The Impact of Healthy Eating Among Patients with Type Two Diabetes

Submitted by

Charlyn Mae Habeeb

A Direct Practice Improvement Project Presented in Partial Fulfillment

of the Requirements for the Degree

Doctor of Nursing Practice

Grand Canyon University

Phoenix, Arizona

December 22, 2021

GRAND CANYON UNIVERSITY

The Impact of Healthy Eating Among Patients with Type Two Diabetes

by

Charlyn Mae Habeeb

has been accepted

December 22, 2021

DPI COMMITTEE:

Dr. Robin Schaefer, DNP, MSN., RN., DPI Project Chairperson

Paula Noble, DNP, APRN, AGCNS-BC., MSN, RN., Content Expert

ACCEPTED AND SIGNED:

Lisa G. Smith, PhD, RN, CNE
Dean and Professor, College of Nursing and Health Care Professions

2/21/2022

Date

Abstract

For patients with Type II Diabetes, dietary management is known to improve outcomes. However, the project site had no current evidence-based program in place to address dietary management. The purpose of this quantitative quasi-experimental quality improvement project was to determine if the implementation of the Association of Diabetes Care and Education Specialists (ADCES7) Framework on Self-Care Behaviors™ *Healthy Eating Program* would impact the pre-prandial blood glucose levels among adult type II diabetic patients in a nursing rehabilitation center in New York over four-weeks. The scientific underpinnings of the project were Nola Pender's middle-range theory, the health promotion model and Everette Roger's diffusion of innovation change model. The total sample size was 32 adult type II diabetic patients. Data on the pre-prandial blood glucose levels was measured using Nova Stat Strip glucometer at baseline and four weeks post-implementation. A paired *t*-test analysis showed a clinical and statistically significant reduction in the pre-prandial blood glucose levels from baseline (M = 169.59, SD = 34.71) to post-implementation (M = 160.96, SD = 32.08), t (31) = 2.52, p = .017. The findings suggest that the ADCES Framework on Self-Care Behaviors™: *Healthy Eating Program* may improve the blood glucose levels among this population. Recommendations include continuation of the project at the current site, and evaluating the impact of the framework on hemoglobin A1C levels over six months.

Keywords: Association of Diabetes Care and Education Specialists (ADCES7) Framework on Self-Care Behaviors™ *Healthy Eating Program,* healthy eating, pre-prandial blood glucose level, health promotion model, diffusion of innovation change, Type II diabetes.

Table of Contents

Chapter 1: Introduction to the Project 1

Background of the Project 3

Problem Statement 5

Purpose of the Project 6

Clinical Question 9

Advancing Scientific Knowledge 10

Significance of the Project 14

Rationale for Methodology 16

Nature of the Project Design 18

Definition of Terms 20

Assumptions, Limitations, Delimitations 24

Summary and Organization of the Remainder of the Project 26

Chapter 2: Literature Review 30

Theoretical Framework 34

Review of the Literature 38

Type II Diabetes and Its Complications 39

Facilitating Behavioral Change for Blood Glucose Control 52

Evidence Supporting the ADCES7 65

Summary 81

Chapter 3: Methodology 85

Statement of the Problem 86

Project Methodology 88

Project Design 90
Population and Sample Selection 92
Instrumentation or Sources of Data 95
Validity 97
Reliability 99
Potential Bias and Mitigation 109
Ethical Considerations 111
Limitations 113
Summary 116
Chapter 4: Data Analysis and Results 122
Descriptive Data 123
Data Analysis Procedures 125
Results 127
Summary 129
Chapter 5: Summary, Conclusions, and Recommendations 131
Summary of the Project 133
Summary of Findings and Conclusion 135
Implications 136
Theoretical Implications 137
Practical Implications 140
Future Implications 141
Recommendations 142
Recommendations for Future Projects 143

Recommendations for Practice 144

References 147

Appendix A 173

Grand Canyon University Institutional Review Board Outcome Letter 173

Appendix B 174

Permission to Use the ADCES7 Self-Care Behaviors Healthy Eating Handout Tool 174

Appendix C 175

ADCES7 Self-Care Behaviors Healthy Eating Handout Tool 175

List of Tables

Table 1. Characteristics of Variables.....88

Table 2. Demographics of Sample Population N=32.....124

Table 3. Comparison of Pre-Prandial Blood Glucose Results at Baseline and Post-Implementation.....127

Table 4. Comparison of Pre-Prandial Blood Glucose Results at Baseline and Post-Implementation.....128

Chapter 1: Introduction to the Project

The World Health Organization (WHO, 2021) identified diabetes as a life-threatening chronic medical condition that has increased the morbidity and mortality rates among individuals diagnosed with the disease. According to the Centers for Disease Control and Prevention (CDC, 2021), diabetes is the seventh leading cause of death in the United States. Diabetes management has become a national and local health problem. Despite considerable evidence-based interventions, the prevalence and incidence of diabetes continue to rise and contribute to other severe health conditions (CDC, 2021). The increasing prevalence of diabetes burdens the economy nationally and globally (Berbudi et al., 2020). This chronic medical condition (diabetes) is a complex disease that, if poorly controlled, can affect the body's systems and can be very challenging to manage or control (Dao et al., 2019). The severe complications from poorly controlled diabetes include leg amputations, blindness, kidney disease, heart disease, and premature death (WHO, 2021).

Effective strategies are needed to manage the disease, such as diabetes self-care education which healthcare providers can offer to help type II diabetic patients manage and control the complications associated with their condition (WHO, 2021). Implementing effective strategies could reduce excessive readmission rates to healthcare facilities (Berbudi et al., 2020). The New York State Department of Health (2020) data showed two million individuals diagnosed with type II diabetes in 2019 within the State of New York. This number increased from 1.5 million in 2016 (New York State Department of Health, 2020). The New York State Department of Health (2020) identified the need for evidence-based interventions to be implemented in practice to help

enhance population outcomes, care systems, and quality improvement through promoting self-management education for patients diagnosed with diabetes. The provision of diabetes self-management education could achieve clinical and behavioral results among patients with type II diabetes (Dao et al., 2019).

The project focused on educating the nursing staff at a nursing rehabilitation center on the Association of Diabetes Care and Education Specialists (ADCES7) Framework on Self- Care Behaviors for Healthy Eating. The Association of Diabetes Care and Education Specialists include the behavioral change on healthy eating to increase patients' knowledge on nutrition for blood glucose control (ADCES, 2020). The long-term goal for the project was to improve the patients' pre-prandial blood glucose levels. Before implementing the project, there was no standardized method for nurses to present information on diabetes to patients. The project was worth conducting because nurses are ideal for offering critical elements of self-management education to individuals with type II diabetes. However, many nurses have not had comprehensive training in the subject matter relating to diabetes, limiting their roles in diabetes management (Crowe et al., 2019). It was determined that type II diabetic patients could benefit from patient-centered teaching to manage diabetes.

This project was completed by implementing the ADCES7 education framework on healthy eating at a nursing rehabilitation center in New York. Before implementing the education intervention, baseline data for the pre-prandial blood glucose levels were retrieved from the Epic electronic health record (EHR). The primary investigator educated the nurses on the ADCES Healthy Eating Program, and they, in turn, educated the diabetic patients on healthy eating. Post-implementation pre-prandial blood glucose

results were collected four weeks after to determine the impact of the ADCES7 Framework on Self- Care Behaviors for Healthy Eating on the blood glucose levels of type II diabetic patients on the three medical units at the rehabilitation center.

Chapter 1 introduces the topic and examines the background of the problem for this direct practice improvement project. A problem statement, the purpose of the project, and clinical question are discussed. Other sections of the chapter include advancing scientific knowledge, the project's significance, the rationale of using a quantitative methodology, and the nature of the project design. The last segments comprise operational terms used, assumptions, limitations, delimitations noted, and a summary of the remainder of the project.

Background of the Project

The American Diabetes Association (ADA, 2021a) reported that in 2018 the prevalence of diabetes among adults within the United States was 34.2 million. The report presented by the ADA (2021a) also showed that 26.8% (14.3 million) individuals 65 and older had type II diabetes in 2018. The information was validated by the CDC (2021), which identified an increase in the prevalence of type II diabetes from 90% to 95% of individuals within the United States. The rise has occurred due to unhealthy eating habits, sedentary lifestyles, and obesity (CDC, 2021). Cheng et al. (2016) emphasized that the complications associated with diabetes contribute to extended lengths of stay in hospitals, poor health outcomes, and increased medical costs for care. The CDC (2021) identified expenses related to type II diabetes management in 2017 were $327 billion, with approximately $237 billion used to provide direct medical care to manage the disease. The ADA (2021a) statistical data highlighted those diabetic

expenditures were 2.3 times higher than other medical diagnoses, including heart failure. The condition can be managed if the appropriate actions are incorporated into one's daily activities, such as healthy eating, exercise, and modified lifestyle changes (ADA, 2021a).

According to the New York State Department of Health (2020), in King's County, where the project was conducted, approximately 1.6 million individuals (10.5%) of the adult population are diagnosed with type II diabetes or have elevated blood glucose levels. About 25% of residents have type II diabetes (New York State Department of Health, 2020). These individuals have special needs related to nutrition, hydration, medical therapy, and physical activity (New York State Department of Health, 2020). For these reasons, continual assessment, maintenance, and education are critical for type II diabetic older adults (New York State Department of Health, 2020).

This quality improvement project was implemented in a nursing rehabilitation center in New York. The project site did not have a certified diabetes educator and admitted approximately 45 patients (n = 45) 65 or older who were diagnosed with type II diabetes and receiving long-term care. According to recent data obtained from the Epic electronic health records, 50% of the patients had elevated glucose levels. The Director of Nurses asserted that most diabetic patients refused to eat the meals offered at the nursing rehabilitation center and instead ate food brought in by family members. Subsequently, having nurses learn how to provide diabetic self-management education could help the patients to make healthier food choices and prevent or delay the complications of the disease. This project implemented an educational intervention guided by the ADCES7 Framework for Self- Care Behaviors on Healthy Eating to promote optimal self-management of diabetes.

Nurses play a pivotal role in the management of diabetes by using evidence to provide quality care to patients (Powers et al., 2017). Nurses' central role in diabetes care is to encourage behavioral change and promote self-care to manage diabetes through education, empowerment, and support (Powers et al., 2017). Diabetes self-management education requires time to interact with the patients, collaboration, support, knowledge, and skills among nurses, and the evidence-based resources or tools to help patients gain the knowledge and skills to modify their behavior and manage diabetes (Powers et al., 2017). As diabetes continues to be an economic burden and challenging to control, the need to implement an evidence-based educational intervention is evident so that patients can learn to modify their behaviors to manage diabetes (Powers et al., 2017).

Problem Statement

This section presents the problem statement for the quality improvement project. It was not known if or to what degree the implementation of the ADCES7 Framework on Self-Care Behaviors™ *Healthy Eating Program* would impact the pre-prandial blood glucose levels among adult type II diabetic patients. The ADCES7 was created in 1997 and was first known as the American Association of Diabetes Educators seven (AADE7) domains of education on self-care behaviors (healthy eating, being active, monitoring, taking medication, problem-solving, reducing risks, and healthy coping) for the management of diabetes (Powers et al., 2021). The framework was validated by the American Diabetes Association and health care settings to provide education, support, and empowerment to diabetic patients (ADCES, 2020; Powers et al., 2021).

The problem identified the need to implement an evidence-based education framework on healthy eating to promote diabetes management (ADCES, 2020). The

project was implemented in a nursing rehabilitation facility in New York over four weeks. The population affected were type II diabetic patients aged 65 and over. The ADA (2021b) stated that approximately 25% of Americans over 60 years had been diagnosed with type II diabetes. This aging population is one of the drivers of the diabetes epidemic (ADA, 2021b). The effects of poorly managed diabetes negatively impact the quality of life and functional status of individuals diagnosed with the disease (ADA, 2021b).

The project solved the problem by providing nurses with information regarding the ADCES7 framework for diabetes self-care. Education on the ADCES7 Framework on Self-Care Behaviors™: for Healthy Eating increased the nurses' knowledge levels and prepared them to effectively educate older adults with type II diabetes. Since there was no evidence-based diabetes education program at the nursing rehabilitation center, there was a need for the ADCES7 Framework on Self- Care Behaviors for Healthy Eating Healthy Eating to be implemented to provide quality diabetes care. Implementing this strategy contributed to glycemic control among the older adults at the facility and will subsequently improve the residents' quality of life in the nursing rehabilitation center.

Purpose of the Project

The purpose of this quantitative quasi-experimental quality improvement project was to determine if the implementation of the Association of Diabetes Care and Education Specialists (ADCES7) Framework on Self-Care Behaviors™ Healthy Eating Program would impact the pre-prandial blood glucose levels among adult type II diabetic patients in a nursing rehabilitation center in New York over four-weeks. Before implementing the project, the nursing rehabilitation center did not have a diabetes educator. There was no evidence-based diabetes education program implemented to

guide nurses in educating patients about diabetes. As a result, there was a gap in the provision of education on diabetes among the patients by the nurses. The ADCES7 is an evidence-based framework developed by the Association of Diabetes Care and Education Specialists (ADCES, 2020) to guide diabetes education within the context of seven domains namely, healthy coping, healthy eating, being active, monitoring, taking medication, problem-solving, and reducing risks. The independent variable was the educational intervention based on the ADCES7 Framework for Self-Care Behaviors on Healthy Eating. According to Alayoub et al. (2018), evidence-based diabetes education programs are at the foundation of diabetes care and can effectively influence behavioral change among patients with diabetes. The dependent variable was the patients' pre-prandial blood glucose levels. The Center for Medicare Services (CMS, 2019) requires healthcare organizations, such as the nursing rehabilitation center, to provide self-management education and support for patients diagnosed with type II diabetes (CMS, 2019).

Convenience sampling was used to select the sample for the project from the three medical units. Convenience sampling was used due to the ease and accessibility of recruiting the patients. The inclusion criteria were individuals 65 years and older, male or female diagnosed with type II diabetes, able to read and write English, and have elevated glucose levels (over 180 mg/dl). The exclusion criteria included individuals with type I diabetes, altered mental state (through sedation from medication or neurological problems), unable to read or write English, and or under the age of 65 years old. The project was implemented to determine if there was a cause-and-effect relationship between the independent (ADCES7 Framework on Self-Care Behaviors™: for Healthy

Eating Program) and the dependent variable (pre-prandial blood glucose levels of type II diabetic patients) (Leedy & Ormrod, 2021).

The healthcare providers who implemented the ADCES7 education framework were 14 registered nurses and five charge nurses (the five charge nurses were also registered nurses) who (according to the Director of Nurses) were employed for over one year at the time of the project, worked the 7-a. m. or 7 p. m. shifts, trained to use the Nova Stat Strip glucometer to assess the blood glucose levels of the patients and had access to documenting in the Epic EHR software. The nursing rehabilitation center is located in a densely populated urban area in New York. (Neighborhood Scout, 2019). Approximately 65% of this county's population were older adults over 65 years (Neighborhood Scout, 2019). Over 34% of the people were Blacks, 18.9% were Latinos, and 12.7% were of Asian descent (Neighborhood Scout, 2019). According to the Director of Nurses, the nursing rehabilitation center provides subacute and long-term care for approximately 200 patients. The patients included in the project were admitted to the long-term care units. The patients accepted at the nursing rehabilitation center are 30 to 85 years old. Approximately 45 patients 65 and older had type II diabetes at this project site.

The project contributed to the body of nursing knowledge by showing how education using the ADCES7 framework could improve the nutritional behaviors of older adults in nursing rehabilitation centers. The diabetes self-management education supported patients in making healthy lifestyle adjustments, participating in health-seeking behaviors to promote healthy eating, and taking the necessary steps to prevent complications and improve health outcomes. This project's findings can guide clinicians

in other rehabilitation facilities to develop self-management programs to improve outcomes and close the nursing practice gap in diabetes self-care (Hurley et al., 2017; Rutten et al., 2020).

Clinical Question

Despite multiple evidence-based interventions and the advancement of diabetes management, the prevalence and economic burden of diabetes are still significant health care issues (Alayoub et al., 2018; CDC, 2021; Rutten et al., 2020; WHO, 2021). The evidence showed that nurses routinely assess patients' blood glucose levels in most nursing rehabilitation centers, and treatment is determined based on these levels (Alghafri et al., 2017; Bradford et al., 2017). The evidence also revealed that there are no effective interventions to promote the goals of diabetes care so that glycemic control can be achieved for diabetic patients (Alghafri et al., 2017; Bradford et al., 2017). According to Alayoub et al. (2018), evidence-based diabetes self-management education (DSME) programs are the cornerstones of diabetes care. They can effectively influence behavioral change among patients with diabetes. The CMS (2019) requires healthcare organizations, such as the nursing rehabilitation center, to provide diabetes education and support for patients diagnosed with diabetes.

Previous research findings showed that DSME on healthy eating is beneficial in achieving blood glucose control. In a randomized control study done by Blumi et al. (2019), the ADCES7 framework was the independent variable. A quasi-experimental design was used to determine the impact of education on diabetes control among type II diabetic patients. The results showed statistically significant improvement in the patients' glycemic control and hemoglobin A1C (9% to 7%). The findings from the study

demonstrated that consistent, evidence-based DSME could produce significant improvement in blood glucose control (Blumi et al., 2019). Also, the results showed DSME is effective when support and empowerment are offered to patients (Blumi et al., 2019). Consequently, the following clinical question guided this quality improvement project: It was not known if or to what degree the implementation of the ADCES7 Framework on Self-Care Behaviors™ *Healthy Eating Program* would impact the pre-prandial blood glucose levels among adult type II diabetic patients in a nursing rehabilitation center in New York?

The independent variable was the ADCES7 Framework on Self- Care Behaviors for Healthy Eating Program, which was used to educate 14 nurses and five charge nurses who then provided the education to 32 patients. The instruction included information on the three major food groups (carbohydrates, fats, and protein) (see appendix C), how nurses can partner with patients to promote engagement for diabetes management, making healthy food choices, tracking the food being consumed, and understanding meal portions for the diabetic patient. The dependent variable was identified as the pre-prandial blood glucose results of the 32 patients. Data on the dependent variable were acquired using the Nova Stat Strip glucometer at baseline and four weeks post-implementation of the intervention (ADCES Framework on Self- Care Behaviors for Healthy Eating). These two datasets were compared to determine the impact of the education framework.

Advancing Scientific Knowledge

One aspect of diabetes management that is a recommended standard of care includes incorporating DSME among patients with type II diabetes. The cornerstone of

managing diabetes is the ability of nurses to promote self-management activities when delivering care to patients with diabetes (Samdal et al., 2017). Research showed that the most effective approach to managing type II diabetes is through education programs designed to improve the knowledge and skills needed for diabetes self-care (Biernatzki et al., 2018). Using DSME knowledge, nurses could educate patients and establish realistic goals to improve the patients' health outcomes (Biernatzki et al., 2018; Hu et al., 2021). Therefore, spearheading an educational intervention with the ADCES7 guidelines as the evidence-based framework helped the nursing staff promote better and improve diabetes care (Lange & Pearce, 2017). The project implemented the ADCES Framework on Self-Care Behaviors for Healthy Eating as an evidence-based tool for nurses to provide quality care and education to patients with type II diabetes, which aligned with previous research (Biernatzki et al., 2018; Pal et al., 2018; Pinto et al., 2017).

The assessment phases of nursing care need to include more than evaluating patients' blood glucose levels through routine finger sticks and administering insulin based on the finger sticks' results (Pinto et al., 2017). Lee et al. (2019) conducted a study to investigate the effect of structured diabetes education programs combined with blood glucose monitoring to manage type II diabetes. The results showed that diabetes education with blood glucose monitoring improved behavioral habits and positively influenced self-care behaviors among patients with the disease (Lee et al., 2019). The nurses who care for the patients at the nursing rehabilitation center needed a diabetes education framework to promote health literacy among the patients. The nursing staff who provide diabetic patients with essential knowledge of diabetes self-care management are required to take the appropriate measures to promote healthy self-care behaviors

among the patients (Hailu et al., 2019). The scientific body of knowledge on diabetes education presented to the nurses enhanced the management of type II diabetes in the nursing rehabilitation center. The results of the project, in turn, allowed for the presentation of evidence that validated the ADCES7 framework as an evidence-based intervention for controlling type II diabetes.

The scientific underpinnings of the project were Pender's middle-range theory, the health promotion model (HPM), and Roger's diffusion of innovation change model. Pender completed seminal work on the HPM in 1982 (Pender, 1982). Rogers completed seminal work on the diffusion of innovation in 1962 (Rogers, 2003). The seminal work Rogers completed helped him identify the general patterns and similarities in the social change process within organizations (Rogers, 2003). Pender's HPM focuses on the individual within the context of adopting specific behaviors that will achieve quality health outcomes (Pender, 1982). The HPM model comprises three main components: personal characteristics and experiences, behavior-specific cognitions and affect, and behavioral results (Pender, 1982). Regarding behavior-specific cognitions and impact, the concepts are perceived benefits of action, perceived barriers to activity, perceived self-efficacy, activity-related effect, interpersonal influences, and situational influences are aligned with this direct practice improvement project (Pender, 1982). The concept of perceived benefits of action was aligned with the ADCES7 Framework on Self-Care Behaviors™: for Healthy Eating through the nurses collaborating with the patients to identify healthy food exchanges among the main food groups (carbohydrates, fats, and protein). The concept of activity-related effects from the HPM was also aligned with the ADCES7 Framework on Self-Care Behaviors™: for Healthy Eating. The nurses had the

patient engaged in the educational activity during the provision of care (Pender, 1982). The concept of perceived self-efficacy from the HPM aligns with this project by learning about diabetes and adopting health-promoting behaviors to control their blood glucose levels (Pender, 1982). For this project, the concept of activity related to the affect is linked to the project through the positive impact of the ADCES7 Framework on Self-Care Behaviors™: for Healthy Eating in enhancing the patients' knowledge on diabetes (Pender, 1982). According to Pender (1982), the concept of interpersonal influences in the HPM serves as the intersection between the nurses and the patients. The staff nurses at the nursing rehabilitation center provide direct care to the patients and are considered the primary source of influencing behavioral change through education and support (Pender, 1982). The concept associated with the component of behavioral outcomes aligned to the project is health-promoting behavior by adopting healthy eating to control diabetes among the patients (Alligood, 2018; Pender, 1982).

For this direct practice improvement project, the staff nurses provide direct care to the patients and are considered the primary source of influencing behavioral change through education and support (Pender, 1982). The nursing rehabilitation center fully adopted the ADCES7 Framework on Self-Care Behaviors™: for Healthy Eating to manage diabetes. The project was directly linked to the HPM within the context of the nurses using education to promote behavioral change for managing type II diabetes. Effective management of diabetes involves health care providers collaborating with patients to support and promote self-care behaviors (Susanto, 2019).

Roger's diffusion of innovation theory explains how an individual over time allows an idea to "diffuse" or spread through a population or social system (Rogers,

2003). The results are that the populace or person adopts a new idea, behavior, or product (Rogers, 2003). This quality improvement project used the educational intervention to promote healthy eating to manage type II diabetes in a nursing rehabilitation center. Roger's theory's five stages (knowledge, persuasion, decision, implementation, and confirmation) were aligned with this project (Rogers, 2003) and used to help nurses "diffuse" the evidence-based education on healthy eating among the diabetic patients at the rehabilitation center so that positive health outcomes can be achieved (Rogers, 2003).

Significance of the Project

Before implementing the ADCES7 Framework on Self-Care Behaviors™: for Healthy Eating, the project site did not have a diabetes educator or diabetes education program. Nurses accomplished the management of diabetes at the nursing rehabilitation center following orders from the physicians to assess the blood glucose levels through finger sticks and then determining if insulin coverage should be administered based on the doctors' orders. The lack of a diabetes educator and an evidence-based education program presented a gap in practice for diabetes management among the adult type II diabetic patients 65 years and older. A mixed-method study done by Adu et al. (2019) explored the barriers associated with poor diabetes management and found that a lack of education on diet, poor medication management, and poor blood glucose monitoring impacted the health outcomes of patients with type II diabetes. Furthermore, Adu et al. (2019) concluded that health care providers should use structured DSME as an intervention to alleviate the identified gaps in the management of the disease.

The project results added to the existing body of evidence that enhancing nurses' knowledge about diabetes positively impacts the care and support patients with type II

diabetes receive. The nurses at the rehabilitation center are now positioned to use evidence to assist the patients in achieving glycemic control by adopting healthy eating habits. Studies have shown a direct correlation between blood glucose levels and type II diabetes complications, such as neuropathy, cardiac disease, and increased mortality rates (Cheng et al., 2016). Any improvement in the patients' glucose levels can slow down the development and progression of microvascular complications (Cheng et al., 2016). Because this quality improvement project was implemented in a nursing rehabilitation center to provide a structured education program for the management of diabetes, a similar education program using the ADCES7 can be implemented in other nursing rehabilitation centers to improve the health outcomes of diabetic patients.

The quality improvement project fit within and contributed to previous literature regarding the need for a standardized method to educate type II diabetic patients related to the management of the disease (Adu et al., 2019; Biernatzki et al., 2018; Samdal et al., 2017). Many nursing rehabilitation centers do not have structured diabetes education programs to assist patients in achieving glycemic control (Munshi et al., 2016). It has been shown that activities such as diet and exercise contribute to blood glucose control among patients with uncontrolled diabetes and influence their health outcomes (Colberg et al., 2016). According to Powers et al. (2017), research outcomes showed that diabetes education programs, such as the ADCES7 self-care behaviors, have enhanced patients' knowledge of diabetes and improved their health outcomes. Colberg et al. (2016) acknowledged that most of the patients admitted to hospitals with diabetes complications stated that they did not receive diabetes self-management education during their admission. Therefore, the results from this project have demonstrated the feasibility of

implementing the ADCES7 Framework on Self-Care Behaviors™: for Healthy Eating Program for the nurses to use as an educational tool for diabetic patients to promote blood glucose management (Powers et al., 2017).

The results can guide future diabetes education programs and prepare nurses to provide quality care for type II diabetic patients. The evidence obtained from current literature demonstrated a need for nursing rehabilitation centers and long-term care facilities to transition from the traditional approach used for managing diabetes (Rasoul et al., 2019). Instead, rehabilitation centers and long-term care facilities should adopt a more structured and therapeutic method that include developing diabetes self-management programs for nurses. The diabetes self-management program enabled nurses to provide evidence-based supportive care to patients to adopt health-promoting behaviors to effectively control diabetes (Rasoul et al., 2019).

Rationale for Methodology

This project used a quantitative methodology. The quantitative method aims to gather objective data appraised through numerical analysis to apply mathematical and statistical measurements (Elfil & Negida, 2017). The results from quantitative methods are objective and easy to interpret (Curley & Vitale, 2019). The quantitative approach enables the collection of baseline and post-implementation data and allows for statistical inferences and numerical comparisons to demonstrate the potential decrease in the patients' blood glucose levels (Biernatzki et al., 2018; Samdal et al., 2017). The rationale for choosing the quantitative methodology was that it was the most appropriate method for evaluating the effectiveness of the intervention (ADCES7 Framework on Self-Care Behaviors™ Healthy Eating). In addition, based on Polit and Beck (2017), this

methodology was the most practical method to evaluate the baseline and post-implementation measurements of pre-prandial blood glucose levels of the patients.

The direct practice improvement project could have included subjective data on diabetes management. Still, as stated by Esperon (2017), this method would not have enabled the primary investigator to capture the objective data needed to answer the clinical question. In addition, subjective data cannot be used to determine the impact of the healthy eating program on the pre-prandial blood glucose levels of the patients because of the lack of statistical analysis (Esperon, 2017). The rationale was that this methodology relies heavily on the participants' experiences and the subjective or life occurrences of individuals who participate in the project or research (Leedy & Ormrod, 2021). In qualitative research, the investigator is more focused on processing, interpreting, and identifying themes to determine the outcomes from qualitative data (Leedy & Ormrod, 2021). The qualitative design explores human responses to the influence of a phenomenon (Boswell & Cannon, 2018). According to Curley and Vitale (2019), the qualitative methodology does not provide statistical representation; instead, it provides data from the participants' lived experiences, behaviors, feelings, and perspectives. These types of responses cannot be measured statistically and are subjective data. Since this methodology is based on the individual's perspective, it is most likely impossible to replicate the project's results (Curley & Vitale, 2019).

For this project, the quantitative approach was the most appropriate methodology. It relied on numerical data that was analyzed using statistical analysis. The process helped the primary investigator align the data collected with the clinical question (Leedy & Ormrod, 2021; Polit & Beck, 2017). The quantitative method is also more feasible for

generalizations because the variables' interaction (cause and effect) can be statistically interpreted to determine the results (Polit & Beck, 2017). The quantitative methodology was aligned with the project's goals because the primary investigator sought to collect quantifiable data on the pre-prandial blood glucose levels of the patients—additionally, the use of the quantitative method aligned with previous projects and studies. The evidence revealed that studies examining the effectiveness of diabetes education programs in improving patients' health outcomes with type II diabetes are often performed using quantitative methodology. In the previous studies, the researchers could use the results to improve practice and assist patients (Gathu et al., 2018; Hailu et al., 2019; Murray et al., 2018).

Nature of the Project Design

The most practical project design for this project was a quasi-experimental design. The quasi-experimental design allowed the primary investigator to manipulate the independent variable (ADCES7 Framework on Self-Care Behaviors™: for Healthy Eating) to quantify its causal effect on the dependent variable (pre-prandial blood glucose levels). The data were analyzed numerically and categorically for the organization and interpretation of the results. Polit and Beck (2017) explained that the quasi-experimental design enables the primary investigator to use statistical analysis to measure the independent variable's impact on the dependent variable. This was achieved by comparing baseline and four-week post-implementation pre-prandial blood glucose levels.

Compared to the correlational design, the quasi-experimental plan was the most appropriate for evaluating the impact of the ADCES7 Framework on Self-Care

Behaviors™: for Healthy Eating Program (independent variable) on the pre-prandial blood glucose levels (dependent variables) in a nursing rehabilitation facility. According to Polit and Beck (2017), the correlational design determines the relationship between two or more variables. However, it is not used to examine the cause and effect of the variables on each other (Polit & Beck, 2017). In correlational design, the variables do not undergo manipulation to achieve the outcomes. The DPI project was implemented to identify the impact of a DSME on healthy eating in achieving pre-prandial glycemic control among patients with type II diabetes. The quasi-experimental design enabled the primary investigator to use statistical analysis to measure the independent variable's impact on the dependent variable based on baseline and post-implementation measurements.

Data collection commenced after the nursing rehabilitation center granted permission to implement the project and approval from the Institutional Review Board (IRB) at Grand Canyon University. Three educational sessions provided education on the objectives of the ADCES7 Framework on Self-Care Behaviors™: for Healthy Eating and the outline of the framework. The primary investigator offered the educational sessions. Fourteen nurses and five charge nurses who worked on the three medical units attended the educational sessions. The Director of Nurses was also present for all the educational sessions and supported the primary investigator throughout the implementation of the project by making the necessary accommodations for the nursing staff to attend the educational sessions and helping to provide the location where the sessions were held. The educational sessions were completed on-site (at the nursing rehabilitation center) with adherence to COVID-19 physical distancing guidelines. There were three

educational sessions at different times for the nurses who worked the other shifts to attend.

The inclusion criteria for the patients included in the project were individuals 65 or older, male or female, diagnosed with type II diabetes within the past year, able to read and write English, and had elevated glucose levels (over 180 mg/dl). The exclusion criteria included individuals with type I diabetes, altered mental states (medication or neurological), who were unable to read or write English, and under the were the age of 65 years. The demographic data were collected from the Epic EHR database by the Director of Nurses and the primary investigator. The data collected included gender, age, and marital status. The data were de-identified using codes randomly assigned to each patient. The data collected were entered into a Microsoft Excel spreadsheet with the same de-identified code to maintain confidentiality. The computer used for data analysis was protected with password access that was only accessible by the primary investigator. Once the results were collected, the data were analyzed using the Statistical Package for Social Sciences version 27 (SPSS-27) with an inferential paired samples *t*-test.

Definition of Terms

According to Creswell & Creswell (2017), terms refer to describing the main words used in the project. This section provides clarification and precise meanings of the terms used so that the reader can draw meaning from the content. The following terms were used operationally in the quality improvement project.

