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Developing Outpatient, Clinic-Based Education for Patients With Diabetes and Prediabetes

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Doctor of Nursing Practice

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of the requirements for the degree of

Doctor of Nursing Practice

by

Ruth Ann Slayton RN, MSN, FNP-BC

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Dedication

This project is dedicated to the memory of my grandmother, Laura Bell McNew. She was the first person with diabetes that I ever knew. I watched her struggle to do exactly the right things, eat at the right time, eat the right things, and always take her insulin. She did an awesome job reminding us when she should eat to the minute. I loved going to her house as a child and eating her toast and butter. It always tasted better than anyone else's. The disease still caused heart damage eventually, and this was the reason I lost her. Perhaps if she were here today, she would not suffer the same with the illness, especially with all the updated procedures for diabetes, such as continuous glucose monitoring. I love you and miss you and watching the tender way you took care of Grandpap, who had Alzheimers, and yelling up the stairs at me when I stayed with you.

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I also would like to acknowledge my co-workers for your assistance in pointing out some of those individuals that would benefit from my project program and my fellow providers, Debbie Nale FNP and Sheryl Wright FNP (from when I got my start as a provider). I thank you for the referrals. I acknowledge diabetic patients and have the desire to help you make your illness easier.

I further acknowledge my family, my real cheerleaders, and always supportive beings that pushed me thus far and never complained when I had another assignment that took me away from them and our family activities. They include Anthony Slayton, my spouse of 32 years, and my four children: Derrick, Samantha, Dylan, and Carter, and grandchildren Evey, Emma, and Silas Slayton. Finally, my parents, David and Darlene Gipe, without you two I would not have acquired the work ethic needed to succeed in this program.

Abstract

Education and support provided to the newly diagnosed prediabetic or Type 2 Diabetic are inadequate in the outpatient arena. In rural areas, instruction for diabetes is minimal to non-existent, and patients are paying for this with their health and lives many times. The financial burden of diabetes in the United States is astronomical. The loss of life and life quality is significantly high as well. A systems-based approach to education in the rural health clinic would be of great benefit and has proven to be enough to reverse or avoid the progression of the disease. A clinic or field-based diabetes education program is far superior to typical and usual inpatient education and minimizes complications and decreases morbidity and mortality rates in the individual with diabetes as well as decreases costly hospital stays and risks for nonpayment at an organizational level.

Keywords: diabetes mellitus, inpatient, self-care, type 1 diabetes, type 2 diabetes

Table of Contents

Acknowledgments ii

Abstract iv

List of Tables vii

List of Figures viii

Chapter 1: Introduction 1

- Case for Diabetic Education and Outpatient Management 1
- Prevalence of Diabetes 2
- Cost of Diabetes 3
- Purpose and Value of Diabetic Self-Management Education 4
- PICOT Question 4
- Hypothesis Statement 5
- Theoretical Framework 5
- Self-Care 6
- Self-Care Deficit and Nursing Systems of Care 7
- Conceptual Model 7
- Why the Grand Theory? 8
- Operational Definitions 9
- Scope of the Scholarly Project 11
- Chapter Summary 12

Chapter 2: Literature Review 13

- Search of Literature for Diabetes Self-Management Education 13
- Prevalence of Diabetes 14
- Risk Factors and Complications of Diabetes Mellitus 15
- Cost of Diabetes 17
- Value of Outpatient Diabetes Education and Questionnaires to Evaluate 17
- Barriers to Outpatient Education in Diabetes 22
- Self-Care Theory and Outpatient Diabetes Education 23
- Self-Care Deficit and Nursing Systems of Care 23
- Chapter Summary 24

Chapter 3: Methodology 25

- Project Design and Purpose 25
- Measurement Tools 26
- Data Collection 27
- Timing of DSME and Secondary Considerations 28
- Methodological Appropriateness 29
- Feasibility and Appropriateness 29
- Limitations and Obstacles 30

IRB Approval and Process....31
Interprofessional Collaboration....31
Practice Setting....32
Target Population....32
Risks and Benefits....33
Timeline for Project....33
Summary....34

