American Association of Diabetes Educators 7 Intervention in Managing Type 2 Diabetes in Older Home Health Patients

Submitted by

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Abstract

Management of chronic disease pathologies requires the patient to have the ability to understand and manage their care. This may be especially challenging in the aging population caring for themselves at home. The home care agency noted the patients had a knowledge deficit regarding T2DM self-management of blood glucose levels. The purpose of this quantitative quasi-experimental quality improvement project was to determine if the implementation of the American Association of Diabetes Educators 7 (AADE7) diabetes self-management program improved glucose levels and diabetic management knowledge among adult diabetic home health patients aged 65 and older. The project took place in northwestern Illinois over four-weeks. The theoretical framework utilized for this project included Rosenstock's health belief model (HBM) and the Dorothea Orem's model of nursing. Diabetic self-management knowledge was measured using the 16 items Diabetic Self-Management Questionnaire (DSMQ) in a total sample size of 10 home health patients. A paired *t*-test was used to analyze a change in blood glucose levels and knowledge. The results indicated a clinical and statistically significant improvement in both reducing blood glucose levels $t(9) = 16.71$, $p = .000$ and improved knowledge $t(9) = 8.80$, $p = .000$ pre to post-implementation. The results indicate that the implementation of the AADE7 diabetes self-management program may improve glucose levels and diabetic management knowledge among adult diabetic home health patients. Recommendations include sustainment of the practice improvement project and looking for other evidence-based interventions that can aid in lowering the risk of complications.

Keywords: T2DM, DSMQ, Rosenstock's HBM, Orem's model of nursing, blood glucose levels, American Association of Diabetes Educators 7, AADE7, diabetes mellitus

Dedication

To my husband, Basil Ohakosim, who has adamantly stood by me along this journey. Your endless support has allowed me to reach the heights of my dreams, and I love you. To my late sister Elizabeth Ibe even with your sickness at the weakest point of your life, you believed in me, and your constant encouragement gave me the courage to keep moving forward. To my younger sister Henrietta Green and cousin Precious Dennar, who supported me through endless prayers, gave me the spiritual energies needed to go through this doctoral journey. To my children, Chinecherem, Onyemaechi, and Chinenye Ohakosim, thank you for your support, patience, and love throughout this period. I love you all very much! To my Nephew, Shedrack Green, Niece Ijeoma Ibe, and Aunty Joy Dickson, thank you for your love, support, and encouragement in my many moments of crisis. To my deceased parents, Stephen and Victoria Uchegbu, may your gentle souls keep resting in peace. I dedicate this degree to you for all your love and support of being what I am today. Thanks to my brother Sammy Stephen and all my friends for the words of encouragement and reminding me to pray without ceasing. It was worth all the sacrifices in not giving up.

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Chapter 1: Introduction to the Project

Type 2 diabetes mellitus (T2DM) is a disease that can lead to significant health complications and has reached epidemic levels in the United States (Rowley, Bezold, Arikan, Byrne, & Krohe, 2017). Cellular insulin resistance, followed by a declining pancreatic β-cell function, characterizes the condition. Patients with T2DM struggle to maintain a healthy blood glucose level and are at risk for significant complications such as peripheral neuropathy and blindness (Kahn, Cooper, & Del Prato, 2017). Diabetes was a public health issue, with an estimated 370 million patients affected worldwide (Kahn et al., 2017). There is a deficit of T2DM self-management in elderly patients receiving at-home care from visiting nurses in northwestern Illinois. The home health organization practice guidelines did not specify a protocol for providing T2DM self-care education to affected patients. The home health nurses lacked the knowledge necessary for delivering appropriate T2DM education, and the patients confirmed that visiting nurses rarely, if ever, discussed the management of T2DM. Patient education on how to control blood glucose levels is essential to self-management of the disease. It helps to prevent acute complications such as ketoacidosis (American Diabetes Association, 2018).

The International Diabetes Federation (IDF), like the American Diabetes Association (ADA), reported the need to enhance blood glucose management skills for most patients diagnosed with T2DM (IDF, 2017). Although T2DM can develop at any age, the disease disproportionately affects elderly patients. Empirical research shows that the disease is prevalent in approximately 9% of the general population (Boyle, Thompson, Gregg, Barker, & Williamson, 2010). Unfortunately, in patients 65 years of age and older, the prevalence is between 25% and 33% (Boyle et al., 2010; Kirkman et

al., 2012). The diabetes epidemic, particularly in the elderly, is not projected to improve. Kirkman et al. (2012) reported a probable 4.5-fold increase in T2DM prevalence in patients 65 years of age and older by the year 2050. To compound the issue, when the disease is not diagnosed in the elderly, it causes increased complexities in its management (Aspinall & Lang, 2018; Yakaryilmaz & Öztürk, 2017).

There is no cure for T2DM, but blood glucose levels can be managed by dietary intake, regular exercise, and avoidance of unhealthy habits such as smoking (Piero, Nzaro, & Njagi, 2015). Constant monitoring of the fasting and post-prandial blood glucose levels is critical to disease management and provides the patient with the information needed to blunt the impact of T2DM (Piero et al., 2015). As noted by Piero et al. (2015), lifestyle management was the most significant factor of self-care diabetes management in preventing complications such as cardiovascular disease (CVD) and peripheral vascular disease (PVD). Self-care and lifestyle management represent major tasks among the elderly due to reduced health literacy levels and lack of knowledge about the disease (Souza et al., 2014).

Prescribed pharmaceutical treatment for diabetes, along with lifestyle management, can be a problem for the elderly. This population has a higher probability of noncompliance and a greater possibility of adverse drug interactions due to the treatment of comorbid conditions (April & Freeland, 2017). This is particularly evident in the home-health setting when nurses visit with elderly diabetic patients. Diabetes self-management education provided by nurse providers during home visits has been found to improve health care outcomes in patients living with the disease (Lavelle et al., 2016). The purpose of this quantitative, quasi-experimental project was to determine if the

implementation of the American Association of Diabetes Educators 7 (AADE7) diabetes self-management program yielded lower glucose levels and diabetic management knowledge utilizing the 16 items Diabetic Self-Management Questionnaire (DSMQ) in adult diabetic home health patients, aged 65 and older, over four-weeks in northwestern Illinois (American Association of Diabetes Educators, 2018). Pre- and post-intervention DSMQ scores and glucose levels were compared using paired sample *t*-tests among participants to address this clinical project.

Chapter 1 provided a brief overview and background of the project and identified the project's problem statement, objectives, purpose, and significance. The clinical questions illuminated the scientific knowledge about the project. Other sections of the chapter included the rationale of the methodology, the nature of project design, the definition of terms, assumptions, limitations, and delimitations of the project. The final paragraph of the chapter includes the key points with a transition sentence for Chapter 2.

Background of the Project

As of 2018, 23 million Americans**,** or nine percent of the population, had diabetes with T2DM, accounting for 90 % of diagnosed cases (Bullard et al., 2018). Approximately 1,500,000 new cases of diabetes were diagnosed in the United States (U.S.) annually (Yakaryilmaz & Öztürk, 2017). In 2015, diabetes of all types was the seventh leading source of mortality in the U.S., with 79,535 death certificates listing it as the immediate cause of death (Meneilly & Tessier, 2001). While 23 million Americans have been diagnosed with diabetes, another 38% of the population, or about 124 million people, may have prediabetes (Meneilly & Tessier, 2001). Prediabetes is a condition that, if not addressed, often leads to T2DM within five years (Rowley et al., 2017). Boyle et al.

(2010) projected that by 2050, diabetes prevalence in the U.S. would affect 25% to 28% of the population. Rowley et al. (2017) further concluded that by 2030, the number of diagnosed cases of diabetes in the U.S. would double to more than 54 million individuals.

Diabetes is not without cost and carries physical, emotional, and financial burdens that weigh on all stakeholders (patients, families, clinicians, and healthcare organizations). Diabetes increases the risk of several associated complications such as chronic renal failure, non-trauma associated lower-limb amputations, and adult blindness (Centers for Disease Control and Prevention, 2017). Patients with diabetes are also at higher risk for psychological disorders, with an estimated 13.8% suffering from diabetes-related major depression and 44.6% reporting considerable psychological distress associated with the disease (Chew, Shariff-Ghazali, & Fernandez, 2014). Among elderly patients (over the age of 65), the risk of complications is higher. Those with a primary diagnosis of diabetes are more likely to suffer morbidity and fundamental life task disruptions than those patients without the disease (Gregg, Engelgau, & Narayan, 2002; Mordarska & Godziejewska-Zawada, 2017).

Type 2 Diabetes is characterized by cellular insulin resistance, the breakdown of the feedback loop between the pancreas β-cells, and insulin-sensitive tissues (Skyler et al., 2016). The breakdown leads to eventual β-cell loss of function, leading to low insulin production, causing impaired blood glucose management (Skyler et al., 2016). In the elderly, the creation of insulin slows down or is limited as a natural part of the aging process, thus predisposing them to develop the disease (Yakaryilmaz & Öztürk, 2017). Nevertheless, despite both age-related and genetic factors predisposing the elderly to T2DM, lifestyle-related risk factors such as obesity, the over-consumption of highly

processed foods rich in saturated fat and simple carbohydrates, and a sedentary lifestyle remain the most significant predictors of the development of the disease. Piero et al. (2015) emphasized that diet and lifestyle modification has been shown to reduce the prevalence of T2DM in high-risk patients by as much as 63%.

Both the ADA and the United States Department of Veteran Affairs have published guidelines for the treatment of T2DM in elderly patients. These guidelines target glycosylated red blood cell (A1c), fasting glucose, and pre-bedtime glucose levels based on the cognitive and physical condition of the patient (Kirkman et al., 2012). Notably, the targets and recommended treatment modalities for elderly patients in moderate health and with minimal cognitive disruption are identical to those of younger adults (Kirkman et al., 2012). If properly educated about how to control their disease, elderly adults can manage their T2DM as well as the young.

Elderly patients receiving at-home care from visiting nurses in northwestern Illinois were not receiving T2DM education for self-management. The home health care practice guidelines nor the training protocols addressed the topic of T2DM self-care education for diabetic patients. The visiting nurses were not provided with an expectation or the necessary tools to deliver appropriate T2DM education. Informal discussions with the patients confirmed that visiting nurses rarely if ever, discussed the management of T2DM even with patients having a primary or secondary diagnosis of the disease. The implementation of a proper evidence-based educational intervention such as the association of diabetic educators seven (AADE7) and the use of the Diabetic Self-Management Questionnaire (DSMQ) (Appendix B) instrument to evaluate the patient's needs can help them become more engaged with their self-care related to the disease.

The gap noted in the literature was related to evidence-based interventions designed to improve the management of T2DM in cohorts of elderly patients (Dunning, Sinclair, & Colagiuri, 2014). Investigations with older adults managing T2DM were limited and almost non-existent in both long-term and home care settings (Kirkman et al., 2012). The investigation conducted by Kalra and Sharma (2018) highlighted that of the seven diabetes control practices, which required attention from nurses caring for elderly T2DM patients, six were managed by the patients, with no consistent teaching or practice directions for educating patients performing self-care. Thus, this project targeted a population that was forgotten in the management of T2DM in older home-health adults.

Problem Statement

Although there are guidelines for the self-management of T2DM, they are not written for older adults with comorbidities and other issues affecting their ability to conduct self-management effectively. While the literature suggested multiple reasons for non-compliance from older adults, it was not known if the implementation of the American Association of Diabetes Educators 7 (AADE7) diabetes self-management program yielded lower glucose levels and diabetic management knowledge utilizing the 16 items Diabetic Self-Management Questionnaire (DSMQ) in adult diabetic home health patients aged 65 and older over four-weeks in northwestern Illinois. Diabetic self-management programs provide T2DM patients opportunities to learn ways to control the symptoms of their disease and to achieve clinically meaningful outcomes, such as lower HgbA1c levels and decreases in the occurrences of complications such as neuropathy, cardiovascular disease, nephropathy, retinopathy and skin, and soft tissue disorders. When these complications are present, patients can learn six ways to manage them with a

diabetic self-management program (Golden et al., 2017). Diabetic education programs have been shown to be successful as patients engage in self-care behaviors (American Association of Diabetes Educators, 2018). Such programs include the American Association of Diabetes Educators 7 (AADE7), which focuses on healthy eating, increased physical activities, regular blood sugar monitoring, medication compliance, and follow-up checkups that are defined in these programs as relevant to patients' learning. The patients would also show a change in their laboratory results, indicating a change in their hemoglobin A1C (HbA1c) levels to be below 5%.

The need for the project was prompted by the primary investigator noting a knowledge deficit of T2DM self-management in elderly patients receiving at-home care from visiting nurses. Current practice guidelines, as established by the managing health care organization, did not specify a protocol for providing T2DM self-care education to these patients. Hence, the visiting nurses lacked both the knowledge and the framework for delivering appropriate T2DM education tool use and updated guidelines. Informal discussions with the patients confirmed that visiting nurses rarely, if ever, discussed the management of T2DM, even with patients having a primary or secondary diagnosis of the disease. Blood glucose monitoring, dietary management, medication compliance, and the importance of physical activity were recommended educational topics for discussion with T2DM patients in all populations and settings (Choudhary et al., 2015).

The population affected by the problem are older adults ages 65 and above. Diabetes management in this population presents challenges due to the unpredictability related to clinical presentation, psychosocial environment, availability of resources, and frequency of illness (Leung, Wongrakparich, & Munshi, 2018). Diabetes management

differs across the field and is dependent on where the individual lives (community-dwelling, assisted living, independent living, living with family, or nursing home) (Leung et al., 2018). Some older diabetic adults are high functioning and medically stable and can perform self-management with or without caregivers. For individuals who are not able to follow instructions because of health literacy issues, cognitive decline, depression, chronic pain, and polypharmacy, management of the disease is difficult (Leung et al., 2018).

The project contributed to solving the problem by providing evidence-based strategies specifically for older home-health adults with comorbidities, complications, and other issues (such as failed vision, dexterity, and limited health literacy). The project helped the home health nurse practitioners and nurses increase their knowledge base regarding diabetes care beyond the national guidelines for this population. The PowerPoint focused on the American Association of Diabetes Educators, who has outlined the seven most important components of diabetes self-care management, known as (AADE7), components of diabetes self-care management, and a diabetic questionnaire developed for the home-health nurses measured their knowledge levels regarding the information. The project helped the nurses learn a more concise dialogue with their patients and improved observation skills for patient engagement using the teach-back method to validate their understanding of the material.

Purpose of the Project

The purpose of this quantitative, quasi-experimental project was to determine if the implementation of the American Association of Diabetes Educators 7 (AADE7) diabetes self-management program yielded lower glucose levels and diabetic

management knowledge utilizing the 16 items Diabetic Self-Management Questionnaire (DSMQ) in adult diabetic home health patients, aged 65 and older, over four-weeks in northwestern Illinois. The primary investigator used an evidence-based instrument, the Diabetic Self-Management Questionnaire (DSMQ) (Appendix B), to evaluate the level of diabetic self-management knowledge of the participant before and after the diabetic educational intervention. Blood glucose levels were utilized to determine the blood glucose condition of the participants before and after educational intervention as well. The educational intervention consisted of self-care activities related to diabetes, medication, physical activity, and interaction with a health care professional about glucose management (Appendix C).

The project used a quantitative, quasi-experimental design for the project to answer the two clinical questions. A quantitative methodology was used to analyze the collected data using statistical and numerical analysis. The two-groups allowed the primary investigator to review the differences and effectiveness of the educational intervention with the participants. The pre/post-test design determined the effectiveness of the diabetic educational intervention via the participants' decreased glucose levels. The independent variable was the diabetic educational intervention, and the dependent variable was the participants' glucose levels.

The project contributes to the nursing field's limited body of literature related to diabetes management for older adults. The project provided problem-solving solutions and evidence-based findings to the visiting nurses' home health organization in helping older adults with self-management of diabetes. The educational intervention would help the patients understand their disease process and prevention of chronic symptoms with

individualized care. The findings of the project could encourage dialogue among the providers in giving continuity of care.

The project site was one of two home health agencies located in a suburban, northwestern part of Illinois. The county has a diverse population of (White, Hispanic, or Latino, and Black or African American). It is one of four counties with the highest prevalence of diabetes (12.7%) (United States Census Bureau, 2018). Furthermore, the primary care physicians in Will County see an average of 1,799 patients per year, which is an increase from 2016. The older population, aged 65 and older, comprises 13.1% of the population (United States Census Bureau, 2018). This justifies the need for home-health nurse practitioners and providers for the residents.

Clinical Questions

According to Chatterjee, Khunti, and Davies (2017), 415 million people live with diabetes worldwide, and an estimated 193 million people have undiagnosed diabetes. Type 2 diabetes accounts for more than 90% of patients with diabetes. It leads to microvascular and macrovascular complications that cause profound psychological and physical distress to both patients and caregivers and significantly burdens healthcare systems (Chatterjee et al., 2017). Early detection through screening programs and the availability of safe and effective therapies reduces morbidity and mortality by preventing or delaying complications (Chatterjee et al., 2017).

Type 2 diabetes (T2DM) is growing, and some practice outcomes in primary care are often below standard (Arx, Gydesen, & Skovlund, 2016). Studies have shown that healthy habits are potent determinants of health outcomes. Furthermore, patients who reported adherence to either the therapy or general medical advice achieved better

metabolic glycemic control and reduced cardiovascular risk factors (Arx et al., 2016). Evidence from the literature review demonstrated that the lifestyle of patients with T2DM and healthy behavior changes with adherence to the treatment regimen is the cornerstone for glycemic control.

Advanced practice nurses are obligated to make a difference in this population's quality of life by implementing high-quality education with motivational interviewing techniques to achieve this goal. The project provided the primary investigator the opportunity to measure two different sets of variables. The independent variable was the diabetic educational intervention, while the dependent variables were the glucose levels of the patients and the knowledge levels, as measured by the DSMQ instrument. The clinical questions were derived from a population, intervention, control, outcome, time (PICOT) format. The following clinical questions guided this quantitative project:

Q1: To what degree did the implementation of the American Association of Diabetes Educators 7 (AADE7) diabetes self-management program over 4 weeks increase the knowledge levels of self-management behaviors, as measured through the DSMQ instrument, of older adult diabetic patients in a home health setting in northwestern Illinois?

Q2: To what degree did the implementation of the American Association of Diabetes Educators 7 (AADE7) diabetes self-management program over 4 weeks affect glucose levels of older adult diabetic patients in a home health setting in northwestern Illinois?

Advancing Scientific Knowledge

Literature shows that the population of older adults is increasing at an alarming

level. For example, between 2003 and 2013, the population of 65 and above people rose by 24.7 percent worldwide (Chatterjee et al., 2017). One of the main elements of this project is patient education and the ability to manage blood glucose levels in type 2 diabetes patients. The senior population is increasing, and so is the prevalence of type 2 diabetes (T2DM). But at the same time, Clinical Investigators are turning a blind eye to this area due to the assumption that understanding T2DM among young people is essential as it has a direct effect on the economy. Caregivers are left with little information that they can base their decision upon, yet the disease is highly heterogeneous, meaning that a slight mistake can be fatal (Chatterjee et al., 2017). This project advanced the body of knowledge since it led to interventions that address this problem, such as a diabetes self-care education program for nurses and patients.

Diabetes self-management education has proven to be cost-effective by reducing hospital admissions and readmissions and estimated lifetime healthcare costs related to lower risk for diabetes complications (Harrington, Carter-Templeton, & Appel, 2017). It also showed the importance of the prevention of complications in the management of T2DM. There is an urgent need for investigators to pay more attention to this area by involving the seniors in clinical studies and trials to find an optimal treatment that would offer appropriate guidance to caregivers. Secondary prevention in the elderly diabetic population helps in reducing the economic burden on healthcare costs associated with the complication of diabetes.