ADCES 7 Framework

The Association of Diabetes Care and Education Specialists (ADCES, 2020) developed seven evidence-based self-care behaviors for diabetic patients. The seven main

areas of focus (framework) in self-management of diabetes are healthy eating, being active, monitoring blood sugar levels, medication regimen, problem-solving, reducing risks, and healthy coping. The ADCES7 framework provides education for nurses to provide diabetes self-management education to patients (ADCES, 2020).

Blood Glucose or Glycemic Control

This term refers to blood glucose levels to remain below 140 mg/dl and have a closer range of 70 to 110 mg/dl for optimum health (ADCES, 2020; American Association of Clinical Endocrinologists [AACE], 2020).

Clinical Significance

The effectiveness or impact of an intervention or treatment on the health outcomes of individuals (Heavey, 2018; Schober et al., 2018).

Comparison & Intervention Group

Comparison group refers to the group of individuals or participants who do not receive intervention or treatment. In contrast, the intervention group relates to the individuals or participants who received the intervention/treatment and data is collected to determine the impact or effectiveness of the intervention through identifying the differences that exist between the two groups (comparison and intervention), (Heavey, 2018; Schober et al., 2018).

Diabetes Education Program for Nurses

An evidence-based educational program was developed and implemented to equip nurses with the knowledge, skills, and expertise necessary to provide quality care to patients with diabetes in various health care settings (Powers et al., 2017).

Diabetes Self-Management

Diabetes self-management is a critical element in the care and management of diabetes. It is an ongoing process that supports clinicians, such as nurses, to help patients develop the knowledge, skills, and abilities essential for diabetes self-care to prevent complications (ADA, 2021a; ADCES, 2020).

EPIC Documentation Software

Epic is used by nurses to document the patients' care they provided, and the treatment patients received (Cole et al., 2018).

Healthy Eating

The consumption of fruits and vegetables in three or fewer servings daily is considered healthy eating. The dietary intake that constitutes healthy eating includes consuming fruits and vegetables and simultaneous reduction of the consumption of meat and carbohydrates. Individuals with type II diabetes who practice healthy eating have reported improved health outcomes and glycemic control (ADCES, 2020).

Hemoglobin A1C

This is a measurement of the average blood sugar levels over three months. In patients with type II diabetes, hemoglobin A1C should be less than 7%. The test is completed by collecting venous blood for analysis (Rutten et al., 2020).

Nova Stat Strip Glucometer

Glucose meters are used to assess the blood glucose levels of diabetic patients. The machine is portable and requires specific codes to accurately identify each patient before assessing the blood sugar level through a finger stick. The glucometer was

developed to transmit the blood glucose results for each patient to the electronic health record (Nova Biomedical, 2020).

Pre-Prandial Blood Glucose Level

A measurement of blood glucose levels before eating. The target for patients with type II diabetes is 80-130mg/dl (ADA, 2021b).

Self-Care Behaviors

The Association of Diabetes Care and Education Specialists (ADCES. 2020) identified seven main behaviors for effective management of diabetes. The main behaviors are namely, healthy eating (consuming healthy diet), being active (adequate exercise and physical activities), monitoring blood glucose levels, taking medication including understanding about insulin, and oral anti-diabetic medications, problem solving, healthy coping, and reducing risk (ADCES, 2020)

Statistical Significance

Within the broad context, statistical significance determines that the results of an evidence-based intervention or research findings are statistically consistent, reliable, replicable, and did not occur by chance (Polit & Beck, 2017; Schober et al., 2018).

Type II Diabetes Mellitus

This is a chronic metabolic disease that affects how the body metabolizes glucose. The body cannot produce enough insulin to control the blood glucose level. Resistance to insulin resulting in elevated blood glucose levels also characterizes type II diabetes. Poorly controlled diabetes can result in life-threatening complications, such as peripheral vascular disease, heart disease, stroke, and renal failure (Mayo Clinic, 2021).

Assumptions, Limitations, Delimitations

This section discusses the assumptions, limitations, and delimitations of the project. According to Theofanidis and Fountouki (2018), assumptions are statements that are considered to be truths but cannot be scientifically tested or examined. The primary investigator identified three assumptions in this project. First, it was assumed that all the nurses who participated in the ADCES7 Framework on Self-Care Behaviors™: for Healthy Eating would educate the patients and monitor them for compliance to healthy eating. The goal of implementing the ADCES7 framework at the nursing rehabilitation center was for the nurses to transfer the knowledge gained into the care and education of the diabetic patients and monitor and assess their responses to the education and provide ongoing support (ADCES, 2020). Second, it was assumed the educational intervention would improve the pre-prandial blood glucose levels of the patients. This assumption was driven by the clinical question, which sought to determine the impact of the healthy eating education program on the pre-prandial blood glucose levels of the patients. According to Elfil and Negida (2017) bias can exist with this assumption. The primary investigator should ascertain the scientific method used to protect the dependent variable (pre-prandial blood glucose levels) from manipulation. Third, it was assumed the nurses were motivated to improve the care of patients through the use of the ADCES7 Framework on Self-Care Behaviors™: for Healthy Eating. According to Germ et al. (2018), educational programs are designed to enhance nurses' knowledge to improve the quality of care and education delivered to patients. As a result, the primary investigator was driven by the assumption that the nurses would provide quality care supported by

evidence and best practice using the guidelines from the ADCES7 for the self-management of diabetes (Germossa et al., 2018).

This section identifies the limitations of the project. According to Theofanidis and Fountouki (2018) limitations are circumstances or factors the primary investigator cannot control for implementing the direct practice improvement project (Theofanidis & Fountouki, 2018). There were three limitations to this project—first, the lack of control over the data collection process for the variable of interest. The primary investigator was not allowed direct contact with the patients or access to the Epic electronic health record and was also prohibited from collecting demographic data (age, sex, highest level of education among the nurses). As a result, the primary investigator had to rely on the data provided by the Director of Nurses. According to Suresh (2018), lack of control over the data collection or retrieving the data can result in inappropriate data analysis and inaccurate transfer of data to the researcher/primary investigator (Suresh, 2018). Consequently, the limited control could impact the outcome of the results (Suresh, 2018).

Second, the registered nurses who attended the educational sessions were not monitored to ensure or determine if they were educating the patients about healthy eating and might not be willing to include the ADCES7 Framework on Self-Care Behaviors™: for Healthy Eating in the care of the patients. Chai et al. (2018) acknowledged that developing strategies to determine or evaluate if nurses or care providers are providing diabetes education to patients after being educated on diabetes care is an essential outcome measure to help determine the effectiveness of the education program/intervention. Therefore, the lack of validation that the nurses educated the patients is a limiting factor for this project (Chai et al., 2018). Third, this project was

implemented within a limited time frame (4 weeks). According to Elfil and Negida (2017), to determine the sustainability of the project or evidence-based intervention health promotion intervention for blood glucose control, the primary investigator would need to monitor and evaluate the intervention over a prolonged period.

This section describes the delimitations of this project. According to Theofanidis and Fountouki (2018), delimitations are the factors or boundaries set by the primary investigator. There were three delimitations for this project. First, the project was implemented on three medical units in a nursing rehabilitation center in New York. As a result, there was a restriction in the demography of the sample. Theofanidis and Fountouki (2018) stated that implementing an evidence-based intervention in a specific site and among a particular population limits the generalizability of the results to other health care facilities. Second, the sample was selected from the people of patients with type II diabetes who were 65 and older. Boswell and Cannon (2018) posited that the focus on a particular sample, site for implementation, and the variables narrow a project's scope and decrease the applicability of results to other settings. Third, the primary investigator used the ADCES7 Framework on Self-Care Behaviors™: for Healthy Eating Program to educate the nurses, who incorporated the knowledge gained into the care of diabetic patients. Using a specific education program presented a delimitation because the primary investigator could not validate that the program could educate nurses and patients in other health care organizations or if another educational intervention would have been equally applicable and practical.

Summary and Organization of the Remainder of the Project

The WHO (2021) acknowledged that the mortality and morbidity rate have

increased among individuals diagnosed with diabetes. The ADA (2021a) ranked diabetes as the seventh leading cause of death in the United States and acknowledged a steady increase in individuals with diabetes complications. The CDC (2021) and the WHO (2021) identified diabetes as an economic burden both nationally and globally. The effects of poorly controlled diabetes on the body's systems were explored by Berbudi et al. (2020) and Schulman-Green et al. (2016). The New York State Department of Health (2020) data showed an increase in the prevalence of diabetes in New York State, where the project was implemented.

The WHO (2021) also identified the need for health care providers to offer patients diabetes self-care education at the national and local levels to for effectively manage diabetes and reduce the mortality and morbidity rates. The gap identified in practice was the need to provide a consistent approach for the nurses to provide education on diabetes to patients. The nursing rehabilitation center site did not have a diabetes educator, and before implementing the project, there was no evidence-based education program for diabetes management. Consequently, it was identified that the ADCES7 Framework on Self-Care Behaviors™: for Healthy Eating Program needed to be implemented by providing education to the nurses who then provided the information to the patients.

The problem and purpose statements formed the basis for the implementation of the project, and both were developed from the need identified (to implement the ADCES7 Framework on Self-Care Behaviors™: for Healthy Eating Program) at the nursing rehabilitation center. The ADCES7 is an evidence-based framework that health care providers can use to guide education on the principles of diabetes care (ADCES,

2020). The project answered the following clinical question: It was not known if or to what degree the implementation of the ADCES7 Framework on Self-Care Behaviors™ *Healthy Eating Program* would impact the pre-prandial blood glucose levels among adult type II diabetic patients in a nursing rehabilitation center in New York? The project used the quantitative methodology with a quasi-experimental design to examine if the ADCES7 Framework on Self- Care Behaviors for Healthy Eating improved the adult type II diabetic pre-prandial blood glucose levels. The rationale for using the quantitative method with quasi-experimental design was that it enabled the collection of numeric data that could be statistically analyzed (Polit & Beck, 2017). The quasi-experimental design allowed for the supply of baseline and post-implementation pre-prandial blood glucose levels to measure the efficacy of the intervention and answer the clinical question (Leedy & Ormrod, 2021)

The project provided an evidence-based framework for nurses to educate diabetic patients at the nursing rehabilitation center (Biernatzki et al., 2018; Pal et al., 2018; Pinto et al., 2017). The scientific underpinnings of the project were Pender's middle-range theory, the health promotion model (HPM), and Roger's diffusion of innovation change model. Pender completed seminal work on the HPM in 1982 (Pender, 1982). Chapter 2 will review previous and current literature regarding diabetes self-management education. The theoretical framework discussed includes Pender's HPM and the diffusion of innovation framework developed by Rogers. A detailed review of the literature is provided with the themes and subthemes related to the topic. A summary of chapter 2 and transitional sentence will lead to Chapter 3. Chapter 3 is the methodology section of the manuscript. It will present the statement of the problem, clinical question,

methodology, and design. Other areas will discuss the population and sample selection, instrumentation (ADCES7), and data sources (Nova Stat Strip glucometer and Epic EHR). The last sections will provide the validity and reliability of the instruments used in data collection and analysis procedures, potential bias and mitigation, ethical considerations, and project limitations.

Chapter 4 offers the analysis and project findings. A descriptive summary of the participants will be given. The project results will be presented using an objective lens displayed in tables. Chapter 5 summarizes the quality improvement project, findings, and conclusions. A discussion of the theoretical framework and change model will be presented. Other sections include the practical and future implications of the project. The last segments comprise recommendations for future quality improvement projects and clinical practice.

Chapter 2: Literature Review

Diabetes is a complicated disease that can be challenging to manage. It can result in severe consequences, such as amputation, blindness, and premature death (Rowley et al., 2017). According to the ADA (2021a; Burd et al., 2020), the disease contributes to frequent hospital admissions, increased medical costs, and poor patients' health outcomes. The cost of treatment for the management of diabetes creates an enormous demand on financial resources at the national and local levels within the United States. According to the ADA (2021a), the financial cost to care for individuals diagnosed with diabetes at the age of 40 is $211,400; individuals diagnosed with the disease at the age of 50 is $135,600; and at age 60 the cost is $70,200. The occurrence and rate of diabetes continue to rise despite many interventions that have been implemented (ADA, 2021a). The New York State Department of Health (2020) affirmed that type II diabetes is preventable if appropriate actions, such as healthy eating, exercise, and lifestyle changes, are incorporated into practice.

The overall purpose of the quality improvement project was to determine if the implementation of the ADCES7 Framework on Self- Care Behaviors for Healthy Eating improves the pre-prandial blood glucose levels and quality of care of patients with Type II diabetes in a nursing rehabilitation center in New York. Nurses are at the forefront of healthcare delivery systems, yet they seldom provide education on diabetes to patients who are diagnosed with the disease (Chai et al., 2018; Gucciardi et al., 2020). The project used the ADCES7 Framework on Self- Care Behaviors for Healthy Eating to empower patients to learn more about diabetes in order to improve their health outcomes. The knowledge gained from implementing the ADCES7 Framework on Self- Care

Behaviors for Healthy Eating Program is presently a valuable evidence-based education tool that the nursing staff is using to provide education and care to patients with type II diabetes in the long-term care setting. The quality improvement project helped fill the gap created by the lack of using an evidence-based framework to educate patients with type II diabetes in nursing rehabilitation centers (Munshi et al., 2016).

Chapter 2 provides a comprehensive literature review on the best practices to substantiate the implementation of the ADCES7 framework. The background of the problem, the theoretical frameworks of Pender's health promotion and Roger's diffusion of innovation. The review of the literature will also be presented. Literature will be evaluated regarding diabetes self-management education for diabetic patients. The literature is separated into three themes and subthemes. The themes are type II diabetes and its complications, facilitating behavioral change for blood glucose control, and evidence supporting the ADCES7. The subthemes for theme one are namely, the impact of diabetes on the health care system and the economy, recommendations for the management of diabetes, and the impact of nursing care and education for the management of the disease. The subthemes for theme two include the impact of nutrition on type II diabetes, barriers to healthy eating among patients with type II diabetes, and barriers to diabetes self-management among patients with type II diabetes. The subthemes for the third theme are the impact of diabetes education, barriers to the provision of education among patients with type II diabetes, and health promotion and self-management support for patients with type II diabetes.

The literature review was conducted by utilizing peer-reviewed articles published between 1982 to 2021. The inclusion criteria for the articles were articles written in

English, related to type II diabetes, and conducted within the past five years. The exclusion criteria were articles written over six years, those involving type I diabetes, and children. Databases searched were Grand Canyon University online library, PubMed, CINAHL, Cochrane, Medline, ProQuest Nursing and Allied Health, and EBSCOhost. Keywords searched included type II diabetes, DSME support, nurses' knowledge, healthy eating, self-care behaviors, Pender health promotion theory, and health promotion. The search yielded 256,000 articles; however, the search was narrowed to 150 articles. A total of 50 articles were selected.

Diabetes care remains an economic burden; therefore, there is a need for prevention strategies to reduce health care costs and promote quality of life for individuals diagnosed with the disease. The ADA (2021b) called on healthcare organizations to develop strategies to assist patients in effectively self-managing diabetes to minimize complications. Furthermore, the World Health Organization (WHO, 2021), in echoing the need for global involvement and initiatives to control diabetes, called for more dynamic interventions from health care agencies to manage and prevent the complications associated with diabetes (Munshi et al., 2016).

According to Blaslov et al. (2018), diabetes was first documented in 1552 B.C. on an Egyptian papyrus. Blaslov et al. (2018) acknowledged that during this period, diabetes was classified as a mysterious ailment characterized by polyuria (excessive urination) and weight loss resulting in death. Diabetes was introduced the year 150 BC/AD by Dr. Arêtes (a Greek physician) who described the disease to be 'honey and siphon' (because of the sweet urine) (Blaslov et al., 2018). A vivid understanding of diabetes and the complications associated with the disease were identified in 1889 when researchers

discovered that insulin was released from the beta cells in the pancreas to control blood glucose levels (Blaslov et al., 2018; Chudasama, 2020). Despite initial discoveries and scientific developments on diabetes over the years, current studies on type II diabetes show that a gap in management still exists (Coffey, et al., 2018; Gucciardi et al., 2020). As a result, the poor management of this chronic illness warrants the need to implement education programs so that individuals diagnosed with the disease can receive optimal care for diabetes management and achieve quality health outcomes (Blaslov et al., 2018; Chai et al., 2018; Gucciardi et al., 2020).

While there is no single approach to manage diabetes effectively, various studies suggested a lack of diabetes education and management in health care settings has led to poor health outcomes for patients with diabetes (Cable, 2016; Krall et al., 2016; Sonmez et al., 2017). The project provided nurses with information on healthy eating for the management off diabetes so that they (the nurses) can educate the type II diabetic patients 65 and older at the nursing rehabilitation center. According to Munshi et al. (2016) and Powers et al. (2017), educational interventions on diabetes self-management behaviors using a guiding framework, such as the ADCES7, enabled nurses to assist patients with type II diabetes to adopt healthier lifestyle choices (diet, activity, blood glucose monitoring and medication management) that enhanced their health and wellbeing. The behavioral changes among the patients with type II diabetes resulted in improved glycemic control and lowered hemoglobin A1C levels (Munshi et al., 2016; Powers et al., 2017).

Bradford et al. (2017) and Enomoto et al. (2017) explored the factors that contributed to poor health outcomes for patients with type II diabetes and found that a

lack of education among patients, inadequate knowledge among caregivers, and poor communication about diabetes management among caregivers and patients resulted in increased readmission rates and lack of glycemic control for the patients. Powers et al. (2017) posited that nurses developing competencies in providing diabetes education helped patients decrease the risk of acquiring diabetes-related problems and improved their health outcomes. Lange and Pearce (2017) identified that nurses' knowledge and skill on diabetes self-management education have proven to improve diabetes management for patients with type II diabetes.

Theoretical Framework

The scientific underpinnings of the project were Pender's middle-range theory the health promotion model (HPM), and Roger's diffusion of innovation change model. Pender's health promotion model was developed in 1982 (Alligood, 2018; Pender, 1982; Petiprin, 2020). The foundation of Pender HPM is based on promoting health through behavioral change (Khodaveisi et al., 2017; Pender, 1982; Susanto, 2019). The HPM focuses on the individual adopting specific health related behaviors through motivation that is enhanced by the desire to achieve wellbeing and objectify the health potential of individuals resulting in the achievement of quality health outcomes. The seminal work that influenced the development of the health promotion model was a study Pender conducted to examine the influence of health promoting behaviors among youths to determine how the behaviors were established and influenced in youths (Alligood, 2018). Pender used the results from the study to develop the three significant underpinnings of the health promotion model which are namely, individual characteristics and experiences, behavior-specific cognitions, and affect and behavioral outcomes (Pender, 1982).

The HPM also defines health protection or the prevention of illness to be driven by the person's desire to take the necessary actions to avoid getting sick, detect illness early and maintain the highest level of functioning while living with the constraints of the disease (Pender, 1982). The three main components of Pender HPM are individual characteristics and experiences, behavior specific cognitions and affect, and behavioral outcomes (Pender, 1982). The HPM linked the patients' health needs to the adoption of healthy behaviors through education and support from health care providers (mainly nurses) resulting in behavioral change and quality health outcomes (Pender, 1982; Petiprin (2020).

The two components of the HPM model that were applicable to address the clinical question for the adoption of the ADCES7 Framework for Self-Care Behaviors on Healthy Eating to improve the blood glucose levels of the type II diabetic patients were the behavior specific cognitions and affect and behavioral outcomes. The ADCES7 Framework for Self-Care Behaviors on Healthy Eating was the health promotion educational tool used by the nursing staff to educate the patients on healthy eating for blood glucose control. The HPM served as an intersection between nurses and the patients for the enhancement of behavioral change (Alligood, 2018; Pender, 1982; Petiprin, 2020). The concepts for the component of behavior specific cognitions and affect within the model that were linked to this project are namely, the concepts of perceived benefits of action which aligned the ADCES7 Framework for Self-Care Behaviors on Healthy Eating to the nurses working in collaboration with the patients to recognize healthy food exchanges among the three main food groups, namely, carbohydrates, fats and proteins. The concept of activity related affect from the behavior

specific cognitions component in the HPM was aligned with the patients learning through the nurses using the ADCES7 Framework for Self-Care Behaviors on Healthy Eating to help the patients understand the impact of adopting healthy eating behaviors to control their blood glucose levels (Pender, 1982).

The concept of perceived self-efficacy in the HPM directly linked the education program to the patients being educated about diabetes and the benefits of eating healthy for diabetes management (Pender, 1982). The concept of interpersonal influences is a link between the staff nurses and the patients by nurses being the principal source of supporting behavioral change for blood glucose management among the patients (Pender, 1982). The concept of health promoting behaviors for the component of behavioral outcomes in Pender HPM is directly linked to the nurses working with the patients and use the ADCES7 framework as a guide to adopt healthy eating habits and achieve the desired behavioral outcomes for blood glucose control (Pender, 1982). The concepts of Pender HPM applied in the project enabled the nurses to use the ADCES7 framework to assist the patients in understanding more about healthy eating for diabetes management (Putra et al., 2019).

Roger's theory of diffusion and innovation was very essential for this project. The five stages: awareness/knowledge, persuasion, decision, implementation, and confirmation can occur over time (Lien & Jiang, 2016; Mohammadi et al., 2017). The change theory helped to link the implementation of the ADCES7 Framework for Self-Care Behaviors on Healthy Eating to improve the blood glucose levels of the type II diabetic patients (Mohammadi et al., 2017). As mentioned earlier, awareness/knowledge in the change model was linked to the ADCES7 framework through educating the

nursing staff about the project (Rogers, 2003). The persuasion stage was aligned with the project through the nurses being persuaded and encouraged to attend the educational sessions and being encouraged to use the ADCES7 Framework for Self-Care Behaviors on Healthy Eating to educate the patients (Rogers, 2003). During the persuasion stage, the nurses were influenced by the advantages of innovation to improve practice (Lien & Jiang, 2016). The decision stage in the change model linked the nursing staff making the decision to accept the ADCES7 Framework for Self-Care Behaviors on Healthy Eating as a teaching tool for diabetic patients (Rogers, 2003). The implementation stage is linked to the nurses applying the knowledge gained on the ADCES7 Framework for Self-Care Behaviors on Healthy Eating to educate the diabetic patients (Rogers, 2003). The confirmation stage of the change model is in alignment with the project being fully adopted by the nursing rehabilitation center as the evidence-based education program for diabetes care (Lien & Jiang, 2016; Rogers, 2003).

In summary, the HPM model identified nurses to be the principal influencers of supporting behavioral change among individuals throughout their life span (Pender, 1982). The diffusion of innovation model helps nurses to translate new ideas, educational strategies, and innovative interventions into practice to improve health outcomes and advance practice (Lien & Jiang, 2016; Tk & Chandran, 2017). The five stages of Roger's diffusion of innovation framework, provided a process by which the ADCES7 Framework for Self-Care Behaviors on Healthy Eating was implemented into practice. The transfer of knowledge on the ADCES7 Framework for Self-Care Behaviors on Healthy Eating to the nurses helped them to incorporate the knowledge into the care of type II diabetic patients (Tk & Chandran, 2017).

The project advanced both theories through using education to achieve health promoting behaviors among diabetic patients and transfer evidence into practice. Providing education on diabetes is an evidence-based approach for health promotion through behavioral change. According to Alligood (2018) health promotion through behavioral change or the adoption of healthy lifestyle practices is the basis for Pender's HPM. Roger's diffusion of innovation theory was advanced through the adoption of the ADCES7 as an education tool to control diabetes and the diffusion of the knowledge throughout the rehabilitation center. The project advanced scientific knowledge on the approaches that can be applied to educate nurses who will in turn provide quality care and education to patients.

Review of the Literature

This section of the chapter will examine the evidence-based and peer-reviewed articles that are aligned with the problem and purpose of this project. The major themes discussed are type II diabetes and its complications, facilitating behavioral change for blood glucose control, and evidence supporting the ADCES7. The three subthemes for theme one, are namely, impact of diabetes on health care and the economy, recommendations for diabetes management, and the impact of nursing care and education for management of diabetes. The subthemes for theme two are the impact of nutrition on type II diabetes, barriers to healthy eating among patients with type II diabetes, and barriers to diabetes self-management among patients with type II diabetes. The subthemes for theme three are the impact of diabetes education, barriers to the provision of education among patients with type II diabetes, and health promotion and self-management support for patients with type II diabetes.

Type II Diabetes and Its Complications

The initial step in diabetes management among individuals with type II diabetes is understanding the disease and identifying the complications associated with it (ADA, 2021b). Diabetes is a complex chronic metabolic disorder, which if uncontrolled, can result in life-threatening complications (ADA, 2021b). According to Berbudi et al. (2020) and Macido (2019) approximately 90% of the reported cases of diabetes globally is type II diabetes. The ADA (2021b) asserted type II diabetes occurs when the beta cells in the pancreas do not produce enough insulin to control the glucose levels in the blood. In patients who are obese and patients who are not physically active, there is resistance to the insulin uptake, and the pancreas increases cell mass to produce more insulin to compensate for the insulin resistance resulting in type II diabetes (ADA, 2021b). As a result, patients with type II diabetes require insulin therapy to control the blood glucose levels. The long-term effects of insulin resistance in type II diabetes leads to macrovascular complications, such as atherosclerosis, which can result in heart disease, and microvascular complications, namely neuropathy (damage to peripheral nerves), retinopathy (impairment in the retina), and nephropathy (damage to the kidneys causing impairment in renal function) (ADA, 2021a; CDC, 2021).

According to the ADA (2021b) the average blood glucose range is 70 to 110 mg/dl, pre- prandial (before breakfast) blood glucose levels 80 to 130 mg/dl, and post-prandial (after dinner) 140 to 180 mg/dl. The Mayo Clinic (2021) explained that if the blood glucose levels for patients with type II diabetes are elevated over a prolonged period, such as over three months, it affects the body's homeostasis and debilitates the functions of individuals who have poorly controlled diabetes. Patients with diabetes are

more susceptible to infections, including respiratory tract infections and urinary tract infections (Mayo Clinic, 2021). A life-threatening complication that affects patients with type II diabetes as a result of uncontrolled blood sugar levels is hyperosmolar hyperglycemic state (HHS) (Adeyinka & Kondamudi, 2021; Stoner, 2017). Stoner (2017) explained that HHS is manifested in elevated blood glucose levels and serum hyperosmolarity. The condition is characterized by severe dehydration, marked elevated blood glucose level, altered neurologic function, positive acetone in the urine, fruity breath, and increased osmolality level. HHS usually occurs after a prolonged period of hyperglycemia resulting in insufficient oral fluid intake to prevent severe dehydration and extreme osmotic diuresis (Adeyinka & Kondamudi, 2021). The Cleveland Clinic (2019) identified the diagnostic criteria to determine a hyperosmolar hyperglycemic state, which are plasma glucose level greater than 600 mg/dl and elevated serum osmolality greater than 320 mOsm/kg (the normal range is 275 to 295) with the absence of ketoacidosis. The incidence in the mortality rate of HHS is approximately 20%, and it is significantly higher than diabetic ketoacidosis (the life-threatening complication seen in patients with type I diabetes), which is less than 1% among patients admitted to the hospital (Cleveland Clinic, 2019).

A review done by Berbudi et al. (2020) explored the impact of type II diabetes on the immune system and found that elevated blood glucose levels result in susceptibility to infections among patients diagnosed with the disease. With the increasing prevalence of the disease, individuals will be more prone to increased infections because hyperglycemia affects the immune system and inhibits the body from developing resistance or fight against invading organisms because of damage to the immune system. In a systematic

review conducted by Khalil (2017) between 2000 to 2016, Khalil (2017) examined the macrovascular factors associated with type II diabetes. Khalil (2017) found a direct relationship between elevated blood pressure and blood glucose control in the progression of diabetic retinopathy and nephropathy (Khalil, 2017). The researcher concluded that patients with diabetes require early interventions, such as diabetes self-management programs, to minimize the risk of complications. This theme was divided into three subthemes, the impact of diabetes on health care and the economy, recommendations for diabetes management, and role of nurses in the provision of care to diabetic patients (Khalil, 2017).

The Impact of Diabetes on Health Care and the Economy. Diabetes and its associated complications are a tremendous burden both nationally and globally. Data from the ADA (2021a) showed that in 2015 approximately 30.3 million people in the United States were diagnosed with type II diabetes (ADA, 2021a). Within that same year, the cost of medications to control type II diabetes was 2.3 times higher than the cost of care for non-related diabetes diagnoses (ADA, 2021a). According to Hirsch et al. (2017), the cost of care for patients with type II diabetes in the United States increased from $174 billion to $245 billion in 2012, with an increase of 41% over five years (2012 to 2017). The United States Department of Health and Human Services (USDHHS, 2018) acknowledged that diabetes is more prevalent among the older population of individuals both globally and nationally. As a result, Medicare covers approximately 62% of the medical costs for diabetes management within the United States, with roughly 3.2% of the costs for diabetes care paid by individuals who are not insured (USDHHS, 2018).

Data from the CDC (2021) showed that diabetes is the costliest chronic medical condition to manage, and approximately $1 of every $4 in the United States is spent on caring for individuals with type II diabetes. An estimated $237 billion is spent annually to provide direct medical care to patients with diabetes, and another $90 billion is lost on reduced production (CDC, 2021). The CDC (2021) acknowledged that from 2002 to 2017 there was a 60% increase in the cost of care for individuals 65 and older who have type II diabetes, and Medicare is primarily covering the cost of care for these patients. To stress the high cost of diabetes care, the CDC (2021) identified that the lifetime individual cost of care for complications associated with diabetes is 48% to 64% more than stroke and heart disease.

Based on the current trends on the prevalence of diabetes within the United States, one in every three persons is projected to be diagnosed with type II diabetes by 2030 (CDC, 2021). More than 34 million individuals of all age groups have diabetes (approximately 1 in 10), with 888 million people diagnosed with prediabetes (CDC, 2021). According to Gregg et al. (2019), the national statistics on the complications of diabetes indicated that between 2010 to 2015, hospitalizations for hyperglycemic crisis related to type II diabetes increased by 73%, and the reported percentage of deaths related to complications of type II diabetes within the same period increased by 55% (Gregg et al., 2019). The complications associated with diabetes are increasing among adults 64 and older, and the increasing prevalence of diabetes will have a profound impact on the health of individuals and the cost of care if a multifaceted approach is not used to control the disease (Gregg et al., 2019; Hirsch et al., 2017). According to the ADA (2021a), in 2018 34.2 million individuals within the United States were diagnosed with diabetes

compared to 30.3 million individuals diagnosed in 2015. This increased the need to provide treatment therapies that target the education of patients on how to manage the disease and achieve glycemic control (ADA, 2021a). The prevalence of diabetes among seniors (65 and older) is at 26.8% of the United States population with approximately 14.3 million seniors diagnosed with the disease (ADA, 2021a).

Recommendations for Diabetes Management. As mentioned earlier, diabetes can be challenging to control, and the complex nature of the disease requires a combination of evidence-based strategies to manage the condition (Pinto et al., 2017). The ADA (2021b), in its position statement on the standard of care for diabetes management, identified the need for a comprehensive approach to address the various aspects of diabetes care (ADA, 2021a). The standards set forth by the ADA emphasized that health care providers should provide timely treatment that is supported by evidence-based guidelines and use a collaborative approach (ADA, 2021a). The patient-centered approach requires for health care providers to align patient care for diabetic patients with education on disease management using a behavioral approach (Pinto et al., 2017). Fostering a collaborative community among care providers and diabetic patients with education and support is essential for achieving quality health outcomes (AACE, 2020).

The Healthy People 2030 initiative is the fundamental framework that guides health care organizations, communities, and health care providers to develop goals and set benchmarks for disease management and health promotion at the local and national levels (USDHHS, 2018). The main objective of diabetes care is to decrease the cost of care and improve the quality of life for individuals who are diagnosed with the disease (USDHHS, 2018). Effective therapy must be developed to manage diabetes because a

diagnosis of diabetes increases the mortality rate for individuals with the disease by 1.8 times compared to patients who do not have the disease (USDHHS, 2018). The individuals with diabetes are at higher risk of developing heart attacks, renal failure, lower-limb amputations, and blindness (USDHHS, 2018). One of the main objectives declared in the national agenda to improve the quality of life for patients living with diabetes is a reduction in complications, improvement in community health care services through health promotion, education, and the provision of support services for individuals diagnosed with the disease (USDHHS, 2018). In the control of diabetes, the model for health promotion and disease management requires a multifaceted approach to empower patients with diabetes to modify behaviors and adopt healthy lifestyle practices for the control of the disease (USDHHS, 2018).

