronic diseases like diabetes mellitus (United States – Mexico Border Health Commission, 2010). The four counties of interest to the aims of this study are the Pima, Yuma, Santa Cruz and Cochise counties as those are the four counties where veterans enrolled in the CCHT program are enrolled (Appendix A & B).

Many factors contribute to the concerning effects of T2DM in this border region. The region is described to have a distinct border culture that is often marginalized from the mainstream societies of Mexico and the U.S. (McEwen, Rentfro & Vincent, 2009). This region is described as a complex political and regulatory environment with high poverty rates, barriers to health care and cultural challenges (United States – Mexico Border Health Commission, 2010). Hispanics along the U.S.-Mexico border region also have a distinct cultural support infrastructure where the family plays a major role in decision making (McEwen et al., 2009). In this distinct border culture, culturally competent approaches to Hispanic healthcare should incorporate the cultural value of family, or *familismo*, as a more effective means to addressing diabetes; however, most Hispanics in this region receive the conventional methods of diabetes education (McEwen et al., 2009).


Considerations in the Older Adult

A large proportion of the veteran population is over the age of 65. Roughly half (11 million out of 22 million total) of all living veterans are 65 years of age or older (United States Department of Veteran Affairs, 2014). This is important to consider when assessing and managing diabetes in this population as there are several important variants that differ from diabetes management in the younger cohort. According to the American Diabetes Association, A1C should be maintained below 7.0% as to avoid future microvascular and macrovascular complications of uncontrolled T2DM (ADA, 2014a). However, in older adults (65 years of age or older) with multiple medical and functional comorbidities, the A1C goal is increased to less than 8% (2014a). The rationale behind this adjusted A1C goal is the consideration that a goal of less than 7% may not be realistic and that older adults are at an increased risk for the complications of hypoglycemia (2014a). Tight T2DM management is difficult to maintain in frail elders despite appropriate glucose monitoring, effective pharmacologic dosing, and thorough diabetes self-management education (ADA, 2014a; McCulloch & Munshi, 2014; Pratley, Heller & Miller, 2014).

In certain, high risk older adults the A1C goal may even be higher than 8.0%. These goals are individualized based on the client’s situation and health goals; in palliative care higher A1C goals are accepted as preservation of quality of life and avoiding hypoglycemic events are weighted as being of more importance than potential microvascular complications in the future (McCulloch & Munshi, 2014).

In older adults, hypoglycemic events can lead to impaired cognition, dizziness, and death, therefore establishing goals and choosing appropriate pharmacologic agents is necessary for ensuring best possible care. First line recommendation of diabetes management is metformin 500
mg twice a day, the same as for younger adults, the main difference is the titration period up to maximum dose of 1000 mg twice a day should be slower as to decrease the potential for side effects (Lipska, Baily & Inzucchi, 2011; Garber et al., 2013; McCulloch, 2014b; McCulloch, 2014c; McCulloch & Munshi, 2014). This is information further contextualizes considerations for diabetes care management of the older adult. These are important considerations as roughly 50% of veterans are older than 65 years of age (United States Department of Veteran Affairs, 2014). While this information does not respond to the aims of the paper, it provides an exemplar of management of the older adult with T2DM.

The literature review for diabetes management in the older adult also stressed the importance of reducing additional cardiovascular risk factors such as dyslipidemia and hypertension (Halter et al., 2014). Treatment for these comorbidities is beneficial even if the veteran is over the age of 80 (Followell et al., 2011; McCulloch & Munshi, 2014; McCulloch, 2014b). Similar to treatment with the oral hypoglycemic, medications prescribed for hypertension or dyslipidemia should also be titrated up slowly as to decrease the potential for adverse effects. In addition to pharmacologic management in these conditions, patient education should be included to involve smoking cessation, proper diet, and individualized exercise regimens (McCulloch, 2014a; 2014b; 2014c). Older adults with diabetes should also be referred to a nutritionist to receive diet modification that is individualized based on their medical and lifestyle needs, frequently nutritional evaluation is needed in the older adult population (McCulloch, 2014a).

The literature review for tele-health in older adults is also worth investigating as older adults face unique barriers and challenges when trying to use tele-health technologies. One qualitative study performed multiple focus groups and interviews with the purpose of examining
the difficulties elders have with utilizing tele-health services and what potential solutions could help bridge the gap (Cimperman, Brencic, Trkman, & Stanonik, 2013). Cost, security, and computer anxiety were the three most commonly reported barriers to utilizing tele-health services effectively (Cimperman et al., 2013). Some ways the participants reported tele-health services could be better facilitated was if the services were more ‘user-friendly.’ Some examples included using different visual equipment like tablets instead of computers, have presence of secure mechanisms, more intuitive graphical overlays, and more phone support from health care personnel (Cimperman et al., 2013). Additional articles indicated that when education is provided linking to technology to the benefits in health older adults are more likely to continue use (Chou, Chang, Lee, Chou & Mills, 2013; Peeters, de Veer, van der Hoek & Francke, 2012). Having a fixed number of tele-health contacts in a day also improves perception and adherence to the program from older adults (Peeters et al., 2012). Improvements in these areas may improve perceptions older adults have towards various health technology services like the CCHT program.

**DNP Role in Diabetes Management**

The role DNPs have in tele-health services and management of chronic disease such as T2DM is huge and is anticipated to grow (Bartol, 2012; Robertson, 2012). The state of T2DM incidence, prevalence, and associated morbidity and mortality in vulnerable populations like rural Hispanic veterans is cause for alarm (Adams et al., 2008; Chow et al., 2012; Osborn et al., 2011; Romero et al., 2012; Utz, 2008). DNPs can help curb these dire statistics by improving diabetes care in their clients via medication management, education, and increased access to providers (Robertson, 2012). DNPs can achieve this by providing quality care that is individualized and evidence-based (Robertson, 2012). Evidence-based guidelines like the ADA
2014 standards of care provide an excellent approach to most clients with T2DM; however, applying these guidelines to unique subgroups can be difficult (ADA, 2014d). DNPs must be sensitive to the individual complexities of each client when devising care plans for managing their chronic conditions. In the case with the Hispanic veterans, one must consider that many of them may be older and have cultural considerations different to that of the mainstream veteran culture. Some examples of how the DNP should adapt their management of T2DM management in this high risk subgroup would include careful consideration of stronger pharmacological therapy and a stronger emphasis on non-pharmacological intervention such as moderate aerobic activity and dietary modification (Kirkman et al., 2012; McCulloch, 2014a). Earlier referral to a diabetic educator and/or nutritionist is also recommended as to enhance knowledge and strengthen lifestyle modifiers (McCulloch, 2014a; McCulloch & Munshi, 2014). The mindful DNP synthesizes what he/she has learned from evidence-based practice (EBP) and when appropriate, applies relevant EBP to the population they are serving (Robertson, 2012).

Besides the DNPs role in synthesizing and applying EBP into their practice, the DNP can also contribute to the generation of EBP (American Association of Colleges of Nursing, 2006). While the doctorate of philosophy is traditionally known for generating research in the academic arena, the DNP serves as a catalyst for research application in the workplace (Edwards, 2009). Active involvement with vulnerable populations like the Hispanic veterans in the tele-health program allows the DNP to not only translate applicable research into practice but they can also evaluate research, recommend new avenues of research, and research new problems that arise from practice (Edwards, 2009). DNPs can facilitate evaluation and research in distinct populations at their practice sites that might otherwise be overlooked in academic research studies. Diabetes management in Hispanic veterans in the Southwest border region is an
excellent example of how certain guidelines and quality measures may not reach the unique needs of the population. The same could be true for NPs who work with other diverse populations whereby diabetes management may need adjustment based on the demographics, cultural norms and values, and geopolitical region. Valuable information on diabetes management could be obtained from clinic based DNP projects. While the applicability and generalizability of DNP projects may be limited, other clinicians and patients in similar practice settings can benefit from their efforts. These efforts are necessary, as much innovation and creativity will likely be needed to reduce health disparities of populations with various chronic diseases.

Program Evaluation Models

There is a large assortment of reputable program evaluation models in the literature. Among the articles reviewed some of the most frequently mentioned include randomized controlled trials (RCT)s, RE-AIM, the Chronic Care Model, and the Centers for Disease Control (CDC) Framework for Program Evaluation (Agbooa et al., 2014; Naik et al., 2014; Shea et al., 2009; Verhoeven, Tanja-Dijkstra, Nijland, Eysenbach & Van-Gemert-Pijnen, 2010). Due to feasibility of time and resources for this study, a RCT would not be probable despite it having the highest level of scientific rigor. The CDC framework was selected as it utilizes community based participatory research (CBPR) elements in the planning, implementation, and evaluation of an intervention. The CBPR process is useful as it recognizes the relationships between investigators, the health care workers, and the community they aim to serve; by building capacity with the community, CBPR also helps to mitigate existing health disparities like diabetes in vulnerable populations (Naik et al., 2014; McEwen & Murdaugh, 2014). Investigators should
work with members of the health program and the community to truly evaluate whether or not quality health outcomes are indeed being met as intended (Rosenthal et al., 2014).

One limitation of utilizing the CDC framework is that it was structurally designed to evaluate primary prevention programs; however, diabetes management programs are a form of tertiary prevention. Therefore, concepts outlined in the Chronic Care Model (Wagner, Austin, & Vorkoff, 1996) will also be utilized to ensure chronic disease management phenomena are not left uncaptured by using the CDC framework alone. The two models will be discussed in further detail in the next two sections of this chapter.

The Chronic Care Model

The Chronic Care Model is useful as it provides a comprehensive framework for reshaping an acute problem focused program into a health system supportive of chronic disease management (Wagner, Austin & Vorkoff, 1996). The model is prevention oriented and works to decrease disease related complications from chronic conditions like diabetes. Health care organizations utilizing the Chronic Care Model are more likely to have reports of high quality, patient-centered care (Peterson, Blackburn, Phillips & Puffer, 2014; Stock et al., 2014). The rationale for achieving these outcomes is attributable to the effectiveness of the Chronic Care Model for providing a framework for translating diabetes-related research into practice (Chatterjee & Narayan, 2011; Jackson & Weinberger, 2009).