Although there are guidelines for the self-management of T2DM, they are not written for older adults with comorbidities and other issues affecting their ability to conduct self-management effectively. While the literature suggested multiple reasons for

non-compliance from older adults, it was not known if the implementation of the American Association of Diabetes Educators 7 (AADE7) diabetes self-management program yielded lower glucose levels and diabetic management knowledge utilizing the 16 items Diabetic Self-Management Questionnaire (DSMQ) in adult diabetic home health patients aged 65 and older over four-weeks in northwestern Illinois.

Most of the literature on diabetes type 2 in the elderly involves descriptions of prevalence, pathophysiology, and treatment protocols. Three organizations, including the American Diabetic Association, American Diabetes Educators, and Powers et al. (2015), in a joint statement, described diabetes as a chronic disease that requires a person with diabetes to make significant daily self-management decisions to perform complex care activities. Diabetes self-management education and support (DSME/S) provides the foundation to help people with diabetes to maneuver these decisions and actions and has been shown to improve health outcomes.

This project was based on the management of Type 2 diabetes patients 65 years and above. Patients must adhere to their treatment regimen through education and self-care management to manage their blood glucose. Self -care plays a vital role in diabetes management. As the self-care agency, the patient must be responsible for applying the knowledge of diabetes to maintain blood glucose levels to near-normal levels and to engage in other health practices, such as eye care, foot care, to prevent complications (McEwen & Wills, 2011). George (2010) described self-care demand as "the measures of care required to meet existent requisites which demand regulatory action to maintain life promote health and development of general well-being; however, there remains a gap in the literature related to the translation of the evaluation of diabetes self-management

education in the community setting by the primary care and Advance Practice Nurses (APN). This project focuses on implementing a diabetes self-management education intervention for patients with Type 2 diabetes to support and develop self-care abilities. Orem's model goes on to explain that supportive educative systems can perform or can learn to perform the therapeutic self-care but cannot do so without assistance. (George, 2010).

Dorothea Orem's self-care deficit theory helped determine the significance of self-care for Type 2 diabetic patients. Dorothea Orem identified three classifications of the nursing system to meet the patient's self-care requisites: wholly compensatory system, partly compensatory system, and supportive-educative system. Nursing educators must teach patients how to solve problems and make decisions, given its impact on patients with chronic diseases' quality of life. (Borji et al., 2017). Various studies have shown that the use of education and self-care models improves the condition of the patients. Therefore, it is crucial to identify how education intervention affects the diabetes knowledge of elderly patients with diabetes mellitus. (Borji et al., 2017).

The health belief model (HBM) was the chosen theoretical framework for this project. The decision-making model was developed in the late 1950s (U.S. Department of Health and Human Services (HHS), which consisted of six constructs. The six constructs which are provided to design educational content that supports the installation of these three conditions that are in the target population (Masoudiyekta et al., 2018). The HBM is ideal for the project because physical and cognitive capability is a variable among the targeted population. The assumptions and constructs of the model were designed to support educational modification at the patient level since the outcome goal of the

process was the alteration of the patient's belief, which leads to modified behavior (Rosenstock, 1974).

The HBM provided a teaching model for effecting change in health-related behaviors predicated on three of the six assumptions. The first assumption was that people must believe they are susceptible to a specific health condition to effect change (Janz & Becker, 1984). The second assumption was related to the individual's belief that an action or actions will protect specific health conditions to effect change (Janz & Becker, 1984). The third assumption was that people believe they can act or have actions specified in number two to effect change (Janz & Becker, 1984).

Significance of the Project

Two well-documented trends in healthcare in the U.S. were addressed by this project. Type 2 diabetes mellitus has reached epidemic prevalence levels, and the number of diagnosed cases is expected to rise by 54% by 2045 (International Diabetes Foundation (IDF), 2017; Rowley et al., 2017). The lifespans continue to increase, which contributes to a corresponding increase of the disease in individuals over the age of 65. The project was significant because, by 2050, the world's population will have individuals over the age of 65 years and older (Sander et al., 2014). The risk of developing T2DM increases significantly as a person ages (Boyle et al., 2010; Kirkman et al., 2012).

The significance of this project was that the educational intervention targets two segments of a neglected population regarding the burgeoning T2DM crisis, elderly patients in at-home care, and the visiting nurses who care for them. This project was in response to the demands of an aging population, which has experienced substantial

growth since 2013 (Landers et al., 2016). Another reason for the importance of conducting the project was that the literature abounds with investigations describing the treatment of T2DM in elderly patients. However, little attention has been given to determining the best way to educate the elderly about T2DM. Furthermore, minimal attention was given to developing the skills of visiting nurses, who are the primary source of care for a significant proportion of the elderly population (Landers et al., 2016). In addressing in-home care for elderly diabetic patients, this project filled an existing gap in the literature and expanded the nursing practice and education that may soon be of critical importance.

Rationale for Methodology

The primary investigator selected a quantitative methodology to conduct the project. The quantitative approach allowed the primary investigator to analyze numerical data utilizing statistical methods (such as a paired sample *t*-test) (Christenson & Gutierrez, 2016). Quantitative analysis was used to measure variables derived from the targeted population (independent variable DSMQ educational intervention, dependent variable patients' glucose levels). The quantitative methodology allowed the primary investigator to define the variables related to the clinical questions.

A qualitative methodology was not conducive to this project because the primary investigator was not seeking to understand questions about a phenomenon (Leedy & Ormrod, 2011). A qualitative approach focuses on comprehending the participant's feelings, beliefs, and behaviors (Leedy & Ormrod, 2011). This method reviews the participants' answers typically taken from open-ended questions in an interview mode, looking for themes, trends, or patterns for solutions (Leedy & Ormrod, 2011). This type

of investigation is considered inductive and is dependent on emphasizing an individual's lived experience (Leedy & Ormrod, 2011).

The quantitative methodology was appropriate for this project because it was structured and used the DSMQ instrument for its method of collection for data. Additionally, the project was deductive and used statistical sampling methods (such as the paired *t*-test). In contrast, the qualitative project is defined as an "active investigation" using observation and interview methods (Leedy & Ormrod, 2011). For this project, the primary investigator was able to measure the variables as they occurred, providing data considered good, consistent, and accurate.

Nature of the Project Design

The project was a quantitative project that employed a quasi-experimental design, which allowed the primary investigator to assess the participants' before and after administering the DSMQ instrument and educational intervention. Using a quasi-experimental design with pre and post-implementation provides a causal effect relationship that helps determine and validate the relationship between two or more variables in the project (Trochim, 2020). A pre/post-test design allowed the primary investigator to assess the participants' before and after administering the educational intervention. The instrument was used at two different points of time, which allowed the primary investigator to see the effects of the treatment on the group. This project was a quasi-experimental, pre/post-test design because the primary investigator did not randomly assign the participants. In this project, the primary investigator introduced the American Association of Diabetes Educators 7 (AADE7) diabetes self-management program as an educational intervention and evaluated the impact of the intervention on

knowledge levels (using the DSMQ instrument) and blood glucose levels before and after the implementation.

A quasi-experimental design is one that resembles an experimental design but lacks a random assignment (Trochim, 2020). For this quality improvement project, the quasi-experimental design was used (Trochim, 2020). In a quasi-experimental design, the independent variable is manipulated, but the participants are not randomly assigned to the conditions (Leedy & Ormrod, 2011). The independent variable was manipulated before the dependent variable was measured, which eliminated the directionality of the issue (Leedy & Ormrod, 2011).

Definition of Terms

The following terms were used operationally in this project.

American Association of Diabetes Educators 7 (AADE7). The American Association of Diabetes Educators (AADE) has defined the AADE7 diabetes self-management program as a framework for patient-centered self-management education, training, and care (American Association of Diabetes Educators, 2018). The AADE7 includes seven self-care behaviors that are essential for effective diabetes self-management, including 1.) healthy eating, 2.) being active, 3.) monitoring, 4.) taking medication, 5.) problem solving, 6.) healthy coping, and 7.) reducing risks. Diabetes educator interventions can be organized according to this framework and serve as the intervention for the current project.

Blood Glucose. Blood glucose or glycemia derives from foods people eat and that their bodies use it for energy. As it penetrates the blood cells, it is called blood glucose or blood sugar (American Diabetes Association, 2017). Blood glucose testing is used to

determine the categories of glycemia and to diagnose diabetes. Blood sugar is measured with a blood sugar meter (also called a glucometer) or a continuous glucose monitor (CGM) to check your blood sugar. A blood sugar meter measures the amount of sugar in a small sample of blood, usually from the fingertip. Depending on the glucose level in the blood, a person can be diagnosed as normal, borderline, or diabetic (Seino et al., 2010).

Diabetes mellitus type 2. Diabetes mellitus type 2 (T2DM) is a long-term metabolic disorder characterized by impaired glucose tolerance, impaired fasting glucose, cellular insulin resistance, failure of pancreatic islet β-cells, and a wide range of associated complications. The body is eventually unable to regulate blood glucose levels without intervention. Although genetic predisposition for the disease is common, T2DM is mostly a lifestyle-associated disease and mainly diagnosed in adults (Kahn et al., 2017).

Diabetes Self-care Management Education. An education and support method of a continuing process for an individual to improve their skills and knowledge to manage diabetes by positive behavioral changes (Powers et al., 2015). An example of diabetes self-care management education is the AADE7 diabetes self-management program, which is the intervention utilized in the present project.

Diabetic Self-Management Questionnaire (DSMQ). The Diabetic Self-Management Questionnaire was developed as a German instrument at the Research Institute of the Diabetes Academy (Schmitt et al., 2013). The 16-item instrument is used in targeting diabetes self-care and evaluates behaviors linked with glycemic control, which is a treatment regimen for Type 1 or Type 2 diabetes (T2DM) patients. (Schmitt et al., 2013). For this project, the questionnaire was used to measure the self-management

knowledge level and covered four different segments of diabetes self-management. The subscales were a) glucose management, b) dietary control, c) physical activity, and d) health care use (Schmitt et al., 2013).

Elderly patients. A chronological term is given to individuals 65 years old and older (Singh & Bajorek, 2014). These individuals are also called geriatrics, where their functions diminish with age leading to vulnerability (Sieber, 2007). Elderly patients with T2DM serve as the population of the project.

Epidemiology. A medical specialty that investigates the incidence, prevalence, distribution, and control of diseases and other health-related phenomena (Centers for Disease Control and Prevention, 2017).

Evidence-based Practice (EBP). The integration of the best process improvement evidence with clinical expertise and patient values to facilitate clinical decision-making. This evidence is a crucial part of quality improvement in the nursing practice (Varaei, Salsali, Cheraghi, Tehrani, & Heshmat, 2013).

Pathogenesis. The deviations from normal physiology associated with the development of a specific disease or disorder (Kahn et al., 2017).

Perceived susceptibility. A term is also known as perceived vulnerability, which refers to a person's awareness of their risk or chances of contracting a disease or condition (Witte, 1992).

Assumptions, Limitations, Delimitations

Assumptions. Assumptions are proposed beliefs of the project, which have not been scientifically proven (Leedy & Ormrod, 2011). The first assumption noted in this project was that diabetes self-care education management was a productive strategy to

control Type 2 diabetes and glucose levels. This strategy was reality-based because it was a topic the primary investigator could evaluate objectively. The second assumption was that the educational intervention the primary investigator implemented would lead to a behavioral change based on the success of prior interventions (Varaei et al., 2013). This assumption was based on findings from other investigations such as Monaco (2018). The third assumption was that the instrument used was specific and reliable to use with the targeted demographics. The tool used in the project was selected based on previous use in other projects with similar populations; thus, the primary investigator expected the results to be similarly effective (Haugstvedt, Aarflot, Igland, Landbakk, & Graue, 2016).

Limitations. Limitations are possible flaws inherent in the population, design, or methodology of the project, which limit the generalizability of the results (Leedy & Ormrod, 2011). Three limitations noted in the project were the sample size, lack of previous investigations of the proposed project area, and time frame (cross-sectional). A small sample size reduces the power of the project and raises the margin of error (Deziel, 2018). In other words, small sample sizes can increase the likelihood of Type II error, which can skew the results, minimizing the power of the project (Leedy & Ormrod, 2011). sample size should be based on the required confidence level, the margin of error, and the expected deviation between the participants' results. This affects the statistical tests (*t*-test) in identifying possible significant relationships within the dataset (Leedy & Ormrod, 2011). If the primary investigator had based the project on a larger sample size, it would have generated results that are more accurate.

The second limitation was related to the limited literature on diabetes self-management of older adults (home health care setting). The literature review is a

significant part of the investigation since it identifies and evaluates the past body of work conducted in the project area. There is little empirical research on the subject the primary investigator has chosen. Hence, the project findings could be used to contribute to the past body of literature as a building block for future projects.

The third limitation was the time frame in which the project was conducted (cross-sectional). A cross-sectional project allowed the primary investigator to collect the data on these participants at a single point in time to examine the impact of diabetic educational intervention. The cross-sectional approach helped evaluate the participants and how they were affected by the educational intervention and whether the frequency of the occurrence varied with population characteristics (Hemed, 2015). A longitudinal investigation would have allowed the primary investigator to measure and identify the impact of the educational intervention over a more extended time and verified by more significant amounts of data (Leedy & Ormrod, 2011). A longitudinal investigation would also allow the primary investigator to track the participants used in the project; hence, providing stronger results in helping the home health agency to implement strategies.

Delimitations. Delimitations are characteristics that occur from the limitations within the scope of the project (Simon & Goes, 2013). Two delimitations of the project included the theoretical framework and the inclusion/exclusion criteria of the participants. The health belief model was the chosen theoretical foundation for the project. It was chosen to address the participants' lack of education and the efficacy of self-care regarding effective diabetic self-management. The inclusion criteria included individuals 65 years and older, individuals with T2DM as a primary or secondary diagnosis, live in a home-health setting, use of oral or injectable diabetic medication, and

the ability to read/write English. Exclusion criteria included patients under the age of 65, not having a primary or secondary diagnosis of T2DM, patients unwilling or unable to provide informed consent, unable to participate in the full duration of the project, and individuals who lacked the necessary physical and cognitive capabilities to participate in the project.

Summary and Organization of the Remainder of the Project

Diabetes self-management education and home health visits have been beneficial for improving clinical and healthcare outcomes for older adults living with diabetes (Lavelle et al., 2016). The problem could be diminished if nurse practitioners were educated and given the tools to advise patients on a continuum with scrutiny and re-evaluation (Lavelle et al., 2016). The notable gap in the literature related to discussing intervention and management of T2DM older adults in a home-health setting. Unfortunately, the recommended treatment for this population with moderate health and minimal cognitive interruption was the same one used for younger adults (Kirkman et al., 2012). Older adults can manage their T2DM as well as younger adults if appropriately educated on how to control their disease.

Chapter 1 provided a brief overview, history, and present problem of older adults managing their T2DM in a home-health setting. Other segments included the problem statement, purpose, and significance of the project. The clinical question narrowed the focus of the project and problem statement. Several sections related to advancing of scientific knowledge, rationale of methodology, nature of project design, definition of terms, assumptions, limitations, and delimitations. The final section is related to a summarization of the chapter while providing a few transitional sentences into Chapter 2.

The rest of the chapters are as follows: the literature review is discussed in Chapter 2, which focused on the limited previous inquiries about the project's topic. Chapter 3 evaluated the project's methodology, population, sample size, and DSMQ instrumentation. Chapter 4 delivered the project's findings and results. Chapter 5 provided a summarization, conclusions, and recommendations for future projects and nursing practices.

Chapter 2: Literature Review

The purpose of this quality improvement project was to educate older adult patients who participated in the American Association of Diabetes Educators 7 (AADE7) diabetes self-management program to lower their morning fasting glucose levels or increased knowledge in diabetic self-care over four-weeks. An individual's self-management is the most critical factor in controlling glucose levels and maintaining euglycemia (Schmitt et al., 2016). The lack of glucose control increases the risk of long-term complications of diabetes (Schmitt et al., 2016). However, proper testing, treatment, lifestyle changes, healthy eating techniques, walking, exercise, and other physical activities, promote adherence to a present pattern that is of considerable public health importance providing beneficial effects on human health and prevention or treatment of diabetes (Asif, 2014).

Home health nurse practitioners must learn to assess their older patients regarding diabetes self-management in detecting physical and cognitive difficulties and other areas needed for improvement. A standardized diabetic self-management education and tool, such as the American Association of Diabetes Educators 7 (AADE7), can help the elderly diabetic patients to manage their glucose levels effectively (American Association of Diabetes Educators, 2018). Chapter 2 consisted of a synthesis of the research obtained during an extensive literature review designed to establish the background, significance, and theoretical underpinning for the project. Other parts of the chapter included gaps and needs, the health belief model, and how it was used to answer the clinical questions. The last segment provided a few transitional sentences, which led to Chapter 3.

The literature review was conducted using specific search terms and filters to identify sources suitable for this project. The databases searched were: *JSTOR*, *Elsevier*, *CINAHL*, *PubMed*, NCBI, ScienceDirect, Clinical Key, PMC, *OVID*, and *Google Scholar*. Initial search terms included diabetes, diabetes at-home care, diabetes treatment for the elderly, diabetes educational intervention, diabetes epidemiology, diabetes pathophysiology, health belief model, and type 2 diabetes. The numerical results of the literature search were extensive, with over 80,000 possible matches regarding diabetes in older adults. However, a narrower search related to elderly or older adults and diabetes self-management produces less than 2,000 articles. The primary investigator used 30 articles, with 80% of them published in the last five years.

As of 2018, 23 million Americans, or 9% of the total population, have been diagnosed with diabetes Type 2 diabetes mellitus (T2DM), accounting for 90% of those cases (Bullard et al., 2018). The disease affects roughly 14% of the population in the United States and is higher in elderly patients over the age of 65 years (Abdelhafiz, Koay, & Sinclair, 2016). The disease is expected to increase by the year 2050 and remains prevalent in older adults (Abdelhafiz et al., 2016). It was further noted that diabetes was more prevalent in males than females with increased age (Centers for Disease Control and Prevention, 2017). Unfortunately, as the baby boomer generation in the United States continues to age, the diabetes numbers will grow, tripling the number of individuals over the age of 85 by 2050 (Jaul & Barron, 2017).

Older adults experience diabetes mellitus complications and comorbidities more frequently than their younger counterparts (Chentli, Azzoug, & Mahgoun, 2015). A few of the complications include renal impairment, cognitive decline, problems with

dexterity, and vascular. Health care providers must understand their patients' knowledge of the disease, health beliefs, and cultural values and how it affects their recommendations (Adejoh, 2014). Patients 65 years of age and older are often excluded from clinical quality improvement projects due to safety concerns and various comorbidities that may interfere with the generalizability of results (Weinger, Beverly, & Smaldone, 2014). It is critically important to establish best-practice recommendations for the treatment of T2DM in elderly patients, particularly regarding disease self-management (Weinger et al., 2014).

For older adults, the production of insulin slows down or is limited as a natural part of the aging process (Yakaryilmaz & Öztürk, 2017). Hence, predisposing persons over the age of 65 for the development of T2DM (Yakaryilmaz & Öztürk, 2017). However, despite both age-related and genetic factors influencing the elderly for T2DM, lifestyle-related risk factors such as obesity, over-consumption, processed foods, and a sedentary lifestyle remain the most significant predictors of developing the disease. According to Piero et al. (2015), diet and lifestyle modification has been shown to reduce the incidence of T2DM in high-risk patients by as much as 63%.