The AACE (2020) developed an algorithm for the comprehensive management of type II diabetes. The algorithm specified that health care providers should use evidence-based tools to promote lifestyle modifications, such as diet, weight control, physical activities, and medication management, and preventing complications through education (AACE, 2020). The treatment principles for type II diabetes and prediabetes management include nutrition, physical activity, sleep, behavioral support, and smoking cessation (AACE, 2020). The CDC (2021) identified partnerships among private and public organizations to manage, control, and prevent diabetes through education and health promotion. Controlling diabetes through the development of lifestyle change programs and collaboration with health care providers have led to the adoption of healthy life style practices among diabetic patients (CDC, 2021). The CDC (2021) asserted the need for the availability of diabetes education and support services to assist individuals with

diabetes learn how to take care of themselves and manage diabetes. The CDC (2021) stated that health care organizations should incorporate evidence-based diabetes education programs to help diabetic patients gain the knowledge to make healthy lifestyle choices on reducing the risk of complications related to diabetes. The CDC (2021) specifically identified the ADCES7 DSME program as an evidence-based intervention that can assist patients in adopting healthy lifestyle practices through behavioral change. The evidence showed that DSME and support enable individuals with diabetes to learn how to care for themselves and achieve glycemic control (CDC, 2021).

In addressing the recommendations for effective diabetes management Harris (2019) postulated that health care providers should be equipped with the knowledge, skills, expertise, and evidence-based tools to provide support and education to patients with type II diabetes. According to the CDC (2021), patient education on medication regimen, diet, activities, routine screening for the complications of diabetes, follow-up care, and establishing short and long-term goals could decrease the risk of complications associated with diabetes. The implementation of ADCES7 Framework for Diabetes Self-Care on Healthy Eating at the nursing rehabilitation center is based on the best evidence specific to diabetes care and has proven to control diabetes, and improve the health outcomes of patients with type II diabetes (CDC, 2021; Harris, 2019).

The Impact of Nursing Care and Education for Management of Diabetes. Nurses are direct caregivers and at the forefront of health care delivery (Davies et al., 2018). As a result, it is recommended that nurses use evidence-based diabetes education programs, such as the ADCES7 framework, to provide education on diabetes, monitor and support patients, and measure their health outcomes (CDC, 2021). The ADA (2021b)

and Davies et al. (2018) acknowledged that nurses are positioned to support patients in making informed decisions on diabetes care and provide quality care that is organized and driven by theoretical underpinnings to support behavioral change. Nurses and other health care providers play essential roles in assisting patients to understand and apply the concepts of diabetes management relating to activities such as healthy eating, and engaging in exercise to prevent the complications, and achieve glycemic control. According to Davies et al. (2018), the critical components of the ADCES7 self-care behaviors enable caregivers, such as nurses, to provide care that is structured and supported by evidence. The ADCES7 framework allows for ongoing support and aligns activities with the individual's health care needs to achieve health outcomes (Davies et al., 2018).

In a primary outpatient setting, Azami et al. (2018) conducted a randomized controlled study to evaluate the impact of a diabetes education program delivered by nurses on improving lifestyle, clinical and psychosocial outcomes among type II diabetic patients. The participants included 142 adults who were randomly selected for the study. The intervention group received education on diabetes, and the control group received the standard diabetes care (Azami et al., 2018). The outcomes of the study were measured by laboratory values which included the collection of hemoglobin A1C values prior to implementing the diabetes education program and 24 weeks after implementation, weight, and responses to a questionnaire on diabetes self-management (Azami et al., 2018). The data were analyzed using analysis of variance. In week 12 of the study, the participants who received the education on diabetes had significantly decreased hemoglobin A1C values at 49% compared to the participants who were in the control

group. In week 24 of the study, the differences between the hemoglobin A1C values increased to 62% ($p < 0.001$) (Azami et al., 2018). The results showed that 21.1% of the patients who received the diabetes education intervention achieved hemoglobin A1C levels <7% in comparison to the patients from the control group who did not achieve a decrease in their hemoglobin A1C levels (Azami et al., 2018). The researchers concluded that the diabetes education program was effective in improving the lifestyle, clinical, and psychosocial outcomes of the participants who were included in the intervention in comparison to control group (Azami et al., 2018).

To evaluate the impact of nurse's role for management of type II diabetes, Crowe et al. (2019) completed a systematic review. The objectives of the systematic review were to determine the effectiveness of nurse-led interventions for diabetes care in relation to glycemic control, cost effectiveness of care, and patient satisfaction (Crowe et al., 2019). The researchers conducted a literature search using EMBRASE and CINAHL for data. The question was: Is nurse led primary care for diabetes clinically effective (improvements in glycemic and other biological measures, patient satisfaction, and cost-effectiveness)? The method included a review of quantitative studies among adults between 2003 to 2018 (Crowe et al., 2019). The studies were evaluated with Cochrane Collaboration's tool to examine any potential risk for bias. The researchers reviewed 18 studies that were previously published and met the eligibility standards (Crowe et al., 2019). Three randomized control trials showed a statistically significant difference in the blood glucose levels for the patients who received diabetes care and support from nurses to control their blood glucose levels. Crowe et al. (2019) acknowledged that three studies showed a significant reduction in the patients' hemoglobin A1C levels. There was an

improvement in self-care behaviors and control of the complications associated with diabetes in three of the randomized control trials (Crowe et al., 2019). The four studies that measured cost-effectiveness based on nurses' care of patients with type II diabetes showed that the care and education nurses provided for patients with diabetes led to reduced costs of care to manage diabetes. The researchers concluded that there was supporting evidence to substantiate the essential role nurses play in providing quality care to diabetic patients (Crowe et al., 2019).

In an observational study, Rutten et al. (2020) examined the impact of nurses using a patient-centered approach to enhance patient engagement in self-care activities (healthy eating, exercise, blood glucose self-monitoring, and medication therapy) for blood glucose management among type II diabetic patients (Rutten et al., 2020). The research question aimed at identifying the impact of a patient-centered diabetes education program on the blood glucose levels for patients with type II diabetes (Rutten et al., 2020). The study was conducted in forty-seven primary health care settings and six outpatient clinics between November 2015 and February 2017 (Rutten et al., 2020). The participants included in the study were1299 patients (Rutten et al., 2020). The study lasted for one year and entailed using a patient centered approach to provide diabetes self-care education (Rutten et al., 2020). The education program was the independent variable and the dependent variables were the blood glucose levels, low density lipo-protein cholesterol levels, body mass index and the hemoglobin A1C levels of the participants (Rutten et al., 2020). The data collected was analyzed using a repeated measure and paired *t*- test was used to compare the baseline and post intervention data. The results showed a significant reduction in the participants' blood glucose levels, body

mass index (-0.22, 95% CI -0.33 to -0.10 with $p<0.001$), low density lipo- protein cholesterol from -2.71 to -0.77 and hemoglobin A1C levels from 0.12% to 0.08% (Rutten et al., 2020). The researchers concluded that patient-centered diabetes education programs that are support led by nurses are effective interventions for blood glucose control. The study also revealed that diabetes teaching and knowledge about the disease process were impacted by the educational intervention and patient centered approach (Rutten et al., 2020). The researchers acknowledged the significance of including diabetes education in the plan of care for type II diabetic patients (Rutten et al., 2020).

In a systematic review, Akiboye et al. (2021) evaluated the impact of nurses on diabetes care in in-patient settings. The research question was: What is the impact of diabetes nurses in hospital setting? The researchers conducted a systematic search of MEDLINE, CINAHL and Embase from 1998 to 2019, and the principal search terms were nurses in hospital setting and diabetes care. Ten studies that included the standardized measurement of outcomes met the inclusion criteria for the review. One study was a randomized control trial, and nine were quasi-experimental with a pretest posttest design (Akiboye et al., 2021). The results showed a reduction in the length of stay in hospitalizations from 0.5 to 3 days and improvement in the delivery of care and decrease in the admission rates for complications associated with diabetes (Akiboye et al., 2021).

The impact of nurses' knowledge on the management of type II diabetes was investigated by Hurley et al. (2017) in a mixed-method study. The research question was, what is the impact of nursing management on the care of patients with diabetes in a nursing home setting? The study used the pretest posttest design to evaluate the nurses'

knowledge of diabetes. The study was conducted in 44 nursing homes (Hurley et al., 2017). Staff education was provided for the nurses who took care of patients with type II diabetes. A focus group intervention was then used to determine the level of supportive care provided to the nursing home residents (Hurley et al., 2017). The results indicated that there was a gap in nurses' knowledge about diabetes, and the need for more evidence-based interventions and guidelines for the management of diabetes existed (Hurley et al., 2017). Further, nurses needed education with current evidence to be better prepared to manage the care of patients. The limitations included time and geographical constraints in getting the nurses to commit to the investigation thoroughly. According to the authors, the findings can be used to support the development of educational programs on diabetes management (Hurley et al., 2017).

In summary, the literature identified that diabetes is a complicated chronic disease that can be challenging to manage if there is no structured ongoing care for effective management through education and support. The researchers identified the debilitating complications associated with type II diabetes and stressed the need for implementation of educational tools and guidelines for nurses to use to improve the health outcomes of patients with type II diabetes (ADA, 2021a; Berbudi et al., 2020; CDC, 2021; Cleveland Clinic, 2019; Rutten et al., 2020). The ADA (2021b) and CDC (2021)) explained that access to evidence-based tools would help prepare nurses to use the components of the DSME to promote diabetes self-care so that patients with type II diabetes can gain the knowledge and skills necessary to effectively self-manage diabetes.

The direct practice improvement project used the Pender HPM and the diffusion of innovation change theory to implement the ADCES7 Framework for Self-Care

Behaviors on Healthy Eating in a nursing rehabilitation center and evaluate the impact of the framework on the pre-prandial blood glucose levels of patients 65 and older with type II diabetes. The subtheme recommendations for diabetes management provided the current evidence from the various organizations that set forth the guidelines and standards for effective diabetes management. These guidelines were used in this project to support the implementation of the ADCES7 Framework for Self-Care Behaviors on Healthy Eating (AACE, 2020; ADA, 2021a; CDC, 2021; Harris, 2019; Pinto et al., 2017; USDHHS, 2018).

The findings in the literature identified the role nurses play in the provision of care to diabetic patients. The studies done by Davies et al. (2018) and Rutten et al. (2020) explored the impact of supporting behavioral change for patients with type II diabetes through the application of education programs. The results indicated that the patients who received education on diabetes management had improved blood glucose levels and hemoglobin A1C levels compared to the patients who received the standard care for blood glucose management (Davies et al., 2018). The synthesized literature demonstrated the complications associated with poorly controlled blood glucose levels and the impact of providing diabetes care and education that is supported by evidence and driven by a theoretical framework to control the complications associated with the disease (ADA, 2021b; Berbudi et al., 2020; Schulman-Green et al., 2016). The evidence suggested that no single intervention can control diabetes, but adoption of self-care behaviors. namely diet and activity (modifiable risk factors), can minimize the risk of complications, such as heart disease, nephropathy, and retinopathy (ADA, 2021b; Cheng et al., 2016; Khalil, 2017; Morgan et al., 2018).

The literature discussed under theme one provided the supporting evidence on the complications of type II diabetes, and the subthemes explored the recommendations and the essential role nurses can play in the provision of evidence-based diabetes care, education and ongoing support to patients with type II diabetes (Akiboye et al., 2021; Azami et al., 2018; Crowe et al., 2019; Davies et al., 2018). Theme one also provided the evidence that supported the application of Pender health promotion model as the theoretical framework to support behavioral change for the project (Alligood, 2018; Kurnia et al., 2017; Pender, 1982; Sibel & Argon, 2018). Theme two will explore facilitating behavioral change for blood glucose control.

Facilitating Behavioral Change for Blood Glucose Control

According to Cheng et al. (2016), research results have confirmed that education on self-care behaviors can control diabetes if it facilitates behavioral change in patients. For blood glucose control and to effectively manage diabetes, Cheng et al. (2016) explained that it is essential patients are educated on both the modifiable and non-modifiable risk factors of the disease. According to Cheng et al. (2016), the non-modifiable risk factors for type II diabetes are age, family history, and history of gestational diabetes. The modifiable risk factors for diabetes are diet, hypertension, smoking, obesity, and sedentary lifestyle. Nevertheless, studies have shown that there is a gap in diabetes education especially among patients with type II diabetes (Cheng et al., 2016). The standards of care set forth by the ADA (2021b) stated that diabetes care provided by health care practitioners, such as nurses, should be supported by evidence-based education that will promote behavioral change relating to the modifiable risk

factors, diabetes self-care, and the enhancement of psychological well-being (ADA, 2021b).

In a quantitative, quasi-experimental study, Flode et al. (2017) explored the impact of behavioral change based on knowledge gained from a DSME program. The study was conducted in a primary care setting with the objectives to explore the impact of diabetes education on behavioral change among patients with type II diabetes. The participants were selected by random sampling, and 115 participants were included in the study. The diabetes education program was implemented between the month November 2013 and June 2014. The dependent variables were diabetes knowledge and self-efficacy to determine behavioral change. The data collected from pretest posttest samples were analyzed using paired *t*-tests, and the Wilcoxon signed-rank test was used for skewed data (Flode et al., 2017). The results showed a significant difference in the data ($p < 0.001$) from the baseline over three months of implementing the intervention. The results also showed that there was significant improvement in the participants' self-efficacy scores (determined behavioral change) from baseline ($p = 0.022$) over three months. The researchers concluded that facilitating behavioral change among type II diabetic patients in primary care settings requires collaboration among healthcare providers and patients (Flode et al., 2017).

An exploratory test was done by Zupa et al. (2018) to examine the support type II diabetic patients receive to promote durable behavioral change after receiving education on diabetes in a primary health care setting. A total of 222 patients participated in the study. The patients' hemoglobin A1C was calculated and showed a reduction from 9.6 to

8.4 over six months. Over the 12-month time frame, hemoglobin A1C decreased from 9.2 to 8.1 ($p < 0.001$).

According to Flode et al. (2017) and Zupa et al. (2018) collaboration and partnership among care givers are essential for facilitating behavioral change. The Pender HPM, which was the overarching theoretical framework for this quality improvement project, identified behavioral change to be a significant concept relating to diabetic patients (Pender, 1982). Behavioral change has helped diabetic patients to control diet and exercise, which in turn decreased their blood glucose levels (Kurnia et al., 2017). For this project, the influence of health promotion supported behavioral change through the nurses using the ADCES7 Framework on Self- Care Behaviors for Healthy Eating Program to educate the type II diabetic patients. The Pender HPM was used to identify how to facilitate behavioral change among individuals with type II diabetes to achieve wellness and wellbeing (Pender, 1982). The ADA (2021b) and USDHHS (2018), in the Healthy People 2030 recommendations, identified the need for the provision of education, and support from caregivers to patients with chronic medical conditions such as diabetes. Nurses are positioned to help patients identify how prior behaviors can determine current behaviors and influence current health states (Khodaveisi et al., 2017). Implementing the ADCES7 framework allowed nurses to promote behavioral change on healthy eating among patients with type II diabetes (Khodaveisi et al., 2017).

Facilitating and sustaining behavioral change for the control of type II diabetes require support and motivation from health care providers (Kurnia et al., 2017). In the argument on lifestyle adjustments through the adoption of healthy behaviors, Swanson and Maltinsky (2019) contended that facilitating behavioral change for diabetes

management requires evidence-based care and patient-centered education tailored to assist patients with type II diabetes achieve optimum health outcomes. According to Swanson and Maltinsky (2019), before providing diabetes education, health care providers must assess the specific behaviors that influence the adoption of diabetes self-care behaviors. Assessing specific behaviors enables health care providers to identify the barriers that can inhibit self-care behaviors and assist patients in developing strategies to overcome them and participate in self-care activities (Swanson & Maltinsky, 2019). The ADA (2021b) recommended in the national standard for diabetes management suggested that individuals with type II diabetes be encouraged to participate in diabetes self-management education programs and obtain the necessary support they need to enhance their knowledge and skills for diabetes care (ADA, 2021b).

Impact of Nutrition on Type II Diabetes. The ADA (2021b) asserted the reference range for the pre-prandial blood glucose levels for adult patients with type II diabetes is 80 to 130 mg/dl and post-prandial 80 to 180 mg/dl. Balanced nutrition is an intervention that contributes to the management of type II diabetes (ADA, 2021b). According to Sami et al. (2017), poor nutrition or dietary intake can cause elevated blood glucose levels, resulting in complications, such as altered tissue perfusion, neuropathy, and nephropathy, resulting in loss of functionality over time (Sami et al., 2017). Dietary practices and sedentary lifestyles are modifiable risk factors that contribute to the increasing incidence of diabetes (Sami et al., 2017).

Studies showed how adherence to dietary practices have resulted in resulting in the control of diabetes (CDC, 2021; Susanto, 2019). On the other hand, it was identified that the lack of education about diabetes, cultural beliefs, and norms influenced how

patients with diabetes accept treatment, perceive diabetes education, and manage the disease (CDC, 2021; Susanto, 2019). In a randomized quantitative study, Morgan et al. (2018) evaluated the effectiveness of education on nutrition among patients with type II diabetes. The education intervention included teaching diabetic patients to make healthier food choices from the food groups and accurately count the carbohydrates of food intake. The hypothesis for the study was that the patients who participated in the diabetes self-management education program on nutrition and healthy eating would have normal hemoglobin A1C levels after the program. The research method was a randomized selection of the participants, and the study included 150 adults with type II diabetes. The independent variable was the education on nutrition for the control of diabetes, and the dependent variable was the hemoglobin A1C levels over six months. A baseline hemoglobin A1C measurement was obtained from the patients. The pre-intervention hemoglobin A1C = 7% to 10%. After six months, the hemoglobin A1C improved -0.83%, -1.28, -0.33, $p < 0.001$ and counting carbohydrate for healthy eating -0.63%, -1.03, -0.18, $p = 0.04$. The statistical analysis calculated the baseline characteristics to formulate a comparison using Wilcoxon, Kruskal Wallis, and chi-square tests. The results showed that diabetes self-management education focuses on teaching patients about healthy food choices and encouraging them to make the appropriate food choices and impact their health outcomes. This was evidenced by an improvement in the patients' hemoglobin A1C level (Morgan et al., 2018).

In a systematic review, Barreira et al. (2018) explored the impact of diet and physical activity on the blood glucose levels among patients with type II diabetes. The systematic review attempted to identify the effectiveness of implementing a combination

of diet and physical activities on blood glucose levels and lipid profiles among diabetic patients. The systematic review included review of 30 randomized controlled trials that focused on physical activities and dietary interventions among patients with type II diabetes. The participants included in the studies were 60 years and older. The findings indicated that physical activities and dietary modifications effectively help patients achieve glycemic control. The authors concluded that the results could guide the development of diabetes interventional programs for patients who are 60 years and older. The limitations identified were the intensity, type of exercise, and the nutritional plan that may affect the outcome, varying duration of the study, and the population of patients included in the study. The patients were not tracked over time to identify or determine the long-term benefits of the interventions. The researchers also recognized that the patients taking medications and herbal supplements were not considered and therefore presented as a limitation.

In a quantitative study conducted in a clinic, Pinto et al. (2017) used convenience sampling to evaluate if type II diabetic patients' value nutritional therapy. The sample size was 62 patients who were diagnosed with type II diabetes. The method used to collect the data was face-to-face, semi-structured interviews on dietary intake and physical activity. The interview included data collection the participants 24-hour dietary recollection. A five-point Likert scale was used to rate the response of the participants. The researchers used food composition tables to calculate the data collected on the participants' nutritional habits. The data were analyzed using a one-way analysis of variance (ANOVA) to make multiple group comparisons (dietary intake and physical activity). Pearson's correlation coefficient was used to analyze the correlation among the

groups in the data collected. The researchers used a two-tailed analysis to determine the statistical significance. The Mann-Whitney test was used to analyze the differences of the scores for dietary intake quality, and the result was statistically significant ($U = 473.5$; $p < 0.001$). The results of the ANOVA analysis (F-19.6; $p < 0.001$) showed that the patients engaged more in nutritional dietary intake in comparison to physical activity. The results showed that the patients viewed healthy eating habits as a behavioral intervention that could help them to control diabetes. To achieve glycemic control, patients with type II diabetes have to make dietary modifications to lose weight and gain control. The results produced enough evidence to substantiate the use of diabetes self-management education on nutrition to support patients' glycemic control. The synthesized literature review indicated that diabetes education programs impact patients' health outcomes (Barreira et al., 2018; Pal et al., 2018; Pinto et al., 2017). The evidence also showed a link between adherence to nutritional therapy and blood glucose control among type II diabetic patients (Pinto et al., 2017).

According to Abu-Qamar (2019), achieving glycemic control among patients with type II diabetes requires ongoing adherence to recommended dietary guidelines for effective management of diabetes. Balanced nutrition that is guided by a plan supported by evidence is fundamental for diabetes management. The balanced meal plan is fundamental for regulating and controlling glucose and fats within the body and enhance the body’s response to the pharmacological interventions to control diabetes (Abu-Qamar, 2019). As a result, patients with type II diabetes can achieve optimal glycemic control. Diabetes self-management education on the different food groups, carbohydrates,

protein, fats, and fibers equips diabetic patients with the knowledge to make healthy food choices (Abu-Qamar, 2019).

In a randomized controlled trial, Hemminngsen et al. (2017) examined the effects of diet and physical activity for the management of type II diabetes. The research question was: What is the impact of diet and physical activity on reducing complications among patients with type II diabetes? The research method used a quantitative randomized control trial with the Cochrane methodology to collect and analyze the data. The study included 12 randomized controlled trials, which randomized 5,238 individuals with type II diabetes. The independent variables were diet and being active, and the dependent variables were complications associated with diabetes. The researchers aimed to assess the impact of nutrition, being active, or combining on both the management of diabetes and management of the complications associated with individuals at risk for developing type II diabetes. The results showed that adopting healthy eating habits or being active alone could not decrease the complications associated with diabetes. The researchers concluded that when diet and exercise combined with other treatments for type II diabetes, the risk of complications, such as heart disease, retinopathy, and nephropathy, is decreased (Hemminngsen et al., 2017).

Barriers to Healthy Eating among Patients with Type II Diabetes. In a qualitative study, Cradock et al. (2021), used the Human-Centered Design, to identify the perceived barriers and facilitators to healthy eating and being active. The researchers used the design probe to capture the data, and thematic analysis to analyze the data collected. The number of participants included in the study was 21, and the intervention (independent variable) was a ten-week education program on exercise, diet, and diabetes

self- care. The pre- and post-assessments were based on healthy eating, lifestyle modifications, controlling weight, and being active. The results from the reflective theme analysis showed that access to healthy food choices, cravings for unhealthy foods, social support, energy, and mental health were the barriers to healthy diet behaviors. The facilitators to healthy diet behaviors were planning (available support for healthy eating and being active), economic status (financial status), and food environment (access to food). The researchers concluded that self-care education on behavioral change for the management of diabetes requires support and motivation to adopt healthy eating habits and achieve glycemic control.

An observational cross-sectional study was conducted by Halali et al. (2016) to identify the barriers to dietary adherence among patients with type II diabetes. The study participants included 146 individuals who were obese with poor blood glucose control. The participants received self-care education on healthy eating one year before the study. A 24-item questionnaire was used to identify the dietary barriers. The data were analyzed using exploratory factor analysis with principal component analysis extraction and varimax rotation to identify the factors associated with lack of adherence to dietary recommendations. The factor analysis revealed seven barriers to diet behaviors, namely, situational barriers with variance at 11.64%, cost of nutritious foods 9.11%, challenges with snack and meal planning variance at 8.76%, confusion variance 8.45%, work related issues variance 7.72%, and small portion size variance at 6.78%. The researchers acknowledged that the total of the factors was 59.49% for variance. The results showed that the patients with type II diabetes experienced barriers were lack of palatable/tasty meals, unable to resist the temptation of unhealthy foods, and the cost for healthy foods.

According to Halali et al. (2016), the results from the study identified factors that can prevent type II diabetic patients from following the recommended diet to control diabetes. The researchers stressed the importance of identifying the barriers that impact self-care behaviors for effective diabetes management (Halali et al., 2016),

Barriers to Diabetes Self-Management among Patients with Type II Diabetes. Siminerio et al. (2018) explored the factors that impede DSME programs among 35 diabetes educators who worked in various patient care settings, including inpatient, outpatient, and medicine units. The study was qualitative, and the purpose was to identify the barriers associated with diabetes education programs. The nurse educators identified the overwhelming number of patients with diabetes that they have to care for, the reduction in diabetes educators to share the workload, the expectations from management to produce more with little to no resources, and not being appreciated for the difference they are making in improving the health outcomes of the patients as barriers to DSME (Siminerio et al., 2018).

In a qualitative exploratory analysis, Kulhawy-Wibe et al. (2018) examined structural barriers to identify the obstacles associated with diabetes education programs among five patients with type II diabetes. The researchers used structured telephone interviews that were based on the barriers that prevent individuals from managing diabetes. The data were analyzed using inductive thematic analysis. The results showed a lack of qualified diabetes educators and nurses to provide the necessary knowledge and limited access to quality healthcare. The lack of quality diabetes education programs and ready access to resources resulted in poor diabetes management among the study

participants. The researchers acknowledged that the sample size was too small ($n = 5$), limiting the generalizability results.

In a cross-sectional study with correlational design, Houle et al. (2016) examined if socioeconomic status was a barrier to the adoption of self-care behaviors and glycemic control. The study included 295 participants who were recruited for the study after they received education on diabetes self-care behaviors. Socioeconomic status was measured by income level, level of education, and occupation (independent variables), and the dependent variables were hemoglobin A1C levels and blood glucose values. The data collected on the participants' income level, level of education, and occupation were statistically analyzed using non-parametric tests. The results showed a high correlation > 0.80 between income, educational level, and occupation in relation to hemoglobin A1C and blood glucose control among the participants. According to the researchers, the results indicated that income, occupation, and educational levels were associated with blood glucose control among type II diabetic patients. The results showed a relationship between blood glucose control, low income, and education level among the participants ($p < 0.05$ and $p < 0.01$). The researchers concluded that health care providers, such as nurses, should be prepared to evaluate the barriers to diabetes self-management among patients with type II diabetes so that they are better positioned to assist and support the patients in achieving glycemic control (Houle et al., 2016).

When exploring the barriers to the management of diabetes, Christensen et al. (2020) conducted a explorative study. The study included 28 participants from a socially disadvantaged area. The data were collected during workshops that used the ADCES7 diabetes education program and analyzed through systematic text summarization. The

barriers identified were lack of support from care providers, lack of influence and motivation within the participants' the social environment, and experience of a sense of hopelessness and powerlessness over controlling the disease. The researchers identified the development of patient-centered approaches, support, and empowerment could help patients overcome the barriers identified when providing diabetes self-management education (Christensen et al., 2020).

In a qualitative study performed by Ribu et al. (2019) the challenges and life problems that affected self-management of type II diabetes were explored. The study design was based on the grounded theory and sought to identify the psychosocial barriers that existed among the participants. The study included 50 participants, and the data collection occurred from May 2012 to March 2013 with 26 face-to-face interviews. The first phase of the data analysis was done through open coding (analyzed the data in the participants' experiences with access to healthy eating/diet habits, physical and mental conditions, resources, and socioeconomic status). The second phase of the data analysis included axial coding which analyzed the participants' actions (struggling) and consequences (self-managing, self-managing, often failing, or giving up). The results showed that the patients reported a lack of empowerment and support from caregivers, which resulted in the failure of patients to adopt diabetes self-care behaviors, such as diet, blood glucose monitoring, and exercise.

According to Dao et al. (2019), identification of the barriers that exist for diabetes self-management enables health care providers to identify strategies to help patients overcome the barriers they encounter and adopt self-care behaviors to control the diabetes and promote quality outcomes. The ADA (2021b) recognized that the psychosocial and

socioeconomic status and needs of patients with type II diabetes can impact their abilities to participate in DSME, achieve quality of life, and improve their health outcomes. As a result, Kim (2016) reiterated that diabetes self-management education programs that are standardized are ideal interventions for diabetes self-care but can be challenging for patients if health care providers do not provide individualized patient-centered care and on-going support needed to meet the educational needs of the patients.

In summary, the evidence showed that management of type II diabetes requires behavioral change that should be supported and encouraged by health care providers with the application of an evidence-based framework. The synthesized literature review identified that facilitating behavioral change for blood glucose control enabled health care providers to help patients control the modifiable risk factors associated with diabetes (ADA, 2021a; Cheng et al., 2016; Khodaveisi et al., 2017; Pender, 1982). These risk factors are mainly dietary practices and physical activity or exercise. The literature review demonstrated how health care providers applied the Pender HPM to help patients identify the barriers to adopting self-care behaviors through the acknowledgment of prior and current behaviors that can prevent the adoption of healthy lifestyle practices (ADA, 2021b; Cheng et al., 2016; Khodaveisi et al., 2017; USDHHS, 2018). Identifying the barriers associated with diabetes management can prepare health care providers to use evidence to develop patient-centered care for the management of diabetes (Cheng et al., 2016; Cradock et al., 2021; Dao et al., 2019; Halali et al., 2016; Kulhawy-Wibe et al., 2018; Siminerio et al., 2018).

In the subthemes, studies were explored that identified the impact of nutrition on the control of type II diabetes. In the quantitative study done by Morgan et al. (2018) to

examine the effectiveness of self-management education on type II diabetes, the results showed that the hemoglobin AIC levels of the participants improved over six months after completion of the self-management education on diet and activity. The research study done by Pinto et al. (2017) examined patients' value of nutritional therapy for the control of type II diabetes; the results indicated that patients accept nutritional intervention as self-care behaviors. The researchers explored the importance of using a patient-centered approach to provide diabetes self-care education and assessed the barriers that might inhibit patients from engaging in diabetes self-care activities (Christensen et al., 2020; Kim, 2016; Ribu et al., 2019). The third theme, evidence-based education program, will include literature supported the ADCES7 as a DSME that can impact the health outcomes of diabetic patients.

Evidence Supporting the ADCES7

Diabetes self-management education is the fundamental approach to improving the health outcomes of patients with diabetes. The goal of diabetes self-management education is to support patients in making informed decisions on self-care behaviors, promote quality of life, and improve the state of their health (ADCES, 2020). The ADA (2021a) identified the ADCES7 framework as a robust evidence-based education program for the management of type II diabetes. The ADCES7 framework can be used to guide health care providers to provide education for individuals with diabetes. The ADCES7 framework was evaluated within the context of advances towards diabetes self-management (ADA, 2021b). The results of the evaluation identified the ADCES7 framework was an effective tool for support and education in the achievement of quality health outcomes for diabetic patients (ADA, 2021b). The ADCES7 focuses on using self-

care behaviors to control diabetes through the modifiable risk factor, namely, healthy coping, healthy eating, being active, taking medication, monitoring, reducing risk, and problem-solving (ADA, 2021b).

In a randomized control study, Chai et al. (2018) explored the effects of diabetes self-management education among patients diagnosed with type II diabetes. The research question was developed to evaluate the efficacy of self-management education on glycemic control among individuals with type II diabetes. The dependent variables were hemoglobin A1C, pre-prandial blood glucose, postprandial blood sugar, anxiety and depression. The independent variable was the education program that lasted for six months. The number of participants was 118, with 63 participants enrolled for the control group. The methods included a two-hour diabetes self-management program that lasted for six months for the participants selected in the education group. Participants received education on the ADCES7 self-care behaviors for healthy eating and exercise. The control group received ten minutes of basic diabetes education during outpatient follow-up care. The researchers collected data on the blood glucose levels and the hemoglobin A1C levels from the control and intervention groups for six months (Chai et al., 2018). The researchers used SPSS 16 to analyze the data collected from the research. The data were analyzed using independent *t*-tests and paired *t*-test and Mann-Whitney U tests. The results showed a significant reduction in the participant's pre-prandial blood glucose levels with the intervention group 6.78 mmol/L and the control group was 7.70mmol/L ($p<0.00$). The results for the hemoglobin A1C were 6.7% to 6.2% for the group who received the educational intervention and 6.7% to 7.7% for the control group with ($p < 0.01$), (Chai et al., 2018). The limitations identified were the inability to identify if the

alterations in blood glucose levels and improvement in hemoglobin A1C were directly linked to the education program among the intervention group. The implication was that DSME programs are beneficial in helping individuals with type II diabetes achieve blood glucose control (Chai et al., 2018).