In order for health care services like the CCHT program to have a chronic-care system focus, six structural elements should be in place (Jackson & Weinberger, 2009; Wagner, Austin & Vorkoff, 1996). The first essential element of the chronic care model is to have available community resources where individuals can seek to improve their health (Wagner, Austin & Vorkoff, 1996). The next structural element is having a supportive health system that values the
philosophies, goals, and values of the health care workers and the clients they serve (Wagner, Austin & Vorkoff, 1996). Leaders of the health care systems need to be willing to write policies and commit resources towards reorganizing existing practices to assist clients in managing their chronic illnesses (Wagner, Austin & Vorkoff, 1996). Without dedicated leadership, meaningful improvements in chronic disease management like diabetes management will not likely be achieved (Peterson et al., 2014; Wagner, Austin & Vorkoff, 1996). The third element is having available self-management support; this is done by encouraging individuals with chronic illnesses to set goals and collaborate with the health care workers in fine-tuning their treatment (Wagner, Austin & Vorkoff, 1996). The fourth element is having a set delivery system design; this means everyone knows their role in the health provision team (Wagner, Austin & Vorkoff, 1996). This element also stresses the importance of follow-up with the clients as this helps support self-management efforts (Wagner, Austin & Vorkoff, 1996). By providing timely counseling, support, and education, the health care program founded in the chronic care model framework can avoid the incidence of adverse outcomes. The fifth element is having decision support whereby health care workers can easily access recent evidence on assessment and treatment guidelines for various chronic conditions (Wagner, Austin & Vorkoff, 1996). The final structural element of the chronic care model is an adequate clinical information systems or tracking tools. Computers are helpful in meeting this structural element as it allows for a more integrated means of collecting, storing, and sharing pertinent data (Jackson & Weinberger, 2009). The computerized system can also be used to send care reminders for preventative care and remind health care workers when to call patients who need follow-up (Jackson & Weinberger, 2009). This is important as it allows the health care service to visualize whether or not their performance is reaching quality benchmarks (Wagner, Austin & Vorkoff, 1996).
Clinical information systems like electronic health records and associated databases from the computer system can be used to help evaluate whether vested programs have areas for improvement and develop questions that will help drive future research (Peterson et al., 2014; Wagner, Austin & Vorkoff, 1996).

The chronic care model helps bring health care back to its originating principle of helping people stay healthy. Health care should be modeled after quality, the ability to provide effective, efficient care that is in accordance with best practice guidelines (Mitchell, 2008). The chronic care model is framed with the concept of quality as illustrated by the six essential structural elements (Wagner, Austin & Vorkoff, 1996). People may have to live with chronic conditions like diabetes, but effective team-based management that follows the chronic care model can prevent health care conditions from getting worse and further interfering with their livelihood. The chronic care model in relation to the CCHT program will be further discussed in chapter three.

**CDC Framework for Program Evaluation in Public Health**

Another framework that will be paramount to the effective evaluation of the CCHT program is the well substantiated CDC Framework for Program Evaluation in Public Health (CDC, 2012; CDC, 1999). As previously mentioned, a program evaluation is the systematic collection of information and outcomes with the purpose of judging the program, improving effectiveness of the program, and/or making decisions regarding future program development (CDC, 2012). The purpose of this evaluation will be to assess the extent to which services provided by the CCHT program affected quality indicators of diabetes management and other related bio-measures of BMI, BP and LDL. The CDC Framework for Program Evaluation was selected because of its use of CBPR elements, specifically whereby it starts with engaging the
stakeholders and ends with disseminating the findings to the stakeholders. CBPR elements are helpful as the elements of partnering, power sharing and capacity building help mitigate existing health disparities like diabetes in vulnerable populations (Naik et al., 2014).

The CDC Framework for Program Evaluation in Public Health is comprised of four guiding standards and six steps for conducting program evaluations (CDC, 2012; CDC, 1999). (Figure 1).


The four standards that compose the CDC Framework for Program Evaluation in Public Health include utility, feasibility, propriety, and accuracy (CDC, 1999). Utility refers to the program evaluations’ relevance to the program, i.e. the results must be useable by the stakeholders. In order to ensure the concept of utility is reached in a program evaluation,
stakeholders should be involved in the evaluation design. This guiding standard respects the value of CBPR in performing effective program evaluations. The second standard, feasibility, refers to whether or not the proposed evaluation will be realistic to complete given the limited time and resources available (CDC, 1999). Feasibility not only refers to realistic ability at the clinical setting, but also to academic requirements and limitations (CDC, 1999). The third guiding standard of this framework is the propriety. This refers to the ethical considerations of conducting the evaluation; procedures need to be in place to protect human subjects and confidential patient related data. The last of the guiding standards is accuracy (CDC, 1999). There needs to be a systematic means of collecting and analyzing data (CDC, 1999). Data accuracy is necessary to ensure the collected data is valid and can therefore be interpreted appropriately to make sound recommendations.

The six steps of the CDC Framework for Program Evaluation in Public Health are: 1) Engage the Stakeholders; 2) Describe the Program; 3) Focus the Evaluation Design; 4) Gather Credible Evidence; 5) Justify Conclusions; and, 6) Ensure Use and Share Lessons Learned. These steps must be done in order and with the four aforementioned guiding standards in mind in order to appropriately use this framework as intended. How these six steps will be followed in performing the program evaluation of the CCHT diabetes program will be discussed in Chapter III.

Summary

The literature review described research that has studied the effectiveness of telehealth programs at achieving glycemic control as manifested by statistically significant differences in hemoglobin A1C levels. Telehealth works because it allows for quicker, streamlined responses to variations in glycemic management (Dy, Morin, & Weinstock, 2013; Klobucar et al., 2012;
Telehealth has also been found to be a more feasible option in the rural population where there are difficulties in implementing and retaining primary care clinics (Shea et al., 2009). While studies have been done to show that telehealth interventions are indeed effective even within vulnerable ethnicities and cultures, no study was found that specifically evaluated a diabetes telehealth program for Hispanic veterans. There are some notable considerations when addressing diabetes management in the Hispanic adult. Diabetes management in the older adult differs from a younger cohort in that one must be more sensitive for hypoglycemic events (McCulloch & Munshi, 2014). The growth of the DNP role in diabetes management was briefly discussed. The literature review chapter is concluded with discussion of two models, the Chronic Care Model and the CDC Framework for Program Evaluation in Public health. These two models will serve as frameworks for conducting the CCHT program evaluation.
CHAPTER III: METHODS

In this chapter the methods for conducting the program evaluation of the care coordination home telehealth (CCHT) program for diabetes management in rural Hispanic veterans will be discussed. The program evaluation will be discussed using the CDC Framework for Program Evaluation in Public Health and the Chronic Care Model as a guide. Details regarding the sample of interest, evaluation methodology, setting, and protection of human subjects will also be discussed.

Applying CDC Framework and Chronic Care Model to CCHT

The CDC Framework for Program Evaluation in Public Health and concepts from the Chronic Care Model will be used in the program evaluation of diabetes management among rural Hispanic veterans enrolled in the CCHT program. Modeled after the CDC Framework, there are six steps in the program evaluation which include: Step 1 – Engage Stakeholders, Step 2 – Describe the Program, Step 3 – Focus the Evaluation, Step 4 – Gather Credible Evidence, Step 5 – Justify Conclusions, and Step 6 – Ensure Use of Evaluation Findings and Share Lessons Learned.

Step 1 – Engage Stakeholders

The first step of the CDC Framework for Program Evaluation is to engage the stakeholders. Stakeholders in this program include the public who directly provides the financial resources via federal taxes, administrative and clinical staff in the CCHT program, and the veterans who utilize the tele-health services. The stakeholders of the aims in the program evaluation, however, would be the administrators who oversee the program and are concerned with the results of the evaluation. The manager of the CCHT program and the Home and
Community Services Supervisor (HCSS) in the Rehabilitation and Transitional Care Line (RTCL) at SAVAHCS are the primary stakeholders of the program evaluation aims.

A meeting was conducted with the CCHT program manager, the supervisor of HCSS in the RTCL, the Chief of Quality, Performance Management, and Credentialing, the Research Compliance Officer, and the Chief Management Support/Public Affairs Officer. Meeting with the CCHT program manager and supervisor of the HCSS in the RTCL provided information about the various activities performed by the CCHT program. From these meetings, a general understanding of the program objectives and program activities occurred. The stakeholders generously provided a plethora of reading materials regarding the program activities and the telecommunication technologies that aid in the performance of said activities. In a meeting with the Chief of Quality, Performance Management and Credentialing and the Research Compliance Officer the steps of project approval within SAVAHCS was discussed. Lastly, the Chief Management Support/Public Affairs officer explained data availability and how data would be extracted from the corporate data warehouse.

Following these meetings, a proposal for this program evaluation was submitted and approved by the HCSS in the RCTL and the Chief of Quality, Performance Management, and Credentialing (Appendix C & D). The Chief Management Support/Public Affairs Officer) has agreed to assign a data analyst to run a report containing the biological and demographic measures of interest.

In order to fully engage the stakeholders, a meeting with veterans enrolled in the program, staff persons of the program, and taxpayers funding the CCHT program would be required. However, engaging these stakeholders is not in line with the program evaluation aims
nor is it feasible within the time constraints of the project. This is one of the study limitations that are discussed in further detail in Chapter V.

**Step 2 – Describe the Program**

The next step is to describe the program. This involves discussing program needs, targets, outcomes, inputs, outputs, activities, and relationships between activities and outcomes. Two brief and informal meetings occurred on 10/11/2013 and 12/22/14 with the CCHT manager and staff members for the purpose of performing a general survey of the CCHT program resources and activities. The CCHT program’s policies and standard operating procedures from SAVAHCS were reviewed. SAVAHCS tele-health services have been in effect since 2003 but the CCHT program and its growth have occurred within the last decade in response to an increased number of veterans who are at increased risk for developing the many micro and macro-vascular complications associated with poor diabetes management (C. White, personal communication October 11, 2013).

The CCHT program is one of the many services that are part of the Rehabilitation and Transitional Care Line at SAVAHCS. Over 700 veterans at SAVAHCS are enrolled in CCHT; approximately 50% of those enrolled are living in rural areas (C. White, personal communication, October 11, 2013). The CCHT program is voluntary and incurs no additional cost to the veteran. Services were originally limited to those with landline phones or Ethernet connections but the program now has access to cellular modems which allows service use to all veterans who live wherever cell-phone service is available. For more on CCHT overview and goals please review Appendix E.

While the focus of this paper is on the CCHT diabetes program, the CCHT program also provides auxiliary health services for veterans with heart failure, chronic obstructive pulmonary
disease, depression, post-traumatic stress disorder, hypertension, substance abuse, and weight management. Each of these CCHT services requires certain clinical inclusion criteria. Most of the inclusion criteria are designed to enroll veterans who have not had success with initial therapies through primary care. Veterans enrolling in CCHT for type 2 diabetes mellitus (T2DM) must have uncontrolled diabetes with an A1C above their individual goal within the past three months (or) be newly prescribed insulin and have documented wide fluctuations in blood sugars.

Each veteran who meets the inclusion criteria can be enrolled in the SAVAHCS CCHT T2DM program. When they are admitted to the program, an initial assessment is completed by a member of the CCHT team. Veterans are given and educated on how to correctly use their home tele-monitoring unit or ‘tele-buddy.’ They are also introduced to the: registered nurse (RN), registered dietician (RD), certified diabetes educator (CDE), and/or care coordinators that will be overseeing their care.