The literature supported self-care education as one of the essential parts of the ongoing treatment of T2DM. In a joint statement by the American Diabetes Association (ADA), the American Association of Diabetic Educators (AADE), and the Academy of Nutrition and Dietetics recommended that all T2DM patients receive Diabetic self-management educations (DSME/S) as needed (Powers et al., 2015). It also noted that a patient who received DSME/S (educational intervention) was associated with reduced hospital admissions, readmissions, delayed onset of complications, and improved

psychosocial outcomes (Powers et al., 2015). This recommendation was based on data provided by retrospective investigations such as Brunisholz et al. (2014), which found that patients who received DSME/S were 1.5 times more likely to achieve bundled diabetes-related goals than those without the education. There is, however, a significant gap in the literature supporting the use of DSME/S with elderly patients (Dunning et al., 2014). Investigations with older adults managing T2DM have been limited and are almost non-existent in both long-term and home care settings (Kirkman et al., 2012).

This project evaluated the effectiveness of diabetes self-care -management education for adults 65 years and older with T2DM in a home-care setting. The literature divulged that self-management education was the main standard for diabetes management concerning an integral element within the care of diabetic disorder. Based on the apparent gap in the literature, this project implemented a formal evaluation of an educational intervention targeting the delivery of DSMQ, DSME/S, glucose monitoring, and AADE 7 behavior education to a cohort of older adults receiving at-home care services from visiting nurses.

Landers et al. (2016) reported that the management of chronic conditions was as much as 19% lower in at-home care settings, outcomes are the same as in-hospital care, and patient satisfaction is significantly higher. Conservative estimates expect the number of patients receiving regular at-home care from professional care providers to increase to 34 million by 2030 (Vincent & Amalberti, 2018). Thus, not only is it critical to understand better the efficacy of DSME/S with elderly patients but for practitioners to expand their knowledge of how DSME/S functions in an at-home care setting.

Theoretical Foundations

Rosenstock's health belief model (HBM) and the Dorothea Orem's model of nursing were utilized to guide the project. The health belief model (HBM), developed by Hochbaum, Rosenstock, and Kegels (1952), was chosen to address the lack of education regarding T2DM self-management and a perceived lack of confidence in the efficacy of self-care (Rosenstock, 1974). The nursing theoretical framework guiding the development of this project was the self-care deficit nursing theory, also known as the Dorothea Orem Model of Nursing, which was developed by Dorothea Orem between 1959 and 2001 (Orem, 2001). Following is an in-depth discussion of each model and its applicability to the quality improvement project.

Health belief model. The health belief model (HBM) is useful in explaining the self-care behaviors related to disease prevention (Adejoh, 2014). The HBM model was selected because it fits the evidence-based educational intervention chosen for the patients and addressed their unhealthy behaviors. The underpinning of the model stated that individuals would implement an action to prevent, control, or treat disease (diabetes) dependent if they see the problem to be severe (Adejoh, 2014).

The model was developed in the 1950s by Hochbaum, Rosenstock, and Kegels and was considered one of the first attempts to describe the psychology of illness, healthcare-related decision-making, and preventive health behavior (Rosenstock, 1974). The health belief model consists of five concepts that are supplied to help design educational content that encourages behavioral change in the targeted population (Masoudiyekta et al., 2018). The five core concepts are perceived susceptibility, severity, benefits, barriers, and cues to action (Rosenstock, 1974). Perceived susceptibility

described a person's belief that they are at personal risk of developing a condition or disease. The risk may be non-insignificant. Many individuals believe that diabetes is not a severe or long-lasting condition (Ling, 2018). This misconception related to the severity of the disease causes poor compliance with medication and self-management processes (Ling, 2018). As advanced nurse practitioners, it is essential to promote changes in the beliefs (Ling, 2018). Individuals who understand and accept that diabetes is a severe, chronic illness that can be controlled with diet, exercise, and medication regimen develop higher self-management skills.

The second concept, perceived severity, states a person must believe the consequences of developing the disease are severe enough, evoking an emotional response (Rosenstock, 1974). The recognized values are non-specific and can be physical or psychological effects of the condition (Rosenstock, 1974). It can also be a perceived socioeconomic impact of the disease (Rosenstock, 1974). In this phase, the patient worries or develops a fear, which motivates them to act responsibly to avoid poor clinical outcomes such as death, disability, or pain (Shabibi et al., 2017). The individuals realize that a lack of proper self-management could affect their working conditions, family life, and social support or communication (Shabibi et al., 2017). A high-perceived severity brings about self-care behaviors (Shabibi et al., 2017).

The third concept, perceived benefits, is a person who believes that by taking a specific action, the risk of developing the disease can be reduced (Rosenstock, 1974). In this phase, an individual's view could be positive or negative and is based on the benefits and barriers before the behavior occurs (Shawley-Brozka & Misra, 2018). For this project, the participants had concerns that educational intervention would be useful. In

Adejoh's (2014) investigation, the choices the participants made in self-behaviors (exercise and regulated meals) improved their glucose levels and disease outcomes. For them, they decided that the benefits of participating in the evidence-based educational intervention outweighed the barriers.

The fourth concept was related to an individual's perceived barriers (Rosenstock, 1974). This involves an individual making behavioral changes, although there are obstacles. This phase is influenced by one's personal experiences from a past event (Shawley-Brozka & Misra, 2018). The prediction of the barriers related to poor diabetes management can affect one's intention to participate in positive behavior (Shawley-Brozka & Misra, 2018). For behavior change to occur, the barriers that could create an obstacle before the patient engages or decreases their commitment must be removed (Shawley-Brozka & Misra, 2018).

The last concept, cues to action, is the resistance to motion caused by perceived barriers that frequently cannot be overcome without an internal or external force altering the balance of intent (Rosenstock, 1974). This concept emphasizes people's readiness to change, while the idea of self-efficacy and confidence allows them to act successfully (Adejoh, 2014). An example in this project is participants who resisted making dietary changes until they experienced or heard that a close relative or friend suffered a heart attack secondary to having diabetes. The cues to action involve external suggestions (reminders from family or friends to take medications) or internal (feeling their glucose levels are high or low), causing the individual to act (Adejoh, 2014).

The HBM was selected for this project because it explained why older diabetic patients do not engage in preventive health behaviors. The theoretical model remains

relevant today, as seen in investigations such as Adejoh (2014), Shawley-Brozka, and Misra (2018), and Shabibi et al. (2017). Recently, a sixth concept has been added to the theoretical model, which is self-efficacy or the internal belief that patients can change their behavior; Although this concept was not part of the original HBM, it was used as a part of the framework integrating it into the intervention plan-of-care (Masoudiyekta et al., 2018; Shojaei, Farhadloo, Aein, & Vahedian, 2016).

Self-care deficit nursing theory. The self-care deficit nursing theory, also known as the Dorothea Orem Model of Nursing, is considered a grand nursing theory, which means the theory covers a broad scope with general concepts that can be applied to all instances of nursing (Orem, 2001). This framework always guides nursing practice, and nurses follow the concepts from the theoretical framework unconsciously. Self-care is effective, learned, informed, and objective, and defined as behaviors of a person done in concrete life situations by the person himself or his relatives (Borji, Otaghi, & Kazembeigi, 2017). Self-care is considered an essential and valuable principle because it emphasizes people's active role in their healthcare, not the passive.

Diabetic self -management involves focusing on an individual's role in managing chronic disease. This term is often associated with self-care and includes an array of activities needed to manage one or more chronic conditions (Centers for Disease Control and Prevention, 2017). Dorothea Orem identified three classifications of the nursing system to meet the patient's self-care requisites: wholly compensatory system, partly compensatory system, and supportive-educative system. She tried to explain nurses' role by mentioning terms such as the nursing system (wholly compensatory, partly compensatory, supportive, and educative) and nursing agency (abilities). Irshad Ali

(2018) defined sick patients as self-care deficits who have fewer agencies (abilities) and more demands (universal, developmental, health-related, and therapeutic) (Irshad Ali, 2018). This project describes the usability of theory into practice that resulted in a drastic change in practice and the patient's early recovery.

In Orem's self-care model, the patient's ability and defects are examined, and nursing interventions are designed for self-care by the patient according to the identified needs of the help-seeker (Borji et al., 2017). Dorothea Orem's model was applied to this project using assessment form, getting some information from the demographic characteristics of the patient, patient's specific need for self-care related to health (such as medical information, previous medical history, diagnoses, medications, allergies, and patient expectations) and their general care needs (such as body systems, health, usual patterns of daily life, and the perception of their social interactions) (Borji et al., 2017). The patient's needs about the disease, health, diagnostic tests, and other collected registration requirements were determined.

Orem (2001) identified self-care as a human regulatory function that individuals must maintain life, health and independently care for themselves. Dorothea Orem's self-care model was used to guide the project to determine whether a diabetes self-management education program would increase diabetes-related knowledge such as healthy eating, physical activity, prevention, management of hypo-/hyperglycemia, prevention of complications, medication, and changes in behavior such as self-monitoring of blood glucose levels (Borji et al., 2017). This project highlights the applicability of Dorothea Orem's theory in a patient with diabetes.

Review of the Literature

Six themes guided the discussion of the review of the literature section. The themes were related to the complications and challenges for the older population, risk factors, and interventions. Each theme had subthemes, which were based on current empirical literature. This section provided a comprehensive overview of diabetes and glucose monitoring in the older population. The similarities, contrasts, and limitations of the investigations related to the subject were presented.

Type 2 diabetes T2DM is a cluster of metabolic diseases, which affects lipids, proteins, and carbohydrate metabolism (Karamanou, Protogerou, Tsoucalas, Androutsos, & Poulakou-Rebelakou, 2016). The subject was essential because diabetes has become a prominent health condition of the aging population, with approximately one-quarter of older adults over the age of 65 having the disease (Centers for Disease Control and Prevention, 2017). According to Sinclair, Makahi, and Shea-Solatorio (2013), healthcare providers must set the proper glycemic goals for their patients by educating them on self-care and management.

Complications and challenges for older diabetic population. For healthcare providers, older adult patients with diabetes pose a challenge for them to manage. The reason, as stated by Monaco (2018), is their unique goals and risks must be balanced in combination with each other. The individualization, simplification, and education about the treatment and regimen are essential in caring for older adults. As a health care provider, the task in care for older adults becomes difficult because of the medications used in treating comorbidities associated with aging (Monaco, 2018). Additionally, it is essential for healthcare providers to tailor-make the older adult diabetes regimen to their

specific needs; extra attention must be focused on the individual's ability to self-manage and adherence to their treatment (Monaco, 2018).

Huang (2016) emphasized that within the coming years, the population health of older adults with T2DM was expected to increase. For this group, the rates of complications, specifically glycemic control, microvascular and cardiac problems, and mortality, rises because of their advanced age. The clinical course for this population was different today than reported in previous investigations such as Bethel, Sloan, Belsky, and Feinglos (2007) and Bertoni, Krop, Anderson, and Brancati (2002). The rationale was that most of the current literature and understanding regarding the clinical course of diabetes in older adults was founded on inquiries from the 1990s' populations (Huang, 2016). A deeper understanding of the clinical course of the disease in this population was essential for developing evidence-based recommendations, forwarding research, allocating resources, and adjusting health care policies for older adults (Huang, 2016).

Glucose monitoring. The continual monitoring of one's glucose level is essential in identifying hypoglycemia. In treating the older adult population, the self-management of diabetes is challenging because of their limited understanding of hypoglycemia and the actions needed. Empirical research shows that many older patients with T2DM and cognitive decline were more prone to hypoglycemia and its complications (Mattishent et al., 2019). For many older adults, hypoglycemic episodes occur in 28% -65% of the patients, with 80% being asymptomatic (Mattishent et al., 2019). Some patients have been noted to experience up to two hours a day in the hypoglycemic state (Mattishent et al., 2019). In today's health arena, newer technological devices have increased diabetes management in children and younger adults (Mattishent et al., 2019).

Mattishent et al. (2019) conducted a mixed-method examination in a community setting with diabetic adults over 65 years of age. The cross-sectional, qualitative investigation involved 12 participants with a mean age of 85, capturing data of hypoglycemic events and adverse events. Participants were identified and recruited from the geriatric and medical wards at a university hospital. Once discharged from the hospital, the authors contacted them to confirm their participation in the project and to wear a continuous glucose monitoring device (Freestyle Libre). The inclusion criteria included participants 65 years or older with Type 1 or T2DM, glucose-lowering medication, and the Mini-Mental Test with a score of less than eight. The written instrument, Mini-Mental Test, was used as a screening tool for memory issues while the patients were hospitalized.

In the investigation by Mattishent et al. (2019), detailed field notes provided the results of each interview using thematic analysis. NVivo 12 software was used to analyze the data manually, and the authors listened to the audio recordings of the discussions. Trustworthiness was established by using two members of the project team to check the transcripts for accuracy. The results from the data captured from the 14 days ranged between 3% and 92% (mean 55%), with six participants who had less than 60% capture. Sixty-six (66%) or nine of the participants were insulin users and experienced some prolonged hypoglycemic events. The average duration of hypoglycemic events ranged from 106 min to 437 min.

An examination conducted by Soma et al. (2018) used a continuous glucose monitoring device (CGM) (Freestyle Libre) on 326 (n=326) older diabetic adults from an outpatient facility to determine the effects of hypoglycemia. The results demonstrated

that among the participants, 235 (*n*=235) (72.1%) used drugs linked with hypoglycemia, and 63 (*n*=63) (19.3%) had hypoglycemic episodes and were unaware. The investigation supported other examinations such as Mattishent et al. (2019) and Ruedy, Parkin, Riddlesworth, and Graham (2017), which confirmed the need for using alternative methods such as CGM for monitoring glycemic levels and hypoglycemia in older adults. This is significant mainly for older adults who cannot perform the finger stick (due to low vision and dexterity issues), have compliance issues, and need continual glucose monitoring.

In summary, the need for using alternative methods to monitor older adults' glycemic levels that are associated with higher risks is crucial to significant patient outcomes. Healthcare providers should become knowledgeable regarding other ways, which can be utilized in this population. The investigations of Mattishent et al. (2019), Ruedy et al. (2017), and Soma et al. (2018) showed that although conducted in different settings, older adults could embrace new methods of monitoring their glucose levels. The newer methods are beneficial but must be individualized to the patient.

Polypharmacy. Polypharmacy is the use of numerous medications, which typically increases with one's age (Peron, Ogbonna, & Donohoe, 2015). Many drugs are prescribed to this population and are intensified by them purchasing over the counter medications without their healthcare providers' knowledge (Peron et al., 2015). In the U. S., approximately 57% of women and 59% of men use five or more medications daily (Peron et al., 2015). Furthermore, roughly 20% of older adults take ten or more drugs. Elderly diabetic patients are at a higher risk of receiving polypharmacy than individuals without the disease.

Many inquiries emphasized that polypharmacy increased adverse drug events, hypoglycemia, drug interactions, and patient costs (Lipska, Krumbolz, Soones, & Lee, 2016). Additionally, the higher number of medications indicates the less likely the patient adhered to their medication regimen (Lipska et al., 2016). An investigation conducted by Dobrica et al. (2019) evaluated the use of polypharmacy in T2DM patients versus non-diabetic patients. This cross-sectional, retrospective, observational project used medical records of hospitalized patients. The patients diagnosed with T2DM (n=63) were included in the project group, and the non-diabetic patients (n=63) were utilized as controls. The age range of the project group was 46-89 years of age, with a mean age of 69.19. The age range of the control group was 42-93, with a mean age of 67.05.

The results showed that diabetic patients had more comorbidities (10.35 ± 3.09 vs. 7.48 ± 3.59, p = 0.0001) and received more drugs (7.81 ± 2.23 vs. 5.33 ± 2.63, p = 0.0001) vs. non-diabetic control group (Dobrica et al., 2019). The drug-drug and food-drug interactions were higher in T2DM patients versus the control patients. The statistical data showed: 8.86 ± 5.76 vs. 4.98 ± 5.04, p = 0.0003 (minor: 1.22 ± 1.42 vs. 1.27 ± 1.89; moderate: 7.08 ± 4.08 vs. 3.54 ± 3.77; major: 0.56 ± 0.74 vs. 0.37 ± 0.77) and 2.63 ± 1.08 vs. 2.19 ± 1.42 (p = 0.0457). The inquiry confirmed that T2DM older adult patients, who received more drugs than their counterparts, were subjected to increased drug-drug and food-drug interactions. The investigation concluded that polypharmacy should be a concern for healthcare providers in T2DM patients, especially older adults (Dobrica et al., 2019).

Noale et al. (2015) conducted a cross-sectional examination that identified the characteristics of older diabetic patients and their association with polypharmacy. The

targeted population from 57 diabetic centers comprised of 1,342 (*n*=1342) diabetic individuals aged 65 years and older receiving oral medications. The participants completed the METABOLIC inquiry questionnaire that focused on the living arrangements to cognitive skills. The participants' vitals were taken at the end of the evaluation and educational sessions. Glucose blood samples were collected 11 days before the completion of the questionnaire.

The results from Noale et al. (2015) investigation indicated that 57.1% of the population was prescribed five or more medications. The female population had a higher association with polypharmacy, a history of diabetes for longer than four years, and a higher body mass index of 30kg/m2. Other factors associated with polypharmacy were reduced nutritional intake, cognitive and dexterity issues, and inadequate social support. Logistic regression models were used to identify the characteristics linked with polypharmacy. Statistical significance was found with a p-value < 0.05. The examination concluded that polypharmacy is detrimental to older diabetic patients and was significantly associated with certain risk factors. The authors believed it was useful for providers to identify patients at risk.

The first similarity of the inquiries written by Lipska et al. (2016), Dobrica et al. (2019), and Noale et al. (2015) showed that polypharmacy is a global problem affecting older diabetic patients. The second similarity was the time frame in which the investigations were conducted. The differences noted in the investigations were the designs (retrospective) versus the posttest. However, the information stated in the results mirrored the other by noting that healthcare providers should be concerned with polypharmacy for older diabetic adults. A medication assessment should be conducted by

each nurse provider visit regarding (new, discontinued, and herbal) medications to increase awareness of patients who are at risk.

Depression. Park and Reynolds (2015) stated that depression was a significant problem in older adults with T2DM. Untreated or undertreated depression in an older adult affects the ability to manage the disease and comply with their regimen (Park & Reynolds, 2015). Depression is a persistent feeling of sadness and loss of interest in daily activities or life (Cagliostro, 2019). For an individual to be diagnosed with depressive disorder or major depression, the symptoms persisted for two weeks or longer (Cagliostro, 2019). In older adults, research showed that the combination of T2DM and depression could increase their risk for dementia (Park & Reynolds, 2015). Depression erodes the success of the healthcare provider and patient communication and destroys other healthy relationships. Investigations show there was a strong association of depression with the burdens or complications of the disease. The difficulties leading to depression were complications that include costs, increased medical treatments, and death.

A longitudinal investigation conducted by Chiu, and Du (2019) of middle-aged and older adults (n=328) evaluated the association of depressive symptoms and glucose control. The authors used a self-reported Center for Epidemiologic Investigations Depression Scale (an eight-item) questionnaire that measured the depressive symptoms in older adults. The eight-item scale asked the participants if they experienced feeling depressed, felt that everything was an effort, felt that their sleep was restless, was happy, felt lonely, enjoyed life, felt sad, or was unable to keep going (Chiu & Du, 2019). The depression scale used yes or no for each item with a score range from 0-8. A cutoff value

of 3 indicated depression. The alpha coefficients of the scale were 0.82 and 0.84, which showed excellent reliability (Chiu & Du, 2019).