According to Fain (2017), the ADCES7 framework has shown to help individuals with both type I and type II diabetes achieve glycemic control within the context of the pathophysiology of diabetes, and treatment options, healthy eating habits, physical activity, medications, monitoring and using the patient assessment data to improve their health outcomes. The ADCES7 framework allowed nurses to help patients prevent the complications of diabetes, promote healthy coping when experiencing psychosocial issues and concerns while developing the ability to problem solve, and learn diabetes self-management strategies. In a retrospective cohort study, Jakoby et al. (2020) evaluated the effectiveness of the ADCES7 self-care behaviors to provide education to control type II diabetes. The research question was: What is the impact of a two-hour diabetes self-management education program among patients with type II diabetes from low socioeconomic status? The patients participated in the DSME program between September 2017 and December 2018. The total number of participants was 94 patients with type II diabetes. The retrospective study included patients with type II diabetes admitted at the Central Counties Health Center in Illinois. The study included patients with type II diabetes, uninsured, and receiving Medicare and Medicaid Services. The dependent variable was the blood glucose levels of the participants. The independent variable for the study was the DSME. The data collected on the hemoglobin A1C were analyzed with a *t*-test and Fischer's exact to identify the comparison of the paired values.

The results showed that after the DSME program, 44 participants had improvement in hemoglobin A1C (75.9%; $p = 0.003$), and 38 patients (65.5%; $p = 0.066$) displayed an improvement of hemoglobin A1C > 0.5%. The results indicated that a DSME program could significantly improve glycemic control (Jakoby et al., 2020). The strength of the study was that certified dietitians and diabetes nurse educators delivered the program. Secondly, the hemoglobin A1C measurements for the study were obtained through the Nova Stat strip point of care testing glucometer that was approved by the Federal Food and Drug Administration in 2010 for blood glucose monitoring (Jakoby et al., 2020). The study's limitations included the incompleteness of the measurement for the specified interval after completion of the DSME program (Jakoby et al., 2020). The researchers acknowledged that the results could be skewed because of selection bias. There was a difference between the baseline values of the patients' hemoglobin A1C levels. The difference indicated that the DSME program significantly improved glycemic control for the patients included in the study (Jakoby et al., 2020).

Impact of Diabetes Education. Diabetes self-management education is essential for the effective management of type II diabetes. According to the ADA (2021b) and Fain (2017), individuals with type II diabetes living in all the demographic locations need education on blood glucose management to manage and control the disease. Diabetes prevention programs are more effective when healthcare providers develop competencies and knowledge about diabetes management. Nurses are positioned to provide evidence-based education on diabetes self-care behaviors to patients with type II diabetes (Harris, 2019). The ADA (2021b) and Fain (2017) acknowledged that if patients receive support and guidance, they, in turn, adopt the recommended lifestyle practices and comply with

the diabetes management programs. The outcome is a reduction in diabetes complications and improved health outcomes Harris (2019).

A quantitative study conducted by Gucciardi et al. (2020) explored the impact of diabetes education for glycemic control among patients with type II diabetes. The method used was a cohort design to integrate the primary care teams. The care team was comprised of nurses and dietitians who provided direct self-management education to patients with type II diabetes. The research question was: What is the impact of a diabetes self-management education program on the hemoglobin A1C levels of patients with type II diabetes? The ADCES7 tool was used to educate the nurses and dieticians who then were encouraged to educate the patients with type II diabetes. The tool used was the ADCES7 self-behaviors (independent variable), and the dependent variables were the patients with type II diabetes who were included in the intervention and control groups. The number of patients with type II diabetes who participated in the study was 771. The study had a control group, which was comprised of 284 patients who did not receive education on diabetes management. The total number of patients with type II diabetes who received individualized education on diabetes was 487. Implementation of the self-management education was individualized for each participant in the primary care setting.

The goal of the intervention was to decrease the hemoglobin A1C level to < 7%. The study lasted for 12 months, and the results showed that the participants who received the educational intervention had a reduction in their hemoglobin AIC levels when the results were compared to the hemoglobin A1C of the control group (Gucciardi et al., 2020). An exploratory analysis was used to determine the results and revealed that the

hemoglobin A1C levels for the intervention group had a significant reduction in hemoglobin AIC by an average of -0.007 with 95% confidence interval of -0.0009 to 0.006. The researchers identified that the control group did not change with a 95% confidence interval not over zero. The mean reduction of hemoglobin A1C within the group intervention was $p = 0.0012$. The study's limitation was that the historical cohort design did not allow for consistency among the study participants. The study did not evaluate the impact of education on the nurses and dietitians. The researchers acknowledged that this could impact the quality of education the patients with type II diabetes received. The results of the study demonstrated the impact of DSME for the management of type II diabetes (Gucciardi et al., 2020).

In the study completed by Cunningham et al. (2018), the importance of diabetes self-management in promoting quality of life was explored. The goal of the study was to evaluate the influence of a DSME program on the patients' quality of life and the hemoglobin A1C levels among patients with type II diabetes. The researchers conducted a systematic review of quasi- and randomized controlled trials. Forty-four articles were systematically reviewed, with 14 studies selected for periodic review, and eight articles chosen for the meta-analysis. The results showed that the patients' quality of life improved after the educational intervention in four studies. However, a statistical significance in the variation of the hemoglobin A1C was not identified.

The impact of diabetes self-management education and support among 466 patients with type II diabetes between 21 to 85 years old was examined by Blumi et al. (2019). The study was a randomized control trial that used the scalable intervention model. The study aimed at exploring if supplementing the ADCES7 self-care behaviors

would improve the health outcomes of patients with type II diabetes and subsequently decrease the mortality and morbidity rate. The study used a pretest-posttest design, which included collecting data on the patients' hemoglobin A1C, BMI, and blood glucose levels. The independent variable was the ADCES7 DSME, and the dependent variables were the participants' BMI, hemoglobin A1C, and blood glucose levels. The researchers collected data on the dependent variables one year after implementing the ADCES7 (Blumi et al., 2019). The data were analyzed using descriptive statistics to calculate the mean and averages, and an ANOVA was used to analyze the changes in the clinical outcomes. Mann-Whitney U tests were used to make comparison of the data, and chi-square tests were used to compare the self-care goals (ADCES7 self-care goals) (Blumi et al., 2019). The results for the self-care goals achieved showed healthy eating among the participants in the control group were 64 (40.3%) and the intervention group 78 (46.4%), $p = 0.293$. For being active, the control group was 31 (27.9%) and the intervention group 55 (43.7%), $p = 0.012$. In the self-care category of monitoring 44 (37.9%) were in the control group and 59 (45.0%) for the intervention, $p = 0.277$. For taking medications, 42 (39.6%) were for the control group and for the intervention group 48(52.7%), $p = 0.065$ (Blumi et al., 2019). The results for self-care behaviors relating to problem solving showed the control group 29 (67.4%) and the intervention group 34 (58.4%), $p = 0.366$. For reducing risk, the control group showed 39 (48.8%) and the intervention group 51 (57.3%), $p = 0.266$. Lastly, healthy coping in the ADCES7 self-care behaviors had 10 (35.7%) in the control group and 18 (52.9%) in the intervention group, $p = 0.175$ (Blumi et al., 2019). The results showed that consistent care and empowerment significantly improved the hemoglobin A1C, BMI, and blood glucose levels (dependent variables) of

the diabetic patients. The researchers acknowledged that DSME requires partnership between patients and health care providers to establish mutual and achievable goals of care for effective diabetes self-care. The ADCES7 self-care program is an effective evidence-based tool incorporated in the care of patients with type II diabetes (Blumi et al., 2019).

Barriers to the Provision of Education among Patients with Type II Diabetes. DSME programs have been proven to have substantial benefits for the management of diabetes. However, DSME programs are not optimized to assist patients in controlling diabetes (CDC, 2021). The ADA (2021b) published statistical data on the use of DSME for inpatient and outpatient services. The data showed that using DSME as an educational tool to assist patients with type II diabetes was 7% effective. The CDC (2021) identified that time constraints contributed to the lack of incorporating DSME in the care of patients with diabetes. A lack of awareness about DSME was also identified among diabetic patients (CDC, 2021).

A study done by Powers et al. (2017) identified the factors associated with diabetes self-management education among patients with diabetes. The lack of active patient engagement and the unavailability of educational resources were two factors that contributed to poor health outcomes among patients with diabetes. In a two-arm, randomized pragmatic trial, Hadden et al. (2020) evaluated the self-management education and the barriers associated with implementing diabetes self-management education programs in six rural health care centers in Arkansas. The researchers found that a shortage of qualified health care providers and low enrollment numbers of diabetic patients were factors that contributed to barriers in diabetes self-management education.

Adu et al. (2019) conducted a sequential, mixed-method study to explore the enablers and barriers associated with diabetes self-management among adult patients with type I and type II diabetes. The sample size included in the study was 217 participants. The research question was: In patients with type II diabetes what are the common barriers and enablers to adopting self-management behaviors? The methods used for the study included an online survey and telephonic interviews conducted with participants who were diagnosed with either type I or type II diabetes. The survey inquired about the participants' skills and self-efficacy about diabetes self-management, and the interviews evaluated barriers to diabetes self-management. The gaps identified in diabetes self-management include poor medication management, lack of routine blood glucose monitoring, unhealthy dietary intake, and ineffective coping with stress while managing diabetes. The results also showed that DMSE programs alleviate the gaps identified in diabetes self-management by providing education and support from health care providers. The researchers identified DSME as an intervention that can alleviate the identified gaps in diabetes self-management. The study's limitations were obtaining a multinational picture of skills, knowledge, and confidence for type I and type II diabetes self-management. The researchers acknowledged there was no documentation on the reliability and validity of the quantitative tool used. The quantitative tool was never used at the global level, and the researchers identified that this could limit the interpretations of the research findings. The sample size for the survey was too small, limiting the generalizability of the findings in other settings. The third limitation identified the qualitative data were self-reported, which posed a threat for self-reporting bias. The

researchers concluded that the findings could be used to guide the development of DSME programs to promote self-management behaviors for the management of DM.

Nikitara et al. (2019) conducted a comprehensive systematic review using mixed methods to explore the barriers and facilitators to diabetes management among nurses. The guidelines used to guide the research were the Preferred Reporting Items for Systematic Reviews and Meta- Analyses, and the databases accessed were CINAHL, MEDLINE, and Health Source between 1999 to 2018. The studies that referred to diseases other than diabetes were excluded from the review, and only the primary research done on nurses' roles and knowledge of diabetes management were included in the study. The Joanna Briggs Institute Qualitative Assessment and Review Instrument, Critical Appraisal Checklist for Studies Reporting Prevalence Data, Results for Randomized Controlled Trials-Results for Qualitative Studies-Case Series, and Analytical Cross-Sectional Studies were used for the critical appraisal. The results showed a significant gap in lack of knowledge among nurses in specific areas of diabetes care, timing and administration of insulin, identifying and treating the manifestations of hypoglycemia, and other complications associated with diabetes. The lack of resources or educational tools and protocols contributed to poor glucose management in inpatient settings, such as hospital and skilled nursing rehabilitation facilities. The lack of adequate time to provide diabetes education, care, and support from nurses to patients was also one of the barriers to quality care for patients with diabetes. The lack of collaboration among diabetes specialists was also one of the barriers identified among the nurses, while the diabetes educators identified the failure of nurses to actively participate in patient education on diabetes when they provide care. Nikitara et al. (2019) concluded that

nurses need to play a more active role in providing patient education and support for diabetes self-management and care.

Health Promotion and Self-Management Support for Patients with Type II Diabetes. Type II diabetes is a major global health problem, and one of the major challenges is the lifestyle behaviors of individuals towards the disease. Lifestyle behaviors, namely, diet, exercise, perception of the disease, and treatment options, are influenced by varying concepts and beliefs that can be managed through education and health promotion (Putra et al., 2019). To explore the impact of health promotion to improve behavior among patients with type II diabetes, Putra et al. (2019) applied Pender's health promotion model as the theoretical framework in a cross-sectional study to explore the impact of health promotion among patients with type II diabetes. The study included 177 participants. The dependent variables were personal risk factors, including sex, age, level of education, socioeconomic status, and perception about diabetes and beliefs. The independent variables were the self-care behaviors. The study used questionnaires to answer the clinical question: What is the impact of the Pender health promotion model on self-care behaviors for patients with type II diabetes? The data were evaluated using the structural equation model. The results showed that personal risk factors (education, socioeconomic state, and perception of diabetes) were $t = 2.891$, and self-care behaviors for the management of diabetes were $t = 5.746$. Self-efficacy did not have any effect on self-care behaviors for type II diabetes at $t = .139$. Putra et al. (2019) concluded that diabetes self-care behaviors could be enhanced through health promotion to increase the adoption of self-care behaviors. The results showed that self-care behaviors for management of diabetes are predisposed by individuals' level of education,

socioeconomic status, perceptions of diabetes, and support from caregivers and families. Application of the health promotion models can contribute tremendously in helping health care providers assist patients to achieve their health outcomes (Office of Disease Prevention and Health Promotion, 2020; Putra et al., 2019).

The Office of Disease Prevention and Health Promotion (2020) statistics on type II diabetes indicated 29.1 million people in the United States are affected by the disease. The mortality rates were 1.8 times higher among individuals who have type II diabetes compared to other medical conditions (Office of Disease Prevention and Health Promotion, 2020). Individuals with diabetes are at increased risk for developing renal disease and blindness. One of the most effective interventions that can decrease the risk of complications and prevalence of the disease to promote behavioral change through health promotion and education on dietary and lifestyle choices such as active. Studies have shown that lifestyle change with support and health promotion could effectively control and minimize the risk of complications associated with diabetes (Huntriss & White, 2016). Health-promoting programs for the management of diabetes were proven to have the most significant impact on diabetes management among older adults from most ethnic groups (Office of Disease Prevention and Health Promotion, 2020).

A cross-sectional study was done by George and Premkumar (2016) examined the health promotion behavior among patients with type II diabetes. The study used the Pender health promotion model as the theoretical framework. The sample included 100 participants admitted in a primary health care center. The researchers assessed health promotion behavior through a questionnaire comprised of three categories: dietary restrictions, being active, and adherence to medication. The data collected were analyzed

using descriptive statistics, and the results showed that health promotion behavior on healthy eating was an average of 63%, being active at was 38%, and adherence to medication was 34%. In the conclusion, George and Premkumar (2016) reiterated that it is evitable that health care providers implement evidence-based education programs among type II diabetic patients in order to achieve adherence to modifiable risk factors that are associated with type II diabetes.

In a systematic review, Dineen-Griffin et al. (2019) examined the self-management support and health promotion patients with type II diabetes were receiving in primary health care settings to manage the disease. The researchers used a systematic review of randomized controlled trials to evaluate the evidence of support and health promotion among the patients treated for complications type II diabetes. The researchers reviewed 58 studies and evaluated the studies based on follow-up care, support from health care providers, structured patient-health care provider engagement, and strategies to promote self-care behaviors tailored to each patient's health care needs (Dineen-Griffin et al., 2019). The results showed that primary health professionals who had the knowledge and skills on diabetes care used evidence-based diabetes self-management strategies were positioned to promote self-care behaviors among patients with type II diabetes. The clinical outcomes for the patients in the studies reviewed showed that self-efficacy in confidence to adopt health-related behaviors could result in disease management and improved quality of life for patients with type II diabetes (Dineen-Griffin et al., 2019). The researchers concluded that health care providers should be prepared to uphold health promotion in diabetes self-management support. Healthcare providers can promote self-management support by providing evidence-based practices

and educational tools that can assist individuals in adopting healthy behavior and developing therapeutic relationships with patients to promote health and diabetes self-management support. Diabetes self-management education transcends beyond health care providers' dissemination of information to patients with type II diabetes; it should be a more concerted partnership to promote healthy behaviors and achieve quality health outcomes (Dineen- Griffin et al., 2019).

According to Reddy (2017), 90% of the total population of patients diagnosed with diabetes have type II diabetes. As a result, Reddy (2017) acknowledged that the provision of education and support for patients with type II diabetes is essential. In addition, Reddy (2017) stated that assisting patients to be aware of diabetes and its complications and providing evidence-based education along with support helps individuals with diabetes to be self-sufficient and lead healthier lifestyles. Promoting patients' self-efficacy for diabetes self-management through diet and exercise was shown to improve glycemic control and health and well-being (Reddy, 2017). Support from health care providers and health promotion with diabetes self-management education have enhanced patients' engagement and empowerment to make the necessary lifestyle adjustments for improved health outcomes (Reddy, 2017). Developing the ability to adopt behaviors that promote quality of life will ultimately reduce the cost of care to manage diabetes and relieve the economic burden presented by diabetes (Khodaveisi et al., 2017; Zupa et al., 2018).

Transforming the standards of care to promote self-management of diabetes in clinical settings and the community is essential for managing the diabetes (So & Chung, 2017). The evidence indicated that health promotion and support with evidence-based

self-management education can effectively help individuals with type II diabetes develop quality health outcomes. (So, & Chung, 2017). Nurse-led diabetes self-management education, support, and empowerment could reduce blood glucose levels among patients in various health care settings (Ansari et al., 2016). Innovative approaches in health promotion through self-management education led to the control of diabetes (Gillani et al., 2017).

In summary, the evidence showed that diabetes self-management programs, such as ADCES7, were designed to guide nurses in redefining the management of diabetes and improving the health outcomes for diabetic patients. The studies explored the impact of DSME programs on the health outcomes for patients with type II diabetes (Blumi et al., 2019; Chai et al., 2018; Cunningham et al., 2018; The impact of diabetes self-management education on the modifiable risk factors associated with diabetes, namely diet and exercise, was proven to improve patients' blood glucose levels with type II diabetes (Gucciardi et al., 2020; Horigan et al., 2017). The research results indicated that DSME programs enable health care providers to provide evidence-based education and support to patients to improve their overall quality of life (Chai et al., 2018; Fain, 2017; Jakoby et al., 2020). The ADA (2021a) and CDC (2021) identified the ADCES7 DSME program as a robust framework to promote diabetes self-management.

The impact of DSME was explored by Gucciardi et al. (2020), and Harris (2019) explored the impact of DSME on nurses' knowledge within the context of being prepared to deliver quality individualized, evidence-based education to patients with type II diabetes. Both sets of researchers found that nurses' knowledge of diabetes self-care could influence diabetes self-care behaviors among patients with type II diabetes.

Gucciardi et al. (2020) concluded that the study results confirmed that the ADCES7 is an evidence-based framework that is effective for diabetes self-management education among diabetic patients. With the knowledge and skills gained from the DSME on healthy eating, patients will gain the knowledge and skills to adopt self-care behaviors and identify the barriers that can threaten their ability to adhere to self-care practices to control diabetes (Blumi et al., 2019; Cunningham et al., 2018). The literature review demonstrated the impact of diabetes self-management education on glycemic control and quality of life (Aziz et al., 2015; Cunningham et al., 2018; Gucciardi et al., 2020; Harris, 2019).

In exploring the barriers to the provision of education among patients with type II diabetes, the evidence suggested that a gap in nurses' knowledge to provide DSME to patients with the disease was a factor that resulted in poor diabetes self-management (Dineen-Griffin et al., 2017). Time constraints among health care providers, lack of patient engagement and support, and a shortage of health care providers who are educated and trained to provide DSME were all identified as barriers (ADA, 2021a; Adu et al., 2019; CDC, 2021; Hadden et al., 2020; Horigan et al., 2017; Nikitara et al., 2019; Powers et al., 2017). Health promotion and support for diabetes self-management for patients with type II diabetes were identified as two of the effective interventions that can influence behavioral change and the adoption of self-care activities to promote optimal health. The outcomes in the literature showed that the model was very effective in guiding health care providers to assist patients to adopt healthy behaviors (diet and exercise) to control their blood glucose levels (Dineen-Griffin et al., 2019; Gillani et al., 2017; Khodaveisi et al., 2017; Putra et al., 2019; Reddy, 2017).

Summary

Chapter 2 presented the three themes for this direct practice improvement project that were considered for the implementation of the ADCES7 healthy eating program among type II diabetic patients 65 and older in a nursing rehabilitation center. The themes were type II diabetes and its complications, facilitating behavioral change for blood glucose control and evidence supporting the ADCES7. The implementation of the education program sought to answer the clinical question: To what degree does the implementation of the ADCES7 Framework on Self- Care Behaviors for Healthy Eating impacts the pre-prandial blood glucose levels when compared to current practice among adult type II diabetic patients in a nursing rehabilitation center in New York?

The scientific underpinnings of the project were Pender's middle-range theory, the health promotion model (HPM), and Roger's diffusion of innovation change model were well aligned with the project. The concepts in Pender HPM that were applied to this project were linked with the ADCES7 framework in educating the nurses who in turn educated the patients and promoted the adoption of healthy eating behaviors (Alligood, 2018; Pender, 1982). Roger's diffusion of innovation served as a roadmap for the implementation of the education program, and evaluate the effectiveness of the change that occurred (Rogers, 2003).

Theme one explored type II diabetes and its complications and developed the subthemes which addressed the impact of diabetes on health care and the economy, recommendations for diabetes management, and the role nurses in the provision of care to diabetic patients. Type II diabetes was explored and the debilitating effects of the disease among individual diagnosed with the disease addressed in the sub theme that explored the

impact of diabetes on health care and the economy (ADA, 2021b; Berbudi et al., 2020; Cleveland Clinic, 2019; Khalil, 2017; Stoner, 2017). In the recommendation for diabetes management, the review of literature provided evidence which supports the implementation of education programs for diabetes management (AACE, 2020; CDC, 2021; Harris, 2019). Nurses were identified as health care providers who play an essential role in impacting the health outcomes of type II diabetic patients through education and support (ADA, 2021a; Akiboye et al., 2021; Azami et al., 2018; CDC, 2021; Crowe et al., 2019; Davies et al., 2018; Hurley et al., 2017).

Theme two explored facilitating behavioral change for blood glucose control. The literature review identified studies that indicated the importance of knowledge about the modifiable and non- modifiable risk factors of diabetes prior to using education to facilitate and support behavioral change for blood glucose control (ADA, 2021b; Cheng et al., 2016). On exploring the impact of facilitating behavioral change, the evidence for the sub theme impact of nutrition on type II diabetes revealed dietary practices and sedentary lifestyles are modifiable risk factors that can improve through education and support among diabetic patients (Abu-Qamar, 2019; ADA, 2021b; Barreira et al., 2018; Cradock et al., 2021; Halali et al., 2016; Hemminngsen et al., 2017; Morgan et al., 2018; Pal et al., 2018; Pinto et al., 2017; Sami et al., 2017; Susanto, 2019). The literature review on the sub theme relating to the barriers to healthy eating among patients with type II diabetes found barriers such as food preferences, eating outside of home, lack of support, lack of education, and motivation were factors identified by the type II diabetic patients (Cheng et al., 2016; Cradock et al., 2021; Halali et al., 2016). The barriers to diabetes self-management among patients with type II diabetes, the literature explored quantitative

and qualitative evidence which suggest that a lack of qualified health care providers such as diabetes educators, lack of time and resources to provide education to diabetic patients were barriers to promoting self-management education among diabetic patients (Christensen et al., 2020; Kulhawy-Wibe et al., 2018; Ribu et al., 2 019; Siminerio et al., 2018).

Theme three explored evidence supporting the ADCES7 as an effective evidence-based framework for the provision of education among diabetic patients (ADCES, 2020; ADA, 2021b; Chai et al., 2018; Jakoby et al., 2020). The studies revealed that the patients who engaged in ADCES7 education programs experienced significant reduction in their blood glucose levels and hemoglobin AIC after implementation of the ADCES7 framework (ADCES, 2020; ADA, 2021b; Chai et al., 2018; Jakoby et al., 2020). The impact of diabetes education found evidence in the literature review which validated the effectiveness of diabetes education provided by health care providers who have the knowledge and competencies to support and guide patient in the management of diabetes (Blumi et al., 2019; Cunningham et al., 2018; Gucciardi et al., 2020; Harris, 2019). The literature review for barriers to the provision of education among patients with type II diabetes showed a lack of perceived benefits, health literacy, unwillingness to participate and social influences were hindrance to DSME among diabetic patients (Adu et al., 2019; CDC, 2021; Horigan et al., 2017). Nikitara et al., 2019) found a lack of educational tools, support and collaboration among health care providers to be barriers in the provision of education among diabetic patients (Nikitara et al., 2019). In health promotion and self-management support for patients with type II diabetes Putra et al. (2019) used Pender HPM to examine the impact of health promotion for diabetes control among patients with

type II diabetes. The results identified the application of the health promotion model helped health care providers to identify the predisposing factors (education, and socioeconomic status) that can impact the adoption of health promoting behaviors for the control of diabetes, while enabling them to work with patients to make lifestyle changes in order to achieve blood glucose control (Dineen-Griffin et al., 2019; George & Premkumar, 2016; Huntriss & White, 2016; Office of Disease Prevention and Health Promotion, 2020; Putra et al., 2019; Reddy, 2017; So & Chung, 2017).

Overall, the literature provided the basis for the quality improvement project because the literature indicated a need for DSME that promotes behavioral change for the management of type II diabetes (ADA, 2021a). Chapter 3 will present the methodology of the project and the statement of the practice problem. The project methodology will be explored along with the design, population and sample selection, sources of data, validity and reliability of the instruments that will used to collect the data (Nova Stat Strip glucometer and Epic electronic health record). The validity and reliability of the ADCES7 framework will also be explored. The data collection procedures will be addressed, including how the data will be analyzed. The potential bias and mitigation of the project, ethical considerations, and limitations will be included. The last segment of the chapter will conclude with a summary.

Chapter 3: Methodology

The principal aspect of diabetes care and glycemic control among type II diabetic patients, is to provide the essential educational tools that will increase their knowledge about the disease and enhance self-care behaviors (Adam et al., 2018; Powers et al., 2017). The evidence showed that diabetes self-management programs have significantly decreased the risks of developing diabetes-related complications and resulted in the achievement of glycemic control among patients with type II diabetes (Pal et al., 2018; Powers et al., 2017). Conversely, studies have shown that the lack of a structured or formal approach to diabetes education leads to poor health outcomes for diabetic patients (Ansari et al., 2016; Drincic et al., 2017; Pal et al., 2018). According to the ADCES (2020), education on diabetes management empowers patients to gain knowledge about the disease and the diabetic patients are more prepared to adopt modifiable lifestyle practices such as healthy eating and exercise for blood glucose control (ADCES, 2020).

According to Pal et al. (2018) and Powers et al. (2017) evidence-based diabetes education programs have proven to assist patients to apply the knowledge and skills gained to promote the management of diabetes, develop problem-solving abilities and coping skills to overcome the barriers impeding them from adopting healthy lifestyle practices (Pal et al., 2018; Powers et al., 2017). The purpose of this quantitative quasi-experimental quality improvement project was to determine if the implementation of the Association of Diabetes Care and Education Specialists (ADCES7) Framework on Self-Care Behaviors™ *Healthy Eating Program* would impact the pre-prandial blood glucose levels among adult type II diabetic patients in a nursing rehabilitation center in New York over four-weeks. Prior to the implementation of healthy eating program, the project site

did not have a standardized evidence- based diabetes education program for nurses to assist diabetic patients in developing self-care behaviors to manage diabetes and improve nursing practice. Furthermore, there was a need to educate the nursing staff regarding evidence- based DSME programs. The long-term goal was to see an improvement in the older adults' pre-prandial blood glucose levels. Therefore, this project determined if the pre-prandial blood glucose levels of the type II diabetic patients was decreased after receiving education on the ADCES7 Framework for Self-Care Behaviors on Healthy Eating Program. This chapter presents the methodology for the project and introduces the statement of the problem, and the clinical question. A detailed explanation of the project's methodology, and the project's design are included. A description of the population and the sample selection are mentioned. The data sources and a discussion on the reliability and validity of the ADCES7 framework, Epic EHR, and the Nova Stat Strip Glucometer. The data collection and data analysis procedures are presented. The last sections of the chapter present the potential bias and mitigation strategies, including the ethical considerations, and limitations of the project.

Statement of the Problem

It was not known if or to what degree the implementation of the ADCES7 Framework on Self-Care Behaviors™ *Healthy Eating Program* would impact the pre-prandial blood glucose levels among adult type II diabetic patients. The affected population were older adults over the age of 65 years diagnosed with Type II diabetes. Roughly 25% of Americans over the age of 60 are impacted by the disease (ADA, 2021a). Unfortunately, this population is one of the driving forces of the diabetes surge (ADA, 2021a). The goal of healthcare providers should be to provide evidence-based

strategies for patients to succeed in self-managing their diseases (ADA, 2021a; Pena-Purcell et al., 2019).

Over the past several years, the management of diabetes at the nursing rehabilitation center was done through medical interventions which involved insulin coverage based on the blood glucose results from routine finger sticks done by the registered nurses. Prior to implementation of the project there was no diabetes educator to provide education on blood glucose management. According to the Director of Nurses, the diabetic patients admitted on the three medical units were eating food brought in by family members and often refused the meals offered at the project site. The gap created the need to implement the ADCES7 framework to improve blood glucose control among the type II diabetic patients. According to Kang et al. (2018) and Lee et al. (2020) the ADCES7 framework was developed in 1997 and validated within numerous health care settings to provide education on diabetes management within seven domains, namely healthy eating, healthy coping, being active, taking medication, monitoring, reducing risks and problem solving (Kang et al., 2018; Lee et al., 2020). Application of the ADCES7 framework has resulted in improved glycemic control and quality health outcomes for diabetic patients (Gathu et al., 2018). As mentioned previously this project used the healthy eating domain from the framework for the implementation of the project.

Clinical Question

It was not known if or to what degree the implementation of the ADCES7 Framework on Self-Care Behaviors™ *Healthy Eating Program* would impact the pre-prandial blood glucose levels among adult type II diabetic patients in a nursing rehabilitation center in New York? The independent variable was the ADCES7

Framework on Self- Care Behaviors for Healthy Eating that was used for the weekly structured educational sessions. The dependent variable was the patients' pre-prandial blood glucose levels that were measured as numerical values in milligrams per deciliters. The pre-prandial blood glucose levels of the patients were checked by the nurses using the Nova Stat Strip blood glucose monitor and the results transmitted to the Epic EHR at baseline and four weeks post-implementation of the education program. As mentioned earlier, the quality improvement project used a quasi-experimental design to determine the impact of the diabetes education program on the adoption of healthy eating habits by patients with type II diabetes. The quasi-experimental design was most appropriate because the method allowed the primary investigator to evaluate the ADCES7 Framework on Self-Care Behaviors™: for Healthy Eating Program (independent variable) and examined the variations or effect in the de-identified pre-prandial blood glucose levels of the patients with type II diabetes (Polit & Beck, 2017).

Table 1

Characteristics of Variables

Variable	Variable Type	Level of Measurement
Educational intervention the ADCES7 program	Independent	Nominal
Baseline and post implementation pre-prandial glucose levels (Outcome)	Dependent	Nominal

Project Methodology

According to Roger's theory of diffusion of innovation, practice improvement ingenuity prompts clinicians to convey evidence-based knowledge as the driving force to substantiate any change initiative (Dearing & Cox, 2018). Therefore, this project used a quantitative methodology. The quantitative methodology permitted the evaluation of data

between independent and dependent variables and allowed for statistical appraisal to identify the significance of the findings (Polit & Beck, 2017). According to Varbanova and Beutels (2020), quantitative studies allow for generalizations of the findings to other situations or settings and clinicians can examine the relationships between groups to identify cause and effect using the scientific approach. The quantitative method was most appropriate for this quality improvement project because the clinical question sought to determine the specificity of the ADCES7 Framework on Self- Care Behaviors for Healthy Eating (independent variable) on the pre-prandial blood glucose levels of older adults (Varbanova & Beutels, 2020).