Chapter 4: Results....36

Summary of the Project and Preparation....37
Data Collected....39
Statistical Analysis....40
Question Guiding the Inquiry....42
Reliability and Validity....42
Strengths and Weaknesses....43
Chapter Summary....44

Chapter 5: Discussion, Conclusions, and Recommendations....46

Interpretation and Inference of the Findings....46
Limitations....48
Implications of Analysis for Leaders....48
Essentials of Doctoral Education for Advanced Practice Nurses....49
Recommendations for Future Research....53
Conclusion....54

References....56

Appendix A: Diabetes Self-Management Questionnaire....61

Appendix B: Permission to Use DSMQ Agreement Letter....63

Appendix C: Letter of Support for Urgent Team Clinic....64

Appendix D: Letter of Support From Referring Clinic Owner....65

Appendix E: Flyer for Recruitment and Project Explanation for Participants....66

Appendix F: IRB Approval Letter....67

List of Tables

Table 1. Paired Sample *t*-Test Statistics 41

List of Figures

Figure 1. Conceptual Model 8

Figure 2. Line Graph for A1C#1 and A1C #2 40

Figure 3. A1C Change and Videos Viewed Graph.....42

Chapter 1: Introduction

Case for Diabetic Education and Outpatient Management

Diabetes mellitus (DM) is a result of the body's failure to use or produce insulin. Insulin is produced in the pancreas and helps to regulate blood glucose (sugar) levels that provide an energy source to body cells and tissues. In the absence of insulin, the cells in the body starve due to dehydration and result in body tissue death (CDC, 2020). The American Diabetes Association states that in persons with Type 2 DM, insulin is produced, but it cannot be absorbed into cells. Type 2 DM can be controlled with adequate diet, exercise, weight loss, and medications. In contrast, Type 1 diabetes occurs in the absence of adequate insulin production and requires daily insulin replacement by injection (CDC, 2020).

Diabetic self-management education (DSME) is an effective method for reducing both the morbidity and mortality of the disease. According to Powers et al. (2015), there is a financial benefit of DSME due to the reduction of hospital inpatient stays and readmissions for diabetes-related relapses or complications. Organizational risk also exists if patients with diabetes are not given proper education on self-management of the disease. Non-compliance issues may increase clinic visits and hospitalizations that can affect the outpatient clinic funding and reimbursement. DSME is a valuable tool to aid the newly diagnosed diabetic, non-compliant diabetic, and the prediabetic patient in the process of managing and maintaining self-care, problem-solving, lifestyle interventions, and understanding the disease process. Diabetic self-management education can also help patients better understand the methods used to treat the disease and possibly reverse the illness.

In the rural setting, there is inadequate education for patients with diabetes. DSME is not widely practiced, and disparities exist that call for improved DSME and follow-up for the

diabetic patient. Outpatient or field management is more effective than usual care to improve DM control and is superior to hospital admission and inpatient education.

Prevalence of Diabetes

According to the 2020 Center for Disease Control Diabetes Fact Sheet (CDC, 2020), there were an estimated 34.2 million people who made up 10.5% of the United States population with diabetes. The CDC (2020) reported that 26.8 million have the diagnosis already, and another 7.3 million have the disease but are undiagnosed. An estimate by Golden et al. (2015) showed an additional 9% of the population has undiagnosed DM, and another 38% are prediabetic. It is estimated that approximately 88 million adults have prediabetes (American Diabetic Association), which means one in three Americans without education could progress to a Type 2 DM diagnosis, especially if obesity is also present. Rural communities have a higher population of Type 2 DM as the obesity rates are higher in these areas (CDC, 2020).

The CDC (2020) estimated that in 2018 there were an estimated 1.5 million new diagnoses in those over 18 years old. The increase in cases worldwide from 1980 (108 million) to 2014 (422 million) is a 400% increase (World Health Organization [WHO], 2021). The disease impacts all ethnic, racial, and socioeconomic groups. Only 5.2% (1.6 million) of cases are from Type 1 DM, while Type 2, also called adult-onset, makes up 94.8% (25.2 million) of cases. In 2018 alone, there were an estimated 1.5 million diagnosed in the United States. Uncontrolled DM increases health risk, has more complications, and the risk of death.