The results of the findings by Chiu and Du (2019) demonstrated that the average age of the participants was 67.9 years of age. Eighty-one percent of the participants were White, and 55% were women with hemoglobin A1c (HgbA1c) ranging from 4.8% to 15%. Men and women did not differ between depressive symptoms and glycemic control relationship. There was a higher correlation, an association among participants with elevated depressive scores and worsening glycemic control (β 0.22 with a critical ratio of 3.03). In the participants who had strong social support, the depressive symptoms did not predict or show higher glycemic controls. The investigation concluded that there was a strong relationship between depression and glycemic control in older adults. The investigation also confirmed that patients with depressive symptoms had poorly maintained glycemic controls, particularly with minimal social support from friends or family.

In summary, the topic was significant in this project in helping home health practitioners learn to assess the family and social support circle of their patients. This assessment is an integral part of the older adult's individualized plan-of-care. For older adults with the symptoms do not meet the standard diagnostic criteria for major depression or disorder (Park & Reynolds, 2015). The prevention and early detection of depression are vital to lowering the complications associated with T2DM and allowing the patient to successfully manage the disease and minimize poor outcomes (Park & Reynolds, 2015).

Diabetes distress. Older adults frequently experience diabetes distress (DD), which is described as a difficulty arising from living with the disease (Beverly, Ritholz, Shepherd, & Weinger, 2016). The condition is not attributed to other issues of emotional distress or mental health problems. This experience involves frustration with self-care related to the concerns regarding the complications, future, worries about medical care costs, and perceived lack of support from friends and family (Beverly et al., 2016). Approximately 18 to 35% of diabetes distress was found in older adults living with diabetes (Beverly et al., 2016). The symptoms, like depression, become worse with poor glycemic control (Beverly et al., 2016).

A quantitative, cross-sectional examination conducted by Nanayakkara et al. (2018) emphasized how diabetes distress was associated with increased HgA1c levels and decreased self-care. The examination was performed in 50 diabetic centers located in Australia on patients who were diagnosed with T2DM. The patients were under the guidance and professional care of general physicians, endocrinologists, and diabetes nurse educators. These healthcare providers interviewed the patients, reviewed their medical records and pathology results before collecting data. Clinical variables were the duration of the disease, smoking, attendance, and HbA1c for 12 months, physical activity, diet, and medication compliance. A demographic survey and the Diabetes Distress Score 17-item questionnaire (DDS17) were given to the participants to screen for diabetes-associated distress (Nanayakkara et al., 2018). The patients were asked two screening questions; if one of the answers were positive, the participants continued to answer the DDS17 questionnaire. The DDS17 questionnaire assessed the participants' difficulties related to their diabetes experiences within the past 30 days, which was

graded using a Likert scale from 1 to 6 (not a problem to a very serious problem). The DDS17 yielded a composite score with four subscale scores that examined varied sources of diabetes distress. They consisted of emotional burden, physician-related distress, regimen-related distress, and interpersonal distress. A mean score <2.0 indicated minimal to no diabetes distress, mean score of 2.0-2.9 indicated moderate diabetes distress, mean score >3.0 indicated high diabetes distress.

The authors Nanayakkara et al. (2018) data analysis consisted of summarizing the categorical variables as percentages and differences among the subgroups were analyzed using the X2 test. The variables were reported as means with standard deviations (SD) or as medians with interquartile ranges. *T*-tests were used for normally distributed data, and the Mann-Whitney U test was used for non-normal distributed data. Logistic regression was used to evaluate the participants' age, gender, language, duration of disease, HbA1c, physical activity, diet, smoking, insulin usage, medication compliance, glucose monitoring, and attendance. These variables were analyzed for an association with depression or diabetic distress.

The findings of the investigation by Nanayakkara et al. (2018) from 2,522 adults with T2DM were analyzed. The mean age was 63, T2DM 12 years, and HbA1c was 8.0. Little to moderate diabetes distress was noted in 1663 adults, and high diabetes distress by 120 adults. The findings further interpreted that female gender was associated with higher diabetes distress. The results of this investigation are significant because this is a variable, which is often overlooked or addressed by healthcare providers. The DDS17 questionnaire should be implemented as an evaluation tool and educational intervention in family practices, general practitioners, and diabetes nurse educators. Patients that do

well with their self-care management and medication adherence have a better quality of life and positive health outcomes. The investigation validated other inquiries such as Fisher, Gonzalez, and Polonsky (2014) and Fenwick et al. (2016) that diabetes distress is associated with regimen-related distress and emotional burdens. Doctoral nurse practitioners should emphasize and collaborate with other team members to utilize a diabetes distress-screening tool to address the patient's emotional and psychological health.

Vascular. Beckman and Creager (2016) stated that T2DM is not just a disorder of carbohydrate metabolism but is triggered by vascular disease affecting all blood vessels (veins and arteries). Vascular complications were accountable for many cases of morbidity, hospitalizations, and deaths in patients with T2DM (Beckman & Creager, 2016). Three major indicators of vascular disease are retinopathy, nephropathy, and neuropathy (Beckman & Creager, 2016). Additionally, the severity of vascular problems was other factors linked with the development of the disease, such as uncontrolled high blood pressures, smoking, and dyslipidemia (Beckman & Creager, 2016).

Kosiborod et al. (2018) conducted a longitudinal, quantitative investigation to evaluate the prevalence of vascular complications on a global level. The observational examination that consisted of 15,992 T2DM participants from around the world was conducted in 38 countries and divided into sections per the World Health Organization (WHO). The participants were recruited from primary and specialty clinics such as diabetic nurse educators, physicians, endocrinologists, and cardiologists. The inclusion criteria were a diagnosis of T2DM with a second line lowering treatment, first-line oral

mono or combination therapy, and had vascular complications. The exclusion criteria were individuals with multi-systemic diagnoses and using an injectable agent.

In the inquiry of Kosiborod et al. (2018), baseline data was collected at the start of the second-line therapy. The participants' information was collected via a standardized electronic case report form and transferred to a centralized database via a web-based system. The data cleaning and analysis preparation checked for consistency and outliers. The variables used during the data collection procedures at baseline included: demographic, socioeconomics, blood pressure, pulse, weight/height, body mass index, and waist circumference. Other variables included were the participants' glucose therapy and reason for change, HbA1c, blood, urine test results, frequency of major or minor hypoglycemic occurrences, and micro and macrovascular complications.

The demographics from the investigation of Kosiborod et al. (2018) showed that 54.2% were male, 49.7% were Asian, and 25.6% were White. The mean age of the participants' ranged from 53.1 to 61.9 years of age. The median duration of T2DM was 4.1 years and varied among the regions (3.4 years in Southeast Asia and Western Pacific; 5.7 years in Africa). The HbA1c level at baseline was 8.0%, and body mass index means was 29.1 kg/m2, with the lowest found in the Western Pacific region (26.1 kg/m2). The common first-line medication therapy was metformin, with the second being sulfonylurea (compounds used for antidiabetic drugs). These were used in combination forms of metformin and sulfonylurea for Americans. The investigation showed the highest occurrence of microvascular complications was the highest in Europe (23.5%) and lowest in Africa (14.5%). Prevalence of peripheral neuropathy and chronic kidney disease was noted. The macrovascular complication was higher in Europe (26.7%) and the lowest in

Southeast Asia (4.0%). The highest macrovascular complications noted were coronary artery disease, heart failure, and strokes.

Kosiborod et al. (2018) investigation was the first global T2DM investigation that illuminated the micro and macrovascular complications. The strengths of the investigation were the prospective design, large sample size, a large number of countries involved, and the standardized case form used. The investigation supported this project in emphasizing that T2DM is a global issue. An individual who has a longer length of time with uncontrolled T2DM has an increased incidence and risks of micro and macrovascular complications. The examination suggested that there was a connection between one's HbA1c level and microvascular levels. The investigation showed the need for healthcare providers to improve monitoring their T2DM complications and early risk factors.

Retinopathy. Diabetic retinopathy is prevalent in individuals with T2DM. The disease is described as a slow with asymptomatic retinal changes that could advance to cause abnormal retinal circulation that is due to the disease (Magliah, Bardisi, Al Attah, & Khorsheed, 2018). Furthermore, diabetic retinopathy increases an individual's risk of foot infections, ulcers, non-traumatic amputations, falls, and long-term disabilities. A cross-sectional, descriptive investigation conducted in Pakistan by Hussain, Qamar, Iqbal, Ahmad, and Ullah (2013) involved 300 participants diagnosed with T2DM. The inclusion criteria included the patient's clinical history (diagnosis, oral and insulin usage), length of DM, and positive lab tests of elevated serum total and LDL cholesterol. The HbA1c was measured by a Boronate affinity chromatography (Clover A1c). Purposive sampling was used to recruit participants from both clinics.

Data were analyzed from Hussain et al.'s (2013) investigation utilizing Statistical Package for Social Sciences (SPSS) 17.0, independent sample *t*-test, and chi-square were used to determine the statistical significance. A statistical significance was found p=.0001. The chi-square showed a statistical significance of p=0.023 among the genders (male and female). The results showed that 74.23% of diabetic retinopathy of the participants were diagnosed. The mean HbA1c was 8.15% in the participants with retinopathy. The findings concluded that the age of the participants, male gender, elevated total cholesterol, and microalbuminuria was associated with retinopathy development.

Neuropathy. Peripheral neuropathy is commonly described as a microvascular complication for T2DM patients. It can involve the peripheral, central, or autonomic nervous systems (Callaghan, Cheng, Stables, Smith, & Feldman, 2012). The disease can be found in the distal nerves causing damage to the extremities, especially the feet. Khawaja et al. (2018) conducted a qualitative, cross-sectional examination at the National Center for Diabetes and Endocrinology clinics in Jordan. One thousand and three participants with T2DM partook in the investigation. Demographic data was collected from participants via a structured face-to-face interview, which included (gender, age, marital status, physician visits every three months, family history of T2DM, physical activity, and work status). The patient's neuropathy was evaluated utilizing the translated version (Jordan) of the 15-item Michigan Neuropathy Screening Instrument (MNSI). Thirteen of the items evaluated the symptoms of neuropathy, four of the items assessed peripheral vascular disease, and one item assessed generalized numbness. The scores ranged from 0 to 13 points, with a score > 7 indicated the presence of neuropathic

symptoms. The second portion of the MNSI was the physical examination performed by trained health professionals. They assessed five variables on each participant's foot (a) deformities, (b) dry skin, calluses, infections, or ulcerations. A tuning fork was used to examine the presence or absence of ankle reflex.

Data was collected from the participants' medical files, which included (medications, duration of diabetes, presence of neuropathy, cardiovascular disease, body mass index, and HbA1c). The participants' demographic showed the mean age of 59.76 years of age (SD=9.82). Many of the participants were females, unemployed, and physically inactive. The body mass index was 32 kg/m2 (SD=5.63). The duration of diabetes was 9.24 years, with one-third of them having the disease for over 12 years. Microvascular complications were present in 19.5 of the participants. The prevalence of neuropathy (39.5%) was found in the participants based on the MSNI instrument. The findings showed that 34.8% of the participants scored > 7 in history and > 2 in the physical examination.

Khawaja et al.'s (2018) investigation showed that patients diagnosed with retinopathy were most likely to have presented with neuropathy as well. The investigation illuminated the individual's risk of neuropathy doubled if the cardiovascular disease was present. Another factor that showed the strongest correlation to neuropathy was the length of time the patient had diabetes (OR = 16.98, 95% CI: 10.19–28.28, $p < 0.001$) for those who were having diabetes for ≥ 12 years and (OR = 5.25, 95% CI: 3.29–8.36, $p < 0.001$) for those who were having diabetes for 5–11 years. The examination validated previous investigations such as Al Maskari (2014) and Bansal et al. (2014) related to the prevalence of neuropathy and its risk factors in T2DM.

In summary, the findings of the investigations conducted by Hussain et al. (2013), Khawaja et al. (2018), and Kosiborod et al. (2018) illuminated the need for advanced practitioners to include programs that target earlier detection of diabetic complications and risks in T2DM patients. Patient education is crucial for diabetic patients with dyslipidemia, retinopathy, and other micro and macrovascular diseases. The goal of all advanced nurse practitioners should be to implement preventative measures for diabetic patients that assist them in changing their lifestyle (behavior, food choices, and exercise) to prevent or delay the development of neuropathy, retinopathy, and the prevalence of other vascular complications. Patients with a lengthy duration of diabetes, retinopathy, and other risk factors are susceptible to developing the complications associated with the disease and should be given extra attention to help them avoid the risk factors.

Cognitive decline and dementia. Older adults with T2DM face cognitive decline at a rapid rate doubled to individuals without the disease (Cholerton, Baker, Montine, & Craft, 2016). Cognitive decline was thought to be an indicator of accelerated brain aging and the risk of dementia; instead, further investigations have shown that it is related to T2DM (Cholerton et al., 2016). Individuals with T2DM and genetic risks are more susceptible to experience a faster decline in cognitive speed (Cholerton et al., 2016). It has been shown that a person with pre-diabetic levels of insulin resistance reports episodic memory phases, verbal fluency, working memory, processing speed, cognitive flexibility, and control (Cholerton et al., 2016).

Herath, Cherbuin, Eramudugolla, and Anstey (2016) conducted a quantitative, longitudinal investigation that focused on older adults ages 60 to 64 for twice a year for four years. One thousand eight hundred and eighteen participants diagnosed with T2DM

were randomly selected from a cohort investigation (the PATH through Life Investigation) to evaluate the effect of diabetes medications and the changes in their cognitive areas. The exclusion criteria were individuals with a history of cerebral vascular accident, epilepsy, dementia, used only insulin, or missed a diabetes treatment.

The PATH dataset was connected to the Australian government pharmaceutical database. The participants' cognitive functions were measured utilizing ten neuropsychological tests. The tests included (diet, oral hypoglycemic medications, and insulin), which measured specific cognitive areas using generalized linear models that were adjusted for their age, gender, smoking, physical exercise level, body mass index, and high blood pressure. Each participant was assessed using the Assessment of Cognitive Function and Immediate Recall, which measured short-term memory. A Wechsler Memory Scale Digit Span Backward survey was used to test the participants' working memory. The Spotthe-Word Task was used to assess their verbal ability, and Symbol Digit Modalities Test was used to evaluate the participants' ability to comprehend the speed of information processing (Herath et al., 2016).

The results from the Herath et al. (2016) investigation showed there was no statistical significance between diabetes treated and pharmacological treated groups. Participants who took metformin only had greater cognitive functions for verbal learning, working memory, and executive function versus those who had other forms of diabetes medication treatments. The investigation concluded that participants who took one diabetic medication had higher cognitive skills. The primary investigator feels the investigation results should be viewed cautiously. Metformin is typically used in individuals who have uncomplicated diabetes. In addition, it is a medication

contraindicated in individuals with nephropathy. The investigation stated that individuals with minimal glucose control and diabetic complications could affect their cognitive function. Although the investigation was longitudinal, it evaluated the participants twice a year, which could have affected the results. Regardless, the investigation shows there is a correlation between the number of diabetic medications an individual is taking and its effect on their cognitive skills.

In summary, the topic was relevant to the project in helping healthcare providers understand the importance of conducting a baseline cognitive assessment of older adults with T2DM. The identification of the patient that is at a higher cognitive risk and tracking their changes could change and improve the quality of life for these individuals. Healthcare providers must become knowledgeable regarding the perils of cognitive decline and dementia, which increase in T2DM patients. These factors affect insulin resistance and are avenues for the development of Alzheimer's and vascular disease. The goal is to provide these individuals with alternative options, resources, and medications to diminish the effects found in cognitive decline and dementia.

Frailty. Frailty in older adults with T2DM is one of the complications affecting the patient and their families. The term was described as a common geriatric condition, which increases the decline of one's health and function among older adults (Clegg, Young, Iliffe, Rikkert, & Rockwood, 2013). In older adults with diabetes, it is regarded as a wasting disease with severe weight loss due to malnutrition (Abdelhafiz et al., 2016). According to Abdelhafiz et al. (2016), the rise in an older adult's frailty could change T2DM from progressive to a regressive state with an increased probability of hypoglycemia. When weakness occurs in older adults with diabetes, sarcopenia and

muscle loss are accelerated. The condition leads a frail older adult's body into the normalization of glucose levels and a state of burnt-out diabetes with substantial weight loss.

For older adults with T2DM, short-term concentration on daily glucose monitoring is more significant than focusing on the long-term approach of Hemoglobin A1c (HbA1c) and their limited life span (Abdelhafiz et al., 2016). Stable glucose levels should be maintained between >4 but <15 mmol/l to delay the symptoms; this would ensure the patient to retain their mental capacity and overall well-being (Abdelhafiz et al., 2016). Glycemic levels must be individualized, specific to the patient's general health condition, the occurrence of frailty, and expected life expectancy (Abdelhafiz et al., 2016).

In summary, frailty in older adults with T2DM is a topic that needs to be frequently revisited by home health care providers. The interventions for these high-risk individuals should include a review of their medications (such as short-acting versus long-acting insulin). The guidelines show that the patients' medications must be considered for measuring reduction or possible withdrawal when frailty is presented. A multimodal intervention, which consists of resistance training, eating habits, and education, can increase the older adult's function and independence.

Renal impairment. Type 2 diabetes is a progressive disease, which increases in age, affecting older adults to long-term diabetic complications to include diabetic kidney disease (DKD) (Russo et al., 2018). The condition has been noted in approximately 25% of individuals 65-74 years of age and 50% in those over the age of 75 years (Russo et al., 2018). The two components responsible for the diagnosis are low eGFR and albuminuria.

This complication should be evaluated in older adults since it affects their self-management of diabetes and glucose level. An investigation conducted by De Cosmo et al. (2016) confirmed the two components behind renal impairment for individuals diagnosed with T2DM (eGFR and elevated albuminuria).

The quantitative, longitudinal investigation assessed 27,029 outpatients with T2DM and eGFR > 60mL/min/1.73m2 and albuminuria from an Italian database of clinical diabetologists network (700 diabetic clinics). De Cosmo et al. (2016). The purpose of the examination was to evaluate the predictors of elevated kidney disease, components, and their relationship to other risk factors. The inclusion criteria for the patient selection of medical records were individuals aged 18 years and older, had a follow-up evaluation within the last four to six months with completed data regarding their estimated eGFR and albuminuria.

An analysis conducted by De Cosmo et al. (2016) used electronic medical records retrieved between January 2004 and June 2008. The author's utilized software that was able to extract patient information that measured and monitored the HbA1c, blood pressure, low-density lipoprotein cholesterol, high-density lipoprotein cholesterol, and triglycerides. Other factors evaluated were the participants' medications (insulin, statins, and hypertensives). The normal ranges for HbA1c had various ranges among the diabetic centers; hence, the measured value (normal upper limit) was calculated and multiplied by 6.0, which allowed comparison among the centers. The participant's kidney functions were evaluated by serum creatinine and urinary albumin excretion measurements. All participants' GFR was assessed by using the standardized serum creatinine assay and the Chronic Kidney Disease Epidemiology Collaboration formula.

De Cosmo et al. (2016) used a statistical analysis that evaluated factors linked to individual components of diabetic kidney disease. The authors performed a multinomial logistic regression model to assess four outcome categories. The categories were: eGFR ≥60mL/min/1.73m2 and normoalbuminuria; GFR ≥60mL/min/1.73m2 and albuminuria; and eGFR. The results from this four-year investigation showed that the average age of those who participated was 64 years of age, predominately males (56.4%), with a duration of diabetes (10.8 years). The investigation showed that approximately 8,973 developed kidney disease and increased eGFR. The participants that developed eGFR and albuminuria showed a higher cardiovascular risk factors profile in comparison to the participants who did not develop renal disease.