A qualitative methodology was not selected for this quality improvement project. It would not have provided the statistical representation in numerical data. This methodology relies on data provided by the participants' behaviors, feelings, perspectives, and lived experiences (Kim & Mallory, 2017). Hence, the qualitative methodology makes the responses unmeasurable and impossible to replicate. Furthermore, it would not allow the primary investigator to evaluate the relationships between the ADCES7 Framework on Self- Care Behaviors for Healthy Eating and pre-prandial blood glucose levels. Prior studies have applied the quantitative methodology to examine the effectiveness of the ADCES7 Framework on patients' blood glucose levels and health outcomes and have achieved results that demonstrated the positive impact of DSME programs on glycemic control (Gathu et al., 2018; Hailu et al., 2019; Murray et al., 2018). The quantitative methodology enabled researchers to use the results to improve clinical practice and assist patients in achieving their health outcomes (Gathu et al., 2018; Hailu et al., 2019; Murray et al., 2018). The primary investigator used

quantitative analysis to compare the data collected at baseline and four weeks post-implementation of the intervention. According to Polit and Beck (2017), the quantitative methodology enables clinicians to establish relationships between the variables and answer clinical questions with the data analyzed. Therefore, the quantitative baseline and post-implementation data were compared to answer the clinical question (Polit & Beck, 2017).

Project Design

The project utilized a quasi-experimental design. Quasi experimental design allows the primary investigator to examine pre/post- intervention data (Polit & Beck, 2017). Collecting data from the baseline and post implementation allowed the primary investigator to compare both data in order to determine the impact of the educational intervention on the pre-prandial blood glucose levels (Polit & Beck, 2017). The quasi-experimental design is applied in practical environment and is more generalizable than other designs such as correlational design (Siedlecki, 2020). The quasi-experimental design objectively answered the clinical question for the direct practice improvement project by determining if the educational intervention using the ADCES7 Framework on Self- Care Behaviors for Healthy Eating Program impacted the pre-prandial glucose levels. A correlational design was not chosen because although it determines the relationship between two or more variables, it would not allow the primary investigator to examine the actual effect the independent variable (the ADCES7 Framework on Self-Care Behaviors for Healthy Eating) had on the dependent variable (pre-prandial blood glucose levels) (Boswell & Cannon, 2018). In the quasi- experimental design, the variables were not manipulated to obtain the outcomes of the project. The main limitation

of the correlational design is that it could be used to draw conclusions related to the causal relationships found among the measured variables (Polit & Beck, 2017). The quasi-experimental approach allowed for the use of statistics to evaluate the independent variable (the ADCES7 Framework on Self- Care Behaviors for Healthy Eating) on the dependent variable (pre-prandial blood glucose levels of the patients with type II diabetes). The primary investigator compared the outcomes using quantifiable data (Polit & Beck, 2017).

The project used a pre/post-implementation design. First, the de-identified blood glucose results of the patients were collected from the Epic EHR at baseline, then the nurses were educated on the intervention (the ADCES7 Framework on Self- Care Behaviors for Healthy Eating). The nurses used the ADCES7 tool to educate the patients on nutrition for blood glucose control, the main types of food groups (carbohydrates, fats, ad proteins), developing healthy eating habits, food exchanges from the different food groups and reading the labels of foods. Four weeks after implementing the ADCES7 program de-identified blood glucose levels were collected from the same patient sample. The data were compared to determine if the independent variable (the ADCES7 Framework on Self- Care Behaviors for Healthy Eating Program) affected the dependent variable (pre-prandial blood glucose levels). Finally, descriptive data were collected to assess the characteristics of the sample used for the project. The de-identified aggregate data included sex, age, level of education and marital status. The descriptive data to evaluate the characteristics of the project's sample were collected from the Epic EHR by the Director of Nurses and given to the primary investigator.

Population and Sample Selection

The project took place in New York. The target population for this quality improvement project were adults (65 years and older) diagnosed with type II diabetes and blood glucose levels >180 mg/dl. In the community where the project site was located, 65% were over 65 (Neighborhood Scout, 2019). Roughly 34% of the individuals were Black followed by Latinos (18.9%) and those of Asian descent (12.7%) (Neighborhood Scout, 2019). The nursing rehabilitation center provides short-term and long-term care to approximately 200 individuals. The patient population was representative of this diverse background and had multiple comorbidities and chronic medical conditions, such as type II diabetes, hypertension, heart failure, and stroke. Three medical units at the rehabilitation center admitted patients with type II diabetes. The inclusion criteria were individuals 65 or older, male, or female, diagnosed with type II diabetes within the past year, able to read and write English, and have elevated glucose levels (over 180 mg/dl). The exclusion criteria included individuals with type I diabetes, altered mental state (medication or neurological), unable to read or write English, and under the age of 65 years. The three medical units had a maximum capacity of 70 patients. The primary investigator was not allowed access to the patients or the Epic EHR. As a result, the Director of Nurses and three charge nurses (one from each of the medical units) used the inclusion and exclusion criteria for the project to review the EHR and then selected the sample based on convenience. The primary investigator determined the sample size for the project by using G*Power software, version 3.1.9.2, with an alpha of 0.05, an effect size of 0.5, and a power of 80%. The estimated minimum sample size was 34, but 32 patients met the inclusion criteria for the project.

The 32 patients who were included in the project were admitted on the three medical units in the long-term section of the rehabilitation center. According to the Director of Nurses, the patients on the long-term units are not discharged home, and during the implementation period of the project, there were no admissions in the long-term care section of the nursing rehabilitation center. The Director of Nurses informed the primary investigator that there were admissions and discharges on the acute care section of the nursing rehabilitation center during the implementation of the project. However, the project was implemented on three medical units in the long-term section of the nursing rehabilitation center. The sample was the same 32 patients for the entire project period as provided by the Director of Nurses. The implementation of the ADCES7 Framework on Self- Care Behaviors for Healthy Eating was specific to three medical units at the project site. Therefore, the educational sessions were offered to the nurses who directly cared for the patients admitted on the three medical units. The primary investigator provided education on the ADCES7 Framework on Self- Care Behaviors for Healthy Eating to 14 registered nurses and five charge nurses. The project was implemented by the 14 registered nurses and 5 charge nurses who provided direct care to the diabetic patients on the three medical units, and had access to documenting using Epic EHR. The registered nurses and charge nurses who participated in the educational sessions worked on the medical units in the long-term section of the nursing rehabilitation center.

The quality improvement project met the criteria for implementation through the project site and Grand Canyon University. The evidence-based education program improved diabetes care at the project site, and did not compromise the safety, well-being

or care of the patients. The Director of Nurses approved the project with written authorization after being informed about the program in meetings. Based on the written authorization from the nursing rehabilitation center, the primary investigator was prohibited from selecting the nurses to participate in the education program or collected any form of data from the nurses. The nurses who worked on the three medical units were originally informed about the project by the Director of Nurses, nurse managers and charge nurses through staff meetings, and emails. Flyers with information about the purpose, dates and times of the project were posted on the units. According to the Director of Nurses, the registered nurses who attended the educational sessions provided direct care to the diabetic patients and were not selected through sampling to attend, because the ADCES7 framework was used for staff development/education to improve diabetes care and management on the three medical units. As mentioned earlier, the project site does not have an internal review board, and based on the nature of the quality improvement project, it was determined by GCU and the project site that informed consents were not required from the nurses and the patients.

Confidentiality measures were followed using Grand Canyon University's IRB guidelines and the project site's protocol. The participants were notified that participation was voluntary and their refusal to participate would not interfere with their personal or professional lives. The primary investigator did not collect any data or hard copies of patients' information that contained personal identifiers from the Director of Nurses or the staff nurses.

The patients were not randomly selected, and confidentiality was upheld for the entire duration of the project. The de- identified data for the patients (age, sex, marital

status, and highest level of education and blood glucose results) were matched with unique identifiers and secured on a computer that was placed in a locked cabinet and protected with a password. According to the Director of Nurses the de- identified data will destroyed based on the guidelines of the project site after the project is completed. As mentioned earlier the project site does not have an internal review board and the primary investigator was not an employee at the nursing rehabilitation center and was not allowed to interact with the patients or collect any data from the patients admitted to the nursing rehabilitation center. The primary investigator was not granted access to the Epic EHR and depended on the Director of Nurses to provide the data on the characteristics (age, sex, education, and marital status) of the patients and de-identified blood glucose levels of the patients with type II diabetes.

Instrumentation or Sources of Data

The instrumentation that was used for the implementation of this project was the ADCES7 Framework on Self- Care Behaviors for Healthy Eating Program. Permission for use of the framework was obtained from the ADCES (Appendix B). The framework was developed in 1997 as the American Association of Diabetes Educators seven domains (healthy eating, healthy coping, being active, taking medication, monitoring, reducing risks and problem solving) of diabetes self- care behaviors (Powers et al., 2021). According to Powers et al. (2021), the framework was revised ad renamed (Association of Diabetes Care and Educators, ADCES) in 2020 to reflect a multifaceted approach that includes cultural preferences, behavioral, and psychological factors for the clinical management of diabetes, provision of education, support and empowerment to diabetic patients (Powers et al., 2021). The ADCES DSME comprehensive approach in the

management of care for diabetic patients is centered on the provision of knowledge and skills for diabetes management, behavioral change, clinical improvement, and improved health status/outcomes (ADCES, 2020; Powers et al., 2021). The ADCES7 framework was validated by the American Diabetes Association as the cornerstone of diabetes care, education and support for diabetic patients (ADCES, 2020; Kang et al., 2018; Lee et al., 2020).

The ADCES (2020) have validated the ADCES7 framework within various health care settings and found that the framework provides an evidence-based approach in which assessing, implementing interventions, and evaluating diabetic patients is realistic (ADCES, 2020). The ADCES7 Self- Care Behaviors for Healthy Eating from the framework was used to educate the nurses who in turn provided education to the diabetic patients on three medical units at the project site. The ADCES developed PowerPoint presentations that are aligned with each domain within the framework for clinicians to use during educational sessions (ADCES, 2020). The primary investigator used the PowerPoint for healthy eating to educate the nurses on nutrition for the management of diabetes, the different types of food nutrients (carbohydrates, fats, and proteins), reading food labels and developing a healthy plan for blood glucose control (ADCES, 2020). As mentioned earlier the ADCES7 was originally the Association of Diabetes Care and Education Specialists (AADE7) and the name was changed after the framework was revised in 2020 (Powers et al., 2021).

The sources of data for the baseline and post implementation pre-prandial blood glucose of the patients included in the project were the Nova Stat Strip glucometer and the Epic EHR. As stated previously, the primary investigator did not have access to the

Epic EHR or the glucometer, and relied on the Director of Nurses to provide the de-identified results of the patients' blood glucose levels. The registered nurses used the Nova Stat Strip glucometer to routinely check the blood glucose levels of diabetic patients. According to the Director of Nurses the Scientific and Medical Instrumentation Department at the nursing rehabilitation is responsible for providing a mandatory initial checkout program for the glucometer. According Nova Biomedical (2020), the Nova Sat Strip glucometer provides analytical information to guide blood glucose management for patients with diabetes (Nova Biomedical (2020).

In addition, Nova Biomedical (2020 and Raizman et al. (2016) acknowledged that the Nova Stat Strip glucometer is a valid and reliable tool that was approved by Federal Food and Drug Administration to provide analytical information to guide blood glucose management for patients with diabetes (Nova Biomedical, 2020; Raizman et al., 2016). The Epic EHR is highly functional and fully integrated system that protects patients' health data, and was developed to secure health information (Cole et al., 2018; Shull, 2019). The Epic EHR is interfaced with the Nova Stat Strip glucometer at the project site, in that, the blood glucose results of the patients are transmitted to the EHR, and can only be accessed by authorized individuals. The de-identified data for the characteristics of the patients (age, sex, marital status, and level of education), the baseline blood and post-implementation per-prandial blood glucose levels were obtained from the Epic EHR by the Director of Nurses and given to the primary investigator.

Validity

Validity refers to the ability of a research tool to infer that the conclusions presented are aligned with the principles of statistics (Polit & Beck, 2017). Lee et al.

(2020) examined the content validity, and structural validity of the psychometric properties of the seven domains (healthy eating, being active, healthy coping, taking medication, reducing risks, monitoring, being active and problem solving) of the ADCES program (Lee et al., 2020). The content validity was >.78 and the structural validity of the program showed a correlation coefficient of .82 for the domains of the ADCES7 (Lee et al., 2020). Aronson et al. (2018) conducted a psychometric analysis of the ADCES 7 to determine the effectiveness of the program in promoting self-care behaviors among diabetic patients within each of the domains (Aronson et al. (2018). The internal validity showed the correlation coefficient of 0.94, and the internal consistency with Cronbach's alpha ranging from 0.81 to 0.95 (Aronson et al., 2018). Kong and Cho (2021) examined the validity of the ADCES7 to determine if the program can be used to educate type II diabetic patients for glycemic control (Kong & Cho, 2021). The researchers concluded that the ADCES 7 education program is a valid evidence-based intervention for the promotion of diabetes care and management among type II diabetic patients (Kong & Cho, 2021).

According to Nova Biomedical (2020) the glucometer was a valid, accurate and reliable tool to measure blood glucose levels. Nova Biomedical (2020) reported that The Federal Drug Administration (FDA), approved for the use of the Nova Stat strip glucometer, in health care settings. Nova Biomedical acknowledged that the FDA accepted the content validity for the Nova Stat Strip glucometer with correlation coefficient $R2 \geq 0.95$. The content validity of the Nova Stat Strip Glucometer was completed by experts who had a 92 percent inter-reliability and 90 percent agreement the glucometer measured what it was developed to measure (Nova Biomedical, 2020). Nova

Biomedical (2020) identified the content validity of the Nova Stat Strip Glucometer was tested by a panel of experts who found 90 percent agreement for content validity and inter-rater reliability of 92 percent when compared to three different types of glucometers (Nova Biomedical, 2020).

The Epic EHR system is highly secured with complete adherence to HIPAA protocols for protecting individuals' health information (Altman et al., 2018; Scheid et al., 2019). Epic is a certified technology system in full compliance with the regulations for health care database systems applications within health care facilities within the United States and globally (Scheid et al., 2019). Marino et al. (2018) conducted a study to identify the validity of the EHR compared to Medicaid data for abstracted health information among patients at the Oregon community health center. The researchers found that a strong agreement between the EHR and Medicaid for health information kappa > 0.80, sensitivity > 0.80, and specificity > 0.85 (Marino et al., 2018). In another study, Altman et al. (2018) compared EHR results to manually extracted data for obstetric research. The results showed a very strong validity agreement on the four modes of delivery (vacuum assisted, forceps assisted, cesarean and spontaneous vaginal delivery) with kappa between 0.90 to 0.92 for EHR documentation (Altman et al., 2018). Scheid et al. (2019) also explored the validity of the EHR compared to manual and electronic data extraction for early onset hypoglycemia among neonates. The results revealed an acceptable kappa coefficient of 1 to 0.81 (Scheid et al., 2019).

Reliability

Reliability demonstrates that the tool can consistently produce equivalent results when it is re-tested multiple times under the same condition (Nakadate et al., 2019; Souza

et al., 2017). According to Lee et al. (2020) the ADCES7 framework has demonstrated reliability and is adopted both nationally and globally by health care organizations for the management of diabetes (Lee et al., 2020). The reliability of the ADCES framework was examined by Lee et al. (2020) and the result showed the reliability ranged from 0.70 to 0.88 and the test- reliability ranged from 0.78 to 0.93 (Lee et al., 2020). In a study conducted by Kang et al. (2018) the reliability of the ADCES7 framework for promoting health literacy among diabetic patients was evaluated (Kang et al. (2018). The results showed internal consistency of the program to be 0.92 and the test re-test reliability 0.80 (Kang et al., 2018). The reliability of the seven domains in the program (healthy eating, being active, healthy coping, taking medication, reducing risks, monitoring, being active and problem solving) were examined, and the result showed Cronbach's alpha of 0.92 (Kong & Cho, 2021). The results from studies have shown the ADCES7 education program is a reliable educational tool for the management of diabetes and is applicable to clinical practice and research (Lee et al., 2020).

The reliability of the Nova Stat Strip glucometer was evaluated in a study done by Lockyer et al. (2014). The reliability of the Nova Stat Strip glucometer was evaluated against the Roche Accu-Chek for reliability and consistency (Lockyer et al., 2014). The Nova Stat Strip glucometer showed a remarkable coefficient of variation for blood glucose monitoring across the complete diagnostic range by less than 5% (Lockyer et al., 2014). The results showed that the Nova Stat strip glucometer had a good correlation (Bland-Altman plots r (2) =0.46) compared to the Roche Accu-Chek glucose monitor (Lockyer et al., 2014). Rabiee et al. (2010) evaluated the Nova Stat Strip glucose meter on the values of reliability and accuracy using the Andres clamp technique, which

evaluated the Nova Stat Strip glucometer on the merits of accuracy, reliability, and real-time availability of glucose measurement and results. The results showed that the Nova Stat Strip glucometer was at 97% reliability, accuracy, and speed. The researchers concluded that the Nova Sat Strip glucometer is a suitable glucose monitor (Rabiee et al., 2010).

The nursing rehabilitation center switched from using Cerner to Epic system in 2020. The patient's electronic health information is protected. The blood glucose results for the patients at the rehabilitation center are transmitted to the Epic system. According to Cole et al. (2018), the Epic EHR is a certified technology that is approved to be used meaningfully by health care systems. The Epic EHR System is highly functional and fully integrated, it protects individuals' health data and was developed to secure health information (Cole et al., 2018). The EHR is interfaced with the Nova Stat Strip Glucometer so that the blood glucose results of the patients are transmitted to the Epic EHR, and is secured (Cole et al., 2018). The Epic EHR can only be accessed by authorized individuals who have special access codes (Cole et al., 2018).

Moreno-Iribas et al. (2017) conducted a study to determine the reliability, consistency and specificity of electronic health records concerning patients with type II diabetes (Moreno-Iribas et al., 2017). The results showed the reliability, consistency and specificity at 98.2%, 99.3% and 99.8% with a kappa index of 0.946 (interrater reliability score), (Moreno- Iribas et al., 2017). In a reliability analysis of the Epic EHR done by Germanos et al. (2020), the Cronbach's was between 0.833 and 0.958 (Germanos et al., 2020). According to Hernandez-Boussard et al. (2019) the Epic EHR is a reliable and valid tool and source for data collection.

Data Collection Procedures

The nursing rehabilitation center did not have an IRB, and based on the terms of the authorization letter to implement the project, informed consents were not required for selecting the sample. The primary investigator met with the Director of Nurses and three of the charge nurses to review the inclusion and exclusion criteria for selecting the patients to be included in the project. The inclusion and exclusion criteria were included in the site authorization letter, and the Director of Nurses had a copy of the authorization letter. Prior to implementing the project at the nursing rehabilitation center data, the investigator met with the Director of Nurses, three nurse managers, and four of the charge nurses from the three medical units and provided information about the project. The primary investigator informed them about the implementation of the ADCES7 education program and its benefits in improving diabetes care and sought approval for the implementation.

The Director of Nurses informed the primary investigator that the nursing rehabilitation center did not have an IRB, and that based on the nature of the project, informed consents were not required for implementation, and data collection. The Director of Nurses at the nursing rehabilitation center approved the quality improvement project and specified that the primary investigator would not be given access to the patients' health records or have direct contact with the patients, and there would be no data collected on the nurses who received the education. The Director of Nurses volunteered to select the sample of patients through convenience based on the inclusion and exclusion criteria for the project. The Institutional Review Board (IRB) at Grand

Canyon University granted approval to implement the ADCES7 education program at the nursing rehabilitation center (Appendix A).

After the site authorization was granted and approval to implement the project was obtained from Grand Canyon University, the primary investigator met with the Director of Nurses, the nurse managers for the three medical units, and three charge nurses to finalize the plan for implementation of the project. The highlights of the meeting discussed the necessary accommodations that were made with the nurse managers and charge nurses to facilitate the nurses who worked both day and night shifts to attend the educational sessions. The primary investigator informed the nursing staff present at the meeting that there would be three educational sessions for 15 minutes each. The primary investigator gave copies of the flyers about the project to the nursing staff (Director of Nurses, and charge nurses) present at the meeting, and provided information about the content that would be covered during the educational sessions. After the meeting, the flyers were posted on the three medical units with information about the educational sessions. The Director of Nurses and charge nurses also informed the staff about the educational sessions during meetings on the units, and via emails.

The ADCES7 Framework for Self-Care Behaviors on Healthy Eating Program that was used to implement the project at the nursing rehabilitation center, is an evidence-based model that was developed by the Association of Diabetes Care and Education Specialists in 1997 to be used as a framework in the provision of diabetes care, education and ongoing support to diabetic patients (ADCES, 2020). The ADCES7 framework serves as a guide to clinicians, such as registered nurses to help individuals affected with diabetes achieve optimal well-being and quality health outcomes through education and support for the management of diabetes (ADCES, 2020). According to the ADCES (2020) and Wahowiak, (2017), the education program focuses

on self-care behaviors, namely healthy eating, healthy coping, being active, taking medication, monitoring, reducing risk, and problem solving. The program was approved by Centers for Disease Control and Prevention and the American Diabetes Association as an evidence-based education program for the management of diabetes (ADCES, 2020; Wahowiak, 2017). The primary investigator used the Power point presentation on healthy eating (developed by the ADCES) to educate the nurses. The education sessions focused on defining healthy eating, the effects of consuming added sugars, saturated and trans fats, sodium and alcohol on blood glucose control. The nurses were educated on the three main types of nutrients found in found in foods, namely, carbohydrates, fats, and proteins along with guidance on how to assist patients to develop healthy meal plans, read the labels on packaged foods, and set realistic eating goals for the management of diabetes (ADCES, 2020). As mentioned earlier, the Director of Nurses granted permission and site authorization for the ADCES7 Framework on Self- Care Behaviors for Healthy Eating Program to be implemented. The primary investigator educated 14 registered nurses and 5 charge nurses who worked on the three medical units and provided care to the diabetic patients. The registered nurses who were educated about the healthy eating program were given handouts developed by the ADCES (Appendix C) to use as a guide to provide education to the patients on the three medical units. As mentioned earlier the diabetes education program was developed in 2009 as the Association of Diabetes Care and Education Specialists seven domains of diabetes self-management education. In 2020 the program was revised and the name changed to the Association of Diabetes of Diabetes Care and Education Specialists (ADCES), (Powers et al., 2021).

The Director of Nurses reported to the primary investigator that the registered nurses who attended the educational sessions were qualified to provide education to the patients. The primary investigator was not allowed to collect data on the characteristics, educational level or ages of the registered nurses. According to Nikitara et al. (2019) nurses who provide direct care to

patients should be equipped with the knowledge, and skills on diabetes in order to educate, support and prepare patients to make informed decisions on diabetes management. Nikitara et al. (2019) acknowledged studies have shown improvement in glycemic controls and quality of life among type II diabetic patients when nurses offer diabetes education to the patients (Nikitara et al., 2019). To equip the nurses with the knowledge of the ADCES *Healthy Eating Education Program*, the primary investigator conducted three face to face educational sessions with the registered nurses at the project site.

Prior to conducting the educational sessions on healthy eating for blood glucose control, the primary investigator developed flyers with information about the educational sessions (topic, purpose, date, time, location) and gave copies of the flyers to the Director of Nurses, and three charge nurses for the medical units. According to the Director of Nurses, the flyers were posted on different locations on the medical units. There were three educational sessions that lasted for 15 minutes each and they were offered on Monday, Wednesday and Friday from 10 am to 10:15 am. The Director of Nurses also informed that primary investigator that an electronic link to the ADCES handout on healthy eating was available for the nurses to access, and the nurses were informed about it. The charge nurses who attended the educational sessions informed the primary investigator that they will use the staff use the handouts to educate the patients on the medical units. According to the Director, the nurses who attended the educational sessions were encouraged to attend and were not coerced or forced into attending. The registered nurses were fully informed about the implementation of the quality improvement project. As mentioned earlier, the primary investigator was not allowed to collect data or solicit information from the registered nurses who participated in the educational sessions or permitted to observe them (the nurses) during implementation of the educational intervention.

The data collection approach to answer the clinical question for this project entailed the Director of Nurses using the inclusion and exclusion criteria to select the

sample through convenience sampling for the quality improvement project. The primary investigator did not have access to the Epic EHR or direct contact with the patients and had to depend on the Director of Nurses to select the sample and extract the data (demographic and pre-prandial blood glucose measures) from the EHR. Prior to conducting the educational sessions, the Director of Nurses informed the primary investigator that 32 type II diabetic patients from a total of 70 on the three medical units met the inclusion criteria for the project. Prior to conducting the educational sessions, the Director of Nurses extracted the demographic (age, sex, highest level of education, and marital status of the 32 patients) data and pre-prandial blood glucose levels on the 32 type II diabetic patients from the Epic EHR and gave them to the primary investigator in a de-identified Word document. The data were assigned unique code for identification and were entered in a computer that was locked in a cabinet in the office of the Director of Nurses.

After the demographic (age, sex, highest level of education and marital status) and pre-prandial blood glucose data were collected, the primary investigator conducted the educational sessions with the nurses in the form of a PowerPoint presentation based on the ADCES7 Framework for Self-Care Behaviors on Healthy Eating. The three educational sessions were presented in three 15-minute power point presentations based on the Association of Diabetes Care and Education Specialists education program on healthy eating. The educational sessions were presented by the primary investigator and were conducted face to face with the nurses. During the educational sessions, the ADCES7 framework was introduced to the nurses and the significance of healthy eating for blood glucose control was demonstrated.

The educational sessions offered information on the ADCES7 Framework for Self-Care Behaviors on Healthy Eating, the different types of food groups, how to teach patients to read labels of packaged foods, and the food exchanges that can be made from the different food groups. The PowerPoint used to deliver the education content was developed by the Association of Diabetes Care and Education Specialists. The registered nurses were given handouts on healthy eating that were developed by the ADCES (Appendix C). The primary investigator was not allowed to monitor, evaluate or be present on the units when the nurses were providing education on the ADCES7 healthy eating program to the patients. The primary investigator was also not allowed to collect data from the nurses (including demographic, baseline and post implementation data of the nurses' knowledge about the diabetes healthy eating program), or evaluate if they actually educated the patients. According to the Director of Nurses, the nurses were required to document in the education section of the patients' electronic record each time they provided instructions on healthy eating to the patients. The Director of Nurses informed the primary investigator that the charge nurses routinely reviewed the Epic EHR for evidence of documentation on the teaching done.

After four weeks of implementing the ADCES7 Framework for Self-Care Behaviors on Healthy Eating, the Director of Nurses extracted data on the pre-prandial blood glucose levels from the Epic EHR on the patients included in the project. The data were numerically coded and entered in the Excel spreadsheet and were transferred directly to IBM SPSS version 27 following four weeks of data collection. The data in IBM SPSS version 27 were protected with a password to login in the computer and the

computer was secured in a locked cabinet. The data were deleted from the computer after the project was completed**.**

Data Analysis Procedures

Data analysis was conducted on the de-identified pre-prandial glucose results obtained from the Director of Nurses. The data and statistical analysis were completed in the Statistical Package for Social Sciences version 27. The data collected on the demographics (age, sex, marital status, and highest level of education) for the sample, the baseline and post implementation blood glucose results were reviewed for any missing data. The listwise deletion method was used to identify missing data (Pepinsky, 2018). The skewness analysis and Shapiro Wilk test (Polit & Beck, 2017) were used test for outliers and normality in the variable of interest (pre- prandial blood glucose level), (Polit & Beck, 2017). The demographic data of the sample (age, sex, marital status, and highest level of education) were organized in categories. Tables were used to present the data in an organized format. The data for the dependent variable (baseline and post implementation data for the pre-prandial blood glucose levels) were organized in the categories of male and female with pre-prandial blood glucose levels less than or greater than 180 milligrams per deciliters. Descriptive statistics were used to calculate the means, and percentages of the baseline and post implementation pre-prandial blood glucose levels of the sample.

Descriptive statistics accounted for calculating the means, and percentages of the demographic data (Heavey, 2018). Inferential statistical analysis was used to identify the differences between the mean of the baseline and post implementation pre-prandial blood glucose levels (dependent variables) (Heavey, 2018). The paired *t*-test analysis was

selected for this project because the data analysis allowed for evaluation of the impact of the of the independent variable (ADCES7 Framework on Self- Care Behaviors for Healthy Eating) on the pre-prandial blood glucose levels (dependent variable). The paired sample *t*-test analysis allowed for comparison of the baseline and post implementation blood glucose levels to answer the following clinical question: To what degree does the implementation of the ADCES7 Framework on Self- Care Behaviors for Healthy Eating impacts the pre-prandial blood glucose levels when compared to current practice among adult type II diabetic patients in a nursing rehabilitation center in New York? According to Polit and Beck (2017) paired *t*- test analysis cannot control environmental impact or factors that can affect the dependent variables or outcomes, but the analysis provides the results that are necessary to answer clinical questions when the mean difference for the same group is analyzed (Polit & Beck, 2017). Therefore, the paired *t*- test analysis was most appropriate because the primary investigator sought to determine and analyze the mean difference between the same group of patients included in the sample before and after the implementation of the ADCES Framework on Self- Care Behaviors for Healthy Eating (Statistical Solutions, 2019). The level of significance for the paired *t*- test was set at .05. According to Polit and Beck (2017) a significance level of .05 indicates that a p value less than .05 would be considered statistically significant (Polit & Beck, 2017).

Potential Bias and Mitigation

According to Cheung et al. (2017), sampling bias can exist when the variables selected to determine the distribution are incorrectly selected and are not a representation of the actual distribution. The potential for sampling bias was mitigated by identifying the target population of patients that will be included in the sample, and establishing the

inclusion and exclusion criteria. According to Cheung et al. (2017) identifying the specific population and selecting the sample randomly to represent an accurate distribution of the population under investigation are essential to prevent sampling bias (Cheung et al., 2017). According to White and Bonnett (2018) sampling bias occurs when the investigator presents an under-representation or over-representation of the distribution variables. As a result, the potential exists for systematic distortion in the probability distribution of the sample. As a result, the project's target population were patients admitted on the three medical units and who met the inclusion criteria. The inclusion and exclusion criteria guided the investigator to focus on the target population. The participants were not coerced into agreeing to participate in the direct practice improvement project, and the primary investigator did not have access to the patients' information or the patients. Polit and Beck (2017) acknowledged that a project's methodology could be a source of bias affecting the accuracy of the results. The primary investigator was aware of the potential bias and took steps to mitigate threats to this project's outcomes.

Framing bias is a potential bias that can affect the implementation of this project. According to Ballard (2019) framing bias is evident when the people or establishments determine that an intervention or practice improvement initiative is not beneficial and are willing to adopt or accept the intervention. Framing bias was mitigated in the project by the primary investigator presenting the educational information with a positive approach and current evidence of the ADCES healthy eating program. Ballard (2019) acknowledged that offering the positive and negative information during the engagement can potentially mitigate framing bias.

Another potential bias that was identified is unconscious or implicit bias. Unconscious bias occurs outside the person's awareness and are the negative feelings or perceptions of others that can affect the persons' values and beliefs (Marcelin et al., 2019). Unconscious bias is mitigated through self-awareness and being cognizant of the fact that health care providers are professionals who should continuously strive to use a non-judgmental, unbiased approach towards others or in practice. According to Marcelin et al. (2019) using evidence-based data to inform decision making, and guide the approaches taken are essential for practice (Marcelin et al., 2019).

Ethical Considerations

The quality improvement project introduced a diabetes education program for the nurses at a nursing rehabilitation center to promote education and support for patients with type II diabetes. According to Boswell and Cannon (2018), the transfer of evidence-based knowledge to improve care is not to cause harm to the patients or present the risk for harm (Boswell & Cannon, 2018), The quality improvement project used the ADCES7 framework to provide evidence-based knowledge to the nurses who in turn educated the patients (Boswell & Cannon, 2018). The United States Department of Health and Human Services (2018), in the Belmont Report, identified three fundamental principles for the protection of human subjects who participate in research, namely, respect for others, justice, and beneficence.

The principle of respect for others was relevant to the quality improvement project in that respect for the patients' autonomy was upheld for this project. The ADCES7 Framework for Self-Care Behaviors on Healthy Eating Program was intended to help the diabetic patients learn more about diabetes and gain an understanding of the

behaviors (healthy eating) that would promote glycemic control (ADCES, 2020). The primary investigator did not have any direct contact with the patients, and the nurses provided the education to the patients with the ADCES7 handouts on healthy eating.

Beneficence entails actions or interventions that minimize the risk of harm to others (United States Department of Health and Human Services, 2018). Providing the evidence-based education is an intervention that upholds the principle of beneficence. Therefore, beneficence was applicable to this project because the aim was to promote the adoption of healthy eating in order to achieve quality health outcomes for the diabetic patients. According to the United States Department of Health and Human Services (2018), the principle of justice is based on equality, fairness and protection of others. The vulnerable population of patients were not included in the sample for the project, and based on the nature of the project, informed consents were not required by Grand Canyon University IRB or the project site. The inclusion and exclusion criteria for the project were established to exclude the vulnerable population of patients.