Data collection occurs through the use of the tele-buddy device which collects and logs various health data such as BP, weight and blood glucose levels into the patient’s electronic health record. Each veteran is expected to use the tele-buddy device a minimum of twice a day. The tele-buddy unit is designed with connections for attaching a blood pressure cuff, a scale, and a wireless sensor that records blood sugars from the veteran’s glucometer. Enrolled veterans start by turning the system on and are then asked a few yes/no questions, are provided some brief educational content, and then they are required to log their blood pressure, weight, and blood sugar in the tele-buddy. The tele-health nurse reviews the data and determines if intervention is necessary. Policies are in place on how often assessment should be done and whether seeking intervention is necessary.
Interventions the nurse may perform include: call and speak with the patient/family, assess the situation, educate the patient/family, or determine if the patient needs to speak with a dietician, pharmacist or primary care doctors within their respective health systems. The nurse can also refer the case to a nurse practitioner who is part of the CCHT program. The nurse practitioner can adjust medications accordingly based on the information from the tele-buddy; also nurses who are diabetes educators can adjust certain medications based on a set of standing orders designated by the nurse practitioner.

An initial LDL and A1C level were collected from the participant’s primary care provider; their levels will be checked again at three to six month intervals, depending on the preference of the veteran’s primary care provider and the veterans’ additional comorbidities.

The four measures, LDL, A1C, BP and BMI are all objective measures however; there are a few issues that could affect the validity and reliability of the data. For one, the data reports may not capture all the data requested. LDL and A1C are laboratory measures of high validity. However, the collection of the LDL and A1C are dependent on the veterans’ adherence to attending routine clinic visits. It is anticipated that many veterans in the data may miss their three or six month blood work. The blood pressures are logged via an attached blood pressure cuff that is issued via the CCHT program and the veterans are educated to take their BP during the same time each day. This standardization of how the BP is collected increases the validity of the BP data, however veterans may still take their BP at different times and may have not rested long enough prior to having their blood pressure checked. Original height and weight for the BMI calculation are taken at admission with the same scale by a professional nurse; however, some veterans are issued scales that attach to the tele-buddy while others are entering weights from their own personal scales. The tele-buddy scales are not issued to veterans admitted into the
CCHT program unless they are concomitantly enrolled in the weight-loss or congestive heart failure aspects of the CCHT program. This issue along with the expectation that veterans’ will not take their weight the same time each day affects the reliability of this measurement.

**Step 3 – Focus the Evaluation**

The third step of the CDC Framework is to focus the evaluation design. The stakeholder needs, data sources, and feasibility considerations of resources available to perform this evaluation were reviewed. The evaluation has to answer the question whether or not the program activities are being performed as intended to the target population and if program activities are having an effect on health outcomes. Service outcomes were based on evidence-based practice recommendations for quality indicators for diabetes management programs. These outcomes include the bio-measures of HbA1C, BMI, BP, and LDL; the positive adjustment in these outcomes demonstrates the impact of the programs services. Aspects of evaluation design focus are to be based on the stakeholders recommendations as discussed in step one.

**Steps 4 and 5 – Gather Credible Evidence and Justify Conclusions**

The next two parts of the program evaluation are to gather credible evidence and justify the value of the results found in the program evaluation. These steps focus on how data are collected and used. Descriptive analysis of the diabetes quality indicators over time will be conducted. Data (HbA1C, BP, weight, BMI and LDL) will be reviewed for each veteran at admission to the CCHT program, three months post admission, and six months post admission. Details on the process are discussed more in the upcoming research methods and plan section.

**Setting and Population of Interest**

The setting includes the rural Arizona counties of Pima, Cochise, Yuma or Santa Cruz Counties located in the Arizona-Sonora border region which is served by the CCHT program
These four Arizona counties are contiguous with the U.S.-Mexico international border region. Estimates from 2013 indicate that 53.3% of these four border regions are Hispanic and 9.4% of these four border regions are Veterans (United States Census Bureau 2015a; 2015b; 2015c; 2015d). The population of interest is Hispanic rural veterans with a diagnosis of T2DM diabetes. This population was selected as they are one of many vulnerable populations who are at risk for acquiring diabetes related complications secondary to poor glycemic control (Shea et al., 2009; Utz, 2008). These rural veterans could experience costly and debilitating complications such as kidney failure, peripheral neuropathy, retinopathy, heart attack, stroke, and early death if their glycemic index is poorly controlled (ADA, 2014b; Black & Hawks, 2009).

**Study Design**

A descriptive study design will be used to evaluate the nurse-ran and nurse-managed SAVAHCS CCHT diabetes program delivered to Hispanic Veterans in Southern Arizona. The DNP student will give the requested query items to the Chief Management Support/Public Affairs officer. The query items included: Hispanic/Latino ethnicity, enrollment in the CCHT program, VA identification number to triangulate data values, diagnosis of T2DM (diagnostic codes 250.00 and 250.02), blood pressure, hemoglobin A1C, LDL cholesterol, BMI and specified zip code.

Rural, according to the Federal government, is a non-urbanized area with a population of less than 50,000 (United States Department of Health and Human Services: Human Resources and Services Administration (HRSA), n.d.b). This definition is based on census tract (HRSA, n.d.b). The query required zip codes as searching by census tract was not an option, therefore the selection of zip codes were based on health-profession shortage areas (HRSA, n.d.c).
The query items blood pressure, hemoglobin A1C, LDL, and BMI shall be ranged from admission into the CCHT program through a maximum of two years. The Chief Management Support/Public Affairs officer assigned program analyst to enter these query items into the corporate data warehouse which includes patient data stored in the Veterans Health Information Systems and Technology Architecture (VISTA), a national database that stores integrated inpatient and outpatient electronic health record data and information for VA patients. It serves as an administrative tool to help VA supervisors evaluate whether VA employee activities are delivering quality medical care to veterans. The program analyst will write a query based on the patient data of interest and produce an electronic report with all the query items linked to the requested VA identification number. This report will be sent via encrypted email within the SAVAHCS network to the Nursing Research Liaison at SAVAHCS at a locked computer station. The Nursing Research Liaison will remove all VA identification numbers and replace them with a random case number. The altered file with all the personal identifiers removed will be sent to the DNP student via his encrypted email within the SAVAHCS network where he will run varied analysis from a secure workstation at SAVAHCS.

Data will be analyzed for hemoglobin A1C, LDL, BMI, and BP at three different time points admission to the program (T1), three months (T2), and six months (T3) in the tele-health diabetes program per recommendations from similar studies (Fitzner & Moss, 2013; Verhoeven et al. 2010; Shea et al., 2009). The data collection time points for the bio-measures are in accordance with the ADA standards of care guidelines (ADA, 2014d). The values of each veteran were compared from admission into CCHT to each time period with student t-test. T1 will be compared against T2 and T3. The t-test value among all participants will be averaged; the overall value will be calculated on a probability curve student t-test with an alpha level of 0.10.
A value of 0.099 or less will be considered statistically significant at this alpha level and therefore demonstrates that the CCHT T2DM program is effective at helping rural Hispanic veterans reach positive health outcomes.

**Protection of Human Subjects**

The project will not pose any risk to the veterans enrolled in the CCHT program as this author will not have access to the original report containing identifiers. According to the SAVAHCS policies and procedures for identifying non-research academic work, this project is considered non-research academic work. This is supported because the findings of the project will not be generalizable and will not contribute new knowledge to the science of nursing; therefore, the data requested meet the criteria for academic non-research project approval through SAVAHCS and the University of Arizona (Appendix D & F). Access provided will be de-identified data, no personal information will be retrieved, and no veterans will be contacted. Therefore, no human subject privacy will be violated.

**Step 6 – Ensure Use of Evaluation Findings and Share Lessons Learned**

The final step is to ensure dissemination of results with the necessary stakeholders. At the conclusion of the study a PowerPoint presentation will be presented to the CCHT program staff. During this presentation, program evaluation recommendations will be made by the DNP student and presented to the CCHT staff members and leadership as well as recommendations for future studies.

The program evaluation will incorporate the four standards outlined in the CDC Framework which are utility, feasibility, propriety and accuracy. The results will be made usable to the stakeholders therefore utility will be met. The design of the evaluation has a short timeline and uses minimal resources so the feasibility standard will be met. Only de-identified data will
be used so propriety will be followed. Lastly, a two-sample $t$-test will be averaged and calculated on a probability curve with an alpha level of 0.10. Using statistical analysis in a systematic method therefore meets the accuracy standard (CDC, 1999).

**Chronic Care Model Integration**

While the CDC Framework will be the primary driver behind the CCHT program evaluation at SAVAHCS, considerations from the Chronic Care Model will also be integrated into the philosophy of carrying out the program evaluation. The rationale for this is that the CDC Framework is oriented to primary and secondary prevention while the Chronic Care Model integrates tertiary prevention. As previously mentioned, the Chronic Care Model provides a comprehensive framework for reshaping an acute problem-focused program to a chronic-care system (Wagner, Austin & Vorkoff, 1996). To ensure the CCHT program has a quality chronic-care system focus, six-structural elements need to be in place (Wagner, Austin & Vorkoff, 1996).

First, members in the program should have resources available to them. Second, the patients and staff enrolled in the CCHT program feel they have sufficient support from the organization at large, which in this case would be SAVAHCS. The third element is to have self-management support readily available for the veterans enrolled which means collaborating with the health care team to set individualized goals for health management. The fourth element is having a design in place where at any given time the veteran has access to timely counseling, support and education. The fifth part of the model would be the staff having access to an EBP decision support system like an intelligent EHR or information database. The last piece is having a tracking tool in place whereby staff persons can visualize how the veterans are doing at meeting their health goals.
Many of these questions could be answered through discussions with the staff persons in the CCHT program and by interviewing the veterans who are receiving the health care services. Conversations with the staff persons would provide a general survey on whether or not most of the elements of the Chronic Care Model are being met within the CCHT program. Veteran responses would be necessary also in order to determine if the veterans feel services and resources are available to them. However, due to the time constraints of the DNP project, the student was unable to interview the veterans or staff. Project restrictions and limitations like this are discussed in further detail in Chapter V.

**Anticipated Outcome and Evaluation Plan**

Anticipated outcomes for the rural, older Hispanic adults with T2DM are: hemoglobin A1C levels below 8.0, blood pressure below 150/90 mmHg, LDL level below 100 mg/dl, and BMI below 25. This would be the long term goal, as the short term goal for the six month review of this program evaluation was to have reduction in elevated quality measures that bring the veterans closer to ADA standard goals. A student t-test is anticipated to indicate significant changes between T1 and T3 as previously stated in the study design section.

Descriptive data analysis was anticipated to effectively evaluate whether or not the SAVAHCS CCHT T2DM program is benefitting this unique population of veterans or if there is a need to examine how to improve diabetes management for rural Hispanic veterans diagnosed with T2DM.