De Cosmo et al. (2016) stated that some of the limitations of the investigation included the participants' labs that were not evaluated in a centralized laboratory. This could have led to variability in the GFR values. The information on the participants' albuminuria served only as a categorical trait, which served to measure the urinary albumin concentration in various labs. The last limitation of the investigation was that the four-year follow-up period was available for most of the participants, but not all of them; hence, the findings could not be generalized. The strengths of the investigation were the large sample size, multiple centers used, extended follow-up period; all these factors contributed to representing real-life diabetic clinical practice.

In summary, the investigation of Russo et al. (2018) and De Cosmo et al. (2016) demonstrated the need for advanced nurse practitioners' support and coaching could improve and reduce T2DM risk factors levels in these individuals. Diabetic kidney disease remains a growing health problem. Individuals with the disease are at increased

risk of progressing to end-stage renal disease, which is linked with morbidity, mortality, decreased quality of life, and ballooning health care costs (Peeters et al., 2013). Early detection of kidney disease and treatment utilizing multifactorial approaches (blood pressure control, decreasing proteinuria, lipid therapy, glucose control, and weight reduction) can be used in combination with the coaching from nurse practitioners (Peeters et al., 2013). The mentality of the health community should be that the clinical care for this population could not depend on nephrologists alone. Instead, a collaborative approach among healthcare professionals is needed to change the dynamics in this population (Peeters et al., 2013).

Risk factors. The increased incidence of T2DM has seen multiple risk factors of the disease, which are typically delayed by diagnosis until micro and macro issues occur (Wu, Ding, Tanaka, & Zhang, 2014). Due to the failure of therapies and financial costs to the patients, family, and hospitals, healthcare providers must develop strategies and prevention measures to control the disease (Wu et al., 2014). One's chance of developing T2DM depends on a combination of risk factors such as hereditary genes and lifestyle (National Institute of Diabetes and Digestive and Kidney Diseases, 2016). No individuals can eliminate the risk factors, but they can modify the risk factors centered on obesity, exercise, and lifestyle choices.

***Obesity*.** Leitner et al. (2017) stated that obesity is a chronic metabolic disease globally affecting adults and is the primary risk factor in T2DM. The term "diabesity" is used to highlight that most individuals with diabetes are overweight or obese (Leitner et al., 2017). Weight monitoring must be included in the patient's assessment and part of any anti-obesity treatment (Leitner et al., 2017). Patients should be instructed and

encouraged that weight reduction can be obtained utilizing varied methods such as diet and exercise, pharmacotherapy, or surgery (Leitner et al., 2017). Weight reduction is not a one size fit all strategy, and the patient's lifestyle, comorbidities, access, and resources to healthcare must be considered. Weight loss does help to decrease elevated blood glucose levels and allow the body to respond to insulin resistance (Prospective Studies Collaboration, 2009). The World Health Organization (2016) has recommended that an individual's weight remain below a body mass index (BMI) of <35kg/m2. Being overweight increases one's chance of negative health outcomes, and elevated mortality risks (Leitner et al., 2017).

Hypertension. The coexistence of hypertension and T2DM are common comorbidities and are frequently seen in diabetic patients in comparison with those who do not have the disease (Petrie, Guzik, & Touyz, 2018). Patients with hypertension typically show insulin resistance and have a higher risk of developing cardiovascular disease, which is intensified by hypertension (Petrie et al., 2018). It is typically present in up to two-thirds of individuals with T2DM (Rizvi, 2017). Current ADA guidelines were recently revised regarding blood pressure goals for individuals with T2DM. The guidelines are a blood pressure <140/90 mmHg, targeting <130 mmHg, particularly if the patient has one or more risk factors (Rizvi, 2017). Optimal therapeutic management includes lifestyle changes in dietary adjustment (low fat, increased vegetables, and fiber), weight management, and limited salt.

Current medical guidelines emphasize that a T2DM patient who has any evidence of albuminuria, ACE inhibitor, or ARB should have an antihypertensive regimen (Kenny, 2018). The treatment should be individualized, especially to the patient, which is based

on reducing comorbidities, heart failure, progressive kidney disease, and retinopathy (Kenny, 2018). The goal should be for the healthcare professional to minimize any adverse events related to T2DM. Advanced practice nurses should provide patient education related to the importance of taking their hypertensive medications and remain compliant regarding medical appointments. Poor control of their conditions can increase their chances of morbidity or mortality.

Lifestyle. An investigation by Reddy (2017) focused on how one's lifestyle factors could delay or prevent diabetes. There are two types of lifestyle factors: modifiable and non-modifiable factors. Modifiable factors are related to pre-diabetic individuals, a diet with low fat intake, and minimal consumption of fresh fruits, vegetables, and whole grains. Other ways to minimize the disease is low sugar intake to delay or prevent diabetes onset (Reddy, 2017). The last method to avoid diabetes is to maintain normal cholesterol and blood pressure levels (Reddy, 2017). The non-modifiable factors include one's sex, age, and ethnicity (African American, Alaskans, Native Americans, Latinos, and Pacific Islanders) (Reddy, 2017). Other factors include individuals over 65 years of age, family history, and genetic

Interventions. For older adults with T2DM, the disease is one of the problematic illnesses to manage (Sinclair et al., 2013). The requirements needed to manage the disease along with complex self-management regimens in their daily lives creates emotional stress, feelings of being overwhelmed, frustration, and discouraged (Karlsen, Oftedal, & Bru, 2011). The patient, friends, or family achieves self-management; hence, it is crucial to develop strategies that are individualized according to the patient's needs for more significant health outcomes (Carpenter, DiChacchio, & Barker, 2019). A few

inventions that could be included in the self-management of the disease are motivational interviewing, problem-solving therapy, and technology-based interventions.

***Motivational interviewing*.** Motivational interviewing (MI) is a counseling method developed by Miller and Rollnick (Thepwongsa, Mutukumar, & Kesomboon, 2017). The theory has been used to help patients with lifestyle changes and diseases such as diabetes management (Thepwongsa et al., 2017). The method is comprised of six stages; (a) being familiar with the MI spirit, (b) acquiring basic MI skills, (c) identifying and reinforcing change talk, (d) bringing out and strengthening change conversation, and (e) rolling with resistance (Thepwongsa et al., 2017). The MI phases target and develop the patient's motivation to change, builds commitment and action for change, develop a plan, helps the patient commit to change, and assists them to switch between MI and other interventions (Thepwongsa et al., 2017).

The authors Ekong and Kavookjian (2016) conducted a systematic review that explored how motivational interviewing (MI) helped T2DM patients achieve behavior change. The systematic review used the following databases: *MedLine*, *CINAHL*, and *PsycINFO.* The inclusion criteria included randomized controlled trials that evaluated the effects of MI on behavior changes, outcomes, and clinical outcomes in T2DM adult patients. One hundred and fifty-nine investigations were identified, with 14 being eligible. The investigations targeted the patient's dietary changes, physical exercise, smoking, and alcohol reduction and cessation. The examinations showed that MI had a significant effect on some dietary and weight loss changes. The investigation concluded that MI interventions were beneficial for managing the patients' weight.

In summary, MI training should be introduced as an intervention that advanced nurse practitioners can use to motivate their T2DM patients to remain compliant with lifestyle changes and medication regimen. The home health agency should explore MI with its contents and training methods for educational classes for their providers. Once trained, healthcare providers could incorporate the training style to be specific to their T2DM patient's needs.

***Technology-based interventions*.** Technology interventions can be useful to support diabetes self-management in T2DM patients. The mobile phone and internet interventions can extend into their homes, communities, provide individualized care, and deliver real-time information (Hunt, 2015). The author conducted a literature review using the *MedLine*, *PubMed*, and *PsycINFO* databases utilizing search words: diabetes self-management, type 2 diabetes, smartphones, and diabetes mellitus from the years 2008 to 2013. The articles relied on secondary data (editorials and systematic reviews). Fourteen investigations (quasi-experimental, qualitative, and randomized controlled trials) were used in the project. The results of the investigation indicated that technological interventions had a significant impact on T2DM patient outcomes. Some of the effects noted were an improvement in HbA1c levels, self-management behaviors, weight loss, and self-efficacy. The investigation further showed that the interventions benefited T2DM patients in combination with delivered care by their healthcare providers.

In summary, healthcare providers should become aware and learn non-clinical factors related to a patient's coping mechanisms and social support are as important as clinical indicators in teaching patients self-management skills. The patient and family

should be knowledgeable that the psychosocial strategies influence distress and not glucose monitoring control. The increase in T2DM among older adults demonstrates the need for clinicians to become perceptive in providing healthcare and other interventions that promote an individual's well-being and self-management of the disease.

Summary

The review of the literature showed that the assessment of an individual's self-management skills is a critical factor in controlling and maintaining glucose levels (Schmitt et al., 2016). Healthcare providers who incorporate other strategies and interventions could increase the quality of care in this population. The purpose of this practice improvement project was to educate older adult patients who participated in the American Association of Diabetes Educators 7 (AADE7) diabetes self-management program to lower their AM fasting glucose levels or increased knowledge in diabetic self-care over four-weeks.

Chapter 3, the methodology section, briefly introduced the purpose and organization of the project. The sections comprised of the problem statement, clinical questions, and project design. Other sections included the population and sample selection, instrumentation, data collection, and analysis procedures. The last sections of the chapter delivered ethical considerations, limitations, and delimitations, and a summary of the project before the transitional sentence for Chapter 4. Chapter 5 offered a comprehensive summary of the project. The importance of the topic was briefly explained, and its contribution to the current body of knowledge. Other sections of chapter 5 included the summary of findings and conclusions, implications (theoretical, practical, and future), and recommendations for future projects and clinical practices.

Chapter 3: Methodology

For older adults who are home-care patients, controlling the blood glucose level and establishing euglycemia in Type 2 diabetes mellitus (T2DM) management are the most significant factors for self-management of the disease (Schmitt et al., 2016). Poor glycemic control contributes to the development of co-morbidities and long-term complications of diabetes (Schmitt et al., 2016). The empirical investigation shows there are established guidelines for self-management of T2DM (American Association of Diabetes Educators, 2018). However, they were not written for older adults with challenges such as co-morbidities of diabetes, which affect their ability to conduct effective self-care management (Leung et al., 2018). A proper evidence-based educational intervention such as the association of diabetic educators seven (AADE7) and the use of the Diabetic Self-Management Questionnaire (DSMQ) (Appendix B) instrument to evaluate the patient's needs can help them become more engaged with their self-care related to the disease.

The purpose of this quantitative, quasi-experimental project was to determine if the implementation of the American Association of Diabetes Educators 7 (AADE7) diabetes self-management program yielded lower glucose levels and diabetic management knowledge utilizing the 16 items Diabetic Self-Management Questionnaire (DSMQ) in adult diabetic home health patients, aged 65 and older, over four-weeks in northwestern Illinois. The project answered two clinical questions as follows:

Q1: To what degree did the implementation of the American Association of Diabetes Educators 7 (AADE7) diabetes self-management program over 4 weeks increase the knowledge levels of self-management behaviors, as measured

through the DSMQ instrument, of older adult diabetic patients in a home health setting in northwestern Illinois?

Q2: To what degree did the implementation of the American Association of Diabetes Educators 7 (AADE7) diabetes self-management program over 4 weeks affect glucose levels of older adult diabetic patients in a home health setting in northwestern Illinois?

Chapter 3 provides a statement of the problem and two questions related to the topic. Other segments of the chapter include project methodology, design, population and sample size, and a description of the DSMQ instrumentation. The last sections of the chapter outline the data collection and analysis procedures, ethical considerations, limitations/delimitations, and summarize the chapter.

Statement of the Problem

Literature suggests that proper nutrition therapy is an important part of the foundation for the treatment of diabetes. (Gray & Threlkeld, 2019). However, appropriate nutritional intervention, implementation, and ultimate compliance with the plan remain some of the most vexing problems in diabetes management for three major reasons multiple reasons (Gray & Threlkeld, 2019). It was not known if the implementation of the American Association of Diabetes Educators 7 (AADE7) diabetes self-management program yielded lower glucose levels and diabetic management knowledge utilizing the 16 items Diabetic Self-Management Questionnaire (DSMQ) in adult diabetic home health patients aged 65 and older over four-weeks in northwestern Illinois. Older adults who lack sufficient self-care management of their T2DM are at a higher risk of complications such as chronic renal failure, non-trauma associated limb amputations, and severe eye

disease leading to blindness (Centers for Disease Control and Prevention, 2017). The population affected is older adults in home-healthcare settings who are reliant upon visiting nurses as their health care providers. This Quality improvement project could contribute to the limited literature regarding strategies or interventions in developing guidelines for older adults with comorbidities and complications, affecting their ability to conduct self-management of their disease effectively.

Clinical Questions

The project questions associated with this quantitative, quasi-experimental quality improvement project answered the following:

Q1: To what degree did the implementation of the American Association of Diabetes Educators 7 (AADE7) diabetes self-management program over 4 weeks increase the knowledge levels of self-management behaviors, as measured through the DSMQ instrument, of older adult diabetic patients in a home health setting in northwestern Illinois?

Q2: To what degree did the implementation of the American Association of Diabetes Educators 7 (AADE7) diabetes self-management program over 4 weeks affect glucose levels of older adult diabetic patients in a home health setting in northwestern Illinois?

The first question was answered by the primary investigator (PI), providing evidence-based AADE7 education to the patients (American Association of Diabetes Educators, 2018). The educational intervention consisted of seven topics, which included healthy eating, physical activity, glucose monitoring, medication, problem-solving, healthy coping, and reducing risks. Patients were educated on two topics weekly

throughout the four weeks by the principal investigator (PI) and the home health nurses. Before the educational intervention was implemented, the PI provided the patients with the DSMQ questionnaire (consisting of 16-items) that served as a pre-test. Four weeks later, after the intervention, the same patients were given the same DSMQ questionnaire as a post-test to determine the impact on the adults' knowledge levels related to self-management behaviors.

The second question was answered by the primary investigator (PI), providing evidence-based AADE7 education to the patients (American Association of Diabetes Educators, 2018). Before the educational intervention was implemented, the PI gathered fasting blood glucose levels from the patients' physicians that served as the pre-implementation data. The patient's glucose levels were retaken at their follow-up appointments four weeks after the implementation of the intervention with their physicians. The results were provided to the PI, who compared the pre and post-implementation results.

This quantitative, quasi-experimental quality improvement project permitted the PI to establish the impact of the AADE7 education on the patients' glucose levels. The pre/post-test design was used to determine the effectiveness of the educational intervention, which was provided during a four-week period. A quasi-experimental design provided the ability to evaluate the impact of the intervention on DSMQ scores as well as glucose levels (Leedy & Ormrod, 2011). The PI conducted a paired samples *t*-test to determine if there was statistical significance in the difference in DSMQ scores and glucose levels between the pre-implementation and post-implementation for the participants.

Project Methodology

A quantitative methodology was selected to conduct the project. This approach allowed the PI to review numerical data using statistical analysis (such as the paired sample *t*-test) (Christenson & Gutierrez, 2016). The quantitative methodology measures variables derived from the targeted population. In this project, the independent variable was the AADE7 educational intervention, and the dependent variables were the participants' DSMQ scores as well as the glucose levels.

A qualitative methodology was not chosen for this project because the PI did not seek to understand questions regarding a phenomenon (Leedy & Ormrod, 2011). The qualitative methodology focuses on understanding the participants' feelings, beliefs, and behaviors (Leedy & Ormrod, 2011). This method usually uses the interview method (semi-structured) with open-ended questions, wherein the investigator then searches for themes, trends, or patterns for answers in understanding a phenomenon (Leedy & Ormrod, 2011). This methodology is inductive and relies on a person's lived experience (Leedy & Ormrod, 2011). A qualitative methodology was not appropriate for this project because the dependent variable is continuous, and the investigator is measuring the effect on the dependent variable.

A mixed methodology utilizes a combination of quantitative and qualitative methodologies. This type of methodology is complicated and requires extensive time and resources to strategize and conduct (Schoonenboom & Johnson, 2017). Descriptions of the findings are complex to deliver to the layperson; hence, this methodology was not used for this project. Because the qualitative methodology focuses on understanding the participants' feelings, beliefs, and behaviors (Leedy & Ormrod, 2011), and not statistical

analysis, it was not necessary to mix qualitative and quantitative methodologies. Interviewing the participants using semi-structured, open-ended questions to look for themes, trends, or patterns for answers (Leedy & Ormrod, 2011) was not the purpose of this project.

The quantitative methodology was appropriate for this project because it was structured, and it used the DSMQ instrument and blood glucose levels, which both provide numerical data for analysis. The use of statistical analysis and hard numbers has a distinct advantage in that it can be tested, checked, and provide straightforward analysis. Data are collected rapidly, and the use of randomization in collecting information prevents principal investigator bias (Creswell, 2018). Additionally, the project was deductive and used statistical sampling methods (such as the paired *t*-test). Since this project measured variables derived from the targeted population, a quantitative methodology was the most appropriate.

Project Design

A quasi-experimental design was used to answer the project questions. This design focused on three elements, pre-intervention, intervention, and post-intervention (Allen, 2017). It allowed the PI to measure the variables using the same instrument before and after the educational intervention. This quality improvement project allowed the principal investigator the opportunity to compare the final post-implementation glucose levels and DSMQ scores for the participants to the levels prior to intervention.

A quasi-experimental design allowed the PI to determine if a relationship exists between the intervention and the glucose levels of participants (Allen, 2017). The project was described as quasi-experimental because participants were measured using a pre-

implementation and -post-implementation paired t-test design, and it was not possible for a participant to be tested in an untreated control condition. This quasi-experimental was the type of experimental design typically conducted in healthcare settings (such as home health), where random assignment and control groups are difficult to achieve (Allen, 2017).

One-on-one education was held with participants in their homes weekly with the PI and visiting nurses for four weeks. Each session lasted approximately 45-60 minutes. The American Association of Diabetes Educators developed education materials to address the AADE7 spheres of diabetes self-care behaviors (Appendix C). The PI gained permission to utilize the material to make the education easier and interesting for the participants (Appendix D).

Population and Sample Selection

The project occurred in a healthcare organization, which facilitated in-home health care services. The participants were selected from the initial census of 75 patients of the home health agency. Potential participants must have met the inclusion criteria of 65 years of age or older, primary, or secondary diagnosis of T2DM, uses an oral medication or insulin, and had no cognitive or neurological disabilities to be considered for participation. The exclusion criteria included the following: individuals under the age of 65, non-primary or secondary diagnosis of T2DM, an unwillingness or unable to provide informed consent, unable to participate in the duration of the project, and individuals' who lacked physical or cognitive abilities to participate in the project.

The PI identified and recruited potential participants by talking with other visiting nurses and visiting potential patients during home health visits. Potential participants

were followed-up with telephone calls to confirm their participation in the project. Selected participants were required to give verbal approval to continue participation in the project. Individuals who did not return phone calls (after two times) to the PI were not considered to continue in the project.

After the PI received permission to conduct the project from Grand Canyon University's IRB, informed consent forms were given to the participants for their signature. Each participant in the project was given an overview; of the purpose of the project and informed that their participation was voluntary. The demographic survey, DSMQ questionnaire, and informed consent were given a de-identified code number once the PI received them.

Confidentiality measures were followed using the guidelines emphasized by the Grand Canyon University Institutional Review Board (IRB) and the Belmont Report (National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, 1979). During the overview of the project, the participants were informed of the potential risks of the project, which were related to the loss of information. The PI instructed the participants on the steps that were used to minimize the risk to their information provided. Hard copies of the instrumentation did not include identifiers such as the participant’s name, date of birth, or social security number. The de-identified code used on the participant’s documents was the initial of the patient’s last name, first two numbers of the house address, and the last two numbers of the current year the project occurred. Data collected on the PI’s flash drive and the laptop will be destroyed using Killdisk software and the burning of the chip. All information related to

the project will be destroyed in three years, October 23, 2022, in adherence to Grand Canyon University Institutional Review Board (IRB) protocol.