The project was also in full adherence to the Health Insurance Portability and Accountability Act (HIPAA) regulations to protect patients' information, maintain confidentiality, and privacy (United States Department of Health and Human Services, 2018). The regulations set forth by HIPAA in the safe harbor rule which requires de-identifying patients' identity from data that are collected. The patients' demographic and blood glucose data were de-identified using the regulations set forth by HIPPA. The primary investigator assigned unique codes to the data that could not be tracked to the patients (United States Department of Health and Human Services, 2018). In addition, the data provided by the Director of Nurses were locked in cabinet in the Director of Nurses'

office and were shared only with the primary investigator. The primary investigator followed the terms of the site authorization letter by refraining from attempting to retrieve information from the Epic EHR or the patients on the medical units.

Limitations

There were numerous limitations of this project including the sample selected for the project was patients 65 and older with type II diabetes. The sample selected is a limitation because the findings might not be generalizable to other population of patients (Elfil & Negida, 2017). The small sample size and lack of randomization in selecting the sample increased the potential for bias in the sample selection and limit the applicability of the findings to the larger diabetic population (Polit & Beck, 2017). The project used a quasi-experimental design and lacked randomization of the sample selected. Even though the results indicated a statistically significant difference in the baseline and post implementation blood glucose levels, it is difficult to determine if the difference in the blood glucose levels were a consequence of the ADCES healthy eating program (Heavey, 2018; Polit & Beck, 2017).

Another limitation is that the sample selected was from a single setting and the project was implemented in a specific setting. According to Heavey (2018) this can potentially lead to bias and limit the generalizability of the findings of the project in other health care settings the nursing rehabilitation (Heavey, 2018). The next limitation is that there was no follow up plan to determine the impact of the education program on the patients' outcomes over a prolonged period. According to Heavey (2018) monitoring evidence-based interventions over a prolonged period can provide valuable data that will help clinicians to determine the clinical significance on patients' outcomes (Heavey,

2018). The ADCES7 Framework on Self-Care Behaviors™: for Healthy Eating was the tool used to educate the nurses who in turn were encouraged to educate the patients on healthy eating. This is a limitation because the ADCES framework is comprised of seven domains (healthy eating, healthy coping, being active, medications, monitoring, reducing risks, and problem solving), and maybe the project could have been more effective if the healthy eating program was combined with another domain, such as being active (ADCES, 2020). The ADCES (2020) acknowledged that it requires a combination of evidence- based interventions for effective management of diabetes. The time frame of four weeks allotted to implement the project was also another limitation because the primary investigator was unable to determine the long-term impact of the healthy eating program for blood glucose control among the patients.

The delimitations for this project were namely, the primary investigator was not allowed to monitor if the nurses were actually teaching the patients about healthy eating during care. According to the Director of Nurses, the nurses who were educated on the ADCES healthy eating program were only required to document in the education section of the Epic EHR that the teaching was done. There was no data to examine if the teaching was actually done among the patients. The data collection process was a delimitation, in that, the baseline and post implementation data for the blood glucose levels and the demographic data for the sample were stored and protected in the Epic EHR, and the primary investigator did not have access to the Epic EHR. The primary investigator had to rely on the Director of Nurses to retrieve the data. The primary investigator was not able to ascertain that the de-identified data provided by the Director of Nurses were

accurate (Elfil & Negida, 2017). Having direct access to the Epic EHR would enable the primary investigator to retrieve the actual data for analysis (Elfil & Negida, 2017).

The primary investigator was not allowed to collect data on the nurses' knowledge of diabetes at baseline and post implementation of the education program. According to Heavey (2018) collecting data on nurses' knowledge before implementation of the evidence-based education program is beneficial for determining the educational needs of the nurses, and also being able to identify the level of knowledge gained after the intervention (Heavey, 2018). In addition, data was not collected on the nurses' perception of the education program. According to Polit and Beck (2017) this data could provide useful information on how the nurses perceived the educational intervention (Polit & Beck, 2017).

The findings from this project might not be generalizable to other population because the results are specific to a population of type II diabetic patients 65 and older in a nursing rehabilitation center. The findings could differ from the overall population within other health care settings and there is no proof that the implementation of the healthy eating program (independent variable) actually reduced the blood glucose levels of the sample, because the patients were getting insulin coverage for the elevated blood glucose levels prior, during, and after the implementation of the project (Heavey, 2018). However, the paired t- test analysis was used to determine if there was a statistically significant difference between the means of the baseline and post implementation groups. According to Heavey (2018) results from paired *t*- test analysis have the potential for applicability to the general population (Heavey, 2018).

Summary

Chapter 3 introduces the methodology for this project. The statement of the problem: It was not known if or to what degree the implementation of the ADCES7 Framework on Self-Care Behaviors™ *Healthy Eating Program* would impact the pre-prandial blood glucose levels among adult type II diabetic patients. The clinical question was aligned to the statement of the problem. The independent variable was the ADCES Framework on Self- Care Behaviors for Healthy Eating. The dependent variable was the baseline and post implementation pre-prandial blood glucose levels of the patients included in the project. The characteristics of the variables were identified and the level of measurement (nominal). The project methodology used the quantitative method to evaluate the data for the dependent and independent variables. The rationale for selecting the quantitative approach was the provision of statistical analysis and presentation of the data in numerical form (Kim & Mallory, 2017). The quantitative method allowed for generalizations (Kim & Mallory, 2017). The project design was quasi experimental and it allowed the primary investigator to collect baseline and post implementation data on the pre- prandial blood glucose levels of the patients while prohibiting manipulation of the variables.

The population and sample selection identified the target population (adults 65 and older with type II diabetes and blood glucose levels >180 mg/dl. The sample was selected from three medical units at the nursing rehabilitation center through convenience. Thirty-two patients met the inclusion criteria for the project. The project was approved for implementation by Grand Canyon University and the project site. The confidentiality measures applied and followed were the guidelines from Grand Canyon

University and the project site. The primary investigator used unique identifiers to match the de-identified data collected on the patients' demographic, baseline and post implementation pre-prandial blood glucose levels. The data was secured in a computer that was secured a with password kept locked in a cabinet. Data was not collected from the nurses who attended the educational sessions, and attendance to the educational sessions was voluntary.

The instrumentation or sources of data section identified the ADCES healthy eating program as the tool used to implement the project at the nursing rehabilitation center. The ADCES framework is comprised of seven domains (healthy eating, healthy coping, being active, taking medication, monitoring, reducing risks and problem solving) for management of diabetes. The domain of healthy eating was used to educate the nurses who in turn educated the patients who were included in the sample for the project (ADCES, 2020). The PowerPoint presentation on healthy eating that was developed by the ADCES was aligned with the domain of healthy eating and was used to provide the education. Handouts from the ADCES on healthy eating was given to the nurses (Appendix C).

The sources of data collection for the demographic, baseline and post implementation pre-prandial blood glucose levels of the sample included in the project were the Epic EHR. The Nova Biomedical Stat Strip glucometer was also one of the sources of data for the project. The glucometer was used to routinely check the patients' blood glucose levels and is interfaced with the Epic EHR. The validity and reliability of the psychometric properties of the seven domains for the ADCES7 framework was evaluated for content validity, internal validity, and structural validity (Kang et al., 2018;

Kong & Cho, 2021; Lee et al., 2020). The validity and reliability of the Nova Stat Strip glucometer were also evaluated and the results showed the glucometer is a valid and reliable tool for accurately assessing and recording blood glucose levels for diabetic patients (Lockyer et al., 2014; Nova Biomedical, 2020; Rabiee et al., 2010). The validity and reliability of the electronic health record were evaluated and the results revealed the Epic EHR was valid and reliable for storing, securing, and extracting data (Germanos et al., 2020; Hernandez-Boussard et al., 2019; Moreno-Iribas et al., 2017).

The data collection procedures identified that the project site did not have an IRB, and the primary investigator received a written site authorization letter to implement the project. Informed consents were not required for sample selection. Approval to implement the project was obtained from Grand Canyon University. The primary investigator had a meeting with the Director of Nurses and three charge nurses for the medical units to make final plans the implementation of the project. The data, time, duration, location and content of the education sessions were discussed in the meeting. It was determined that the nurse managers and charge nurses would make the necessary arrangements for the nursing staff who worked on the different shifts (day and night) were facilitated to attend the educational sessions.

The education sessions were presented by the primary investigator. The nurses were offered information on healthy eating, identifying the different types of food groups, develop healthy meal plan, reading the labels on foods and food exchanges from the different food groups. Four weeks after the ADCES7 healthy eating program was implemented the Director of Nurses retrieved the de- identified data for the pre-prandial blood glucose levels of the patients from the Epic EHR. The data was coded numerically

and entered in an Excel spreadsheet on a computer that required password to log in and access information. The computer was locked in a cabinet.

The data analysis procedures identified that the demographic, baseline and post implementation data were reviewed for missing data using the listwise deletion approach (Pepinsky, 2018). The demographic data were arranged in categories and descriptive statistics that presented an analysis of the means and percentages of each category (age, sex, highest level of education, and marital status). The baseline and post implementation blood glucose levels (variable of interest) were reviewed for outliers and normality using the skewness analysis and Shapiro Wilk test (Polit & Beck, 2017). Tables were used to organize and present the data for the demographic, baseline and post implementation blood glucose levels. Descriptive statistics were used to calculate the means, and percentages of the baseline and post implementation blood glucose levels of the sample.

The primary investigator used a paired sample *t*-test analysis to compare the average of the baseline and post implementation blood glucose levels. The paired *t*- test enabled the primary investigator to address the clinical question if or to what degree the implementation of the Association of Diabetes Care and Education Specialists (ADCES) healthy eating program impacts the pre-prandial blood glucose levels when compared to current practice among type II diabetic patients in a skilled nursing rehabilitation center in New York? The level of significance was set at .05. According to Polit and Beck (2017) the level of significance at .05 with *p* value less than .05 indicates a significant difference in the means between the two sets of data (baseline and post implementation blood glucose levels).

The potential bias and mitigation section identified the potential for sampling bias which was mitigated by identification of the target population, developing an inclusion and exclusion criteria, and allowing participation in the project to be voluntary (or free of coercion) (White & Bonnett, 2018). Framing bias was another potential bias identified for this project. Framing bias was mitigated by the primary investigator using a positive approach and evidence to present the educational information to the nursing staff (Ballard, 2019). The third potential bias was unconscious or implicit bias, which was mitigated by being aware that it is not acceptable in health care practice, and by using evidence to inform practice and use a nonjudgmental unbiased approach when relating to others (Marcelin et al., 2019).

The ethical considerations for this project discussed how the three fundamental principles outlined in the Belmont Report, namely, respect, justice and beneficence were upheld for the project (United States Department of Health and Human Services, 2018). The Health Insurance Portability and Accountability Act (HIPAA) regulations to protect patients' information, maintain confidentiality was also upheld for this project by applying the safe harbor to de-identify the data collected from the sample and assign unique identifiers to the data. Numerous limitations were identified in this project. The small sample size sample was selected from patients 65 and older with type II diabetes. The sample selection lacked randomization in sample selection increased the risk of bias and limit the applicability of the project's findings to a similar population (Polit & Beck, 2017). It was also difficult to determine if the ADCES Framework for Self-Care Behaviors on Healthy Eating Program (independent variable) caused a significant difference in the means of the baseline and post-intervention blood glucose levels. There

was no follow up plan to monitor the impact of the healthy eating program over a longer period, and the lack of combining the healthy eating program with another domain from the program such as being active is a limitation because a combined approach in the adoption of healthy behavioral change is effective for blood glucose control (ADCES, 2020).

The delimitations of the project included the primary investigator not permitted to monitor if the nurses were actually educating the patients, not granted access to the Epic EHR and had to depend on the Director of Nurses to provide the de-identified demographic data and the blood glucose results. There is no guarantee that the data was transferred accurately. The time frame for implementing the project and the inability to evaluate the nurses' knowledge of diabetes were also delimitations of the project. The factors that can potentially limit the generalizability of the findings from this project are namely, the results are specific to type II diabetic patients 65 and older, and the single site in which the project was implement (Heavey, 2018).

Chapter 4: Data Analysis and Results

Prior studies showed that DSME programs are effective evidence-based interventions that can help improve patients' glycemic control and outcomes through education, patient engagement, and empowerment (Alayoub et al., 2018; Kulhawy-Wibe et al., 2018). There was no evidence-based diabetes self-management program at the nursing rehabilitation center setting for this project; thus, there was a need for the ADCES diabetes self-care behaviors to be implemented to prepare the nurses to provide quality diabetes care. The project was conducted to address the following clinical question: It was not known if or to what degree the implementation of the ADCES7 Framework on Self-Care Behaviors™ *Healthy Eating Program* would impact the pre-prandial blood glucose levels among adult type II diabetic patients in a nursing rehabilitation center in New York? The project's intervention provided nurses with information regarding the ADCES7 Framework on Self-Care Behaviors™: for Healthy Eating to increase their knowledge on diabetes to be equipped with evidence-based knowledge of diabetes. Knowledge of the ADCES7 Framework on Self-Care Behaviors™: for Healthy Eating prepared nurses to effectively educate Type II diabetic patients and reduce blood glucose levels among the patients.

A quantitative methodology with a quasi-experimental interventional design was used to guide the quality improvement project. The paired *t*-test was used to determine if there was a significant difference ($p < .05$) among the dependent variable (pre-prandial blood glucose levels) from baseline to post-implementation (Laerd Statistics, 2018; Xu et al., 2017). The data analysis is displayed in contingency tables with the baseline and post-implementation data on the pre-prandial blood glucose levels for the 32 patients included

in the project's sample. A paired *t*-test was used to determine a significant difference between the baseline and post-implementation data of the pre-prandial blood glucose levels following the three 15-minute education sessions. The education sessions were delivered using the PowerPoint presentations from the ADCES on healthy eating. The education sessions provided information on the major food groups (carbohydrates, fats, proteins), the importance of reading the labels on foods, and how patients can include their favorite foods or snacks in their meal plan through portion sizes and food exchange (ADCES, 2020). Chapter 4 summarizes the descriptive data of the sample (type II diabetic patients who were 65 years and older) in the project. The data analysis procedures are discussed, and the results are presented using narrative and chart format. The chapter concludes with a summary of the findings concerning the clinical question.

Descriptive Data

The target population for the quality improvement project was patients admitted to the medicine units in the long-term section at the nursing rehabilitation center. The sample selected for this project was adults 65 years and older who were admitted to the three medicine units at the project site and rehabilitated while receiving long-term care for various medical reasons. According to the Director of Nurses, the daily census on the three medicine units was 70 during the project's implementation period. The method used to select the sample for the project from the patients on the three medicine units was convenience sampling. The total sample was $n = 32$ patients from whom the baseline and post-implementation data on the pre-prandial blood glucose levels were collected. The data were matched from baseline and post-implementation for a paired analysis. The demographics of the patients 65 years and older with type II diabetes were obtained from

the Epic electronic health record by the Director of Nurses and given to the primary investigator. The compiled descriptive data included the gender, age, the highest level of education, and marital status of the 32 type II diabetic patients.

The descriptive data (*n, %)* are displayed in Table 1. As shown in the demographics of the sample population, there were 14 males (43.8%) and 18 females (56.3%). Of the 32 patients, 17 (53.1%) were 65 years of age, and 15 (46.9%) were older than 65 years old. The descriptive data for the highest level of education among the 32 patients included in the project showed 7 (21.9%) had completed junior high school, 15 (46.9%) had completed high school, and 10 (31.3%) had received a college education. Additionally, the marital status showed 11 (34.4%) of the patients were single, eight patients were divorced (25.0%), and 13 patients were married (40.6%).

Table 2

Demographics of Sample Population N=32

Variable	*n*	%
Gender		
Male	14	43.8
Female	18	56.3
Age		
65	17	53.1
> 65	15	46.9
Highest Level of Education		
Junior High School	7	21.9
High School	15	46.9
College	10	31.3
Marital Status		
Single	11	34.4
Divorced	8	25.0
Married	13	40.6

Data Analysis Procedures

The primary investigator began collecting data following the project site approval and Grand Canyon Institutional Review Board approval. The primary investigator collected the demographic data on the 32 patients before educating the 14 nurses on the ADCES7 framework. The baseline and post-implementation data for the pre-prandial blood glucose levels were extracted from the Epic electronic system by the project site's Director of Nurses and given to the primary investigator in a de-identified Word report. The patient outcome data on blood glucose levels were entered into an Excel spreadsheet using a unique study identifier to match each patient's baseline and post-implementation blood glucose levels. After all data entry was completed, data were exported to IBM SPSS version 27 for statistical analysis.

Data were checked for outliers and normality using skewness analysis and a Shapiro-Wilk test (Polit & Beck, 2017). After no outliers or severe skewness were identified, the data were evaluated to determine if the assumptions of the inferential paired samples *t*-test, as planned and discussed in Chapter 3, were met. The premises of the paired *t*-test were determined by the Shapiro-Wilk test and the matched-pairs data. Consequently, a paired *t*-test was conducted to address the clinical question by comparing the average pre-prandial blood glucose levels of the patients' baseline and the post-implementation blood glucose levels. The 32 patients included in the project were a sample from the long-term care section of the nursing rehabilitation center. The baseline and post-implementation sample from the population was the same 32 patients. Before, during, and after the project was implemented, the primary investigator was not employed at the nursing rehabilitation center. As mentioned earlier, the primary

investigator was not granted access to the Epic EHR or permitted direct contact with the patients. According to the Director of Nurses, there were no deaths, admissions, or discharges from the long-term care section of the nursing rehabilitation center during the project's period. As mentioned previously, the pre-prandial blood glucose levels of the patients were extracted from the Epic EHR by the Director of Nurses and given to the primary investigator.

The paired *t*-test was conducted as the data were continuous. A paired *t*-test procedure was used to determine whether the mean difference between two sets of observations was significantly different from zero (Mishra et al., 2019). The significance level was set to .05 to indicate that a *p*-value of less than .05 would be considered statistically significant. The data collected from the Epic EHR were shown to be reliable and valid (Hernandez-Boussard et al., 2019). Electronic health records are considered reliable and valid data collection sources (Germanos et al., 2020). In a reliability analysis of the Epic EHR done by Germanos et al. (2020), Cronbach's a between 0.833 and 0.958 (Germanos et al., 2020). According to a study by McGinnis et al. (2009) that examined EHR and written records, the EHR-based data validity was shown to be moderate to excellent, with Pearson *r* correlations ranging from .875 to .99 for EHR and documentation records (McGinnis et al., 2009). The EHR is also considered a reliable source of data, as Goulet et al. (2007) found strong agreement (Kappa between .86 and .99) and high sensitivity and specificity (≥ .95) for quality measures based on electronically abstracted structured data compared with manual review. In a similar study done by Hernandez-Boussard et al. (2019), to identify the validity of EHR for accurate data extraction found Kappa was above .75 (Hernandez-Boussard et al., 2019).

Results

The quantitative quasi-experimental project was implemented to address the following clinical question: To what degree does the implementation of the ADCES7 Framework on Self-Care Behaviors™: for Healthy Eating impacts the pre-prandial blood glucose levels when compared to current practice among adult type II diabetic patients in a nursing rehabilitation center in center in New York? The baseline and post-implementation pre-prandial blood glucose levels of the patients were analyzed using a paired t-test analysis. The results are displayed in Table 2 to compare the means of the baseline and post-implementation results of the pre-prandial blood glucose levels. According to Kim and Mallory (2017), when comparing the means of the same group before and after an evidence-based intervention, the paired *t*-test is applicable for statistical analysis. There was a decrease in the mean pre-prandial blood glucose levels of the patients from baseline (M = 169.59, SD = 34.71) to post-implementation (M = 160.96, SD = 32.08), t (31) = 2.52, p = .017. The *p*-value is less than .05, which indicates that the decrease in blood glucose level was statistically significant.

Table 3

Comparison of Pre-Prandial Blood Glucose Results at Baseline and Post-Implementation

Variable	Baseline		Post-Implementation		*t*	*df*	*p*-value
	M	*SD*	*M*	*SD*			
Pre- Prandial Blood Glucose Level	169.59	34.71	160.96	32.08	2.52	31	.017

Summary statistics were conducted according to gender and age group on the pre-prandial blood glucose levels at baseline and post-implementation of the healthy eating program. The results are presented in Table 4. The data showed that among males who

were 65 years of age, six patients (18.6%) had pre-prandial blood glucose levels < 180 mg/dl at baseline and post-implementation. Eight males (25% of the sample) were older than 65 with pre-prandial blood glucose levels greater than 180mg/dl at baseline. Still, there were only five patients (15.6%) with pre-prandial blood glucose levels greater than 180 mg/dl at post-implementation. Among the females 65-year-old, 11 patients (34.4%) had pre-prandial blood glucose <180 mg/dl before implementing the project, and nine patients (28.1%) had pre-prandial blood glucose levels less than 180mg/dl after implementation of the project. Among the females older than 65, seven patients (21.9%) had pre-prandial blood glucose levels greater than 180 mg/dl before implementing the project. After implementation, four patients (12.5%) had pre-prandial blood glucose levels greater than 180mg/dl.

Table 4

Comparison of Pre-Prandial Blood Glucose Results at Baseline and Post-Implementation

Variable	Baseline		Post	
	n	*%*	*n*	*%*
Males 65 < 180 mg/dl	6	18.6	6	18.6
Males >65 >180 mg/dl	8	25.0	5	15.6
Females 65 <180 mg/dl	11	34.4	9	28.1
Females > 65 >180 mg/dl	7	21.9	4	12.5

The results from the statistical analysis showed a reduction in the mean pre-prandial blood glucose level of the patients from baseline of 169.59 to 160.96 post

implementation of the ADCES healthy eating program. See Table 3. The standard deviation (SD) for the baseline pre- prandial blood glucose level was 34.71, compared to the standard deviation of 32.08 for the post implementation pre-prandial blood glucose levels. The *p*-value was .017 which is an indication that statistical significance was achieved in the decrease of the blood glucose level when the baseline and post implementation groups were compared (Polit & Beck, 2017). The clinical significance of the project is that the patients' blood glucose levels decreased after the implementation of the ADCES7 Framework on Self-Care Behaviors™: for Healthy Eating Program.

Summary

The goal of this quantitative quasi-experimental direct practice improvement project was to examine the impact of the implementation of the ADCES7 Framework on Self-Care Behaviors™: for Healthy Eating among patients 65 and older with type II diabetes. The project aimed to educate nurses on the ADCES 7 Framework on Self-Care Behaviors™: for Healthy Eating so that they (the nurses), in turn, can assist patients in understanding more about the impact of diet on glycemic control. The direct practice improvement project was implemented in a nursing rehabilitation center located in urban New York. The total sample size comprised $N = 32$ patients, 14 males (43.8%) and 18 females (56.3%) from a population of 70 patients. All patients were 65 years or older and diagnosed with type II diabetes. The data on blood glucose levels were extracted from the Epic EHR system at baseline and four weeks post-implementation of the project. The mean blood glucose level was compared between baseline and post-implementation using an inferential paired samples *t*-test. There was a decrease in mean pre-prandial blood glucose levels from baseline ($M = 169.59$, $SD = 34.71$) to post-implementation ($M =$

160.96, *SD* = 32.08), *t* (31) = 2.52, *p* = .017. The statistical analysis results addressed the clinical question. The results offered evidence that the ADCES7 Framework on Self-Care Behaviors™: for Healthy Eating may effectively reduce blood glucose levels for patients ages 65 and older with type 2 diabetes. The direct practice improvement project results showed a decrease in blood glucose levels with a *p*-value less than .05, which indicates that the decrease in blood glucose level was statistically significant. The results also support the clinical significance of the project as the blood glucose level for the patients included in the project improved after the implementation of the ADCES7 Framework for Self-Care Behaviors on Healthy Eating.

Chapter 5 summarizes the findings, conclusions and recommendations of the project based on the paired samples *t*-test analysis of the baseline and post-implementation pre-prandial blood glucose levels to address the clinical question. The theoretical, practical and future implications are discussed. The chapter concludes with recommendations for healthcare practice and evidence-based research using the ADCES7 evidence-based framework to determine the statistical and clinical significance of the framework for the management of diabetes.

Chapter 5: Summary, Conclusions, and Recommendations

Type II diabetes is currently the seventh leading cause of death in the United States (ADCES, 2020). The CDC (2021), in its policy brief on the prevalence of diabetes, identified that 30.3 million people living in the United States have diabetes, and approximately 95% of these individuals are diagnosed with type II diabetes (CDC, 2021). The prevalence of this chronic medical condition has presented a tremendous burden on the U.S. economy and health care delivery systems (Berbudi et al., 2020). According to the WHO (2021), the overarching issues related to the prevalence of diabetes are lack of understanding about the disease, lack of access to quality care, and most importantly, the lack of knowledge on diabetes self-care behaviors (CDC, 2021). Despite efforts to control this chronic medical condition, there has been a gradual rise in individuals diagnosed with the disease (ADA, 2021b). However, studies have shown that the disease can be controlled by adopting behaviors, such as healthy eating. Colberg et al. (2016) concluded that adopting self-care behaviors, such as a healthy diet and physical activity, can effectively contribute to glycemic control among diabetic patients (Colberg et al., 2016).

Historically, diabetes education programs have been proven to be evidence-based interventions that led to the adoption of healthy behavioral practices among diabetic patients (ADA, 2021b). The evidence from prior studies demonstrated that diabetes education programs could considerably reduce the blood glucose levels of patients with type II diabetes and minimize the risk of complications associated with the disease (Pal et al., 2018; Powers et al., 2017). Studies also revealed that the lack of formal diabetes self-care leads to poor glycemic control and health outcomes for patients (Ansari et al., 2016). The primary investigator identified a gap in the evidence of how nurses manage the care

of diabetic patients and acknowledged that it required more than the standard approach used for diabetes care (Hailu et al., 2019; Lee et al., 2019). At the nursing rehabilitation center, there was no diabetes educator, and the standard approach to care was used for blood glucose management among diabetic patients. As a result, there was a need to implement the evidence-based ADCES7 Framework on Self-Care Behaviors™: for Healthy Eating Program. Fourteen nurses and five charge nurses who worked on the three medical units at the nursing rehabilitation center received education on the ADCES7 Framework on Self-Care Behaviors™: for Healthy Eating Program. The ADCES7 Framework for Self-Care Behaviors on Healthy Eating equipped the nurses with the knowledge and skills needed to provide optimal care and education to the diabetic patients. The main implications for diabetes care among the patients were increasing their knowledge, promoting healthy behavioral change, and achieving glycemic control. Baseline and post-implementation data on the pre-prandial blood glucose levels of the patients with type II diabetes were collected to determine the impact of the ADCES7 Framework on Self-Care Behaviors™: for Healthy Eating on the patients' blood glucose levels.

Chapter 5 summarizes the project regarding managing type II diabetes in a nursing rehabilitation center and includes a discussion of the project findings and conclusions. Other sections included are the theoretical implications of the findings related to the Pender HPM and practical and future implications for practice. The last section of chapter 5 is comprised of recommendations for future projects and clinical practices.

Summary of the Project

The direct practice improvement project aimed to advance scientific knowledge on the application of the ADCES Framework on Self-Care Behaviors™: for Healthy Eating

on three medicine units at a nursing rehabilitation center. The results from studies have shown that the provision of education on diabetes has led to glycemic control and quality health outcomes for diabetic patients (Ansari et al., 2016; Pal et al., 2018; Powers et al., 2017). As mentioned earlier, the gap identified in practice was that the nursing staff at the rehabilitation center did not have a standardized, evidence-based approach to provide education on diabetes. Additionally, the nursing rehabilitation center did not have a diabetes education program before implementing the project. As a result, the implementation of the ADCES Framework on Self-Care Behaviors™: for Healthy Eating was justified. The purpose of this quantitative quasi-experimental quality improvement project was to determine if the implementation of the Association of Diabetes Care and Education Specialists (ADCES7) Framework on Self-Care Behaviors™ *Healthy Eating Program* would impact the pre-prandial blood glucose levels among adult type II diabetic patients in a nursing rehabilitation center in New York over four-weeks. The clinical question that directed the project was: It was not known if or to what degree the implementation of the ADCES7 Framework on Self-Care Behaviors™ *Healthy Eating Program* would impact the pre-prandial blood glucose levels among adult type II diabetic patients in a nursing rehabilitation center in New York? The project was initiated after site authorization and permission from the Grand Canyon University IRB to implement the project. A quantitative methodology was used to collect the baseline and post-

implementation data for the patients' blood glucose levels included in the project. De-identified baseline and post-implementation blood glucose levels were collected and entered into the Microsoft Excel document. For confidentiality and data protection, the primary investigator assigned unique codes to the data collected. The sample size was 32; inclusion criteria comprised patients 65 years and older with type II diabetes. Fourteen nurses and five charge nurses who worked on the day and night shifts on the medical units received education and handouts on the ADCES7 Framework on Self-Care Behaviors™: for Healthy Eating. The nursing staff who received education on the ADCES7 Framework on Self-Care for Healthy eating implemented the project among the 32 patients. The data analysis was completed with the Statistical Package for Social Sciences (SPSS), version 27. Descriptive statistical analysis was conducted to determine the means for the total sample and variables of interest to address the clinical question.

The quality improvement project used a quantitative, quasi experimental design. The focus of the project was to determine if the ADCES7 healthy eating program would improve the blood glucose levels of type II diabetic patients who were 65 and older. The secured Epic electronic health record system, which interfaces with the Nova Stat Strip blood glucometer, was used for data collection. The patients' baseline and post-implementation blood glucose results were retrieved from the Epic EHR and analyzed to answer the clinical question using a paired *t*-test analysis. The paired *t*-test analysis showed a statistically significant increase in the participants' blood glucose levels after the intervention. The results will be summarized in the following section. The next section will also include detailed conclusions that can be drawn from the project results.

Then, the implications of the results will be discussed, and recommendations will be made.

Summary of Findings and Conclusion

The pre-prandial blood glucose levels were extracted from the Epic EHR by the Director of Nurses before implementing the project and four weeks after implementation. The data collected from $n = 32$ patients (before and after implementing the ADCES7 DSME program) were analyzed using an inferential paired sample *t*-test. The findings demonstrated a decrease in the mean pre-prandial blood glucose levels from baseline ($M = 169.59$, $SD = 34.71$) to post-implementation ($M = 160.96$, $SD = 32.08$), $t\ (31) = 2.52$, $p = .017$. The decrease was statistically significant after the intervention, as demonstrated by the *p*-value of less than .05. There was clinical significance with the decrease in blood glucose levels of the patients. The sample size and the timeframe for implementation of the ADCES7 framework were selected for the convenience of the direct practice improvement project. The results addressed the clinical question and offered evidence that the ADCES7 Framework for Self-Care Behaviors on Healthy Eating is beneficial in helping type II diabetic patients reduce their blood glucose levels.

The findings from the project showed that there was a significant improvement in the pre-prandial blood glucose levels of the patients. The results of the project are similar to numerous studies that also demonstrated a significant change in patients' blood glucose levels, achievement of glycemic control, and adoption of diabetes self-management skills after the implementation of the education programs (Blumi et al., 2019; Chai et al., 2018; Cunningham et al., 2018; Fain, 2017; Gucciardi et al., 2020). The findings from this project also support the results from prior studies that the provision of diabetes education

to nurses leads to the delivery of quality care to patients and the achievement of blood glucose control among patients (Azami et al., 2018; Jakoby et al., 2020). The ADCES healthy program was fully adopted on the three medical unit and as per the Director of Nurses, the nurses are using the handouts (on healthy eating) to educate the diabetic patients.

Azami et al. (2018) posited that diabetes education programs are the cornerstone of diabetes care and are vital evidence-based interventions that result in positive health outcomes for diabetic patients. The findings from this project can be utilized in other nursing rehabilitation centers and health care facilities to provide education on diabetes. The implementation of this project was efficient and did not require any funding. Therefore, healthcare facilities with limited resources to provide education to nursing staff can adopt the ADCES framework so that nurses are equipped with the knowledge and skills to impact the health outcomes of diabetic patients (Azami et al., 2018).