**Summary**

Program evaluations are necessary in order to determine if program services are meeting the intended outcomes. The various program services offered by CCHT should theoretically improve various objective quality measures of diabetes management such as HbA1C, LDL,
blood pressure, and BMI. To determine if the CCHT program is improving these outcomes in the rural Hispanic veterans, aspects from the CDC Framework for Program Evaluation in Public Health and Chronic Care Model will be used. The quality measures of HbA1C, LDL, blood pressure, and BMI were compared at admission into the CCHT program, three months and six months. The difference between the two time points were calculated with a two-sample $t$-test on a probability curve.
CHAPTER IV: RESULTS

The purpose of this chapter is to discuss the results of the program evaluation among rural Hispanic veterans enrolled in the CCHT program for diabetes management. The findings are outlined utilizing the CDC Framework for Program Evaluation in Public Health. The six steps of the CDC Framework for Program Evaluation in Public Health are to: 1) Engage the Stakeholders; 2) Describe the Program; 3) Focus the Evaluation Design; 4) Gather Credible Evidence; 5) Justify Conclusions; and, 6) Ensure Use and Share Lessons Learned (CDC, 1999). These steps must be done in order and with the four guiding standards - utility, feasibility, propriety, and accuracy in order to evaluate the program (CDC, 1999).

Program Evaluation

The emphasis of this chapter is on Step 4 which is to gather credible evidence. This was done by reviewing the retrieved data and calculating the results in respect to the project aims. The project aims are to evaluate the effects of the SAVAHCs CCHT T2DM program among rural Hispanic veterans on the biological measures of HbA1C, LDL, BP and BMI at three different time periods, initially at admission, three months after admission, and six months after admission.

Step 1 – Engage Stakeholders

Informal meetings with the stakeholders outlined in the previous chapter provided information that helped contextualize the CCHT program in regards to the rural Hispanic veterans that utilize the CCHT program services for diabetes management. Two meetings were held with the CCHT program manager and the Home and Community Services Supervisor in the Rehabilitation and Transitional Care Line. During these meetings the stakeholders mentioned that many of the veterans show improvement in their blood sugars and A1Cs as a result of
participating in the program. Many of the veterans who adhered to the CCHT program demonstrated improvement and discharge back to primary care services for diabetes management. However, the program stakeholders also mentioned a few barriers related to program adherence. These include the loss of their Spanish speaking case managers, the increased patient to case manager load, and difficulties communicating effectively with the veteran’s primary care provider.

Conversations with the Chief of Quality, Performance Management, Credentialing and Nursing Research Liaison, the Research Compliance Officer, and the Chief Management Support/Public Affairs Officer outlined what would be feasible for data approval and collection. These conversations also revealed possible issues with data retrieval and data collection that might explain the results. These issues are discussed further in chapter five.

**Step 2 – Describe the Program**

The program description was discussed in the previous chapter. Veterans must meet certain inclusion criteria to be enrolled in the program. Veterans are followed by a case manager (either a registered nurse or dietician) who reviews various data and determines whether intervention is necessary. According to the program policies, veterans need to have a note documented in the electronic health record every three to six months with an inclusion of the data values of interest: A1C, LDL, BMI and BP.

**Step 3 – Focus the Evaluation**

As discussed in the previous chapter, the evaluation has to answer the question whether or not program activities are having an effect on health outcomes. The health outcomes for the study aims are defined as a statistically significant reduction (p≤0.10) in A1C, LDL, BMI and BP.
at three months (T2) and six months (T3) into the program. The program will also be evaluated based on the percentage of veterans at ADA goal for the various bio-measures.

In order to evaluate whether or not interventions are having an impact on health outcomes among rural Hispanic veterans enrolled in the SAVAHCS CCHT T2DM, descriptive data analysis was done looking at differences between admission into the CCHT program (T1), three months post admission (T2) and six months post admission (T3). The data were collected and analyzed from the corporate data warehouse. The search criteria were selected based on the aims of the study.

**Step 4 – Gather Credible Evidence**

Data was retrieved to quantitatively evaluate the project aims. The search criteria included Hispanic ethnicity, medically underserved zip codes in Southern Arizona, date admitted into the CCHT program (T1), and hemoglobin A1C, blood pressure, LDL cholesterol and BMI values from 1/1/2012 to 3/10/2015. A total of 12 veterans enrolled in the CCHT program met the study inclusion criteria: have a diagnosis of type 2 diabetes mellitus (T2DM), of Hispanic ethnicity, and live in a southern Arizona zip code that is considered a medically underserved area. The data report queried results from January 1, 2012 to March 10, 2015. The age of these veterans ranged from 46 to 80 years of age (M = 65, SD = 10.6). The most recent A1C was used to determine the percentage of Hispanic veterans who are at A1C goal. Veterans met their A1C goal if their A1C was less than or equal to 7.0% or if the veteran was older than 65 years and the A1C was less than or equal to 8.0%. Of the veterans reviewed, three (25%) were at goal A1C by the final data collection point (T3) which was 3/10/2015.

The first aim of the study was to evaluate the effects of the SAVAHCS CCHT T2DM program among rural Hispanic veterans on the biological measure of A1C at T2 and T3. This
was done to determine whether the CCHT program had a significant effect on the veteran’s hemoglobin A1C level from their baseline admission A1C (T1). The A1C is the primary measure of diabetes management as outlined by the American Diabetes Association (ADA, 2014d). The CCHT program policy is to have a current A1C on file prior to admission. However, the policy does not define current therefore the ADA guidelines of three months prior to admission into the CCHT program was used as T1. Of the 12 Hispanic veterans with T2DM enrolled into the program, 25% (n=3) had a T1 A1C reported. The CCHT program policy is to have an A1C on file every three months; this is in accordance with ADA standard of care requires that the A1C be evaluated every three months (ADA, 2014d). Therefore the A1C at T2 was defined as 10-16 weeks following T1. Of the veterans reviewed, 8.3% (n=1) had their A1C checked at T2. The time frame 22-28 weeks following T1 was used to define T3; the T3 A1C was not evaluated for any of the veterans as no veterans had an A1C on file at T3. Of the veterans reviewed, none of them met the CCHT program policy of having their A1C checked at the three-month time intervals.

Evaluation for improvement of A1C for those who did have their routine A1C checked was reviewed at T2 for net improvement and for statistically significant improvement. This could not be done at T3 as none (100%) of the veterans had their A1C on file. Net improvement was determined based on whether the individual had an A1C reduction of at least 0.1 at T2. Of the veterans that met the inclusion criteria, only one (8.3%) showed at least 0.1% reduction in their A1C at T2 and 11(91.6%) are unknown as they did not have their A1C drawn within the time frame at T2. Statistical significance of A1C reduction was not calculated secondary to insufficient data. Therefore, the CCHT program cannot conclude whether or not the CCHT
program had an effective impact on A1C in the veterans of interest as outlined in aim I. The results of A1C are illustrated in table 1.

**TABLE 1. Evaluation of Hemoglobin A1C in Hispanic Veterans in CCHT Program (n=12) between T2 and T3.**

<table>
<thead>
<tr>
<th></th>
<th>Three months (T2)</th>
<th>Six months (T3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Veterans that have A1C reduction of at least 0.1</td>
<td>1 (8.3%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Veterans that did NOT get an A1C drawn within the timeframe</td>
<td>11 (91.6%)</td>
<td>12 (100%)</td>
</tr>
<tr>
<td>Veterans at A1C goal</td>
<td>3 (25%)</td>
<td>3 (25%)</td>
</tr>
</tbody>
</table>

The second aim of the study evaluated the effects of the SAVAHCS CCHT T2DM program among rural Hispanic veterans on the other quality measures of diabetes management including Body Mass Index (BMI), blood pressure (BP) and low density lipoprotein (LDL) at three different time periods T1, T2 and T3. Most of the data were missing when assessing these three quality indicators. Not enough data were available to evaluate T3 for the secondary bio-measures of LDL, BP, and BMI. Therefore program effectiveness in reducing any of the secondary bio-measures in the rural Hispanic veterans cannot be evaluated. The results of aim II are discussed in further detail starting with BMI.

BMI is calculated based on the veteran’s height and weight. Initial BMI was defined as a BMI reported within one month before the admission date (T1). The BMI closest to three months and six months post admission were defined as T2 and T3. The difference from T1 to T2 and T1 to T3 was evaluated as the percentage of veterans who had a reduction in BMI of at least 0.1 kg/m². The percentage of veterans at goal BMI of 25 kg/m² was also calculated. Of the veterans reviewed, only two veterans (16.6%) had a reduction of at least 0.1 kg/m². Most of the data are missing, 75% at T2 and 100% at T3. This is not in accordance with CCHT program policy that
the patient is instructed to monitor his/her weight at home at least weekly. The results are
displayed in Table 2.

**TABLE 2. Evaluation of Body Mass Index in Hispanic Veterans in CCHT Program (n=12) between T1-T2 and T1-T3.**

<table>
<thead>
<tr>
<th></th>
<th>Three months (T1 to T2)</th>
<th>Six months (T1 to T3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Veterans that have BMI reduction of at least 0.1 kg/m²</td>
<td>2 (16.6%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Veterans that did NOT get BMI done within the timeframe</td>
<td>9 (75%)</td>
<td>12 (100%)</td>
</tr>
<tr>
<td>Veterans at BMI goal</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
</tr>
</tbody>
</table>

The initial BP was defined as a BP recorded within one month of admission (T1). The BP recorded closest to three month (T2) and six month (T3) post admission was selected for evaluation. The CCHT program policy reports the veteran’s blood pressure is to be transmitted via the tele-monitor daily. The difference from admission to T2 and T3 was defined as the percentage of veterans who had a reduction in BP of at least 1 mmHg at each data collection point after T1. The percentage of veterans at goal BP of 150/90 mmHg was also calculated, of the veterans reviewed, seven (58.3%) were at BP goal by T3. According to the CCHT program policy a more stringent 140/90 guideline is utilized despite the veterans age; however each patient goal may be individualized by their primary care provider. One potential issue with this data was that the blood pressures were not queried by the data analyst as requested. Another request was made which did show the blood pressures but none of the blood pressures displayed past 12/1/2014 while the other data requests queried as far back as requested 1/1/2012. This issue along with other barriers to retrieving data will be further discussed in step five and six of the CDC Framework in the next chapter. The results are displayed in Table 3.
TABLE 3. Evaluation of Blood Pressure in Hispanic Veterans in CCHT Program (n=12) between T1-T2 and T1-T3.