Instrumentation

The Diabetes Self-Management Questionnaire (DSMQ) was the selected tool to assess the participants' behaviors related to maintaining glucose control. It was developed as a German instrument at the Research Institute of the Diabetes Academy (Schmitt et al., 2013). The tool is used in targeting diabetes self-care and evaluates behaviors linked with glycemic control, which is a treatment regimen for Type 1 or Type 2 diabetes (T2DM) patients. (Schmitt et al., 2013). The principal investigator was given permission to use the DSMQ by Mapi Research Trust (Appendix E). The 16-item questionnaire covered four different segments of diabetes self-management. The subscales were a) glucose management, b) dietary control, c) physical activity, d) health care use (Schmitt et al., 2013).

The items were formulated as behavioral descriptions from the patient's point of view. The responses are provided on a four-point Likert scale (0-does not apply to me, 1-applies to me to some degree, 2- applies to me a considerable degree, and 3-applies to me very much). The items were scored and transformed so that the higher scores indicated more desirable self-management behavior (Schmitt et al., 2016). The negative scores were reversed, then summed, and transformed to the scaled score, which ranges from 0 to 10 (Schmitt et al., 2016). The scaled scores were calculated as sums of item scores (raw score/theoretical maximum score). For example, if the subscale for the glucose management raw score was 12, it was then posed as a transformed score of 12/15*10=8

(Schmitt et al., 2013). A transformed score of 10 signified the highest self-rating of the participant's behavior (Schmitt et al., 2013).

Validity

The validity of the DSMQ questionnaire was verified by face, concurrent, and criterion validity. The face validity was defined as the degree to which an assessment appears to measure the variables (glucose levels and patient self-care management) (Leedy & Ormrod, 2011). The validity of the instrument has been verified in multiple investigations such as Schmitt et al. (2013), Schmitt et al. (2016), and Babatunde and Onu (2018). Concurrent validity was validated because the questionnaire was capable of differentiating respondents. A confirmatory factor analysis (CFA) was conducted and confirmed the validity of the DSMQ scales (Babatunde & Onu, 2018). However, Schmitt et al. (2013) and Babatunde and Onu (2018) showed the scores were visibly different from the varied cultures. A knick-criterion and the Kaiser criterion were used to determine and validate the optimal/expected factors (Babatunde & Onu, 2018). The items loaded with 0.40 one factor and less than 0.30 on other factors showing excellent scaling properties (Babatunde & Onu, 2018). Criterion-related validity of the instrument was examined using Pearson's *r*, which tested the performance of the adapted DSMQ against the routine measurement of the glucose controls utilized in the hospital (Babatunde & Onu, 2018).

Reliability

Reliability is described as the consistency of a measure (Allen, 2017). The 16-item DSMQ questionnaire met the criterion of test-retest, internal consistency, and inter-rater reliability. The test-retest can be seen in the following investigations: Babatunde and

Onu (2018), Schmitt et al. (2013), and Schmitt et al. (2016). The authors Schmitt et al. (2013) reported a Cronbach's alpha of 0.77 for sugar level management, 0.76 for physical activity, 0.77 for dietary control, and 0.6 for healthcare use. The overall alpha coefficient for the questionnaire was 0.84, justifying the assertion that the instrument is highly valid (Schmitt et al. (2013). In the project by Babatunde and Onu (2018), the authors used item-total correlations and Cronbach's alpha to investigate consistency reliability. The item-total correlations were significant when there was a correlation between the item and the hypothesized scale, which was >0.40, and the alpha showed 0.70- .080.

Data Collection Procedures

The quality improvement project was conducted in the participants' home after the PI and nurse visited them and received approval from Grand Canyon University's IRB. Participants were instructed that their participation was voluntary, and they could withdraw without any repercussions. A convenience sample was the investigation of subjects taken from a group that was conveniently accessible to a principal investigator.

One advantage of this is that it is easy to access, requiring little effort and time. However, this sampling method suffers from a serious disadvantage therein, as it is not an accurate representation of the population, and therefore cannot be generalized but used as a gauge of improvement at the site. Only individuals who met the inclusion criteria were included in the project. All participants provided a copy of their fasting glucose labs after the signed informed consent forms were received.

At the initial meeting, participants were given the pre-intervention DSMQ questionnaire (Appendix B), and initial blood glucose levels were obtained. After completion of the questionnaire, participants were provided with one hour of diabetic

education each week for four weeks. Evidence-based diabetic education was given based on the American Association of diabetic educators (AADE7) guidelines. At the end of four weeks, participants were given a post-implementation test using the same DSMQ instrument and provided a copy of their post-intervention blood glucose laboratory results.

Six registered nurses who were visiting nurses that work in the site home health agency were chosen to attend a one-hour training session on the diabetic guidelines and strategies to be implemented for the participants. The AADE7 education tools and DSMQ were given to the nurses before the educational intervention began. The educational intervention consisted of an interactive PowerPoint and teaching using the (AADE7) guidelines (Appendix C). A post-test was provided upon completion of the training, and 80% was required to pass the training before educating the participants. Once trained, the nurses assisted the PI with weekly education for the participants. To ensure continuity in the delivery of the education, the PI observed each nurse's teaching method during every visit, which guaranteed fidelity.

Prior to the implementation of the project, the participants' demographic information was obtained from the patient’s admission records, and hard copies of the laboratory glucose levels were received from the facility administration. The participants’ initial glucose levels were obtained from the visiting nurse’s weekly blood glucose monitoring records one week before the project. Data pertaining to the participants' diabetes self-care activity were collected through the self-administered/reported DSMQ questionnaire. The initial data served as the baseline measurement to evaluate the project outcomes. The PI reviewed the post-implementation of the project after four weeks of

data collection. This data consisted of the participants' pre and post-intervention blood glucose monitoring records and the pre and post-intervention DSMQ questionnaires. The data obtained were utilized to determine the effects of administering the educational interventions on the participants' glucose levels and knowledge levels of self-management behaviors. The second set of glucose levels were reviewed from the participants' electronic medical records one-week post-implementation of the project.

Data Analysis Procedures

The purpose of this quantitative, quasi-experimental project was to determine if the implementation of the American Association of Diabetes Educators 7 (AADE7) diabetes self-management program yielded lower glucose levels and diabetic management knowledge utilizing the 16 items Diabetic Self-Management Questionnaire (DSMQ) in adult diabetic home health patients, aged 65 and older, over four-weeks in northwestern Illinois. The project answered the two clinical questions,

Q1: To what degree did the implementation of the American Association of Diabetes Educators 7 (AADE7) diabetes self-management program over 4 weeks increase the knowledge levels of self-management behaviors, as measured through the DSMQ instrument, of older adult diabetic patients in a home health setting in northwestern Illinois?

Q2: To what degree did the implementation of the American Association of Diabetes Educators 7 (AADE7) diabetes self-management program over 4 weeks affect glucose levels of older adult diabetic patients in a home health setting in northwestern Illinois?

An educational intervention, the American Association of Diabetes Educators 7 (AADE7) diabetes self-management program, was given. To answer question one, a paired *t*-test was performed on the participants' pre and post DSMQ scores as a measure of knowledge levels and self-management behaviors. To answer question two, another two paired-samples *t*-test was performed to determine if there was a statistically significant difference in pre and post-intervention glucose scores after participation in the American Association of Diabetes Educators 7 (AADE7) diabetes self-management program.

Participants' face sheets, which provided demographic information for each participant, were used to collect information about the demographics. Descriptive statistics were used and analyzed the collected data. The descriptive data included the mean, median, and mode of the frequencies related to the categorical responses. The PI used Microsoft Excel 2016 and Statistical Package for the Social Sciences software, version 26, to code and analyze the data.

The project uses the statistics and the criterion established to determine clinical significance. The analyzed data were used to produce statistical information to answer clinical questions, and inferential analysis was conducted to determine whether to adopt, adapt, or abandon the intervention at the site. All the analyses were summarized and presented in Chapter 4.

Potential Bias and Mitigation

. A convenience sample of subjects was utilized from a group that was conveniently accessible to the principal investigator. This sampling method suffers from a serious disadvantage therein, as it is not an accurate representation of the population

and therefore cannot be generalized but used as a gauge of improvement at the site. When convenience sampling is used, inferences are not as trustworthy as when a random sample is used.

Selection bias is also apparent in that only individuals who met the inclusion criteria were included in the project. Potential participants must have met the inclusion criteria of 65 years of age or older, primary, or secondary diagnosis of T2DM, uses an oral medication or insulin, and had no cognitive or neurological disabilities to be considered for participation. In addition, they had to be willing to participate. As such, the project leaves out individuals who may have cognitive or neurological disabilities but still have the aptitude to understand the education. By recruiting only cognitively well patients, this creates a bias. Selection bias may also be created by using only those people who are willing to participate, also likely being those who are most open to learning. If those who opted not to participate were less willing to learn, then the findings would not apply to the general population.

Lastly, the sample size is underpowered. The PI used the G* Power Software, version 3.1.9.2, to estimate the minimum sample size. Parameters used were a large effect size, an alpha level of .05, and a power of 80% to estimate a minimum sample size of 12. The sample for the project was 10, which is slightly underpowered. This creates a sample bias that is not likely representative of the population.

Ethical Considerations

Grand Canyon University (2019) emphasized that ethical considerations are standards that determine right and wrong while a PI is conducting a quality improvement project. The standards describe desirable or undesirable behaviors for the PI overseeing

the project (Grand Canyon University, 2019). Three principles from the Belmont Report guided the project, which was respect for persons, beneficence, and justice (National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, 1979). In this project, the PI showed respect to the participants by being aware of their cultural values, morals, language, and religious backgrounds.

Two ethical issues related to the sample population and project were the vulnerability of the age group (such as cognitive decline) and impairment of the older adults (McGuire, 2014). A health care provider or nurse who works with older adults in the project must evaluate the individual's vulnerability level (McGuire, 2014). This sample population has increased vulnerability because of having a chronic or disabling disease (dependent on the diabetes condition and complications). Hence, it can create feelings of loneliness, minimal health care access, or limited financial sources to maintain their health (McGuire, 2014). Older adults who are vulnerable could become dependent upon the home health nurses for their information. In order to minimize exploiting this population's vulnerability, the PI has taken classes that specialize in geriatric and disease management and maintenance. (McGuire, 2014).

The PI did not share obtained information deliberately or accidentally with other parties or entities that could identify the participants, thus protecting the participants' anonymity and confidentiality. The findings of the project were presented using methods, which ensured they could not be identified. The participants' privacy was protected during conversations related to their medical condition away from family members. The participants were notified that their participation was voluntary and that no financial or psychological harm or risks would occur. The informed consent was written in English,

and the participants were able to understand the information. This minimized the possibility of coercion or unnecessary influence by the PI. Because the PI did not work for the health care agency, nor had family members under the care of this health care agency, there was no potential conflict of interest. The guidelines of the Belmont Report that focused on the beneficence and justice segments were followed while the project was conducted.

Limitations

The limitations found in the project were a small sample size, 10 participants (*n*=10). Leedy and Ormrod (2011) stated that a smaller sample size could reduce the power of the project and increase the margin of error, making the project meaningless. In this project, the small sample size was limited because of the inclusion criteria (older adults with a primary or secondary diagnosis of diabetes). The PI did not adjust the sample size based on the required confidence level and margin of error. A small sample size increases the likelihood of measurement error, which could skew the results (Leedy & Ormrod, 2011).

The timeframe is the second limitation of the project. A cross-sectional project captured the information at a limited time of four weeks. Although the project findings removed the assumptions and accurate data on the variables (independent variable - diabetic educational intervention and the dependent variables – DSMQ score and glucose levels), the time frame prohibited an extended continuation of the project. A longitudinal project would have allowed the PI to determine the cause and effect and analyze the participants' behavior over a longer timeframe. A longer time frame would allow the

investigator to measure the impact of the diabetic educational intervention providing more significant amounts of data.

The delimitations of the project included the inclusion/exclusion criteria of the participants. The criterion could affect the external validity of the project (Patino & Ferreira, 2018). Other delimitations included the theoretical foundation health belief model, variables (independent and dependent), and population chosen. The theoretical framework limited the generalizations found in the project to the variables and sample population that were chosen. The population chosen was a delimitation because the project included only home health diabetic patients.

Summary

Upon receiving the site authorization and approval from the IRB (Appendix A), the investigator began with the recruitment of the participants and the intervention. Systematic procedures were followed for the collection of data and analysis. The four-week project incorporates two main components: (a) the self-care education component and (b) the patient support component. After the intervention, all collected data were organized and recorded in a Microsoft Excel™ worksheet. All the data were subsequently imported into the SPSS software for coding and analysis.

Validity and reliability were essential factors in collecting and analyzing data. The instrument selected, DSMQ, used for collecting data in this project has been tested, evaluated, and found to be a valid and reliable instrument (Schmitt et al., 2013). Moreover, test results about the DSMQ revealed homogeneity, correlations, and consistencies in the item characteristics (Schmitt et al., 2016). In a comparative analysis between DSMQ and another data collection instrument, Summary of Diabetes Self-Care

Activities (SDSCA), the results showed DSMQ is a more adaptable instrument to analyze diabetes patients' behaviors (Schmitt et al., 2016). The IBM SPSS version 26 was used to analyze the data. Procedures were set for the analysis of the data.

Furthermore, investigation shows that older adults who are provided an evidence-based diabetic educational intervention such as AADE7 can evaluate their needs and encourage greater self-management of the disease. Chapter 3 includes the topic, problem statement, and proposed clinical questions. Other segments in the chapter discussed the project methodology, design, population, and sample selection. The last sections of the chapter reviewed the instrumentation (DSMQ questionnaire) and its validity and reliability factors. Data collection and analysis procedures, ethical considerations, limitations and delimitations, and summary concluded the chapter.

Chapter 4 covers the problem statement, methodology, and clinical questions. The descriptive data provide a narrative summary of the sample population, characteristics, and demographics. The other sections included in the chapter are data analysis procedures and results, which are presented using figures and scatterplots. The last section of the chapter offers a concise summary of what was found in the project.

Chapter 4: Data Analysis and Results

Older home health adult patients developing and maintaining self-management skills for Type 2 diabetes mellitus (T2DM) is critical to avoid adverse or complications (such as hospitalization, neuropathy, loss of lower extremities, and death. Establishing a normal glucose level is the most significant action for patients to manage the disease (Schmitt et al., 2016). There has been a problem that there was not much literature written for older adults with co-morbidities, affecting their ability to perform adequate self-management care (Leung et al., 2018). An introduction to an evidence-based educational intervention such as AADE7 and the use of the DSMQ instrument to evaluate the patient's needs to increase patient engagement related to the disease.

This quality improvement project addressed T2DM among the elderly population. The specific problem was as follows: it is not known if the implementation of the American Association of Diabetes Educators 7 (AADE7) diabetes self-management program yielded lower glucose levels and diabetic management knowledge utilizing the 16 items Diabetic Self-Management Questionnaire (DSMQ) in adult diabetic home health patients aged 65 and older over four-weeks in northwestern Illinois. A quantitative methodology based on pre-and post-implementation testing was applied to a sample size of 10 to answer the clinical questions. The remainder of Chapter 4 consists of descriptive data, data analysis procedures, results based on inferential statistics, and a summary related to the answer to the clinical question.

Descriptive Data

The project had 10 participants (n=10). The demographic characteristics of the participants are shown in Table 1. A six-item demographic survey information was

collected from the patient's medical admission records. The demographic survey consisted of the participant's age, gender, marital status, ethnicity, years of DM, and education level. The descriptive statistics were described using means, minimum, and maximum of the numerical data, and frequency of categorical responses (Leedy & Ormrod, 2011). The average age for participants was 70.5 years of age. Half (50%) of the intervention participants classified themselves as white. Sixty percent are female, 40% are married, 50% completed secondary school, while 30% were college graduates, and 70% have had T2DM for more than 5 years. Table 1 outlines the details of the demographic data of participants.

Table 1.
Frequency Table of Demographic Characteristics of Project Sample (n=210)

Characteristic	*n*=10	100%
Age		
60-70	5	.50
71-80	5	.50
Race		
White	5	.5
Non-white	5	.5
Gender		
Male	4	.40
Female	6	.60
Marital Status		
Married	4	.40
Single	3	.30
Widow/Widower	3	.30
Education		
Primary	2	.20
Secondary	5	.50
Undergraduates	2	.20
Post-graduates	1	.10
Years with Type 2 Diabetes		
Less than 5	3	.30
5-10	4	.40
More than 10	3	.30

The participants of the project were, on average, 70.5 years of age, with a minimum of 64 and a maximum of 80 years of age. The average time with T2DM was 13 years, with a minimum of 2 years and a maximum of 40 years. The average glucose pre-implementation was 144.38, while the average post-implementation was 128.67, creating an average 15.11-point drop in glucose levels. Every participant's glucose levels dropped, with a minimum decrease of 10.09 and a maximum decrease of 18.20. The average DSMQ pre-implementation was 32.28, while the average post-implementation was 38.52, creating an average increase in score by 6.24 points. Every participant increased their DSMQ score, with a minimum increase of 2.29 and a maximum of 9.38 points. Table 2 outlines the details of the interval variables.

Table 2.
Summary Statistics Table for Interval Variables of Interest (n=10)

Variable	Min	Max	*M*	*SD*	SE_M	Skewness	Kurtosis
Age	64.00	80.00	70.50	4.77	1.51	.52	.41
Years with T2DM	2.00	40.00	13.00	12.89	4.08	1.37	.82
Glucose							
Glucose Pre-Implementation	137.80	151.47	144.38	4.62	1.46	.35	-.98
Glucose Post-Implementation	120.51	138.61	128.67	6.47	2.05	.42	-1.02
Change in Glucose	-18.20	-10.09	-15.11	2.86	.90	.53	-1.16
DSMQ							
DSMQ Pre-Implementation	24.52	46.55	32.28	6.45	2.04	1.30	1.71
DSMQ Post-Implementation	28.81	50.64	38.52	5.94	1.88	.47	1.30
Change in DSMQ	2.29	9.38	6.24	2.24	.71	-.34	-.70

Blood glucose levels vary, depending on a person's health status and whether they have eaten. People without diabetes typically have between 80–120 milligrams of glucose

per 1 deciliter of blood. A blood sugar target is a range that is reached as much as possible. The typical targets before a meal are between 80 and 130 mg/d, while two hours after a meal is less than 180 mg/dL. It is essential to keep blood sugar levels in the target range as much as possible to help prevent or delay long-term, serious health problems, such as heart disease, vision loss, and kidney disease. Staying in the target range can also help improve energy and mood (Centers for Disease Control and Prevention, 2017).

The DSMQ consists of 16 items covering five different aspects of diabetes self-management: dietary control, medication adherence, blood glucose monitoring, physical activity, and physician contact. All items are formulated as behavioral descriptions from the person's point of view (example: Participants rate the extent to which each description apply to them, such as to 0 - does not apply to me) (Schmitt A. et al., 2013) Item scores are transformed so that higher scores indicate more desirable self-management behavior (requiring reverse-scoring of negatively-keyed items) (Schmitt et al., 2013 in Appendix D).

Data Analysis Procedures

Clinical question one asks, to what degree did the implementation of the American Association of Diabetes Educators 7 (AADE7) diabetes self-management program over 4 weeks increase the knowledge levels of self-management behaviors, as measured through the DSMQ instrument, of older adult diabetic patients in a home health setting in northwestern Illinois? The primary investigator used the Diabetes self-management questionnaire' (DSMQ) to assess the pre and post-implementation levels of diabetic self-management knowledge of the participants. The tool targeted Type 2 Diabetes (T2DM) patients' self-care behaviors associated with glucose control (Schmitt et

al., 2013). In this project, the questionnaire comprised of four areas for diabetes self-management. The areas included: (a) glucose management, (b) dietary control, (c) physical activity, and (d) health care use. Prior to the educational intervention and pre-test, an informed consent form was assessed, and the participants' questions answered.