Implications

Nursing implications are potential outcomes or inferences from the project's findings (Polit & Beck, 2017). This section explains how the results impact specific nursing practices (Polit & Beck, 2017). The project's strengths included identifying the impact of diabetic education on the patients as they gain understanding on the importance of diet for blood glucose control. The second strength was observing the nursing staff verbalized being empowered with knowledge and feeling prepared to educate the patients. The third strength was that the project was practical, cost-effective, and easily implemented. Based on the results, it is evident that the healthy eating program can augment positive health outcomes at the rehabilitation center. Fourth, the ADCES7

Framework for Self-Care Behaviors on Healthy Eating was adopted by the nursing rehabilitation center and is now being used by the nurses as the evidence-based quality improvement teaching program for diabetes care in the medicine units.

Even though the results from this project showed clinical significance, one of the weaknesses identified was the limited sample from the population, which only included participants 65 years and older. The sample used can potentially restricted the application of the project's findings to other, similar environments and populaces. The second weakness was the inability of the primary investigator to collect demographic data on the characteristics of the nurses. Collecting the demographic data on the nurses would have provided an insight into the highest level of education and years of practicing as nurses. The primary investigator would have been able to use descriptive statistics (by calculating percentages) to analyze the nurses' demographic data and determine the highest level of education among the nurses. The third weakness of this project was not collecting pretest-posttest data on the nurses' knowledge to determine the impact of the educational intervention on their knowledge or an evaluation of their prior knowledge of diabetes management with education on healthy eating. The fourth weakness identified was that, even though the results showed improvement in the pre-prandial blood glucose levels among the participants, the findings may not be generalizable because the project was limited to one nursing rehabilitation center. In addition, the primary investigator cannot prove or determine that the ADCES7 framework actually led to the decrease in the patients’ blood glucose levels.

Theoretical Implications

The quality improvement project examined two theoretical frameworks. Pender

HPM was the nursing theoretical model used for this quality improvement project. The theoretical underpinnings in Pender HPM help individuals engage in actions that promote health through behavioral change, resulting in acceptable or valued health outcomes (Alligood, 2018). The concept of interpersonal influences in the HPM serves as the intersection between the nurses and the patients. The concept of interpersonal influences in the HPM for this project identified the nurses as the patients' social support system for the adoption of healthy eating habits (Pender, 1982). The staff nurses provide direct care to the patients and are considered the primary source of influencing behavioral change through education and support (Pender, 1982). The concept of perceived benefits of action was aligned with the ADCES7 framework through the nurses collaborating with the patients to identify healthy food exchanges among the different food groups. The concept of activity-related effect from the HPM was also aligned with the ADCES7 Framework on Self- Care Behaviors for Healthy Eating through the nurses having the patient engaged in the educational activity. The concept of health promoting behaviors enabled the nurses to establish set goals and strategies of healthy eating with the patients, such as selecting the food they liked from the food exchange group in the meal plan (Pender, 1982). The nursing rehabilitation center adopted the ADCES framework to provide evidence- based education on healthy eating among the diabetic patients. The adoption of the ADCES7 education intervention was aligned with the concept of health promotion in the Pender HPM. According to Kurnia et al. (2017), Pender’s HPM supports diabetes care and education because it incorporates individual responsibility, the role of nurses in providing education and support, and reiterates the importance of promoting healthy eating behaviors among diabetic patients. Effective management of

diabetes involves health care providers collaborating with patients to support and promote healthy behaviors (Susanto, 2019).

Roger's diffusion of innovation change model was the second theoretical framework used during the direct practice improvement project. The diffusion of innovation theory was developed in 1962 ((Lien & Jiang, 2016; Rogers, 2003). The change theory focuses on implementing and leading change through innovation within multifaceted organizations (Rogers, 2003). The practice site used to implement the direct practice improvement project was a nursing rehabilitation center in a large urban city in New York. Roger's change model was used to guide the implementation of this project. The five stages in the model were aligned with this direct practice improvement project (Rogers, 2003). The first stage, which is awareness was associated with the provision of the evidence- based knowledge about the project to the nursing staff (Rogers, 2003). The second stage of the model (persuasion) was aligned with the primary investigator persuading and encouraging the nursing staff to participate in the education sessions on the ADCES healthy eating program (Rogers, 2003). The persuasion stage resulted in the nursing staff gaining information about the program (Rogers, 2003). The decision stage of the is in congruence with the nursing staff deciding to accept the education program as an evidence-based intervention to improve practice (Rogers, 2003). The fourth stage is implementation, and for the project, the nurses applied the knowledge gained to educate the patients on diabetes. The confirmation stage of the model is aligned with this project by being fully adopted as the evidence-based education program for the provision of diabetes care (Lien & Jiang, 2016; Rogers, 2003).

The primary investigator was not allowed to monitor the nurses during the provision of care and education to the diabetic patients or to collect data that would reflect the perception of care from the patients. Based on feedback from the Director of Nurses, the nurses who attended the educational sessions included education on the ADCES7 among diabetic patients. According to the Director of Nurses, the nurses documented in the patients' EHR on the education offered to the type II diabetic patients.

Practical Implications

One of the practical implications of this quality improvement project was how the ADCES7 healthy eating program was significant in providing diabetes care and education among patients diagnosed with type II diabetes. The results from the data analysis for this project showed the importance of evidence-based knowledge about diabetes management among patients. The statistical significance of the intervention indicated that diabetes self-management education promoted healthy eating behaviors and improved the blood glucose levels of diabetic patients. Education on healthy eating for diabetes care prepared the nurses to apply the knowledge gained into the care of the patients that resulted in improvement of the blood glucose levels.

The findings of this quality improvement project confirmed that evidence-based education on healthy eating is a practical, evidence-based strategy for the management of diabetes and the provision of education to patients diagnosed with the disease (CDC, 2021). The national goals for diabetes include decreasing its prevalence, minimizing the progression of complications, helping individuals diagnosed with the disease achieve glycemic control, and promoting quality of life (CDC, 2021; Siminerio et al., 2018). Since the nursing rehabilitation center did not have a diabetes educator, the nurses had to

be equipped with the knowledge, skills, and resources to provide quality care and education to the diabetic patients (Siminerio et al., 2018). The findings from the project and the results from prior studies demonstrated that consistent DSME promotes the adoption of healthy behaviors among diabetic patients (Fain, 2017; Gucciardi et al., 2020).

Future Implications

This quality improvement project's most crucial future implication is to improve diabetes care and education for patients with type II diabetes. Numerous studies showed the positive impact of diabetes self-management education in achieving glycemic control and quality health outcomes (Siminerio et al., 2018; Susanto, 2019). Implementation of the healthy eating program among patients with type II diabetes demonstrated the effective use of an evidence-based education tool to promote diabetes self-care behavior. The healthy eating program confirmed the impact of health promotion through education among the diabetic population 65 and older. Encouraging health promotion is the basis of behavioral change (Pender, 1982). Applying a statistical approach to analyze the quantitative data provided valuable results that can guide future direct practice improvement projects. The statistical analysis of the quantitative data (pre-prandial blood glucose levels) also provided information that can guide future approaches towards data collection and data analysis. Lastly, the effectiveness of the ADCES7 healthy eating program substantiated by this project demonstrates that the intervention should be implemented in health care organizations to promote diabetes care and glycemic control. The results of the data analysis showed that the pre-prandial blood glucose levels of the

patients with type II diabetes improved after the implementation of the healthy eating program.

Recommendations

The findings from this project are consistent with prior studies which proved that diabetes education significantly improves patients' outcomes, leads to glycemic control, and promotes their quality of life (Gucciardi et al., 2020; Jakoby et al., 2020). Consequently, the first recommendation is for the nursing rehabilitation centers to officially implement the ADCES7 Framework for Self- Care Behaviors on Healthy Eating to promote diabetes education and support for diabetic patients. Secondly, as the prevalence of diabetes increases (CDC, 2021), nurses in other health care settings (such as primary care) can adopt the ADCES7 framework and evaluate its impact on blood glucose control among both types I and type II diabetic patients. Third, future projects should evaluate the impact of the ADCES7 framework on the hemoglobin A1C levels of type II diabetic patients over six months before and after the educational intervention. The fourth recommendation is that quality improvement projects be developed to evaluate the factors that influence or inhibit self-management of diabetes among patients with type II diabetes. With these data, nurses will be positioned to tailor interventions for patients related to their diabetes educational needs and care. Lastly, the project results illustrated the need for diabetes education programs to improve the quality of care and education nurses provide for patients with diabetes in nursing rehabilitation centers and other health care facilities. Providing continuing education to the nursing staff who provide direct patient care to diabetic patients is a viable approach for increasing

professional competency for nurses and promoting behavioral change among patients with type II diabetes (Rutten et al., 2020).

Recommendations for Future Projects

The evidence from prior studies shows the need for diabetes self-management programs to be implemented in health care facilities so that diabetic patients can be empowered to develop self-care behaviors to achieve glycemic control (Crowe et al., 2019; Davies et al., 2018; Garber et al., 2020; Harris, 2019). Based on the findings from this project, there are several recommendations for future research. First, future projects and research should evaluate nurses' knowledge of diabetes care before and after implementing educational interventions. This approach will allow clinicians to collect data that will help determine how prepared nurses are in the provision of self-care education for the management of diabetes.

Second, future projects should be conducted over a more extended period to provide long-term follow-up (at least six months) to determine the impact of a healthy eating education framework on the patients' blood glucose levels and health outcomes. This project was cost-effective and feasible, but the time allowed for implementing, collecting, and analyzing the data collected was limited. As a result, the limited time-restricted collecting data for a prolonged period. According to Siminerio et al. (2018), health promotion for diabetes self-management education entails behavioral change over time. Therefore, monitoring the effectiveness of the healthy eating program over an extended period would provide valuable data on its effectiveness. According to Colberg et al. (2016), education interventions supported by evidence-based research over time have proven to improve the health outcomes of patients with type II diabetes.

Another recommendation is that future projects include a combined approach of the interventions from the ADCES7 self-care behaviors, such as eating healthy and exercising to lower blood glucose levels. According to the CDC (2021), effective management of type II diabetes requires an arrangement of self-management interventions, such as diet and activity combined with the standard approach to diabetes management. Together, self-management interventions and standard approaches can be operative strategies that can improve glycemic control and decrease the burden of diabetes care.

Future investigators should also select participants for projects from a diverse age range. For instance, future projects should include middle-aged adults (30-65) diagnosed with type II diabetes to evaluate the impact of education on diabetes care. For this project, the sample was selected from adults 65 and older, which may have limited the applicability of the findings to other populations of diabetic patients.

Finally, future investigators should recruit participants for a larger sample size. The sample size for this direct practice improvement project was 32 patients with type II diabetes. The sample size and the characteristics of the participants for this project limited the generalizability of the project's results. According to Siminerio et al. (2018), including a sample from a larger population of participants could increase the generalizability of research findings.

Recommendations for Practice

The ADA (2021b) recommended that health care providers are positioned to provide patients with education and empowerment on behavioral changes to manage and minimize the complications associated with the disease. As a result, the first

recommendation for practice is implementing evidence-based DSME programs, such as the ADCES7 self-care behaviors, for the diabetic population on a broad scale. Additionally, the implementation of more DSME programs in health care facilities should be increased. The CDC (2021) acknowledged that the lack of structured, evidence-based DSME programs in health care facilities is an ongoing problem that may negatively impact patients with diabetes.

Due to the positive results of the education sessions in this project, it is recommended that evidence-based continuing education on diabetes management for nurses be developed because it will prepare them to develop professional competencies for diabetes care. Nurses should also be provided with the DSME tools and resources to incorporate into their care of diabetic patients. The CDC (2021) acknowledged that the availability of support and the necessary resources for nurses to provide evidence-based education and diabetes care have aided in adopting self-care behaviors among patients with type II diabetes.

Following these recommendations, the project site and similar organizations should provide an ongoing in-service at least every six months and an annual continuing education program on diabetes care for nurses. According to Reddy (2017), the more nurses are equipped to provide quality care and education; then the more likely patients are to achieve blood glucose control and effective diabetes management. Along these lines, nurses in rehabilitation centers should be encouraged to be involved in quality improvement initiatives to improve diabetes care among patients. According to Fain (2017) and Reddy (2017), the increasing prevalence of diabetes within the United States and the lack of education programs, especially among patients with type II diabetes, are

the main contributing factors to poor health outcomes. Therefore, if nurses at the nursing rehabilitation centers, such as the project site, become actively involved in implementing education programs in combination with the standard approach to diabetes care, the patients will be supported in adopting healthy behavioral practices for glycemic control.

In conclusion, the CDC (2021) informed health care providers that diabetes self-management among patients with type II diabetes is the foundation for blood glucose control. The ADA (2021b) recommended that health care providers acquire the knowledge and skills necessary to provide patients with education and empowerment to achieve quality health outcomes. Numerous research results have indicated the usefulness and relevance of the ADCES7 self-care behaviors in preparing health care providers to assist patients in adopting behaviors geared towards promoting glycemic control ADA (2021b). The project adds to the current body of literature by exploring the impact of healthy eating on the blood glucose levels of diabetic patients through the utilization of the ADCES7 framework for self-care behaviors.

References

Abu-Qamar, M. Z. (2019). Use of nutrition therapy in the management of diabetes mellitus diabetes mellitus. *Nursing Standard, 34*(3), 61-66. https://doi.org/10.7748/ns.2019.e11253

Adam, L., O'Connor, C., & Garcia, A. (2018). Evaluating the impact of diabetes self-management education methods on knowledge. Attitudes and behaviors of adult patients with type 2 diabetes mellitus. *Canadian Journal of Diabetes, 42*(5), 470-477. E2. https://doi:10.1016/j.jcjd.2017.11.003

Adeyinka, A., & Kondamudi, N. P. (2021). Hyperosmolar Hyperglycemic Nonketotic Coma. https://www.ncbi.nlm.nih.gov/books/NBK482142/

Adu, M. D., Malabu, U., Malau-Aduli, A., & Malau-Adulif, B. (2019). Enablers and barriers to effective diabetes self-management: A multinational investigation. *PLOS One, 14*(56): e0217771. https://doi.org/10.1371/journal.pone.0217771

Akiboye, F., Sihre, H. K., Al Mulhem, M., Rayman, G., Nirantharakumar, K., & Adderley, N. J. (2021). Impact of diabetes specialist nurses on inpatient care: A systematic review. *Diabetic medicine: a journal of the British Diabetic Association*, e14573. Advance online publication. https://doi.org/10.1111/dme.14573

Alayoub, H., Curran, S., Coffey, M., Hatunic, M., & Higgins, M. (2018). Assessment of the effectiveness of group education on knowledge for women with newly diagnose gestational diabetes. *Iris Journal of Medical Science, 187*, 65-68. https://doi.org/10.1007/s11845-017-1609-9

Alghafri, T. S., Alharthi, S. M., Al-Farsi, Y., Al-Busaidi, Z., Banneriman, E., Craigie, A., & Anderson, A. (2017). Health professionals' perceptions about physical activity promotion in diabetes care within primary health care settings in Oman. *Heliyan*, *3*(12),1-30. https://doi.org/10.1016/j.heliyon.2017.e00495

Alligood, M. (2018). Nursing Theorist & Their Work (9th ed). Elsevier

Altman, M. R., Colori, K., & Daratha, K. B. (2018). The Reliability of Electronic Health Record Data Used for Obstetrical Research. *Applied clinical informatics*, *9*(1), 156–162. https://doi.org/10.1055/s-0038-1627475

American Association of Clinical Endocrinologists (AACE). (2020). Clinical Practice Guidelines for Developing a Diabetes Mellitus Comprehensive Care Plan. Endocrine Practice, 21(4), 1-70. https://www.worlddiabetesfoundation.org/

American Diabetes Association (ADA). (2021a). *Statistics about diabetes.* https://www.diabetes.org/resources/statistics/statistics-about-diabetes

American Diabetes Association (ADA). (2021b). Glycemic Targets: Standards of Medical Care in Diabetes-2021. *Diabetes Care, 44*(Supplemental 1): S73-S84. https://doi.org/10.2337/dc21-S006

Ansari, R. M., Hosseinzadeh, H., & Zwar, N. (2016). Quantitative research on self-management of type 2 diabetes in the middle-aged population of rural areas of Pakistan. *International Education and Research Journal*, *2* (8), 62-65. https://doi.org/10.1016/j.cegh.2018.04.003

Aronson, R., Brown, R. E., Jiandani, D., Walker, A., Orzech, N., & Mbuagbaw, L. (2018). Assessment of self-management in patients with diabetes using the novel LMC skills, confidence and preparedness index (SCPI). *Diabetes Research and Clinical Practice*, *137*, 128-136. https://doi.org/10.1016/j.diabres.2017.10.028

Association of Diabetes Care and Education Specialists (ADCES). (2020). *ADCES 7 Self Care Behaviors*. https://diabetes educators.org/living-with-diabetes/diabetes/ADCES7-self-care-behaviors.

Azami, G., Soh, K. L., Sazlina, S. G., Salmiah, M. S., Aazami, S., Mozafari, M., & Taghinejad, H. (2018). Effect of a nurse-led diabetes self-management education program on glycosylated hemoglobin among adults with type 2 diabetes. *Journal of Diabetes Research*, *2018*, 1-12. https://doi.org/10.1155/2018/4930157

Aziz, Z., Absetz, P., Oldroyd, J., Pronk, N. P., & Oldenburg, B. (2015). A systematic review of real-world diabetes prevention programs: learnings from the last 15 years. *Implementation science: IS*, *10*, 172. https://doi.org/10.1186/s13012-015-0354-6

Ballard, A. (2019). Framing bias in the interpretation of quality improvement data: Evidence from an experiment. International Journal of Health Policy and Management, 8(5), 307–314. https://doi.org/10.15171/ijhpm.2019.08

Barreira, E., Novo, A., Vaz, J. A., & Pereira, A. (2018). Dietary program and physical activity impact on biochemical markers in patients with type 2 diabetes: A systematic review. *Atencion primaria*, *50*(10), 590–610. https://doi.org/10.1016/j.aprim.2017.06.012

Berbudi, A., Rahmadika, N., Tjahjadi, A. I., & Ruslami, R. (2020). Type 2 diabetes and its impact on the immune system. *Current Diabetes Reviews, 16*(5), 442-449. https://doi.org/10.2174/1573399815666191024085838

Biernatzki, L., Kuske, S., Genz, J., Ritschel, M., Stephan, A., Bachle, C., & Icks, A. (2018). Information needs in people with diabetes mellitus: A systematic review. *Systematic Reviews, 7*(1), 27-31. https://doi.10.1186/s13643-018-0690-0

Blaslov, K., Naranđa, F. S., Kruljac, I., & Renar, I. P. (2018). Treatment approach to type 2 diabetes: Past, present and future. *World journal of diabetes*, *9*(12), 209–219. https://doi.org/10.4239/wjd.v9.i12.209

Blumi, B. M., Kolb, L. E., & Lipman, R. (2019). Evaluating the impact of yearlong augmented diabetes self-management support. *Population Health Management, 22*(6), 522-528. https://doi.org/10.1089/pop.2018.0175

Boswell, C., & Cannon, S. (2018). *Introduction to Nursing Research: Incorporating Evidence-Based Practice,* (5th ed), Jones & Bartlett

Bradford, A. L., Crider, C. C., Xu, X., & Naqvi, S. H. (2017). Predictors of recurrent hospital admission for patients presenting with diabetic ketoacidosis and Hyperglycemic Hyperosmolar state. *Journal of Clinical Medicine Research, 9*(1), 35-39. https://doi.org/10.14740/jocmr2792w

Burd, C., Gruss, S., Albright, A., Zina, A., Schumacher, P., & Alley, D. (2020). Translating knowledge into action to Prevent type 2 diabetes: Medicare expansion of the National Diabetes prevention program lifestyle intervention. *The Milbank quarterly*, *98*(1), 172–196. https://doi.org/10.1111/1468-0009.12443

Cable, S. J. (2016). The role of the diabetes specialist nurse. S*outh Sudan Medical Journal, 9*(3), 63-66. https://www.ajol.info/index.php/ssmj/issue/view/14475

Centers for Disease Control and Prevention (CDC). (2021). National Diabetes Statistics Report, 2020. Estimates of Diabetes and its Burden in the United States. https://www.cdc.gov/diabetes/data/statistics-report/index.html

Centers for Medicare & Medicaid Services, (CMS). (2019). Diabetic self-management training (DSMT) Accreditation Program. https://www.cms.gov/Medicare/Provider-Enrollment-and-Certification/SurveyCertificationGenInfo/DSMT-Accreditation-Program

Chai, S., Yao, B., Xu, L., Wang, D., Sun, J., Yuan, N., & Zhang, X. (2018). The effect of diabetes self-management education on psychologic al status and blood glucose in newly diagnosed patients with diabetes type two. *Patient Education and Counseling*, *101*(8), 1427-1432. https://doi.org/ezproxy.u ky.edu/10.1 016/j.pec.20 18.03.020

Cheng, L., Leung, D., Sit, J., Li, X., Wu, Y., Yang, M., Gao, C., & Hui, R. (2016). Factors associated with diet barriers in patients with poorly controlled type 2 diabetes. *Patient Preference and Adherence*, 37. https://doi.org/10.2147/ppa.s94275

Cheung, K. L., Ten Klooster, P. M., Smit, C., de Vries, H., & Pieterse, M. E. (2017). The impact of non-response bias due to sampling in public health studies: A comparison of voluntary versus mandatory recruitment in a Dutch national survey on adolescent health. *BMC public health*, *17*(1), 276. https://doi.org/10.1186/s12889-017-4189-8

Christensen, N. I., Drejer, S., Burns, K., Lundstrøm, S. L., & Hempler, N. F. (2020). A qualitative exploration of facilitators and barriers for diabetes self-management behaviors among persons with type 2 diabetes from a socially disadvantaged area. *Patient preference and adherence, 14*, 569–580. https://doi.org/10.2147/PPA.S237631

Chudasama, Y. (2020). Review for "Newly diagnosed diabetes is associated with a higher risk of mortality than known diabetes in hospitalized patients with COVID-19." https://doi.org/10.1111/dom.14099/v1/review1

Cleveland Clinic. (2019). *Hyperosmolar Hyperglycemic Syndrome (HHS).* https://my.clevelandclinic.org/health/diseases/21147-hyperosmolar-hyperglycemic-syndrome.

Coffey, L., Mahon, C., & Gallagher, P. (2018). Perceptions and experiences of diabetic foot ulceration and foot care in people with diabetes: A qualitative meta-analysis. *International Journal of Wound Journal, 16*(1), 183-210. https://doi.org/10.1111/iwj.13010

Colberg, S. R., Sigal, R. J., Yardley, J. E., Riddell, M. C., Dunstan, D. W., Dempsey, P., & Tate, D. F. (2016). Physical activity/exercise and diabetes: A position statement of the American Diabetes Association. *Diabetes Care, 39*(11), 2065-2079. https://doi.org/10.2337/dc16-1728

Cole, A. M., Pflugeisen, B., Schwartz, M. R., & Miller, S. (2018). Cross sectional study to assess the accuracy of electronic health record data to identify patients in need of lung cancer screening. BMC Research Notes, 11(14), 1-4. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5763525/pdf/13104_2018_Article_3124.pdf

Cradock, K. A., Quinian, L. R., Finucane, F. M., Gainforth, H. L., Martin Ginis, K. A., Barros, A. C., Sanders, E. B., & O'Laighin, G. (2021). Identifying barriers and facilitators to diet and physical activity behavior change in type 2 diabetes using a design probe methodology. *Journal of Personalized Medicine, 11*(2). 72. https://doi.org/10.3390/jpm11020072

Creswell, J. W., & Creswell, J. D. (2017). Research design: Qualitative, quantitative, and mixed methods approach. (5th ed.) Thousand Oaks: CA. Sage Publications.

Crowe, M., Jones, V., Stone, M., & Coe, G. (2019). The clinical effectiveness of nursing models of diabetes care: A synthesis of the evidence. *International Journal of Nursing Studies, 93,* 119-128. https://doi.org/10.1016/j.ijnurstu.2019.03.004

Cunningham, A., Crittendon, D., White, N., Mills, G., Diaz, V., & LaNoue, M. (2018). The Effect of diabetes self-management education on HBA1c and quality of life in African- American: A systematic review and meta- analysis. *BMC Health Services Research, 18*(1), 367-371. https://doi.org/10.1186/s12913-018-3186-7-1728

Curley, A. L., & Vitale, P. A. (2019). Population based nursing: concepts and competencies for advanced practice (3rd ed). Springer

Dao, J., Spooner, C., Lo, W., & Harris, M. F. (2019). Factors influencing self-management in patients with type 2 diabetes in general practice: A qualitative study. *Australian Journal of Primary Health*, *25*(2), 176. https://doi.org/10.1071/py18095

Davies, M. J., D'Alessio, D. A., Fradkin, J., Kerman, W. N., Mathieu, C., Mingrane, G., Rossing, P., Tsapas, A., Wexler, D. J., & Buse, J. B. (2018). Management of Hyperglycemia in Type 2 Diabetes, 2018. A Consensus Report by the American Diabetes Association (ADA) and the European Association for the Study of Diabetes (EASD). *Diabetes Care*, *14*, 2669-2701. https://doi.org/10.2337/dci18-0033

Dearing, J. W., & Cox, J. G. (2018). Diffusion Of Innovations Theory, Principles, And Practice. *Health affairs (Project Hope)*, *37*(2), 183–190. https://doi.org/10.1377/hlthaff.2017.1104

Dineen-Griffin, S., Garcia-Cardenas, V., Williams, K., & Benrimoj, S. (2019). Helping patients help themselves: A systematic review of self-management support strategies in primary health care practice. PLOS ONE, 14(8), 1-29. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6675068/pdf/pone.0220116.pdf

Drincic, A., Pieffer, E., Luo, J., & Goldner, W. S. (2017). The effect of diabetes case management and diabetes resource nurse program on readmission of patients with diabetes mellitus. *Journal of Clinical & Translational Endocrinology*, *8*, 29-34. https://doi.org/10.1016/j.jcte.2017.03.003

Elfil, M., & Negida, A. (2017). Sampling methods in Clinical Research: An Educational Review. *Archives of Academic Emergency Medicine, 5*(1), e52-54 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5325924

Enomoto, L. M., Shrestha, D. P., Rosenthal, M. B., Hollenbeak, C. S., & Gabbay, R. A. (2017). Risk factors associated with 30-day readmission and length of stay in patients with type 2 diabetes. *Journal of Diabetes and its Complications, 31*(1), 122-127. https://doi.org/10.1016/j.jdiacomp.2016.10.021

Esperon, J. M. (2017). Quantitative research in nursing science. *Escola Anna Nery, 21*(1), 1-2. http://dx.doi.org/10.5935/1414-8145.20170027

Fain, J. A. (2017). 2017 national standards for diabetes self-management education and support (DSMES): Revised and updated. *The Diabetes Educator, 43*(5), 439-439. https://doi.org/10.1177/0145721717729355

Flode, M., Iversen, M. M., Aarflot, M., & Haltbakk, J. (2017). Lasting impact of an implemented self-management program for people with type 2 diabetes referred from primary care: A one-group, before-after design. *Scandinavian Journal of Caring Sciences, 31*(4), 789-795. https://doi.org/10.1111/scs.12398

Garber, A. J., Handelsman, Y., Grunberger, G., Einhorn, D., Abrahamson, M. J., Barzilay, J. I., Blonde, L., Bush, M. A., DeFronzo, R. A., Garber, J. R., Garvey, W., Hirsch, I. B., Jellinger, P. S., McGill, J. B., Mechanick, J. I., Perreault, L., Rosenblit, P. D., Samson, S., & Umpierrez, G. E. (2020). Consensus statement by the American Association of clinical endocrinologists and American College of Endocrinology on the comprehensive type 2 diabetes management algorithm – 2020 executive summary. *Endocrine Practice, 26*(1), 107-139. https://doi.org/10.4158/cs-2019-0472

Gathu, C. W., Shabani, J., Kunyiha, N., & Ratansi, R. (2018). Effect of diabetes self-management education on glycemic control among type 2 diabetic patients at a family medicine clinic in Kenya: A randomized controlled trial. *African Journal of Primary Health Care Family Medicine. 10*(1), 2071-2936. https:/doi.10 (1): e1-e9. https://doi:10.4102/phcfm.v10i1.1762

George, M. V., & Premkumar, J. (2016). Health promotion behavior among patients with type 2 diabetes mellitus-A cross sectional survey. *International Journal of Science and Research (IJSR), 6*(12), 510-512. https://doi.org/10.21275/art20178644

Germanos, G., Light, P., Zoorob, R., Salemi, J., Khan, F., Hansen, M., Gupta, K., Trautner, B., & Grigoryan, L. (2020). Validating Use of Electronic Health Data to Identify Patients with Urinary Tract Infections in Outpatient Settings. *Antibiotics (Basel, Switzerland), 9*(9), 536. https://doi.org/10.3390/antibiotics9090536

Germossa, G. N., Sjetne, I. S., & Hellesø, R. (2018). The Impact of an In-service Educational Program on Nurses' Knowledge and Attitudes Regarding Pain Management in an Ethiopian University Hospital. *Frontiers in public health, 6,* 229. https://doi.org/10.3389/fpubh.2018.00229

Gillani, S., Sulaiman, S., Abdul, M., & Saad, S. (2017). A qualitative study to explore the perception and behavior of patients towards diabetes management with physical disability. *Diabetology & Metabolic Syndrome* 9(58). https://doi.org/10.1186/s13098-017-0257-6

Goulet, J. L., Erdos, J., Kancir, S., Levin, F. L., Wright, S. M., Daniels, S. M., Nilan, L., & Justice, A. C. (2007). Measuring performance directly using the veterans' health administration electronic medical record compares with external peer review. *Medical care*, *45*(1), 73–79. https://doi.org/10.1097/01.mlr.0000244510.09001.e5

Gregg, E. W., Hora, I., & Benoit, S. R. (2019). Resurgence in diabetes- related complications. *JAMA, 321*(19), 1867-1868. https://doi.org/10.1001/jama.2019.3471

Gucciardi, E., Xu, C., Vitale, M., Lou, W., Horodezny, S., Dorado, L., Sidani, S., & Shah, B. R. (2020). Evaluating the impact of onsite diabetes education teams in primary care on clinical outcomes. *BMC Family Practice*, *21*(1). https://doi.org/10.1186/s12875-020-01111-2

Hadden, K. B., Arnold, C. L., Curtis, L. M., Davis, T. C., Gan, J. M., Hur, S. I., McSweeney, J. C., Mikesell, B. L., & Wolf, M. S. (2020). Barriers and solutions to implementing a pragmatic diabetes education trial in rural primary care clinics. *Contemporary Clinical Trials Communications*, *18*, 1-5. https://doi.org/10.1016/j.conctc.2020.100550

Hailu, F., Moen, A., & Hjortdahl, P. (2019). Diabetes self-management education (DSME)-effect on knowledge, self-care behaviors, and self-efficacy among type 2 diabetes patients in Ethiopia: A controlled clinical trial. Diabetes, metabolic syndrome, and obesity. *Targets and Therapy, 12*, 1289-2499. https://doi.org/10.2147/DMSO.S223123

Halali, F., Mahdavi, R., Mobasseri, M., Asghari, J. M., & Karimi, A. S. (2016). Perceived barriers to recommended dietary adherence in patients with type 2 diabetes in Iran. *Eating Behaviors, 21*, 205-210. https://doi.org/10.1016/j.eatbeh.2016.03.001

Harris, A. N. (2019). Diabetes self-management education provision by an interprofessional collaborative practice team: A quality improvement project. *The Nursing clinics of North America*, *54*(1), 149–158. https://doi.org/10.1016/j.cnur.2018.11.002

Heavey, E. (2018). *Statistics for nursing: A practical approach*. Jones & Bartlett Learning.

Hemminngsen, B., Gimenez- Perez, G., Mauricio, D., Roque, I., Figuls, M., Metzendorf, M. I., & Richter, B. (2017). Diet, physical activity or both for prevention or delay of activity or both for prevention or delay of type 2 diabetes mellitus and its associated complications people at risk of developing type 2 diabetes mellitus. *The Cochrane database of systematic reviews*, *12*(12), CD003054. https://doi.10.1002/14651858.CD003054.pub4

Hernandez-Boussard, T., Monda, K. L., Crespo, B. C., & Riskin, D. (2019). Real-world evidence in cardiovascular medicine: ensuring data validity in electronic health record-based studies. *Journal of the American Medical Informatics Association: JAMIA*, *26*(11), 1189–1194. https://doi.org/10.1093/jamia/ocz119

Hirsch, J. D., Bounthavong, M., & Arimand, A. (2017). Estimate cost-effectiveness, cost benefits risk and risk reduction associated with endocrinology pharmacist diabetes intense medical management clinic. *Journal of Managed Care*, *23*(3), 318-326. https://www.doi:10.18553/jmcp.2017.23.3.318.