The risk for stroke patients due to DM and hypertension (HTN; is increased when carrying the DM diagnosis) is 2–4 times greater than the average population with HTN alone. DM is also the leading cause of end-stage renal disease, as well as the loss of sight in patients ages 20–74. Chronic kidney disease in those adults with DM has a prevalence of 37% (CDC,

2020). The 2020 fact sheet shows in 2017 alone, there were 58,372 new cases of end-stage renal disease related to diabetes. Diabetes is the seventh leading cause of death worldwide (WHO, 2021), with a recorded 1.6 million deaths in 2016 with the DM diagnosis and 2.2 million with hyperglycemia. Golden et al. (2015) reported an age-adjusted mortality rate of 24.9/100,000 per CDC report. The group found the crude death rate to be approximately 78.7 per 100,000 across all ethnic backgrounds. This increased health risk in DM presents an even larger financial burden to the patient, insurance carriers, and the government.

Cost of Diabetes

The cost of DM as a diagnosis has grown historically and continuously to correspond with the annual increase of affected individuals. Historically in 2000, the annual cost was $100 billion. This increased to $174 billion in 2007 (White et al., 2009). The American Diabetic Association (ADA, 2013) reported that the cost for diabetes-related diagnosis was up to $245 billion in 2012, with an annual financial burden per person of $13,700, with $7,900 attributed to DM alone. The cost increased to $327 billion in 2017 by direct and indirect measures (CDC, 2020).

Hospital stays and emergency room (ED) visits are usually significant reasons for cost increases in DM (CDC, 2020). In 2016, there were an estimated 16 million ED visits in the presence of DM. According to the CDC Fact Sheet (2020), other DM-related diagnoses included hypoglycemia (235,000) and hyperglycemia crisis (224,000). Inpatient stays related to DM in 2016 were 7.8 million, with additional stays related to DM complications, cardiovascular disease (1.7 million), lower limb amputations (130,000), stroke (313,000), and hyperglycemic crisis (219,000).

Purpose and Value of Diabetic Self-Management Education

Early support and education soon after diagnosis of diabetes or prediabetes lead to improved understanding of the disease process. Self-care is improved when the disease process is better understood, and this leads to better outcomes. The value of self-care is that it puts the control for disease management in the patient's control rather than the healthcare provider's control and aids in helping the patient with diabetes in owning it as well as goal setting.

Research has shown that taking responsibility leads to success and improved outcomes in the long term. European studies show much benefit from diabetes self-management education and the benefit of organized outpatient clinic-based education (Xu et al., 2008). However, in the Western part of the world, the United States is lacking in both literature review and in practices of organizing outpatient clinic-based education (Gagliardino et al., 2018). The American Diabetes Association (ADA) takes the position that all individuals, regardless of the type of DM, receive DSME and support at diagnosis and as needed after that. DSME has been shown to be cost-effective by reducing hospital admissions and readmissions (Powers et al., 2015). In the United States, where DM numbers are the highest, it was noted to be inadequate education programs that have evolved into studies regarding effectiveness. This represents both a study and practice gap.

PICOT Question

A PICOT question is a tool used to formulate a clinical question. Its formation is an acronym that helps to form the question and guides research to find the evidence best suited in an efficient way. P = patient population and answers who. I = intervention and answers what. C = A comparison to present practice compared to suggested. O = outcomes used as measurements of the effects of the intervention. T = time over which the study monitored, and evidence gathered

answers how long (Bonsall, 2011). The PICOT question for measuring the effectiveness of an outpatient diabetic education program:

In adults with diabetes (Type 2 and prediabetes) ages 20–65, what is the effect of an outpatient, clinic-based, educational program on Hemoglobin A1C and fasting glucose levels compared to adults with diabetes that only receive an inpatient educational program?

P: Adult patient ages 20–65 with diabetes (Type 2 and prediabetes).

I: Outpatient clinic-based education focusing on disease process, nutrition, exercise, and medication.

C: The education a patient with diabetes receives in inpatient hospital care.

O: Based on the reduction of Hemoglobin A1C or improved fasting glucose.

T: This change would be measured over 3 months.