Clinical question two asks, to what degree did the implementation of the American Association of Diabetes Educators 7 (AADE7) diabetes self-management program over 4 weeks affect glucose levels of older adult diabetic patients in a home health setting in northwestern Illinois? The participants' initial glucose levels were obtained from the visiting nurse's weekly blood glucose monitoring records one week before the project. The second set of glucose levels were reviewed from the participants' electronic medical records one-week post-implementation of the project.

Data related to the participants' blood glucose levels before and after the four-week diabetes self-care education and the responses to the DSMQ questionnaire were entered in a Microsoft Excel spreadsheet. Each pre- and post-intervention was matched for each participant. Once completed, the data was imported into SPSS, coded, and prepared for analysis. At the initial meeting, 10 participants (n=10) were given the DSMQ questionnaire (Appendix B). After completion of the questionnaire, these ten participants were provided with 45-60-minute diabetic education each week for four weeks. The participants were educated based on the American Association of Diabetes educator (AADE) guidelines (Appendix C). At the end of four weeks, participants were given a post-implementation test using the same DSMQ (Appendix B) instrument and provided a copy of their blood glucose laboratory results. The principal investigator then compared both results to get an outcome.

This quality improvement project offered the opportunity to quantify subsequent distinguished sequence of variables, which analyze multiple elements of a solitary intervention. Data collected during pre-and-post intervention for the project included: (a) data respective to the participants' biographic information and blood glucose levels acquired from the home healthcare facility records; and (b) data obtained from the DSMQ questionnaire in connection to the participants' diabetes self-care activity. To determine if the scheme intervention could be linked with (a) significantly minimized plasma glucose levels and (b) significantly elevated DSMQ self-care scores, paired-samples *t*-tests were used.

The raw analysis was prepared using a Microsoft Excel™ spreadsheet, and the variables were imported into the SPSS data file with two measurements for each dependent variable (DSMQ score and blood glucose level) from each participant. The SPSS data was cleaned to keep only matching pairs. The participants' pre-implementation and post-implementation scores were compared to see if there was a statistical difference before and after an intervention.

Results

The results of the project were as follows. The clinical project sought to answer two questions. The first question was, to what degree did the implementation of the American Association of Diabetes Educators 7 (AADE7) diabetes self-management program over 4 weeks increase the knowledge levels of self-management behaviors, as measured through the DSMQ instrument, of older adult diabetic patients in a home health setting in northwestern Illinois? The PI utilized DSMQ pre and post-test scores to measure knowledge levels of self-management behaviors. The second question was, to

what degree did the implementation of the American Association of Diabetes Educators 7 (AADE7) diabetes self-management program over 4 weeks affect glucose levels of older adult diabetic patients in a home health setting in northwestern Illinois? The PI collected blood glucose levels of participants prior to and after educational interventions. Both questions were answered using a paired sample *t*-test.

Changes in DSMQ scores. Figure 1 below shows that the participants had a statistically significant increase in DSMQ score from pre-implementation (M = 32.28, SD = 6.45) to post-implementation (M = 38.52, SD = 5.94). A paired-samples *t*-test indicated that this change in the DSMQ was significant $t(9) = 8.80$, $p = .000$.

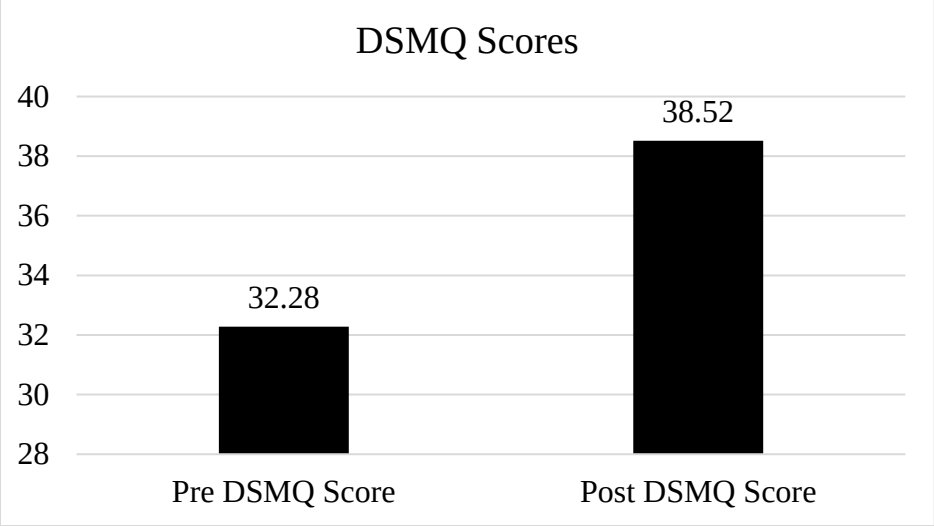

Figure 1 Bar graphs showing the increase in mean Diabetes Self-Management Questionnaire scores

Changes in glucose levels. To determine if a decrease in blood glucose levels (mg/dL) was achieved, a paired-samples *t*-test was performed. A statistically significant difference was found, t (9) = 16.71, p-value =.000 between pre-implementation and post-implementation fasting blood glucose levels.

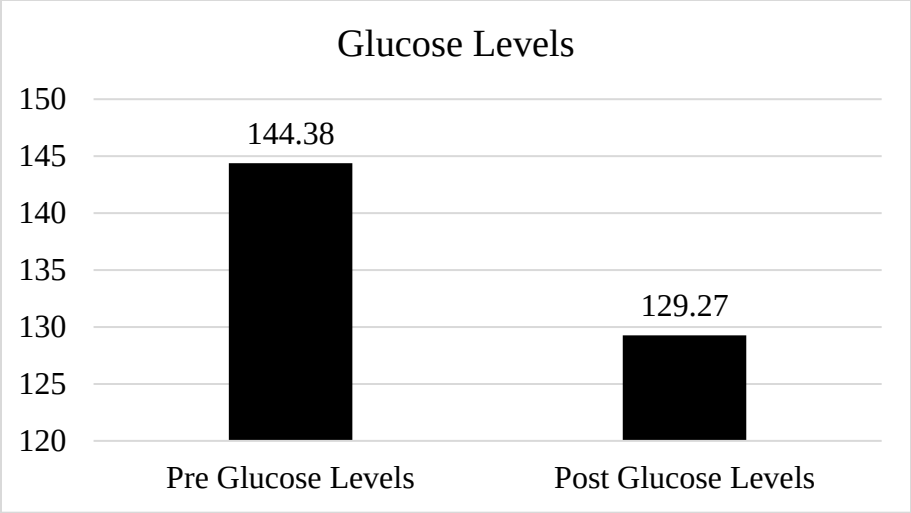

Figure 2 Bar graphs showing the decrease in mean glucose levels (mg/dL) among the participants.

The mean pre-implementation fasting glucose (*M* = 144.38 mg/dL, *SD* = 4.62) was significantly different from participants mean post-implementation (*M* = 129.27 mg/dL, *SD* = 6.00). It appears that the mean score reduced by nearly 15 mg/dL, as shown in Figure 2.

Effect sizes. The Cohen's *d* of the change in glucose was 2.82, and the Cohen's *d* of the change in DSMQ was 1.01. According to Cohen (2016), any *d* value greater than 0.8 is a large effect size. Therefore, it was not only the case that the intervention was associated with statistically significant changes in glucose and DSMQ but also that these changes were substantial in magnitude. Using G*Power Software, Version 3.1.9.2, a large effect size, an alpha level of .05, and a power of 80% was selected to estimate the minimum sample size of 12 to answer the project questions. However, the analysis performed to answer the project question was underpowered (*n* = 10).

Figure 3 below summarized the results in a confidence interval plot. Figure 3 provides a visual summary of how the participants experienced increases in DSMQ and decreases in glucose that did not intersect 0, and that was therefore significant.

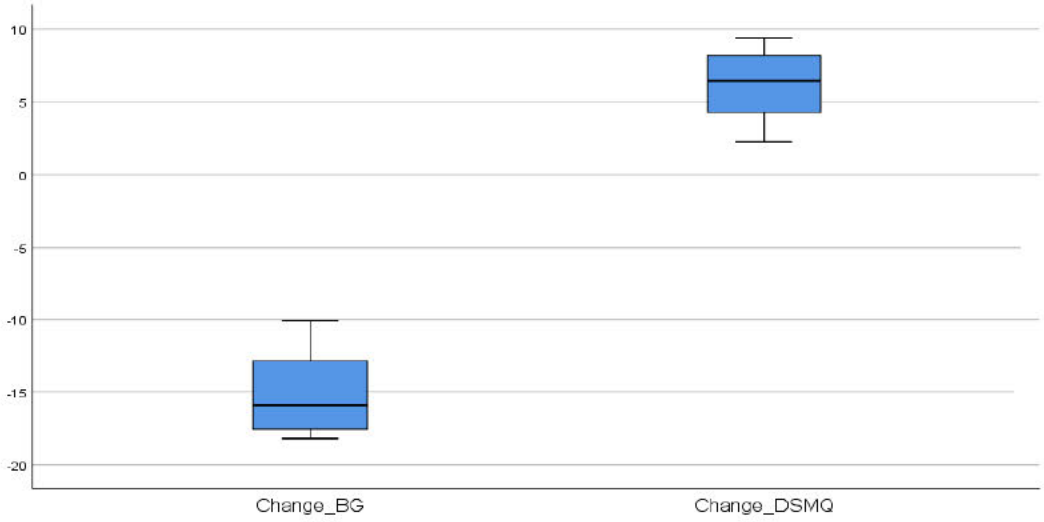

Figure 3 Confidence interval plot of results at 95% confidence

Participants obtained a reduction in their glucose from pre-implementation (M = 144.38, SD = 4.62) to post-implementation (M = 129.27, SD = 6.00) in a statistically significant manner t (9) = 16.71, p = .000, and this effect was large (d = 2.82). Participants also obtained an increase in DSMQ from pre-implementation (M = 32.28.38, SD = 6.45) to post-implementation (M = 38.52, SD = 5.94) in a statistically significant manner t (9) = 8.80, p =.000, and this effect was large (d = 1.00).

Summary

In summary, this quality improvement project examined the glucose levels in older adult diabetic home health patients. The project determined to what degree implementation of self-management and education programs would affect a change in their knowledge of self-management behaviors, as measured by the DSMQ, and glucose levels over four-weeks. The average participant age was 65-90 years of age, with half (50%) of the participants' ethnicity classified as White. The participants showed a reduction in their glucose levels from pre-implementation to post-implementation in a statistically significant manner, t (9) = 16.71, p = .000. The results also demonstrated a

difference in their knowledge levels regarding self-management from DSMQ scores, t (9) = 8.80, p = .000.

Chapter 5 provides a comprehensive review and summary of the project. A re-introduction and a brief description of the project are presented. The following written sections consist of a summary of findings and conclusions. The implication section of the chapter offers a retrospective examination of the theoretical framework, strengths, and weakness of the project, and new insights in solving problems noted. The final sections of the chapter deliver recommendations for future projects and nursing practices.

Chapter 5: Summary, Conclusions, and Recommendations

Despite significant achievements in pharmacological health regarding treating Type 2 diabetes (T2DM) in the past, other management methods have continued to grow to ensure effective control. Schmitt et al. (2016) stated there has been increasing evidence supporting interventional framework links between clinical tools and associated chronic complexities. Other improvements include self-management informing healthcare providers and patients regarding effective strategies to control blood glucose and associated risk factors essential in reducing risk levels of the condition (Schmitt et al., 2016). Although there are different treatments and information available, most diabetic patients fail to attain evidence-based objectives important in preventing further complications. The discrepancies between maximum control and real control were linked to numerous variables such as health clinicians, patients, and related system factors. Central to all the preventive factors includes self-care management, where patients must show consistent self-care behaviors. These behaviors included diet, exercise, self-monitoring of blood glucose, drug adherence, and other preventive care methods (Schmitt et al., 2016).

While the literature suggested multiple reasons for non-compliance from older adults, it was not known if the implementation of the American Association of Diabetes Educators 7 (AADE7) diabetes self-management program yielded lower glucose levels and diabetic management knowledge utilizing the 16 items Diabetic Self-Management Questionnaire (DSMQ) in adult diabetic home health patients aged 65 and older over four-weeks in northwestern Illinois.

Chapter 5 offers a summary of the project and discusses the verified findings associated with the clinical questions. Other sections of the chapter include implications and recommendations for future projects and nursing practices. The final section of the chapter summarizes, in detail, the conclusions of the topic with evidence-based findings of older adults with diabetes and their self-management of the disease the project.

Summary of the Project

This Quality improvement project was developed because of the primary investigator's curiosity regarding the rising incidence of diabetes in older adults noted in clinical and hospital settings. Many of these patients become involved with home health because of a physician or family recommendations. During the primary investigator's tenure as a home health nurse provider and many conversations with other practitioners, the need for significant change in providing care for this population became evident.

This four-week project was conducted in a home health care agency in northwestern Illinois. The goal was to help home health care older adults become more proficient in their self-management of diabetes. The clinical questions focused on diabetic educational intervention and the pre/post-test of the participants' self-management knowledge levels (DSMQ scores) and their glucose levels. The following clinical questions guided the project:

Q1: To what degree did the implementation of the American Association of Diabetes Educators 7 (AADE7) diabetes self-management program over 4 weeks increase the knowledge levels of self-management behaviors, as measured through the DSMQ instrument, of older adult diabetic patients in a home health setting in northwestern Illinois?

Q2: To what degree did the implementation of the American Association of Diabetes Educators 7 (AADE7) diabetes self-management program over 4 weeks affect glucose levels of older adult diabetic patients in a home health setting in northwestern Illinois?

A quantitative methodology, quasi-experimental design was used to answer the project questions. This design focused on three elements, pre-intervention, intervention, and post-intervention (Allen, 2017). At the initial meeting, participants were given the pre-intervention DSMQ questionnaire (Appendix B) and initial blood glucose levels were obtained. After completion of the questionnaire, participants were provided with one hour of diabetic education each week for four weeks. Evidence-based diabetic education was given based on the American Association of diabetic educators (AADE7) guidelines. At the end of four weeks, participants were given a post-implementation test using the same DSMQ instrument and provided a copy of their post-intervention blood glucose laboratory results. To determine if the scheme intervention could be linked with (a) significantly minimized plasma glucose levels and (b) significantly elevated DSMQ self-care scores, paired-samples *t*-tests were used. The remainder of Chapter 5 includes a summary of the findings and conclusion, implications, and recommendations for future research.

Summary of Findings and Conclusion

This section includes a discussion of the findings relative to each clinical question of the project, analysis, and evaluation of the literature's findings to emphasize the project's significance and its contribution to the body of knowledge and to support the conclusion. Despite the project limitations in terms of sample size, sufficient amounts of

data were collected to produce statistical information that supported the project findings and answered the project's clinical questions. Comparing and contrasting the project findings and the literature body of knowledge showed that the literature, overall, supported the project questions that diabetes self-care education can reduce diabetes type 2 (T2DM) blood glucose level and change their self-care views. The project findings advanced the dialogue about diabetes self-care education because it was unknown to what extent a four-week diabetes self-care education could improve diabetes type 2 (T2DM) patients' blood glucose level and change their diabetes attitudes self-care activity. Furthermore, the project findings will allow diabetes educators and healthcare providers to devise short brief interventions of diabetes self-care education to improve the health conditions of more significant populations of (T2DM) patients. In terms of economics, the findings may also significantly impact reducing costs associated with diabetes care at federal, state, and personal levels.

Changes in glucose levels. For the first clinical question, the average glucose pre-implementation was 144.38, while the average post-implementation was 128.67, creating an average 15.11-point drop in glucose levels. Every participant's glucose levels dropped, with a minimum decrease of 10.09 and a maximum decrease of 18.20. The project findings showed a reduction in the participants' glucose levels from pre-intervention to post-intervention with a statistical significance (t (9) = 16.71, p = .000). This reduction in the mean value of the blood glucose level supported the fact that the four-week diabetes self-care education improves T2DM blood glucose levels. Since the p-value is less than 0.05, the finding also confirmed a specific correlation between diabetes self-care education and blood glucose level.

The literature supports that diabetes self-care education helps improve T2DM patients' health outcomes. The American Diabetes Association made recommendations to include diabetes self-management education in standard medical care to control diabetes expansion and improve quality care (American Diabetes Association, 2018). Wong et al. (2014) found that diabetes self-care education participants showed a significant reduction in their HbA1c levels after 12 months. The literature supported the project findings that diabetes self-care education effectively reduces T2DM patients' blood glucose levels. Contrary to the project findings, the literature suggested that diabetes self-care management education requires a long-term intervention to improve T2DM patients' health outcomes (American Diabetes Association, 2018; West, 2014; & Wong et al., 2014). The previous investigations never explored if a four- week diabetes self-care education could produce similar results.

The finding of a four -week diabetes self-care education intervention was a small step in advancing scientific knowledge of diabetes self-management education. Indeed, many studies agreed on the effectiveness of diabetes self-care education to improve patients' blood glucose levels. However, it was not known if a four-week diabetes self-care education could be as effective. A brief diabetes self-care education intervention's effectiveness is highly significant in setting the stage for diabetes educators and healthcare providers to further disseminate diabetes self-care management knowledge to a more significant population. Also, the findings may significantly impact reducing costs associated with diabetes care at all levels.

Changes in DSMQ scores. The second clinical question was to investigate whether a four-week diabetes self-care education could change diabetes type 2 patients'

views of self-care activities in a home health setting. To answer this question, data obtained from the Diabetes Self-Management Questionnaire (DSMQ) were analyzed. The results of the paired sample *t*-test for the overall pre and post-assessment for T2DM patients' views of self-care activities, showed a statistically significant difference, t (9) = 16.71, p-value =.000 between pre-implementation and post-implementation fasting blood glucose levels. The results also demonstrated a difference in the participants' knowledge levels regarding self-management evidence by the change in the Diabetes self-Management questionnaire (DSMQ) scores (t (9) = 8.80, p = .000). Every participant increased their DSMQ score, with a minimum increase of 2.29 and a maximum of 9.38 points.

The quality improvement project findings showed that four-week diabetes self-care education could change T2DM patients' self-care activity views. Studies revealed that factors like lifestyles, improper diet, obesity, lack of exercise, and environment are predictors of diabetes type 2 (Thiering & Heinrich, 2015). The project also found diabetes self-care education to be effective in providing T2DM patients with the information they need about the illness, nutrition, self-monitoring, and physical activity, to improve their health conditions (Surucu, Kizilci, & Ergor, 2017; West, 2014; Wong et al., 2014). Based on evidence-research findings, the Academy of Nutrition and Dietetics developed, published, and recommended the Nutrition Practice Guidelines for adults with diabetes type 1 and type 2 (MacLeod et al., 2017). These findings in the literature suggested that empowering T2DM patients through self-care education with the skills and knowledge about their illness, dietary control, physical activity, glucose management, and health care can eventually change their diabetes self-care behaviors.

The literature supported the project that self-care education can change T2DM patients' views of self-care activity.

This project involved 10 patients selected from a home health care agency in Northwestern, Illinois. The home health agency has a census of about 75 patients; however, only 10 of them who are 65 years and older participated in the self-care education program. The PI used the G* Power Software, version 3.1.9.2, to estimate the minimum sample size. Parameters used were a large effect size, an alpha level of .05, and a power of 80% to estimate a minimum sample size of 12. The project's ideal sample size was 12 participants, but the sample size consisted of 10 participants (n=10); hence, the project sample size is considered slightly underpowered.