<table>
<thead>
<tr>
<th></th>
<th>Three months (T1 to T2)</th>
<th>Six months (T1 to T3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Veterans that have BP reduction of at least 1 mmHg</td>
<td>0 (0%)</td>
<td>1 (8.3%)</td>
</tr>
<tr>
<td>Veterans that did NOT get BP done within the timeframe</td>
<td>11 (91.7%)</td>
<td>11 (91.7%)</td>
</tr>
<tr>
<td>Veterans at BP goal</td>
<td>2 (16.7%)</td>
<td>7 (58.3%)</td>
</tr>
</tbody>
</table>

Similar to evaluation of the A1C, veterans are supposed to have a baseline LDL when admitted to the CCHT program, but the CCHT policy does not specify how recent the LDL cholesterol should be therefore the ADA standards for LDL frequency was utilized (ADA, 2014d). For the purpose of this project baseline LDL was defined as three months prior to the admission date into the CCHT program (T1). Of the twelve Hispanics enrolled in the CCHT program, 16.7% (n=2) had a LDL on file within three months of admission; this lab value represented the admission LDL cholesterol level. According to the ADA (2014d) guidelines, LDL cholesterol should be checked once a year in individuals with diabetes and every six months in high risk individuals with diabetes (ADA, 2014d). LDL cholesterol at the six month mark (T3) was allotted a time frame of five to seven months after the initial LDL cholesterol. Of the veterans who met the inclusion criteria for the program evaluation, none of them had an LDL reported at T3. Therefore, it is unknown if any of the veterans had a net improvement of at least a 1 mg/dL decrease in their LDL cholesterol or if they had a statistically significant improvement in their LDL cholesterol at six months post admission (T3). The percentage of veterans that were at goal of 100 mg/dL or less was reviewed. Upon admission four (33.3%) were at LDL goal and
eight (66.7%) are unknown as they did not have any LDL level on file. The results regarding LDL cholesterol are outlined in Table 4.

**TABLE 4. Evaluation of LDL Cholesterol in Hispanic Veterans in CCHT Program (n=12) between T1-T3.**

<table>
<thead>
<tr>
<th>Description</th>
<th>Count (Percentage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Veterans that have LDL reduction of at least 1 mg/dL</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Veterans that did NOT have an LDL on file at T3</td>
<td>12 (100%)</td>
</tr>
<tr>
<td>Veterans at goal of LDL less than 100 mg/dL</td>
<td>4 (33.3%)</td>
</tr>
</tbody>
</table>

**Summary**

This chapter reported the results of the program evaluation aims. Descriptive data of the Hispanic veterans enrolled in the rural CCHT program were analyzed and presented. Data were analyzed in respect to the project aims of evaluating change in the diabetes indicators of A1C, LDL, BMI, and BP. Data measures such as percent of veterans whose biological measures were at goal and percent of veterans who had biological measures completed per ADA guidelines were reported in Tables 1, 2, 3, and 4.

The goal set for the CCHT program was to show statistically significant changes ($P \leq 0.10$) in these various measures from admission to the CCHT program to T2 and T3. However, there was insufficient data to evaluate the effectiveness of the CCHT program for reducing the bio-measures from initiation into the CCHT program (T1) to T2 and T3. While some veterans had bio-measures within acceptable ranges, there is insufficient data to support that the program was effective to the rural Hispanic group of veterans as a whole. The most noted issue with data analysis was lack of reliable data from the data query; very few veterans had their labs drawn and vitals taken in accordance with the CCHT program policy and ADA standards of care.
(2014d). Interpretations of the aforementioned data are further discussed in the following chapter.
CHAPTER V: CONCLUSION

As the incidence of type 2 diabetes increases in the future, it is imperative that tele-health programs like care coordination home tele-health (CCHT) evaluate the services they provide. Doctors of Nursing Practice (DNPs) who lead tele-health services need to evaluate their program outcomes as to ensure that they are delivering the quality care necessary to reduce diabetes related complications. When evaluating tele-health programs, DNPs must also examine the program’s impact on vulnerable populations as well. This is necessary as pertinent findings in vulnerable subgroups can be overshadowed by the results of the majority. To ensure quality measures are being met and that vulnerable subgroups are also being adequately served in chronic disease management programs, a viable model and means of evaluating such processes is essential.

In this final chapter, the results presented in the previous chapter will be discussed and interpreted following the last two steps of the CDC Framework for Program Evaluation. The descriptive data will be interpreted, compared to the literature, and facilitators and barriers will be identified that might explain why the bio-measures of A1C, BMI, BP and LDL are not being collected per the CCHT program protocols. This chapter will also discuss strengths and limitations of the program evaluation, implications for nursing practice and conclude with some recommendations for future research in this area. Following the six steps of the CDC Framework for Program Evaluation in Public Health this chapter will discuss Step 5 - Justify Conclusions and Step 6 - Ensure Use and Share Lessons Learned (CDC, 1999).

Step 5 - Justify Conclusions

This step of the CDC Framework is to analyze the evidence gathered in a meaningful way that will help the program of interest either substantiate their interventions or show areas for
improvement. In order to justify the conclusions one needs to make meaning of the results. The results from Step 4 of the CDC Framework indicated that the veterans who met the inclusion criteria did not have sufficient data to evaluate whether or not they had statistically significant improvement in their A1C, LDL cholesterol, blood pressure, and body mass index. The lack of reliable data retrieved from the corporate data warehouse does not allow evaluation of the effectiveness of the CCHT program on diabetes management of Hispanic veterans who live in medically underserved areas enrolled in the CCHT program. The bio-measures evaluated are clinically significant as veterans with T2DM are at heightened risk for the microvascular and macrovascular complications associated with poor diabetes management. The data will be broken down in regards to the project aims.

Aim I was to evaluate the effects of the T2DM CCHT program on the primary quality measure of diabetes management, A1C, in the population of interest. Of the veterans who met the inclusion criteria (n=12), only 25% of them were at A1C goal. This does not mean, however, that the other 75% are not at A1C goal as many of the data measures were missing (58%). This is not in accordance with the literature review as most if not all of the tele-health programs had sufficient data to show statistically significant improvement of A1C measures at three months, six months, and one year of participating in a tele-health program(s) (Dy, Morin, & Weinstock, 2013; Fitzner & Moss, 2013; Kesavadev et al., 2012; Klobucar et al., 2012; Marcolino, Maia, Alkmim, Boersma & Ribeiro, 2013; Shea et al., 2009; Stone et al., 2010; Trief et al., 2013). Darkins et al. (2008) reviewed the CCHT program nationally; the study looked at all veterans enrolled in the CCHT program with the aims of evaluating cost effectiveness. The CCHT was identified to be cost effective by reducing hospital admissions (19%) and bed days of care (25%) (Darkins et al., 2008). The Darkins study discussed rural populations and their utilization of
CCHT but did not discuss Hispanics or diabetes management outcomes. Another tele-health study conducted with older adults (n = 23; mean age 83 years) with diabetes, reported significant improvement in A1C at six months and one year into the program. However, in these longer studies all the participants were non-Hispanic whites (Dy, Morin & Weinstock, 2013). Fitzner & Moss (2013) performed a literature review on 58 different tele-health studies with the majority of studies showing positive impact on A1C. The articles reviewed did not include rural subjects and only one of the articles examined a high-risk subgroup which was African-Americans. None of the studies included Hispanics (Fitnzer & Moss, 2013). Another literature review (n=12 articles) that reported statistically significant A1C improvements among subjects who participated in tele-health programs also had minimal Hispanic representation (1-17% Hispanic) (Marcolino, Maia, Alkmim, Boersma & Ribeiro, 2013). Shea et al., 2009 recruited a diverse group of older (n = 1,665), ethnically diverse (35% Hispanic), federally designated medically underserved adults in their study (2009). This study however did not include veterans. Stone et al. (2010) found significant improvements in A1C values among the rural Southeastern veterans (n=150) that participated in a CCHT tele-health program after six months into the program. However, less than 1% of the sample was Hispanic. While the results of the studies in the literature review are comparable in the sense they look at bio-measures in various vulnerable populations, they are not generalizable to this program evaluation. These studies looked at similar populations that either included veterans, individuals who live in medically underserved or rural areas, or vulnerable groups including Hispanics, but none of these studies included all of these variables. Another variance between this program evaluation and the literature was the methodology. The majority of articles in the literature review determined program effectiveness by carrying out more robust methods (Darkins et al., 2008; Klobucar et al., 2012; Shea et al., 2009; Stone et al., 2010; Trief et
al., 2013). Some of the studies used a randomized controlled trial to evaluate the effectiveness of the tele-health group in comparison to a standard care control group (Shea et al., 2009; Stone et al., 2010; Trief et al., 2013). In these studies, A1C measures are ensured as participants are required to have bio-measures reported otherwise they would have not met study criteria. The study designs utilized in these studies are comparable but not generalizable to the study design of the CCHT program evaluation. Comparing this study to similar study designs and small sample sizes would be ideal but there is a dearth of tele-health program evaluations reported in the literature. This could be because most program evaluations for various quality measures are done internally and not published beyond the organizational level. In summation of Aim I, there was insufficient data to determine if the CCHT program had a significant impact on A1C. This is inconsistent with the literature review. However, the findings of the literature review are comparable but not generalizable to this program evaluation.

Aim II was to evaluate the effectiveness of the T2DM CCHT program on secondary quality measures of T2DM including LDL cholesterol, BP and BMI. There were similar findings for Aim II as with Aim I. Of the veterans who met the inclusion criteria (n=12), many of them had data missing. There was insufficient data to conduct the statistical test. There was however, some reduction in these quality measures, 8.3% of veterans had a reduction in BP of at least 1 mmHg and 16.7% of veterans had a reduction in BMI of at least 0.1 kg/m². These findings are comparable to the literature review (Marcolino, Maia, Alkmim, Boersma & Ribeiro, 2013; Shea et al., 2009; Stone et al., 2010). Not all of the articles in the literature reviewed looked at BP, BMI, and LDL cholesterol, but for those articles that did review these quality measures had similar findings of some reduction in these measures but no statistically significant reduction in BMI, BP or LDL cholesterol. One article performed a literature review on tele-health program
effects on various outcome measures including BMI, BP and LDL. Among the 13 RCTs reviewed (n=4207 patients) there were no statistically significant effects on BMI or BP (Marcolino, Maia, Alkmim, Boersma & Ribeiro, 2013). In the tele-medicine study conducted by Shea et al. (2009) a statistically significant impact was reported on LDL, BMI and BP after four years into the study. In the first year of the study there were similar findings of some net improvement but no statistically significant improvements in BMI, BP or LDL (Shea et al., 2009). In summation of Aim II, there was insufficient data to determine if the CCHT program had a statistically significant impact on LDL, BP or BMI. This is similar to the results found in the literature review.