Horigan, G., Davies, M., Findlay-White, F., Chaney, D., & Coates, V. (2017). Reasons why patients referred to diabetes education programs choose not to attend: A systematic review. *Diabetic Medicine*, *34*(1), 14-26. https://doi.org/10.1111/dme.13120

Houle, J., Lauzier-Jobin, F., Beaulieu, M., Meunier, S., Coulombe, S., Côté, J., Lespérance, F., Chiasson, J., Bherer, L., & Lambert, J. (2016). Socioeconomic status and glycemic control in adult patients with type 2 diabetes: A mediation analysis. *BMJ Open Diabetes Research & Care*, *4*(1), e000184. https://doi.org/10.1136/bmjdrc-2015-000184

Hu, X., Zhang, Y., Lin, S., Guo, X., Yang, D., Cai, M., & Gao, L. (2021). Dietary knowledge attitude and practice among the family members of patients with type 2 diabetes and its influence on the KAP of T2DM patients. *Diabetes, Metabolic Syndrome and Obesity: Targets and Therapy, 14*, 205-213. https://doi.org/10.2147/DMSO.S290639

Huntriss, R., & White, H. (2016). Evaluation of a 12- week weight management group for people with type 2 diabetes and pre-diabetes in multi-ethnic population. *Journal of Diabetes Nursing, 20*(2), 65-71. https://eprints.leedsbeckett.ac.uk/id/eprint/2353/1/jdn20-2-65-71.pdf

Hurley, L., O'Donnell, M., O'Hara, M. C., Carey, M. E., Willaing, I., Daly, H., & Dinneen, S. F. (2017). Is diabetes self-management education still the Cinderella of diabetes care? *Patient Education and Counseling*, *100*(10), 1957-1960. https://doi.org/10.1016/j.pec.2017.05.026

Jakoby, M. G., Schleder, M., Luff, V., Yergler, C., Botchway, A., & Burns, C. (2020). A 2-Hour diabetes self-management education program for patients with low socioeconomic status improves short-term glycemic control. *Journal of Patient-Centered Research and Reviews, 7*(3), 275-281. https://doi.org/10.17294/2330-0698.1745

Kang, S. J., Sim, K. H., Song, B. R., Park, J., Chang, S. J., Park, C., & Lee, M. S. (2018). Validation of the health literacy scale for diabetes as a criterion-referenced test with standard setting procedures. *Patient Education and Counseling*, *101*(8), 1468-1476. https://doi.org/10.1016/j.pec.2018.03.013

Khalil, H. (2017). Diabetes microvascular complications—A clinical update. *Diabetes &Metabolic Syndrome: Clinical Research & Reviews, 11*, S133-S139. https://doi.org/10.1016/j.dsx.2016.12.022

Khodaveisi, M., Omii, A., Farokhi, S., & Soltanian, A. R. (2017). The Effect of Pender's Health Promotion Model in Improving the Nutritional Behavior of Overweight and Obese Women. *International Journal of Community Based Nursing, 5*(2), 165-174. https://europepmc.org/article/med/28409170#free full text

Kim, M., & Mallory, C. (2017). *Statistics for evidence-based practice in nursing* (2nd ed). Jones & Bartlett.

Kim, S. H. (2016). Educational attainment moderates the associations of diabetes education with health outcomes. *International journal of nursing practice*, *22*(5), 444–450. https://doi.org/10.1111/ijn.12454

Kong, S., & Cho, M. (2021). Validity and reliability of the Korean version of the self-care of diabetes inventory (SCODI-K). *International Journal of Environmental Research and Public Health*, *18*(22), 12179. https://doi.org/10.3390/ijerph182212179

Krall, J. S., Donihi, A. C., Hatam, M., Koshinsky, J., & Siminerio, L. (2016). The Nurse Education and Transition (NEAT) model: Educating the hospitalized patient with diabetes. *Clinical Diabetes and Endocrinology*, *2*(1), 1-6. https://doi.org/10.1186/s40842-016-0020

Kulhawy-Wibe, S., King- Shier, K. M., Barnabe, C., Manns, B. J., Hemmelgarn, B. R., & Campbell, D. J. T. (2018). Exploring structural barriers to diabetes self-management in Alberta First Nations communities. *Diabetology & Metabolic Syndrome, 10* (87), 1-7. https://doi.org/10.1186/s13098-018-0385-7

Kurnia, A., Amatayakui, A., & Karuncharernpanit, C. (2017). Predictors of diabetes self-management among type 2 diabetes in Indonesia: Application theory of the health promotion model. *International Journal of Nursing Sciences*, *4*(3), 260-265. https://doi.org/10.1016/j.ijnss.2017.06.010

Laerd Statistics. (2018). *Descriptive and inferential statistics*. https://statistics.laerd.com/statistical-guides/descriptive-inferential-statistics.php

Lange, C., & Pearce, R. (2017). Exploration of Diabetes Knowledge among Registered Nurses Working in an NHS Trust. *Journal of Diabetes Nursing*, *21*(2), 203-207 https://www.diabetesonthenet.com?uploads/resources/234fdb3aafd3a48217faab.pdf

Lee, A., Piette, J., Heisler, M., Janevic, M., & Rosland, A. (2019). Diabetes self-management and glycemic control: The role of autonomy support from informal health supporters. *Health Psychology*, *38*(2), 122-132. https://doi.org/10.1037/hea0000710

Lee, E., Lee, Y. W., Chae, D., Lee, K., Chung, J. O., Hong, S., Kim, S. H., & Kang, E. H. (2020). A new self-management scale with a hierarchical structure for patients with type 2 diabetes. *Asian Nursing Research*, *14*(4), 249-256. https://doi.org/10.1016/j.anr.2020.08.003

Leedy, P. D., & Ormrod, J. E. (2021). *Practical Research: Planning and design*. https://www.worldcat.org/title/practical-research-planning-and-design/oclc/859837317

Lien, A. S., & Jiang, Y. (2016). Integration of diffusion of innovation theory into diabetes care. *Journal of Diabetes Investigation, 8*(3), 259-260. https://doi.org/10.1111/jdi.12568

Lockyer, M. G., Fu, K., Edwards, R. M., Collymore, L., Thomas, J., Hill, T., & Devaraj, S. (2014). Evaluation of the Nova Stat Strip glucometer in a pediatric hospital setting. *Clinical biochemistry, 47*(9), 840–843. https://doi.org/10.1016/j.clinbiochem.2014.01.004

Macido, C. (2019). A nurse-led inpatient diabetes self- management education and support program to improve patient knowledge and treatment adherence. *Journal of Health Education Teaching, 10*(1), 1-10. https://files.eric.ed.gov/fulltext/EJ1236325.pdf

Marcelin, J. R., Siraj, D. S., Victor, R., Kotadia, S., & Maldonado, Y. A. (2019). The impact of unconscious bias in healthcare: How to recognize and mitigate it. The Journal of Infectious Diseases, 220(Supplement2), S62-S73. https://doi.org/10.1093/infdis/jiz214

Marino, M., Angier, H., Valenzuela, S., Hoopes, M., Killerby, M., Blackburn, B., Huguet, N., Heintzman, J., Hatch, B., O'Malley, J. P., & DeVoe, J. E. (2018). Medicaid coverage accuracy in electronic health records. *Preventive medicine reports*, *11*, 297–304. https://doi.org/10.1016/j.pmedr.2018.07.009

Mayo Clinic. (2021). *Type 2 diabetes*. https://www.mayoclinic.org/diseases-conditions/type-2-diabetes/symptoms-causes/syc-20351193

McGinnis, K. A., Skanderson, M., Levin, F. L., Brandt, C., Erdos, J., & Justice, A. C. (2009). Comparison of two VA laboratory data repositories indicates that missing data vary despite originating from the same source. *Medical Care, 47*(1), 121-124. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3032537/

Mishra, P., Singh, U., Pandey, C. M., Mishra, P., & Pandey, G. (2019). Application of student's *t*-test, analysis of variance, and covariance. *Annals of cardiac anesthesia*, *22*(4), 407–411. https://doi.org/10.4103/aca.ACA_94_19

Mohammadi, M. M., Poursaberi, R., & Salahshoor, M. R. (2017). Evaluating the adoption of evidence-based practice using Rogers's diffusion of innovation theory: A model testing study. *Health Promotion Perspectives, 8*(1), 25-32. https://doi.org/10.15171/hpp.2018.03

Moreno-Iribas, C., Sayon-Orea, C., Delfrade, J., Ardanaz, E., Garrincha, J., Burgui, R., Nuin, M., & Guevara, M. (2017). Validity of type 2 diabetes diagnosis in a population-based electronic health record database. *BMC Medical Informatics and Decision Making, 17*, 1-6.https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5385005/pdf/12911_2017_Article_439.pdf

Morgan, M. J., Mensa- Wilmont, Y., Bowen, S. A., Murphy, M., Bonner, T., Rutledge, S., & Rutledge, G. (2018). Implementing key drivers for diabetes self-management education and support programs: early outcomes, activities, facilitators and barriers. Preventing chronic disease, 15, E15. https://doi.org/10.5888/pcd15.170399

Munshi, M., Florez, H., Haung, E., Kalyani, R., Mupanomunda, M., Pandya, N., Swift, C., Taveira, T., & Hans, L. (2016). Management of Diabetes in Long- term Care and Skilled Nursing Facilities: A position statement of the American Diabetes Association. *Diabetes Care, 39*(2), 308-318. https://doi.org/10.2337/dc15-2512

Murray, E., Ross, J., Pal, K., Li, J., Dack, C., Stevenson, F., Sweeting, M., Parrott, S., Barnard, M., Yardley, L., Michie, S., May, C., Patterson, D., Alkhaldi, G., Fisher, B., Farmer, A., & O'Donnell, O. (2018). A web- based self-management program for people with type 2 diabetes: The help diabetes research program including RCT. *NIHR Journals Library.* https://doi: 10.3310/pgfar06050

Nakadate, Y., Sato, H., Roque, P., Sato, T., Matsukawa, T., Wykes, L., Kawakami, A., & Schricker, T. (2019). Accuracy of blood glucose measurements using the NOVA StatStrip glucometer during cardiac surgery: a prospective observational study. *Canadian journal of anaesthesia, 66*(8), 943–952. https://doi.org/10.1007/s12630-019-01350

Neighborhood Scout. (2019). *Surf ave & W. 27th St Brooklyn, NY 11224, neighborhood profile.* https://www.neighborhoodscout.com/ny/brooklyn/surf-ave

New York State Department of Health. (2020). *Diabetes statistics for New York State and the nation*. https://health.ny.gov/statistics/diseases/conditions/diabetes/

Nikitara, M., Constantinou, C. S., Andreou, E., & Diomidous, M. (2019). The Role of Nurses and the Facilitators and Barriers in Diabetes Care: A mixed methods systematic literature review. *Behavioral sciences (Basel, Switzerland), 9*(6), 61. https://doi.org/10.3390/bs9060061

Nova Biomedical. (2020). *Stat Strip and Stat Strip Xpress 2 Glucometers.* https://novabiomedical.com'/statstrip-glu/index.php

Office of Disease Prevention and Health Promotion. (2020). *Healthy People 2030.* https://health.gov/

Pal, K., Dack, C., Ross, J., Michie, S., May, C., Stevenson, F., Farmer, A., Yardley, L., Branard, M., & Murray, E. (2018). Digital health intervention for adults with type 2 diabetes: qualitative study of patient perspectives on diabetes self-management education and support. *Journal of Medical Internet Research, 20*(2), e40. https://doi.org/10.2196/jmir.8439

Pena-Purcell, N., Han, G., Smith, M., Peterson, R., & Ory, M. (2019). Impact of diabetes self-management education on psychological distress and health outcomes among African Americans and Hispanics/Latinos with diabetes. *Diabetes Spectrum, 33*(3), 1-10. https://doi.org/10.2337/ds18-0081

Pender, N. (1982). Expressing Health through Lifestyle Patterns. *Nursing Science Quarterly, 3*(3), 115-122. https://doi.org/10.1177/089431849000300306

Pepinsky, T. (2018). A Note on Listwise Deletion versus Multiple Imputation. *Political Analysis,* 26(4), 480-488. doi:10.1017/pan.2018.18

Petiprin, A. (2020). Pender's Health Promotion Model. *Nursing Theory.* https://nursing-theory.org/theories-and-models/pender-health-promotion-model.php

Pinto, E., Braz, N., Nascimento, T., & Gomes, E. (2017). Do patients value nutritional therapy a quantitative studying type-2 diabetes patients. *International Journal of Diabetes and Clinical Research*, *4*(2), 1-6. https://doi:10.239377-3634/1410079

Polit, D. F., & Beck, C. T. (2017). *Nursing research: Generating and assessing evidence for nursing practice* (10th ed.). Wolters Kluwer.

Powers, M., Bardley, J., Cypress, M., Duker, P., Funnell, M., Fischl, A., & Vivian, E. (2017). Diabetes self- management education and support in type 2 diabetes. A joint position statement of the American Diabetes Association, the Association of Diabetes Care and Education Specialists, and the Academy of Nutrition and Dietetics. *The Diabetes Educator*, *4*(3), 40-53. https://doi.org/10.1177/014572176689694

Powers, M. A., Bardsley, J. K., Cypress, M., Funnell, M. M., Harms, D., Hess-Fischl, A., Hooks, B., Isaacs, D., Mandel, E. D., Maryniuk, M. D., Norton, A., Rinker, J., Siminerio, L. M., & Uelmen, S. (2021). Diabetes Self-management Education and Support in Adults with Type 2 Diabetes: A Consensus Report of the American Diabetes Association, the Association of Diabetes Care & Education Specialists, the Academy of Nutrition and Dietetics, the American Academy of Family Physicians, the American Academy of PAs, the American Association of Nurse Practitioners, and the American Pharmacists Association. *The Science of Diabetes Self-Management and Care*, *47*(1), 54–73. https://doi.org/10.1177/0145721720987936

Putra, M. M., Kusnanto, K., Asmoro, C. P., & Sukartini, T. (2019). Application of health promotion model for better self-care behavior in patients with diabetes mellitus. *Belitung Nursing Journal*, *5*(6), 239-245. https://doi.org/10.33546/bnj.913

Rabiee, A., Magruder, J. T., Grant, C., Salas-Carrillo, R., Gillette, A., DuBois, J., Shannon, R. P., Andersen, D. K., & Elahi, D. (2010). Accuracy and reliability of the Nova Stat Strip glucose meter for real-time blood glucose determinations during glucose clamp studies. *Journal of diabetes science and technology*, *4*(5), 1195–1201.https://doi.org/10.1177/193229681000400519

Raizman, J. E., Shea, J., Daly, C. H., Karbasy, K., Ariadne, P., Chen, Y., Henderson, T., Redmond, S., Silverman, S., Moore, A. M., & Adeli, K. (2016). Clinical impact of improved point-of-care glucose monitoring in neonatal intensive care using Nova Stat Strip: Evidence for improved accuracy, better sensitivity, and reduced test utilization. *Clinical biochemistry*, *49*(12), 879–884.

Rasoul, A. M., Jalali, R., Abdi, A., Salari, N., Rahimi, M., & Mohammadi, M. (2019). The effect of self- management education through weblogs on the quality of diabetic patients. *BMC Medical Informatics and Decision-Making*, *19*(1), 205. https://doi.org/10.1186/s12911-0941-6

Reddy, P. H. (2017). Can Diabetes Be Controlled by Lifestyle Activities? *Current research in diabetes & obesity journal*, *1*(4), 1-9. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5792082/pdf/nihms877630.pdf

Ribu, L., Rønnevig, M., & Corbin, J. (2019). People with type 2 diabetes struggling for self-management: A part study from the randomized controlled trial in renewing health. *Nursing open*, *6*(3), 1088–1096. https://doi.org/10.1002/nop2.293

Rogers, E. (2003). *Diffusion of Innovations*. Fifth edition. Free Press.

Rowley, W., Bezold, C., Arikan, Y., Byrne, E., & Krohe, S. (2017). Diabetes 2030: Insights from yesterday, today, and future trends. *Popular Health Management, 20*(1), 6-12. https://doi:10.1089/pop.2015.0181

Rutten, G. E., Van Vugt, H., & De Koning, E. (2020). Person-centered diabetes care and patient activation in people with type 2 diabetes. *BMJ Open Diabetes Research & Care*, *8*(2), e001926. https://doi.org/10.1136/bmjdrc-2020-001926

Samdal, G., Eide, G., Barth, T., Williams, G., & Meland, E. (2017). Effective behavior change techniques for physical activity and healthy eating in overweight and obese adults: Systematic review and meta- regression analyses. *The International Journal of Behavioral Nutrition and Physical Activity, 14(*1), 42. https://doi.org/10.1186/s12966-017-0494-y

Sami, W., Ansari, T., Butt, N. S., & Hamid, M. R. (2017). Effect of diet on type 2 diabetes mellitus: A review. *International Journal of Health Science*, *11*(2), 65-71. htttps://www.ncbi.nlm.nih.gov/pmc/articles/PMC5426415

Scheid, L. M., Brown, L. S., Clark, C., & Rosenfeld, C. R. (2019). Data electronically extracted from the electronic health record require validation. *Journal of Perinatology, 39*(3), 468-474. https://doi.org/10.1038/s41372-018-0311-8

Schober, P., Bossers, S. M., & Schwarte, L. A. (2018). Statistical significance versus clinical importance of observed effect sizes. *Anesthesia & Analgesia*, *126*(3), 1068-1072. https://doi.org/10.1213/ane.0000000000002798

Schulman-Green, D., Jaser, S. S., Park, C., & Whittemore, R. (2016). A meta-synthesis of factors affecting self-management of chronic illness. *Journal of Advanced Nursing*, *72*(7), 1469-1489. https://doi.org/10.1111/jan.12902

Shull, J. G. (2019). Digital Health and the State of Interoperable Electronic Health Records. *JMIR medical informatics*, *7*(4), e12712. https://doi.org/10.2196/12712

Sibel, S., & Argon, G. (2018). Application of Pender's Health Promotion Model to post-myocardial infraction patients in Turkey. *International Journal of Caring Services*, *11*(1), 109-115. http://www.internationaljournalofcaringsciences.org/docs/47_sevis_original_11_1.pdf

Siedlecki, S. L. (2020). Quasi-experimental research designs. *Clinical Nurse Specialist*, 34(5), 198-202. https://doi.org/ 10.1097/NUR.0000000000000540

Siminerio, L. M., Albright, A., Fradkin, J., Gallivan, J., McDivitt, J., Rodríguez, B., Tuncer, D., & Wong, F. (2018). The national diabetes education program at 20 years: lessons learned and plans for the future. *Diabetes care*, *41*(2), 209–218. https://doi.org/10.2337/dc17-0976

So, C. F., & Chung, J. W. (2017). Telehealth for diabetes self-management in primary healthcare: A systematic review and meta- analysis. *Journal of Telemedicine and Telecare*, *24*(5), 356-364, https://doi.org/10.1177/135763633x17700552

Sonmez, H., Kambo, V., Avatanski, D., Lutksy, L., & Poretsky, L. (2017). The readmission rates in patients with versus those without diabetes mellitus at an urban teaching hospital. *Journal of Diabetes and its Complications*, *31*(12), 1681-1685. https://doi.org/10.1016/j.jdiacomp.2017.07.006

Souza, A. C. d., Alexandre, N. M. C., & Guirardello, E. d. B. (2017). Psychometric properties in instruments evaluation of reliability and validity. *Epidemiologia Serviços de Saúde,* 26(3), 649-659. https://doi.org/10.5123/S1679-49742017000300022

Stoner, G. D. (2017). Hyperosmolar hyperglycemic state (HHS). *American Family Physician, 96*(11).729-736. https://pubmed.ncbi.nlm.nih.gov/29431405

Suresh, S. (2018). *Nursing research and statistics*. Elsevier Health Sciences.

Susanto, H. (2019). The effect of diabetes self- management education and support (DSME/S) on self-efficacy in type 2 diabetes mellitus patients. *Journal of Medical Science and clinical Research, 7*(5)635-641. https://doi.org/10.18535/jmscr/v7i5.102

Swanson, V., & Maltinsky, W. (2019). Motivational and behavior change approaches for improving diabetes management. *Practical Diabetes, 36*(4), 121-125. https://doi.org/10.1002/pdi.2229.

Theofanidis, D., & Fountouki, A. (2018). Limitations and delimitations in the research process. *Perioperative Nursing, 7*(3), 155-162. https://doi.org/10.5281/zenodo.2552022

Tk, A., & Chandran, S. (2017). Nola Pender: Health Promotion Model. *Application of Nursing Theories*, 202-202. https://doi.org/10.5005/jp/books/13072_25

United States Department of Health and Human Services. (USDHHS). (2018). *National diabetes statistics report, 2017*. www.cdc.gov/diabetes/data/statistics/statistics-report.html

Varbanova, V., & Beutels, P. (2020). Recent quantitative research on determinants of health in high income countries: A scoping review. *PloS one*, *15*(9), e0239031.

Wahowiak, L. (2017). Providing lifelong education and support: Updates in the 2017 national standards for diabetes self-management education and support. *Clinical Diabetes*, *35*(4), 239-241. https://doi.org/10.2337/cd17-0100

White, S. R., & Bonnett, L. J. (2018). Biased sampling activity: An investigation to promote discussion. *Teaching Statistics*, *41*(1), 8-13. https://doi.org/10.1111/test.12165

World Health Organization (WHO). (2021). *The Facts on Diabetes.* https://who.int/news-room/fact-sheets/detail/diabetes

Xu, M., Fralick, D., Zheng, J. Z., Wang, B., Tu, X. M., & Feng, C. (2017). The differences and similarities between two-sample *t*-test and paired *t*-test. *Shanghai archives of psychiatry*, *29*(3), 184–188. https://doi.org/10.11919/j.issn.1002-0829.217070

Zupa, M., Arena, V. C., Therarle, P., Johnson, P. A., & Siminerio, L. M. (2018). The durability of glycemic control in a diabetes education insurer- based intervention. *American Diabetes Association*, *67*(1), 1-10. https://doi.org/10.2337/db18-691-P

Appendix A

Grand Canyon University Institutional Review Board Outcome Letter

GRAND CANYON UNIVERSITY

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

DATE: May 10, 2021

TO: Charlyn Habeeb

FROM: COLLEGE OF NURSING AND HEALTH CARE PROFESSIONALS

STUDY TITLE: Impact of Healthy Eating among Patients with Type Two Diabetes

ACTION: DETERMINATION OF QUALITY IMPROVEMENT/PROGRAM EVALUATION STATUS

DATE: May 10, 2021

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. Katherine Fetter in the College of Nursing and Health Care Professions, Katherine.Fetter@gcu.edu.

Please include your project title and reference number in all correspondence with this office.

Appendix B

Permission to Use the ADCES7 Self-Care Behaviors™ Healthy Eating Handout Tool

ADCES7 Self-Care Behaviors™

AADE7 Self-Care Behaviors™ (AADE7™) provide an evidence-based framework for assessment, intervention, and outcome (evaluation) measurement of the prediabetes and diabetes patient, program, and population. In addition, diabetes educator interventions can be organized according to the framework. This position statement describes the application of the AADE7 Self-Care Behaviors™ framework in diabetes education and care.

https://www.diabeteseducator.org/living-with-diabetes/aade7-self-care-behaviors

Appendix C

ADCES7 Self-Care Behaviors™ Healthy Eating Handout Tool

ADCES7 Self-Care Behaviors™

HEALTHY EATING

Healthy Eating refers to a pattern of eating high quality, nutritionally dense foods in amounts that lead to better health and wellness. A healthy eating pattern contains a variety of colorful vegetables, fruits, whole grains, dairy, lean sources of protein and oils, while keeping salt, added sugars, saturated and trans fats to a minimum.

TRACK YOUR FOOD

Everything you eat or drink can affect your blood glucose (sugar), blood pressure, blood lipids (such as cholesterol) and weight. So how do you make sense of all that? One way is by tracking what you eat, at least for a few days until you start to see patterns that help you decide what changes you might choose to make.

Use mobile apps, paper and pencil logs, or whatever works best for you. You can achieve your weight and wellness goals by find-ing the right balance of calories and other nutrients to meet your goals. Tracking to identify trends to help reduce your overall calo-rie intake is the best way to determine how to create that balance.

PARTNER WITH YOUR HEALTHCARE TEAM

You probably have lots of questions about making healthy food choices such as how to include favorite foods and drinks, eating out, preparing healthy meals and snacks, what to eat when exer-cising, travelling or at family events.

When it comes to healthy eating, no one eating pattern fits every-one. Work together with your diabetes care and education special-ist and registered dietitian to come up with a plan that fits what you like and meets your health needs.

word wall

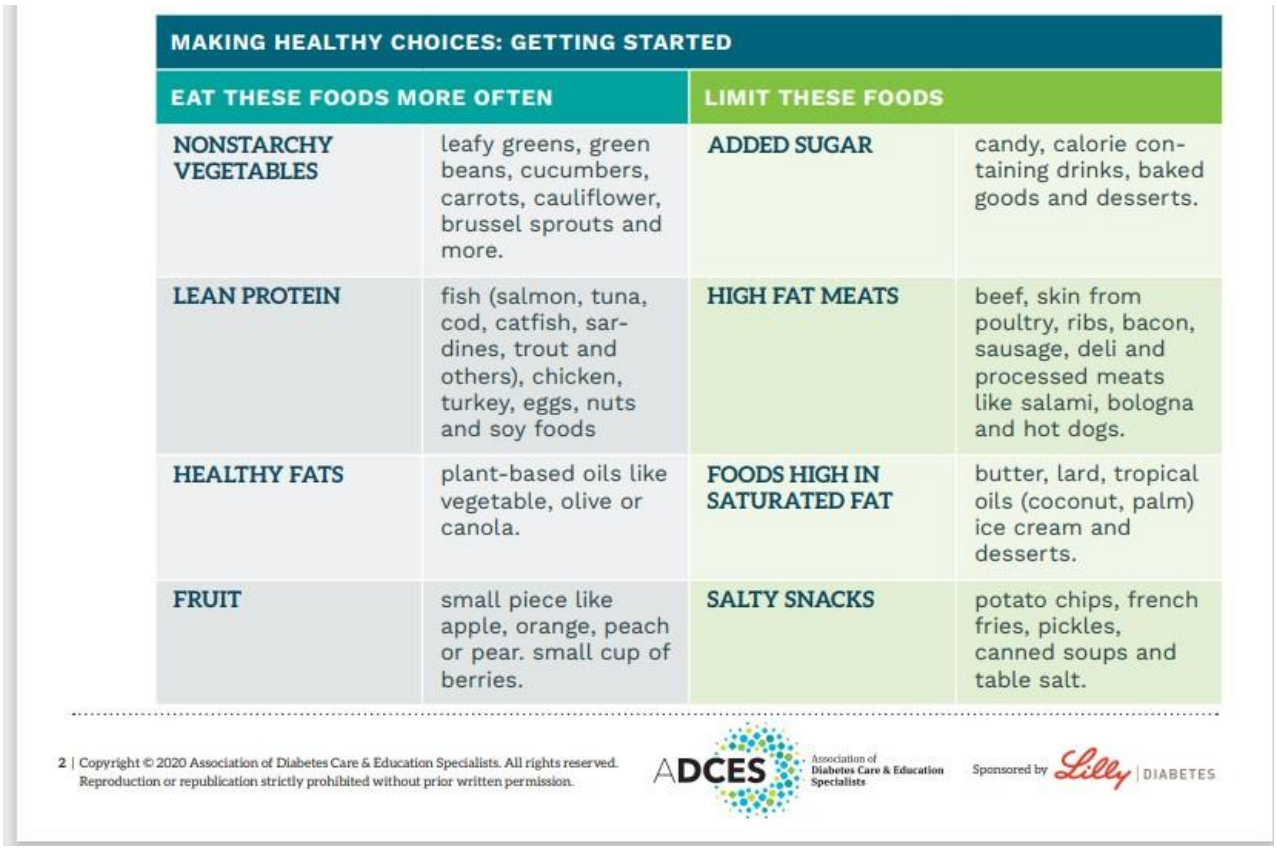
Cardiometabolic health: Keeping your heart and blood vessels healthy and your prediabetes or diabetes well-managed.

Nutritionally dense foods: Foods that have a large amount of vitamins and minerals in a relatively small quantity of food.

Carbohydrates (Carbs) include starches, fibers and sugars. Found in milk, fruits/juices, vegetables, rice, grains, bread, beans/lentils, sugar and honey.

Proteins are made of amino acids which are the building blocks for repair and maintaining a healthy body. Found in milk, cheese, meats, poultry, fish, eggs, nuts and soy.

Fats: Concentrated energy source found in oils, nuts, spreads, olives, avocados, flax seed, peanut butter and salad dressings. Fat has twice as many calories per gram of food as compared to proteins and carbohydrates.



MAKING HEALTHY CHOICES: GETTING STARTED			
EAT THESE FOODS MORE OFTEN		**LIMIT THESE FOODS**	
NONSTARCHY VEGETABLES	leafy greens, green beans, cucumbers, carrots, cauliflower, brussel sprouts and more.	**ADDED SUGAR**	candy, calorie containing drinks, baked goods and desserts.
LEAN PROTEIN	fish (salmon, tuna, cod, catfish, sardines, trout and others), chicken, turkey, eggs, nuts and soy foods	**HIGH FAT MEATS**	beef, skin from poultry, ribs, bacon, sausage, deli and processed meats like salami, bologna and hot dogs.
HEALTHY FATS	plant-based oils like vegetable, olive or canola.	**FOODS HIGH IN SATURATED FAT**	butter, lard, tropical oils (coconut, palm) ice cream and desserts.
FRUIT	small piece like apple, orange, peach or pear. small cup of berries.	**SALTY SNACKS**	potato chips, french fries, pickles, canned soups and table salt.

ADCES Association of Diabetes Care & Education Specialists

Sponsored by Lilly | DIABETES

https://www.diabeteseducator.org/docs/default-source/living-with-diabetes/tip-sheets/ADCES7/ADCES7_healthy_eating.pdf?sfvrsn=28888a58_22

nutritionist for guidance.

Nutrition Facts

8 servings per container
Serving size **2/3 cup (55g)**

Amount per serving
Calories **230**

	% Daily Value*
Total Fat 8g	**10%**
Saturated Fat 1g	**5%**
Trans Fat 0g	
Cholesterol 0mg	**0%**
Sodium 160mg	**7%**
Total Carbohydrate 37g	**13%**
Dietary Fiber 4g	**14%**
Total Sugars 12g	
Includes 10g Added Sugars	**20%**
Protein 3g	
Vitamin D 2mcg	10%
Calcium 260mg	20%
Iron 8mg	45%
Potassium 240mg	6%

* The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.

This label shows that one serving is 2/3 cup. However, it has 8 servings per container. If you eat the whole container, you would have to multiply all the values by 8 to see the right totals for all the components.

The total carbohydrate amount takes into account the sugars and fiber. If you are carb counting, this is the number to pay attention to.

What you eat, how active you are and the medications you take work together to help you reach your diabetes care goals. Healthy eating has a big impact on your diabetes management and involves important skills, such as:

- measuring foods to get familiar with your portions.
- determining the correct portions for you.
- reading labels.
- timing meals with medications.
- being aware of or counting the carbohydrate foods you eat to better understand their impact on your blood glucose.

Diabetes self-management education and support (DSMES) services teach these skills to their participants. Registered dietitian nutritionists also have this expertise and can help you. Ask your provider for a referral so that you can create your own personalized healthy eating plan to best manage your diabetes. You deserve it!

To learn how a diabetes care and education specialist can help you, visit DiabetesEducator.org/LivingWithDiabetes.

For more on this and other behaviors for better diabetes management, visit DiabetesEducator.org/ADCES7.

ADCES Association of Diabetes Care & Education Specialists

Sponsored by Lilly | DIABETES

https://www.diabeteseducator.org/docs/default-source/living-with-diabetes/tip-sheets/ADCES7/ADCES7_healthy_eating.pdf?sfvrsn=28888a58_22