Self-care and management of T2DM represent a significant task among the elderly because of their reduced literacy levels and lack of knowledge about their condition (Schmitt et al., 2016). This project's findings are essential in developing an effective, educative program that could improve self-care management among the elderly population. More so, the project analyzed the impact of the relationship between professional healthcare providers and elderly diabetic patients, an association that could improve self-care management intervention mechanisms.

Elderly patients with type 2 diabetes are faced with numerous challenges when self-managing themselves, such as stress, depressions, and the inability to translate information given by their providers in their daily self-management roles. Diabetes affects patients' ability to interact socially. The patients depended on formal and informal support systems that sometimes overlap. Practitioners and Diabetic Educators must involve mental health support and incorporate formal and informal structures for patients,

enhancing self-efficacy and managing literacy issues. It is also crucial for the health care providers to have a concrete plan that concentrates on self-management tasks and guiding patients not to alter diabetes regimens for social and significant life events.

Implications

The purpose of this quantitative, quasi-experimental project was to determine if the implementation of the American Association of Diabetes Educators 7 (AADE7) diabetes self-management program yielded lower glucose levels and diabetic management knowledge utilizing the 16 items Diabetic Self-Management Questionnaire (DSMQ) in adult diabetic home health patients, aged 65 and older, over four-weeks in northwestern Illinois. Practitioners must be able to evaluate these patients' needs for better self-management related to the disease. Providers who implemented the DSMQ for clinical assessments could help the patients navigate through the barriers that can affect self-management behaviors and glycemic control (Schmitt et al., 2016). All providers must become educated that the elderly population is not an identical or homogenous group. There are different categories of older adults, such as young-old, old-old, and frail, with or without support. Furthermore, healthcare providers should develop patient-centered goals and management tailored based on comorbidities (Munshi et al., 2016).

The strength of the project was the buy-in from the nurse providers delivering diabetic education and conducting the standardized assessment. French-Bravo and Crow (2015, emphasized that employee buy-in to create change is critical in the success of any healthcare setting. The home-health agency employees responded well to adapting and supporting to maneuver internal and external threats and the company’s opportunity for

growth. If agencies can sustain the change, they will remain successful over time (French-Bravo & Crow, 2015).

The weakness of the project was the time frame (cross-sectional). The primary investigator believed a longitudinal project would have allowed significant measuring and identifying the impact of the diabetic educational intervention over time. These would have been verified by a copious amount of data (Leedy & Ormrod, 2011). A longer time frame would have allowed the primary investigator to continue tracking the participants, providing the home health agency stronger results to implement and develop stronger self-management strategies.

Theoretical implications. The theoretical framework chosen for this project was the health belief model by (Rosenstock 1974). The model consists of six constructs: perceived susceptibility, severity, benefits, barriers, cues to action, and self-efficacy (Rosenstock, 1974). The primary investigator focused on three constructs, perceived susceptibility, severity, and self-efficacy, to implement the project and answer the clinical questions. The model was ideal for the project because it emphasized the physical and cognitive capability variables among the older adult diabetic populations. The assumptions and construct of the theoretical framework supported the need for education modification according to the patient's comorbidities, cognitive, and physical shortcomings. This was effective in achieving a change in the patient's belief, leading to modified behavior in self-management and glycemic control.

The first assumption allowed the participants to understand their chronic condition and the changes needed to affect glycemic control. The second assumption was related to the participants' actions in protecting themselves with the health condition to

create change that helped to answer questions. The participants learned effective methods using the American Association of Diabetic Educator's (AADE7) evidence-based information on controlling their glycemic levels. The third assumption was that the participants believed they could act in a way to effect change (Janz & Becker, 1984). This was illustrated by the difference in glucose levels among participants after they received the diabetic educational intervention.

Practical implications. The practical implications emphasized the need for advanced nurse practitioners to learn the seven principles of the AAED7 and integrate patient education as part of their treatment strategies. Home health organizations should develop training supports and organizational policies regarding the educational needs of T2DM elderly patients. The use of the DSMQ to measure patient knowledge levels could be used as a gauge for the efficacy of these interventions.

Future implications. Based on the findings of this project, future projects could look at different subject groups, such as younger populations or specific races. Future projects could also investigate other educational intervention methodologies for those that do not receive regular home health intervention as part of their care. Future projects are also needed to replicate the present project on a larger scale, to confirm generalization of the findings.

Recommendations

Recommendations allow for discovering and pinpointing new areas or opportunities to use the findings noted from this project. The recommendations originated for the outcomes, the use of theories, data collection, or settings. Several

recommendations for future projects and practice were based on the results of the clinical project. These recommendations are presented below.

Recommendations for future projects. The primary investigator for future projects suggested four recommendations. The first recommendation is for future nursing projects to include and educate others, such as caregivers and family members related to elderly care and diabetic complications. These individuals should also receive a health literacy screening in addition to the educational intervention for better patient self-management techniques. The second recommendation is for future projects to utilize a longitudinal timeframe; this would allow investigators to measure the long-term impact of diabetic educational intervention. This would also allow the home health agency the opportunity to adjust their strategies and nurse practitioners' care of providing with this population. The third recommendation is related to future projects, collaborating with other disciplines to help fill in the gaps regarding patient management of the older adult diabetic population. The fourth recommendation is that the home health agency should provide more education and training on diabetes self-management to enhance the knowledge of visiting nurses who care for patients with T2DM at home.

The next step in moving this project forward is to engage the nursing administration to review standardized assessments for other medical conditions. The one assessment tool the health agency should incorporate is a health literacy tool (Newest Vital Sign). This tool is a six-minute tool used to assess the patient's health literacy skills. An assessment of the older adult's health literacy skills would be beneficial for the nurse practitioner, teaching them self-management and glucose control.

Recommendations for future practice. The primary investigator proposed four recommendations for future advanced nursing practice. The first recommendation is for home health nurse practitioners to receive advanced training in the care of vulnerable populations and elderly adults (Bigelow & Freeland, 2017). The second recommendation is for practices to focus on understanding the patient's perception of their disease process and develop realistic goals for self-management activities. The third recommendation is to incorporate a team-based approach, which is patient-centered and prevention-focused (Bigelow & Freeland, 2017). The final recommendation is to ensure that patients have the most appropriate glucose device suitable for their needs and identify treatment barriers in the home not seen in the clinical setting (Lavelle et al., 2016). The benefits of the in-home education included personal attention in ensuring the correct use of home health monitoring devices, building self-management confidence, and identifying treatment barriers in the home that may not be easily discerned in a clinic setting (Lavelle et al., 2016)

Teaching the patients in their home allowed the investigator the unique opportunity to see and discuss the actual food found in the patient's household, as well as address in-home issues such as family support, expired glucose test strips, non-functioning glucometer, or incorrect insulin storage (Lavelle et al., 2016).

The individuals who will benefit from the project findings are the nurses, nurse practitioners, and home health agencies. The nurse practitioners benefit from reading this evidence-based project in learning the importance of utilizing a standardized diabetic assessment tool for self-management and glycemic controls. The findings of this project demonstrated that with the use of the AADE7 evidence-based teaching, the participants

had lower glucose levels and higher levels of knowledge of self-management behaviors, as measured by the DSMQ. Furthermore, these participants felt empowered to maintain their food intake, exercise, and self-management activities.

In December 2014, home health agencies were regulatory mandated with specific requirements regarding monitoring glucose control in patients with T2DM known as Local Coverage Determination (LCD-L35413) (Centers for Medicare & Medicaid Services, 2014). The goal was to safeguard home health agencies using evidence-based interventions to reduce the complications associated with T2DM and home care delivery (Briggs, 2015). The LCD recognizes that many factors, including comorbidities and the patient's blood glucose levels, must be considered in the initial treatment of a diabetic patient while providing concrete directives relating to patient care. This is because home health agencies are receiving a higher level of reimbursement for Medicare patients; hence, higher patient-quality care should be given (Briggs, 2015). The findings from this project can guide nursing administration in-home health agencies to develop guidelines to deter citations or financial repercussions.

Two strategies that are based on the project findings that could be implemented in the home health care setting are mandated nursing education regarding AAED7 principles, specifically with a vulnerable population (older and elderly). This would allow the nursing staff and practitioners to learn the complications, comorbidities, physical and cognitive issues associated with this population and provide educational interventions to improve health outcomes. Hence, allowing them to become empathic and provide patient-centered care. The second strategy is for all the nurse practitioners to use the DSMQ instrument in assessing their patients for self-management and glucose control.

Utilizing the instrument would assist the practitioners in developing a treatment plan specific to the patient. This strategy could be developed and used for other home health settings such as pediatric, non-medical personal care, and private duty.

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Appendix A

Grand Canyon University Institutional Review Outcome Letter

GRAND CANYON UNIVERSITY

3300 West Camelback Road | Phoenix, Arizona 85017 | 602.639.7500 | Toll Free 800.800.9776 | www.gcu.edu

DATE: September 20, 2019

TO: Anne Ohakosim

FROM: COLLEGE OF NURSING AND HEALTH CARE PROFESSIONALS

STUDY TITLE: Educational Intervention in Managing Type 2 Diabetes (T2DM)

ACTION: DETERMINATION OF QUALITY IMPROVEMENT/PROGRAM EVALUATION STATUS

DATE: September 20, 2019

REVIEW CATEGORY: QUALITY IMPROVEMENT/PROGRAM EVALUATION

In collaboration with the Institutional Review Board, The College of Nursing and Health Care Professions at Grand Canyon University has determined that this submission does not meet the definition of human subject research. The submission qualifies as Quality Improvement and/or Program Evaluation; therefore, further IRB review is not required. In future publications and/or presentations, please refer to this submission as Quality Improvement and/or Program Evaluation, not research. If the results of the project will not be published, presented, or disseminated outside of the institution, ensure that all those associated with the project are aware that the project is ongoing.

We will put a copy of this correspondence in your student file in our office. If you have any questions, please contact The DNP Program Lead Faculty, Dr. Amanda Ziemendorf in the College of Nursing and Health Care Professions, Amanda.ziemendorf@gcu.edu.

Please include your study title and reference number in all correspondence with this office, IRB@gcu.edu

Appendix B

Diabetes Self-Management Questionnaire-Revised (DSMQ-R)

Source: Schmitt et al. (2013)

The following statements describe self-care activities related to your diabetes. Thinking about your self-care over the **last 4 weeks**, please specify the extent to which these statements apply to you. Note: If you monitor your glucose levels using continuous interstitial glucose monitoring (CGM), please refer to this where 'blood sugar checking' is requested.	applies to me very much	applies to me to a considerable degree	applies to me to some degree	does not apply to me
1. I check my blood sugar levels (glucose levels) with care and attention. ☐ *Blood sugar (glucose) checking is not required as a part of my self-care.*	☐3	☐2	☐1	☐0
2. The foods I choose to eat make it easy for me to achieve good blood sugar levels.	☐3	☐2	☐1	☐0
3. I regularly see the doctor (diabetes specialist) regarding my diabetes.	☐3	☐2	☐1	☐0
4. I take my diabetes medication (e.g. insulin, tablets) as prescribed/agreed. ☐ *Diabetes medication is not required as a part of my self-care.*	☐3	☐2	☐1	☐0
5. Occasionally I eat lots of sweets or other foods rich in carbohydrates.	☐3	☐2	☐1	☐0
6. I keep records of my blood sugar values (or CGM data) to better manage my diabetes. ☐ *Blood sugar (glucose) checking is not required as a part of my self-care.*	☐3	☐2	☐1	☐0
7. I tend to avoid seeing the doctor (diabetes specialist) regarding my diabetes.	☐3	☐2	☐1	☐0
8. I am regularly physically active to improve my diabetes/my health.	☐3	☐2	☐1	☐0
9. I follow the relevant dietary recommendations for people with diabetes (e.g. given to me by my doctor or diabetes specialist).	☐3	☐2	☐1	☐0

10. I do not check my blood sugar levels (glucose levels) frequently enough for achieving good glucose control. ☐ *Blood sugar (glucose) checking is not required as a part of my self-care.*	☐3	☐2	☐1	☐0
11. I avoid physical activity although it would be good for my diabetes/my health.	☐3	☐2	☐1	☐0
12. I tend to forget or skip my diabetes medication (e.g. insulin, tablets). ☐ *Diabetes medication is not required as a part of my self-care.*	☐3	☐2	☐1	☐0
13. Sometimes I have real 'food binges' (not triggered by hypoglycemia).	☐3	☐2	☐1	☐0
14. Regarding my diabetes, I should see my doctor (diabetes specialist) more often.	☐3	☐2	☐1	☐0
15. I am less physically active than would be optimal for my diabetes/my health.	☐3	☐2	☐1	☐0
16. I could improve my diabetes self-care considerably.	☐3	☐2	☐1	☐0
17. I estimate the carbohydrate content of my meals (for achieving better glucose control).	☐3	☐2	☐1	☐0
18. I eat without regard to my diabetes.	☐3	☐2	☐1	☐0
19. I check/discuss my diabetes treatment with the doctor (diabetes specialist) regularly.	☐3	☐2	☐1	☐0
20. My diabetes self-care is poor.	☐3	☐2	☐1	☐0
21. I check my blood sugar levels (glucose levels) before each meal.	☐3	☐2	☐1	☐0
22. I adapt my insulin doses to the carbohydrate content of my meals.	☐3	☐2	☐1	☐0
23. I adjust the timing of my insulin injections and food intake.	☐3	☐2	☐1	☐0
24. I adapt my insulin doses to the current blood sugar levels (glucose levels) as well as preceding or planned activities.	☐3	☐2	☐1	☐0
25. I try to ensure regular meal times over the day.	☐3	☐2	☐1	☐0

26. I carry fast carbohydrates to enable quick treatment of hypoglycemia (low blood sugar).	☐3	☐2	☐1	☐0
27. In case of hypoglycemia (low blood sugar), I take appropriate amounts of carbohydrates to avoid causing hyperglycemia (high blood sugar).	☐3	☐2	☐1	☐0

Appendix C

Outline of Diabetic Self-Care Education

Source: American Association of Diabetes Educators (2018)

Week 1: Day one activity

- Complete orientation to the program and explanation of expectations and outcomes
- Signing and completing of Consent
- Complete Pre- DSMQ
- Assessment of baseline blood glucose reading

Day two activities

- Review lesson one and two objectives Healthy eating & Being Active
- Provide pamphlets to patient and review
- Provide education materials or pamphlets to patient and review
- Finalize with and address any questions
- Establish goals for the week.

Week 2: Day one activities

- Review the previous week and Journal
- Review objectives and the lesson on monitoring and taking medication
- Provide materials and provide pamphlet and resources
- Address any questions
- Establish goals for the week

Day two activities

- Review the past week and journal
- Review objectives and the lesson on Problem-solving
- Provide education materials or pamphlets to patient and review

- Finalize with and address any questions
- Establish goals for the week.

Week 3: Activities

- Review the past week and journal
- Review objectives and the lesson on Healthy coping,
- Provide education materials and pamphlets to patient and review
- Address any questions
- Establish goals for the week

Week 4: Activities

- Conduct the post DMSQ
- Complete blood glucose reading after
- Review the past week and journal
- Review objectives and the lesson on Reducing risks
- Provide education materials and pamphlets to patient and review
- Finalize with and address any questions.
- Evaluate the intervention and document the process and outcomes and communicate with other Health care providers.

Diabetes Self-Management Education (DSME) is an evidence-based intervention that accelerates the knowledge and skills of people with diabetes to optimize their ability to self-manage the disease. According to the American Association of Diabetes Educators (AADE), DSME is defined as “a collaborative process through which people with or at

risk for diabetes gain the knowledge and skills needed to modify behavior and successfully self-manage the disease and its related conditions (AADE 2018).

Certified diabetes educators used Diabetes self-management education (DSME) curricula that engage participants in informed decision-making and reinforces self-care, problem-solving behaviors, and a collaborative approach with their healthcare providers to enhance clinical outcomes (AADE 2017). They also developed seven self-care behaviors known as the AADE7™ that are widely recognized as the guiding principles for participants in a Diabetes self-care education.

Appendix D

Permission Request Form AADE7

American Association of Diabetes Educators

AADE7 Self-Care Behaviors

Permission Request Form: Publications

[redacted] requests use of the following copyrighted AADE material:

[redacted]

AADE Copyrighted Publication/Project/Program Title(s)/Material(s)/Logo(s): /

Chapter/Article Title(s): AADE 7 SELF-CARE BEHAVIORS
(If applicable)

Page Number(s): /

[redacted]aterial is requested for the following:

Project, Program or Publication: EDUCATIONAL INTERVENTION IN MANAGING TYPE 2 DM

Type of Project, Program or Publication: FOR MY DOCTORAL DISSERTATION / THESIS

Projected Date(s) Project, Program or Publication: [redacted]19
(If applicable)

Page Number(s):

Project, Program or Publication:

Estimated number of copies to be printed or produced: 1

I be used within 1 year: YES

Number Of times will the product be printed, or material be used within I year:

Price if users have to pay for this project, program, or publication?
None

By signing the line below, the signer understands that, if granted permission, the signer must: e Not modify the information in any way;

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SIGNATURE

7, 31, 19
Date

PRINTED NAME and TITLE

Telephone Number/Email

Margaret Maloney, Publications Manager, AADE

7/31/19
Date

Please complete and return this form to Margaret Maloney
Email: or Fax:

Appendix E

Permission to Use the DSMQ Tool

Anne Thu, Sep 5, 2019, at 2:32 PM
To: Lyra"

God afternoon Lyra,
I know this is my second letter to you, PIs I will need confirmation that I can use the DMSQ tools, Just an email and I will be fine. I have written to Dr, Andrea, and I was told that I need to get the tools from Mapi. I have the application form Via eprovide ᵗ/Mapi and approval, but I Still want a written e-mail. Any help will be greatly appreciated; This is for my project on Diabetic Education. Thanking you in advance. Sincerely Anne Ohakosim.

Lyra Thu, Sep 5, 2019, at 3:16 PM
To: Anne >

Hello Anne,
Completing the application from our eProvide platform gives you the approval to use the DMSQ for your unfunded academic use.
Hope this helps.
Best regards,
Lyra
Client Services Associate, Il, MRT Tel: +1859-551-4743

RE: ™: Request #208526_DSMQ-R

Dear Anne,

Thank you for your request and interest in the DSMQ-R.

You may access available translations of the questionnaire directly (see tutorial) by clicking on this link: https://eprovide mapi-trust.org/instruments/diabetes-self-management-questionnaire-revised#need_this_questionnaire.

Please note that there are no other English versions besides the original UK English.

Hope this helps.
Best regards,
Lyra

Client Services Associate, II, MRT

Mapi Research Trust
27 rue de la Villette |69003 Lyon | France
Tel: +33 (0) 4 72 13 66 66 / Fax: +33 (0)472135573 / US Direct line: +1 859-948-3776

Subject: ePROVIDE™: Request #208526 is New

Dear User,

We have received your request with the following details:

Request

- Type of request : (Student of Grand Canyon to use for Diabetic Education project)
- Status : New
- Subject : Permission to use Tools Diabetes Type 2 (DMSQ)
- Description: Pls I want it ASAP. if possible6/10/2019
- Instruments :

DSMQ-R - Diabètes Self-Management Questionnaire-Revised

- Languages: English for Australia and the UK
- Mode of administration: Both (paper and e-application)
- Study financing: None

We'll do our best to handle your request within 4 business days, but our answer may be delayed depending on the current workload. If you need immediate assistance, please edit your request to specify it and we'll contact you in priority. Thank you.

If you have any questions, you may refer to our FAQs.

Best regards,