Hypothesis Statement

In patients ages 20 to 65 years with Type 2 diabetes and prediabetes, involvement in outpatient clinic-based education will improve diabetic control, as evidenced by decreased HbA1C, and will improve diabetes self-care knowledge evidenced by improved DSMQ results, in comparison to the education that the person with diabetes receives in a hospital setting.

Theoretical Framework

The Grand theory of self-care versus self-care deficit by Dorothea Orem titled, *Self-Care, Self-Deficit, and the Nursing Process* was developed with care in mind and is often called, the theory of caring, which is fundamental to medicine and nursing (Orem, 2001). A significant strength of the theory is that it applies to the beginning nurse and the advanced practice nurse. Orem's theory has been utilized in professional nursing, including nursing practice, education,

and administration (Orem, 2001). The theory has a broad scope, yet the concepts are basic and straightforward.

Healthcare providers are in a constant search to discover a patient's ability to care for themself. Practitioners begin assessing this in the patient history obtained when they present as a new patient, and the information is updated with each visit. The purpose is to investigate what happened to cause the illness they present with, was it: obesity, tobacco abuse, improper diet, or only family-related? We are investigating the level of self-care agency they have. The focus is on the patient's ability to manage both wellness as well as illness.

Self-Care

The ability to care for one's self is essential to maintain health and wellness and to recover from illness. There is no uniform word meaning self-care, but this term is used with other terms such as "self-management," "compliance," and "adherence" (Lu et al., 2016). In chronic illness, education is the key to keep a patient well. Diabetes education is often only taught as an inpatient when complications have occurred in the absence of wellness. Diabetes education at the outpatient clinic level allows the patient to maintain self-care goals and to manage disease processes to prevent complications that occur in uncontrolled diabetes. The provider's goal is to determine the patient's self-care ability and increase patient autonomy with concepts of illness prevention, health promotion, and maintenance (Orem, 2001). Orem explained that certain factors that affect self-care ability include: 1) age, 2) gender, 3) developmental state, 4) socio-cultural factors, and 5) environmental factors. The advanced practice nurse (APN) primary goal is to aid the patient in returning to pre-illness stability, and in turn, their self-care agency improved.

Self-Care Deficit and Nursing Systems of Care

A self-care deficit is defined as the extent to which a patient is unable to care for himself. Systems of care are related to the levels of self-care deficit. These levels are wholly compensatory - unable to provide any self-care. If this level occurs in the outpatient area, these patients require a caregiver or agent to act in their place. Partially compensatory, these individuals can meet some but not all needs. The APN role is to teach skills such as self-monitoring of glucose and to teach skills needed, such as foot examination. This instruction often is accomplished through demonstration and return demonstration. The patient that is said to be supportive-educative can meet all self-care needs, and this patient is the easiest to educate on disease management as well as health promotion, resource referrals, and illness prevention. They have full self-care agency, according to Orem (2001). These are the patients that benefit the most from outpatient diabetic education.