It is also important to discuss target goals. Anticipated outcomes for the rural, older Hispanic adults with T2DM are: hemoglobin A1C levels below 8.0%, blood pressure below 150/90 mmHg, LDL level below 100 mg/dl, and BMI below 25 kg/m². These are the target measures set for adequate diabetes management according to the ADA standards of care (ADA, 2014d). The literature indicates however that this is difficult to obtain in adults with long withstanding unmanaged diabetes within a one year time frame (Gaede, Lund-Anderson, Parving, Pederson, 2008; Klobucar et al., 2012; Marcolino, Maia, Alkmim, Boersma & Ribeiro, 2013). These target measures would therefore be the long term goal over three to five years (McCulloch, 2014c). As discussed in Step 2 of the CDC framework in Chapter III, the inclusion criteria for the CCHT program are veterans who have been uncontrolled for a minimum of three months in primary care or are on insulin with wide fluctuations in blood sugars. Even when controlled for race and socioeconomic status, individuals with longstanding unmanaged diabetes can take five to seven years of intensive therapy to reduce the measures of A1C, LDL, BP and BMI to goal levels (Gaede, Lund-Anderson, Parving, Pederson, 2008).
Step 6 – Ensure Use of Evaluation Findings and Share Lessons Learned

The dissemination of the results was shared with the stakeholders. At the conclusion of the study defense on April 20, 2015 a PowerPoint presentation was presented for the CCHT program staff on April 23, 2015. The results from Step 4 and the conclusions from Step 5 were shared with CCHT staff members and leadership.

After reviewing the aims, the primary limitation was an absence of data. The program evaluation identified that veterans are not getting and/or documenting that appropriate measures were collected within the CCHT program policy ranges. Four of the veterans reviewed did not have any of the required measures reported within the time frame. According to the data, 91.6% of the veterans reviewed did not get their A1C performed at T2 and 100% of the veterans did not have blood drawn for an A1C at T3. The analysis also showed a comparable lack of completed LDL cholesterols, BPs and BMIs. These are important quality measures for diabetes management; that they were missing from the requested data report is something that needs to be explored. This program evaluation cannot answer the questions as to why the data are missing but it can raise the question. Possible issues related to missing data were reviewed within the framework of the Donabedian model. The Donabedian model provides an evaluation framework that supports systematic enquiry into health services (Gardner, Gardner & O’Connell, 2013). The three core pieces of the Donabedian model are structure, process, and outcome (Donabedian, 1966).

Structure

There are a few structural issues that may have impacted the lack of data for this program evaluation. Structure, according to the Donabedian model, refers to all factors that affect the context in which healthcare is delivered including physical facility, equipment, human resources,
and staff training (Donabedian, 1966). Without conducting a focus group with the CCHT program staff, interpretation of the results of the program evaluation are from the brief stakeholder meetings and analysis of the CCHT program policies. According to the CCHT program policy for diabetes management the veteran is to have an electronic note entered into the electronic health record by the veteran’s case manager (primary registered nurse or registered dietician) every 90 to 180 days. The policy further entails that the note is to include a restatement of treatment goals of care, blood glucose range, blood pressure range, the most recent A1C and lipids, most recent weight, and relevant responses that indicate a need for further patient education or intervention. Therefore if the staff members are charting on the veterans per the program policies, this raises the question if the staff members know whether the veterans are getting their LDL cholesterol, A1C, blood pressure, and body mass index evaluated per protocol. With increased caseloads and staff turnover these can be structural implications of inadequate human resources and staff training.

The actions that can be taken by the veteran’s case manager however are limited to reminding the veteran of the needed labs and/or reminding the primary care provider of these needed measures. Veterans enrolled in the CCHT program can be issued a scale or blood pressure attachment that connects to the tele-buddy device which would allow the veteran to provide recent blood pressures and weights from the convenience of their own home. However, this depends on whether the veteran is issued these attachments and that they are in working condition. The CCHT policy reports that veterans should be issued a weight and blood pressure cuff as indicated but does not specify criteria for when these attachments are necessary. According to the necessity of weight and blood pressure management in adults with T2DM these attachments should be provided to all veterans enrolled in the CCHT program with T2DM. If
blood pressures and weights are being collected by veterans with their own cuffs and scales those data aren’t available to be retrieved in the queried data report. More specific criteria for issuing this equipment is another potential change to consider.

Another potential structural barrier to bio-measures collection would be accessibility to the tele-health services and individual factors. While access of the CCHT program has increased since its adoption of tele-buddy devices that can utilize cellular towers, there are still geographic areas of rural Arizona that are not in range of the tele-health services. There are individual factors as well as veteran compliance to using the tele-buddy device and making scheduled appointments with their primary care provider in order to complete ordered LDL and A1C bloodwork. According to the CCHT program policy however, a veteran will be considered for discharge if: (a) veteran is non-compliant with entering blood sugar as directed for two weeks; (b) a veteran fails to communicate with the case coordinator for 30 days, (c) veteran is not willing to make lifestyle changes or implement diabetes self-management skills; or, (d) A1C continues to rise or show no improvement after six months. Therefore, if the veterans are being monitored and the CCHT policies are being followed, it is unlikely that non-adherent veterans would explain the evaluation outcomes but it is an additional structural issue for consideration.

The CCHT program policies are in accordance with ADA recommendations in terms of frequency of collecting required bio-measures. However, the policies of the primary care clinics in which the veterans have bloodwork done have not been reviewed. Those policies should be reviewed to ensure their frequency of bio-measure collection is in accordance with ADA recommendations. Besides their policy there are structural issues in regards to physical access to primary care facilities. While veterans can have their blood-pressure, weight, and blood sugars checked via the tele-buddy they still have to regularly make primary care appointments to collect
LDL and A1C levels. Is the primary care provider available every three months? Does the veteran have transportation to and from the primary care clinic every three months? Is the veteran able to travel safely to the primary care clinic and back home in their health condition? The distance may contribute to barriers to regular three month appointments for Hispanic veterans living in rural, medically underserved areas. These are additional structural implications that can affect the collection of the necessary bio-measures and that potentially contribute to missing data from the corporate data warehouse.

One last issue worth mentioning in regards to structural implications that impact data retrieval would be the recruitment and retention of Hispanic veterans in the CCHT program. Many veterans depend on their family for auxiliary health care delivery, and while veterans may be fluent in English, the family members that care for the veteran may not speak English. According to the United States Census Bureau, a large proportion of Hispanic families in the geographic areas queried for this program evaluation speak a language other than English, 51.2% in Yuma, 76.9% in Santa Cruz, 12.8% in Pima, and 27.4% in Cochise county (United States Census Bureau, 2015a; 2015b; 2015c; 2015d). Two Spanish speaking case managers were employed in the CCHT program at the initiation of the DNP project. However, the CCHT program has lost both of the Spanish speaking case managers. One qualitative study indicates that Spanish speaking Hispanics have a preference for Spanish speaking health care workers (Simon, Ragas, Nonzee, Phisulthikul, Luu & Dong, 2013). With no Spanish speaking staff perhaps the families of Hispanic veterans are choosing different avenues for diabetes management (Simon, Ragas, Nonzee, Phisulthikul, Luu & Dong, 2013). However this is uncertain without interviewing the Hispanic veterans enrolled in the CCHT program and their families.
Process

Other possibilities as to why data were missing may be linked to the process itself. Process according to the Donabedian model refers to the sum of all actions that make up healthcare such as how care is delivered and interpersonal processes (Donabedian, 1966). Specifically, the process of how important diabetes related bio-measure data were collected and how those data were retrieved into the report for this program evaluation.

Many of the issues in regards to data collection were discussed in the structure section. These included access to primary care facilities, individual factors and potential recruitment issues. Some additional process issues that impact data collection include communication between the CCHT program and the primary care clinics (Schwamm, 2014). Staff turnover at the CCHT program and the primary care clinics could decrease rapport and effective communication between the program and the clinics. Also turnover can affect rapport and communication with the veterans. Training on how data are entered into the electronic health record is another process that impacts the quality of data.

Another question in regards to data collection is who is responsible for entering the data into the electronic health record. Veterans with scale and blood pressure cuff attachments should have data entered automatically into the electronic health record via the tele-buddy. For veterans that don’t have these attachments who enters the data? Do veterans report the results to the CCHT case coordinator who then inputs them in the computer? What about entering A1C and LDL lab values? Do the primary care clinics enter the lab values or does outpatient laboratory services? If veterans have blood work done somewhere else how is it collected and entered into the VA healthcare system’s electronic health record? These are important questions that need to
be explored in order to evaluate processes associated with the CCHT and to have better success with data collection and retrieval.

Data were retrieved using the VISTA corporate data warehouse which pools data from the VA’s electronic health record system. If data are entered in the correct fields they would be appropriated in this report. However, if data were entered in some other way then they would not have been included in this data query. For example, if lab values like the LDL and A1C are entered as free text and not entered in the laboratory results field then it may not show up in the data query. It may be the same situation with the BP and BMI; if they are not entered in the vitals screen they would not be reported in the data query. Veterans living in rural and underserved locations might see another provider that is outside the VA health network for their diabetes management. The CCHT policy for admission requires enrollment with a VA primary care provider but does not specify that they receive their diabetes care at that location. The veteran might have their A1C and LDL tested in a timely fashion outside the VA healthcare system but not reported in the VA system. Perhaps veterans are reporting LDL and A1C lab values to their CCHT case manager but these values are documented in the VA electronic health record as free text that was not queried as requested by the data analyst. In order to ascertain the possible issues, one would need to do a thorough chart review on the veterans of interest.

Conversations with some of the identified stakeholders, namely the Nursing Research Liaison and data analysts, raised the question of how to best query the data that are closest to evaluating the CCHT program in the context of the project aims. The ideal approach would have been to only appropriate data that are closest to the timeframe of the CCHT program admission. The original request for querying the data was to set a range for the various time points and retrieve data values closest to the time point. For example, if a veteran was admitted 2/1/14, the
queried A1C for admission (T1) would be the A1C closest to that time point. If no A1C is found between 1/1/14 and 3/1/14, the data field would be left null. This however was not an option for querying the data as discussed with the Nursing Research Liaison and the data analysts running the data reports. So a revised data query searched for all A1C values between 1/1/2012 and 3/10/2015 and a separate field with the admission date. This required matching lab values to time points by hand. This made running the data report feasible in terms of getting approval through VA project approval channels but human review can increase the potential for error. One issue identified was that the blood pressures were not retrieved in the first report as requested. Another request was made which may not have been queried as requested. Discussing these various idiosyncrasies of data retrieval was necessary in eventually retrieving the data. However, these conversations were not enough as there are potential issues with the data that could have been corrected if there was better communication between the DNP student and the data analysts running the data report and more time in which to conduct the project. For example, identifying specific template fields might have gathered a more reliable and complete set of data. The laboratory data of A1C and LDL were likely drawn from the laboratory results section in the electronic health record; however labs might also have been reported in some other way unknown to the data analyst. The data query for this DNP project did not search for values that might be hidden in the free text. These potential process issues likely impacted the lack of reliable data for this CCHT program evaluation among rural Hispanic veterans with T2DM.