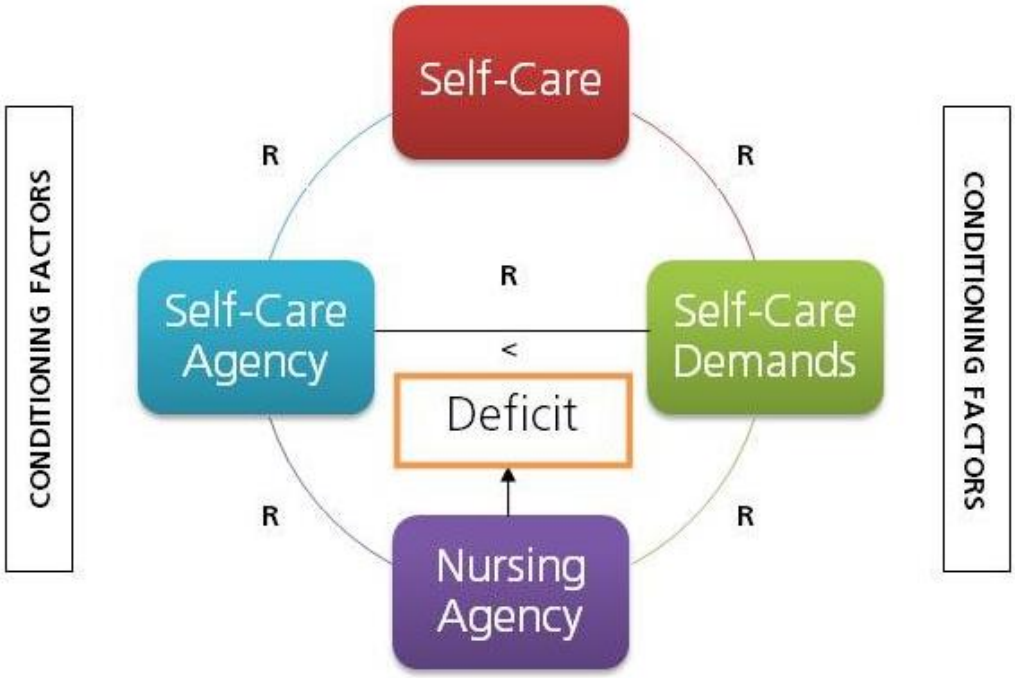
Conceptual Model

The conceptual model in Figure 1, developed by Orem and published by Gonzalo (2021), includes four large squares: self-care, self-care agency, self-care demands, and nursing agency. The "R" on the lines between indicates a relationship between the components. The "<" shows current or potential self-care deficits where intervention would be needed (Gonzalo, 2021). In diabetes education, the circle is unending, meaning self-care and nursing intervention (education) is ceaseless for as long as learning, growth, and mental abilities continue. Conditioning factors present as the actions of the provider triggers growth and learning in the patient. Conditioning triggers in DM relate to exercise, nutrition, and disease management. In persons with Type 2 DM, self-care involves certain behaviors that include diet, exercise, medication-taking (insulin or oral hypoglycemic agents), glucose self-monitoring, and foot care (Xu et al., 2008). The essential

educational activities that the advanced practitioner teaches during outpatient sessions can lead to reversal or remission in the prediabetic.

Figure 1

Conceptual Model



Note. Adapted from *Dorothea Orem: Self-Care Deficit Theory*, by A. Gonazalo, Nurses Labs (https://nurseslabs.com/dorothea-orems-self-care-theory/). In the public domain.

Why the Grand Theory?

In developing the self-care theory, Dorothea Orem defined nursing as "the act of assisting others in the provision and management of self-care to maintain or improve human functioning at home level of effectiveness" (Orem, 1991, p. 161). In person with Type 2 DM, self-care involves certain behaviors that include diet, exercise, medication-taking (insulin or oral hypoglycemic agents), glucose self-monitoring, and foot care (Xu et al., 2008). These are the essential educational activities that the advanced practitioner can teach during outpatient

sessions. The practitioner has a unique ability as well as a calling to improve a patient's disease management. By educating and collaborating with other disciplines, the patient is empowered and becomes and remains his own healthcare agent to be healthier and avoid the micro vascular and the macro vascular complications of diabetes. In the prediabetic, the condition can be reversed if the lifestyle is changed. These nursing and healthcare systems allow the patient to control what can become uncontrollable and add stability to what can become unstable if untreated. The theory and the tools available allow the information to be provided in a convenient and learner-friendly manner.

Operational Definitions

The following terms are referred to in the research and the project and are defined below for a better understanding of terms in relation to this.

Diabetes mellitus. A disease in which the body's own pancreas' ability to make insulin is impaired or ceased, resulting in abnormal metabolism of carbohydrates and elevated glucose levels in the blood and urine (ADA, 2019).

Diabetes self-management education (DSME). The ongoing process of facilitating knowledge, skill, and ability is needed for diabetes self-care. Incorporates needs, goals, and needed ability of the individual with DM and is guided by evidence-based practice.

Diabetes self-management questionnaire (DSMQ). An instrument for screening and assessing a patient's diabetes self-care activities that lead to glycemic control.

Diabetes Type I (DM1). Previously referred to as insulin-dependent diabetes mellitus (IDDM) is a childhood-onset of diabetes that requires insulin injections for regulation (ADA, 2014).