**Outcome**

Outcome according to the Donabedian model refers to the effects on healthcare on patients or populations (Donabedian, 1966). The results of the program evaluation for the rural Hispanic veterans represent the effects of healthcare. As previously discussed, insufficient data
specific to the outcomes of the program evaluation precluded evaluation of the effectiveness of the CCHT program on the quality measures of A1C, BMI, BP and LDL. However, as the Donabedian model emphasizes it is difficult to accurately measure outcomes that can be attributed exclusively to a health care program (Gardner, Gardner & O’Connell, 2013). More needs to be reviewed in order to better correlate outcome measures to the process measures inherent with the CCHT program and its policies.

In summation of the implications of the program evaluation, further investigation is necessary to explore factors contributing to missing data. Due to the lack of data, an evaluation of the ability of the CCHT program to determine change in the selected T2DM quality measures for the Hispanic veterans who live in medically-underserved areas was limited. Performing a thorough retrospective chart review and conducting a focus group with CCHT employees and Hispanic veterans enrolled in the CCHT program would be a good place to start in evaluating why there is insufficient data for evaluating the program evaluation aims.

**Study Limitations**

This DNP project had several strengths and limitations. The strengths of the project will be discussed first. The program evaluation was formatted and closely followed the CDC Framework for Public Health Evaluation. Another notable strength was that the DNP student who performed the program evaluation had no vested interest in the outcome of the data analysis. The research liaison and data analysts that assisted the DNP student in data retrieval also had no connection or vested interest in the outcome of the data analysis. This lack of vested interest in the program results reduces the possibility for research or procedural biases that can plague the integrity of a program evaluation.
The DNP project had several limitations that must be mentioned. For one, the study had a small sample size (n=12); larger sample sizes would be necessary to analyze program effectiveness for veterans with T2DM. Another limitation was the amount of missing data. While this is an important finding as was discussed, it prevented drawing conclusions on whether or not the CCHT program is having a positive impact on Hispanic veterans with T2DM who live in medically underserved areas of Southern Arizona. The various studies cited in the literature review used a randomized controlled trial design and data were collected from the participants and the medical records throughout the studies. Whereas in this program evaluation, retrospective data were reviewed of lab work and vital signs that depended on the efficiency of the primary care clinics or CCHT case managers’ ability to document the data. The lack of data available using a retrospective design contributed to the limited analysis. Perhaps the CCHT program did have an impact on the various measures in aims one and two but without a larger sample size and the appropriated data, the statistical tests that support that assertion could not be conducted. Another issue was the data retrieval for the blood pressures. It is possible that none of the twelve veterans reviewed had a BP done from 1/1/12 to 12/1/14 but it could also be an error in the data retrieval process from the corporate data warehouse.

Another limitation was the selection of rural areas that could be queried by the corporate data warehouse. As described in chapter three, the definition of rural is based on census tract. However, the query required searching by zip code therefore the selection of zip codes were based on designated health-profession shortage areas (HRSA, n.d.b.; n.d.c). A more accurate option would have been to use rural-urban commuting area codes (RUCAs) which are a means of defining rural areas based on population density and population work commuting patterns (Rural Health Research Center, n.d.). A RUCA assignment algorithm was developed so that each
zip code could be calculated a respective RUCA code based on the distribution of its population across the RUCA codes (Rural Health Research Center, n.d.). Having inclusion criteria of certain RUCA codes that meet rural criteria would have been a better option for more accurately capturing the rural population. This was unable to be done due to the financial constraints of the project, the free version of RUCA codes are from 2004 while the most recent RUCA codes cost 500 to 1000 dollars to access.

An additional limitation worth noting concerns stakeholder involvement. As mentioned in Step 1 of the CDC Framework, the stakeholders of the program evaluation were the administrators who oversee the program and are interested in the results of the evaluation. However, a more robust program evaluation would require inclusion of additional stakeholders to the program, namely clinical staff in the CCHT program and the veterans who utilize the tele-health services. Engaging these stakeholders would provide a more comprehensive look at the effectiveness of the CCHT program in regards to helping rural Hispanic veterans better manage their diabetes. A lack of additional time and financial constraints limited the size and scope of the program evaluation.

**Implications for Nursing Practice**

As discussed in the first chapter, T2DM and its related complications is a growing epidemic (ADA, 2014b) and tele-health is a viable option for curbing the morbidities and mortalities associated with unmanaged T2DM (Franc et al., 2011). Diabetes effects various racial groups disproportionately. Hispanics are one of the most affected racial groups, therefore it is likely that DNPs will be working with Hispanic individuals with T2DM (Romero, Romero, Sclay, Ogden & Dabelea, 2012). There are noted barriers among vulnerable populations like rural Hispanics. Questionnaires assessing barriers to care access among rural Hispanics indicate
issues with transportation, language issues, cultural insensitivity and availability of primary care providers (Sadowski, Devlin & Hussain, 2012). For these reasons, tele-health is predicted to become more commonly used in the primary care workplace as a means to increase access to care in rural populations (Shea et al., 2009; Franc et al, 2011; Utz, 2008).

DNPs must work to help their patients achieve the greatest level of overall wellness possible, including secondary and tertiary prevention in those with T2DM. In order to achieve a level of wellness in the client with T2DM, DNPs need to not only initiate treatment for their patients but must also evaluate how their interventions are affecting the populations for whom they provide care. A good way to assess quality is to use a tested model that utilizes quality indicators (CDC, 2012). In this program evaluation the CDC Framework for Program Evaluation in Public Health was used assessing diabetes quality indicators of hemoglobin A1C, blood pressure, weight, and cholesterol (CDC, 1999). By assessing these measures the DNP can retrieve quality feedback that would either enforce the impact of their interventions or suggest if additional follow-up is necessary (ADA, 2014a; 2014d; 2009).

The results of this program evaluation are only applicable to the SAVHACS CCHT T2DM program and not generalizable to other practice sites. However, the methodology of performing a program evaluation in certain populations with T2DM could be reproduced by a DNP in other practice sites. Perhaps DNPs might find similar issues with data collection and data retrieval in vulnerable populations for whom they provide care. It is important to review program outcomes in high-risk subgroups as the findings among these groups can be overshadowed by the results of the majority of people served by a tele-health program (Hamar et al., 2013; Issel, 2013). The findings from this program evaluation will hopefully inspire other DNPs across the country to learn from the data retrieval experiences in this DNP project. Revisions to data query
methods should be evaluated closely in order for DNPs to effectively work towards evaluating and improving patient health outcomes in high-risk vulnerable populations.

**Recommendations for Future Program Evaluations**

As purported in the discussion and implications section of this chapter, there are several avenues for future scholarly work that would benefit the veterans enrolled in the CCHT program. One recommendation would be to perform a more robust program evaluation. Building a logic model that reviews the various inputs and outputs of the CCHT program would provide a more meaningful description of the CCHT program and its relationship to the rural Hispanic veterans it aims to serve. The program evaluation described in this paper evaluates some, but not all, of the outcome measures of the CCHT T2DM program. Constructing a logic model would allow one to identify the process measures and develop ways to evaluate process outcomes. This would require a more in-depth investigation of the day to day functions of the CCHT program.

Performing a focus group with the CCHT program staff and Hispanic veterans with T2DM enrolled in the program would be recommended as to help one identify the various inputs and outputs that could be effectively evaluated for efficiency and obstacles. Furthermore, this would help gather a better understanding of how data are collected and entered in the electronic health record. With this knowledge the principal investigator should be able to access a more complete data review knowing exactly which data fields need to be queried from the corporate data warehouse.

Aside from the four bio-measures listed in the program evaluation additional high-quality data should have been collected. Aside from veteran experiences, understandings, and perspectives that could have be gathered from a focus group, there are additional objective data that would be helpful in terms of narrowing down the issues of data retrieval and storage. Such
data points such as blood glucose readings, frequency of data upload attempts, frequency of logins into the tele-buddy portal, and frequency of successful data uploads would provide much needed knowledge on improving structure and process issues that might hinder adequate diabetes management (Agboola, Hale, Masters, Kvedar & Jethwani, 2014).

Additional recommendations would include adjustments to the CCHT program evaluation to review the population of interest from different aspects such as reviewing specifically rural versus non-rural veterans and Hispanic veterans versus Caucasian veterans. The results from the program evaluation may be limited to the CCHT program in terms of rural Hispanic veterans and may not fully explain the population of interest in context to other veterans enrolled in the CCHT program. One option would be to compare the rural Hispanic group of veterans with T2DM to the non-rural Hispanic veterans with T2DM. Another recommendation would be to compare all rural and non-rural Hispanic veterans with T2DM in the CCHT program to the rest of the veterans with T2DM in the CCHT program. In this proposed scenario a chi-square analysis test could be done comparing these two groups. This would provide a good comparison of how the Hispanic group of veterans with T2DM is doing when compared to other veterans with T2DM enrolled in the CCHT program. Reviewing these study aims however would have required a larger pool of data and subsequent authorization to this data that was not feasible within the scope of this project; however this could be explored in further studies.

Furthermore, it would be beneficial to analyze similar program evaluations at different tele-health programs across the country. A larger study that looked at Hispanic diabetes management in tele-health programs among other organizations besides the VA and among other border states besides Arizona would be useful. Future research that includes a larger sample size
and scope with more a more robust data set would provide a better picture of how tele-health programs in general are affecting diabetes management quality indicators in the rural Hispanic population.

**Summary**

This chapter interpreted the results of the SAVAHCS CCHT T2DM program evaluation for Hispanic veterans who live in medically underserved areas of Southern Arizona. This chapter also summarized study limitations, implications for nursing practice, and recommendations for future research.

Conclusions about whether or not the CCHT program had a significant impact on the quality measures of hemoglobin A1C, LDL cholesterol, blood pressure or body mass index in the Hispanic veterans who were reviewed at three months or six months after admission cannot be determined due to insufficient data. Aim I does not reflect the literature as most tele-health programs have sufficient data to demonstrate a significant impact on hemoglobin A1C in the target population (Agboola, Hale, Masters, Kvedar & Jethwani, 2014; Dy, Morin, & Weinstock, 2013; Fitzner & Moss, 2013; Kesavadev et al., 2012; Klobucar et al., 2012; Marcolino, Maia, Alkmim, Boersma & Ribeiro, 2013; Shea et al., 2009; Trief et al., 2013). However, the study populations in the literature review are slightly different and not generalizable to the rural Hispanic veterans in this study. Aim II of this study is consistent with the literature as most tele-health programs that include the additional diabetes-related quality indicators of BMI, BP and LDL cholesterol do not have sufficient evidence to demonstrate significant impact on these measures six months into their programs (Darkins et al., 2008; Klobucar et al., 2012; Shea et al., 2009; Stone et al., 2010; Trief et al., 2013).
The study strengths and limitations revealed areas for future program evaluation. There are several potential structure and process issues with data collection and data retrieval that might explain why there was a lack of reliable data. This project cannot identify the reasons but it can raise the question as to why so much data are missing. A more robust program evaluation that includes retrospective chart review and holding focus groups with CCHT employees and Hispanic veterans enrolled in the CCHT program are recommended to explore why there was insufficient data to evaluate Aims I and II. Reproducing similar studies with a larger sample size and scope would provide a better sense of how tele-health programs are working or not working to improve diabetes management in the rural Hispanic population.

This is but one program evaluation reviewing how diabetes management can be evaluated for quality in vulnerable populations like Hispanic veterans living in medically underserved rural areas. Microvascular and macrovascular complications of uncontrolled diabetes disproportionately effects populations like the veterans reviewed in this study. Tele-health programs like the CCHT program are purported to help veterans better manage their diabetes to avoid these costly diabetes related complications. Based on the program evaluation, there is room for improving diabetes management and tele-health program evaluation techniques. This author hopes that other tele-health programs can learn from the data querying issues of this project and apply a similar method that categorizes high-risk populations to evaluate program outcomes. One must monitor the high-risk populations enrolled in the program to ensure quality chronic disease management.
APPENDIX A:

ARIZONA-MEXICO BORDER REGION MAP
Data provided by the United States Census Bureau (2014). Created by University of Arizona Library February 16, 2015.
APPENDIX B:

ARIZONA-MEXICO BORDER REGION MAP - POPULATION
Population divided based on county subdivision. County subdivisions are the primary divisions of counties and equivalent entities. They include census county divisions, census subareas, minor civil divisions, and unorganized territories and can be classified as either legal or statistical. Each county subdivision is assigned a five-character numeric Federal Information Processing Series (FIPS) code based on alphabetical sequence within state and an eight-digit National Standard feature identifier.
APPENDIX C:

WRITTEN PROPOSAL FOR APPROVAL FROM THE SOUTHERN ARIZONA VA HEALTHCARE SYSTEM
Proposal for SAVAHCS Tele-health Diabetes Management Program Evaluation

**Background and Rationale:** Diabetes is a serious life-threatening disease that has reached epidemic proportions in the United States (U.S.) (American Diabetes Association [ADA], 2013). Rural Hispanic Veterans in the Southern Arizona region with type 2 diabetes mellitus (T2DM) are at risk for diabetes related complications secondary to poor glycemic control (Romero et al., 2012; Utz, 2008). This population is vulnerable to complications related to diabetes due to their geographic distance to health care services, genetic susceptibility for acquiring T2DM, and low health literacy (AACE, 2008; Adams et al., 2008; Chow et al., 2012; Osborn et al., 2011; Piette et al., 2010). These veterans could experience costly and debilitating complications if their glycemic index is poorly controlled. The Southern Arizona Veterans Administration Health Care System (SAVAHCS) care coordination home tele-health (CCHT) program serves as a useful tool in T2DM management in addition to services through primary care (Darkins et al., 2008). Veteran men and women diagnosed with T2DM are free to enroll in the tele-health program as a supplement to standard diabetes management protocols through their SAVAHCS primary care provider. However, while SAVAHCS CCHT T2DM management program has been provided for the past four years, the program, as with many tele-health programs across the nation, has not been evaluated to determine effectiveness in this uniquely vulnerable demographic - rural Hispanic Veterans with T2DM in the Southern Arizona region.

**Purpose and Aims:** The purpose of this DNP project was to evaluate the effectiveness of the SAVAHCS CCHT T2DM program in achieving successful diabetes self-management and related biological measures among male and female Hispanic veterans who reside in rural Arizona counties and receive their health care through the Veteran’s Integrated Service Network (VISN 18).

Aim I: Successful diabetes management among rural Hispanic veterans will be evaluated using the biological measures of glycosylated hemoglobin A1C (HbA1C) at three different time periods (initially at admission, three months after admission, and six months after admission into the program).

Aim II: Successful diabetes-related management among rural Hispanic veterans will be evaluated using the biological measures of Body Mass Index (BMI), blood pressure (BP) and low density lipoprotein (LDL) at three different time periods (initially at admission, three months after admission, and six months after admission into the program).

**Methods:** The Centers for Disease Control and Prevention (CDC) Framework for Program Evaluation in Public Health was used to examine the effectiveness of the tele-health program in achieving successful diabetes self-management among male and female Hispanic veterans. Inclusion criteria were: 1) veteran enrolled in the CCHT program at SAVAHS which means, the veteran must have uncontrolled diabetes with an HbA1C above their individual goal within the past three months (or) be newly placed on insulin with wide fluctuations in blood sugars, 2) be enrolled in the program for at least six months and 3) self-identify as Hispanic. Data is to be collected from the Veterans Health Administration data warehouse on this patient population. The data will be de-identified by the Quality Management Coordinator by assigning the data
fields to a random case number. Biological measures of HbA1C, blood pressure, BMI and LDL were collected at four different time points; (T1) admission to the program, (T2) three months post admission, and (T3) six months post admission in the tele-health diabetes program. To determine intervention effectiveness, a two tailed t-test was conducted at each of the data collection periods. An alpha level of 0.10 or less was used in order to determine the effectiveness of the tele-health program on individual measures of diabetes management in this vulnerable population.

**Data Requested:**
- Number of veterans enrolled in the SAVAHCS CCHT program with diagnostic codes 250.00 or 250.02 who self-identify as Hispanic.
- Zip codes of veterans enrolled in the SAVAHCS CCHT program with diagnostic codes 250.00 or 250.02 who self-identify as Hispanic.
- Age of Hispanic veterans enrolled in the SAVAHCS CCHT program with diagnostic codes 250.00 or 250.02 who self-identify as Hispanic.
- Hemoglobin A1C of veterans who self-identify as Hispanic at admission T1 to the SAVAHCS CCHT program and at T2 (3 months) and T3 (6 months).
- LDL cholesterol of veterans who self-identify as Hispanic at admission T1 to the SAVAHCS CCHT program, at T2 (3 months), and T3 (6 months). BMI of veterans who self-identify as Hispanic at admission to the SAVAHCS CCHT program (T1), and T3 (6 months).
- Blood pressure of veterans who self-identify as Hispanic at admission to the SAVAHCS CCHT and at T2 (3 months), and T3 (6 months).
- Body mass index of veterans who self-identify as Hispanic at admission to the SAVAHCS CCHT and at T2 (3 months), and T3 (6 months).

**Results/Recommendations:** Pending based on data. Depending on results may recommend new strategies for tailoring the SAVAHCS CCHT T2DM program to meet the needs of the Rural Hispanic Veteran population who reside in a rural community. I plan to disseminate the project findings as part of my practice inquiry project through the University of Arizona College of Nursing.

David Eisenbise

DNP-FNP student at University of Arizona; 1 West Staff RN
Dae@email.arizona.edu
APPENDIX D:

APPROVAL FOR NON-RESEARCH DETERMINATION FROM SOUTHERN ARIZONA

VA HEALTHCARE SYSTEM
Department of Veterans Affairs

MEMORANDUM

DATE: February 27, 2014
FROM: Chief, QM P & C / GME (7-142)
SUBJ: Rural Mexican American Tele-health QA evaluation
TO: Chief, Research (0-151)

1. I have reviewed a request from David Eisenbise, RN, NE-BC to conduct a quality evaluation of Mexican American veterans engaged in VA tele-health.

2. I have concluded that this scholarly activity is not research as defined by VHA Handbook 1058.05. Mr. Eisenbise will be requested to review de-identified, non-protected health information derived from SAVAHCS VISTA data.

3. Attached is the signed Request for Non-Research Determination signed by Mr. Eisenbise and me. I have instructed Mr. Eisenbise to submit a publications documentation form when any publication is drafted.

Q. Scott Ringenberg, M.D.

Cc: David Eisenbise, RN (1W)
    Mary Doyle, RN, PhD (7-11Q)
    Chief of Staff (0-11)
    Research Compliance Officer (0-11C)
APPENDIX E:

HOME TELE-HEALTH SUMMARY
Home Telehealth

For Veterans who have a health problem like diabetes, chronic heart failure, chronic obstructive pulmonary disease (COPD), depression or post-traumatic stress disorder, getting treatment can be complex and inconvenient.

For some, especially older Veterans, conditions like these can make it difficult for them to remain living independently in their own home and make it necessary for them to go into a nursing home where their symptoms and vital signs (pulse, weight, temperature, etc.) can be checked frequently. Having this information means physicians and nurses can change medications or other treatments and prevent serious health problems from developing.

Now there are new technologies that make it possible to check on symptoms and measure vital signs in the home. Special devices (home telehealth) can do this and are easy to use. Home telehealth can connect a Veteran to a VA hospital from home using regular telephone lines.

VA has found that not every patient is suitable for this kind of care. But, for those that are, Home Telehealth can help them to remain at home and live independently.

If you or a loved one is a patient that VA has assessed for Home Telehealth and determined this is an appropriate way to get care, then VA will provide a home telehealth device that best meets the Veteran’s needs.
The most common home telehealth devices VA uses are ones that make it possible to connect a Veteran patient to VA hospital using video technology and messaging devices that collect information about symptoms and vital signs from the comfort of a Veteran patients own home (place of residence).

A care coordinator (usually a nurse or social worker) is the point of contact for a patient using a home telehealth device with a VA hospital. Care coordinators are able to link with the physician to arrange treatment changes, set-up clinic appointments or arrange hospital admissions - **whatever is necessary to ensure that Veterans get the right treatment in the right place at the right time.** Training is provided on how to use the home telehealth device and this training usually takes place in the Veterans home or local clinic.

Many thousands of Veteran patients are regularly using home telehealth devices to coordinate their care. VA finds that patients easily learn how to use these devices and are highly satisfied with Home Telehealth.

Some of the home telehealth devices that connect veteran patients with their care coordinator can also provide information about health, the conditions and the various treatments that may be offered. These home telehealth devices can make it possible to become more actively involved in the actual medical care. A care coordinator will work with the Veteran to help them learn ways to self-manage their care needs.

APPENDIX F:

APPROVAL FOR NON-HUMAN RESEARCH DETERMINATION FROM THE

UNIVERSITY OF ARIZONA
**Note that any changes made to this protocol after receiving Scientific/Scholarly Reviewer confirmation will need to be re-submitted and re-reviewed**

1. **Principal Investigator (Required)**
   
   By signing below, I, the Principal Investigator, certify that I have accurately answered the items listed and believe that the proposed activity does not constitute engagement in Human Research according to DHHS or FDA regulations.

   **Signature**

   **Date**

   **Print Name & Department**

2. **Scientific/Scholarly Review (Required; cannot be a member of the project)**

   Based on the information provided by the Principal Investigator, I have determined that this project does not constitute Human Research.

   **Signature**

   **Date**

   **Print Name**

   **Title**

   **Date**

   Place this completed and signed form, along with the protocol, in your personal files and in other files as directed by your advisor or department authority. **DO NOT SEND TO HSPP.**
REFERENCES