Diabetes Type II (DM2). Previously called non-insulin dependent diabetes mellitus (NIDDM) considered adult-onset and usually starts after the age of 40 and becomes more common with increased age and in the presence of obesity (ADA, 2014).

Fasting glucose. The blood sugar level of an individual when they have had nothing to eat or drink for 6–8 hours or overnight is sometimes used to diagnose DM. The normal range is 70-100 mg/dl (ADA, 2020).

Hemoglobin A1C. A minor component of hemoglobin that glucose is bound, also known as glycosylated or glycated hemoglobin. Said to be an average glucose reading over a 3-month period (ADA, 2020).

Postprandial glucose (PPG). The glucose level in the blood after a meal is typically collected 2 hours after a meal (ADA, 2020).

Prediabetes. A condition that is characterized by slightly elevated blood glucose and considered a risk for progressing to DM2 (ADA, 2014).

Problem areas in diabetes (PAID). A tool used to screen or monitor distress (emotional, physical) related to diabetes (Arzaghi et al., 2011).

Self-care deficit. The inability of the patient to perform self-care activities. Such as feeding, dressing, hygiene, taking medicine, and caring for own needs (Orem, 2001).

Self-monitored blood glucose (SMBG). Refers to home blood glucose testing for the diabetic patient to understand one's own control and need for management changes in the diabetic regime (ADA, 2020).

Summary of diabetes self-care activities (SDSCA). A brief self-report questionnaire of DM self-care that assesses diet, exercise, blood-glucose testing, foot care, and smoking.

Scope of the Scholarly Project

Scope and limitations, as well as inclusion criteria for this inquiry, involves adult patients, ages 20–65, who have been diagnosed as Type 2 diabetics meeting the requirements of the diagnosis of a fasting blood glucose > 140 mg/dl and an HbA1C equal to or > than 6% as well as those diagnosed as prediabetic based on an A1C of 5.5%–6.0%. There was no gender or cultural divide in the admission of participants. The program, at the start, excluded those who were considered "brittle." Brittle refers to the person with diabetes whose blood glucose rapidly spikes and dips. However, this patient could participate in the program without research consideration reported. The participants must be fluent in English speaking, writing, and comprehension as well.

A flier was designed to invite the prospective participants and was distributed and displayed at area rural clinics with the permission of the owners or those with authority to allow the distribution (Appendix E). The tool utilized for this study was the Diabetes Self-Management Questionnaire (DSMQ). Participants completed the questionnaire prior to the start of the program and then repeated it within 1–2 weeks of the conclusion of the educational program.

The preprogram A1Cs of all participants were recorded as well as the fasting glucose levels. The education sessions were held weekly over a 6-week period with licensed speakers educating on exercise, diet and nutrition, infection control, complication, and stress reduction as related to diabetes. Other subjects were education and demonstration of self-glucose monitoring and when to perform as well as medication management discussions. Lab values, including fasting glucose and A1C, were performed immediately after the sessions and again three months after program completion. Preventative issues (e.g., foot care and eye care in the diabetic and warning signs of diabetes complications) were also an integral part of the education.

Chapter Summary

Diabetes is a prevalent and costly disease, and self-care is very important to reduce complications that can be devastating to an individual with diabetes. Type 2 DM and prediabetes require education and monitoring. This education can be provided in an outpatient non-formal environment and effectively allow the patient to project and participate in self-care measures essential to diabetes control or reversal. The theory of Dorothea Orem: Self-Care and Self-Care Deficit (2001) can adequately support the outpatient education program that promotes and teaches the person with diabetes to take care of self. Early after diagnosis is the best time to begin education and self-monitoring. Rural areas especially lack these programs, and the benefits provided are secondary prevention methods to reduce the overall risk of complications and improve overall health.

Chapter 2: Literature Review

Search of Literature for Diabetes Self-Management Education

In the review of literature that pertained to the outpatient education of diabetics and prediabetics and possible benefits of the intervention or gaps in care related to a clinic-based education program, the following sites searched for scholarly information: MEDLINE/Pub Med, CINAHL, The Center for Disease Control-Diabetes Reports, American Medical Journal, American Journal of Nursing, and the Diabetes Research Institute.

The main topics and other terms searched included diabetic education, hospital diabetes (DM) education, effective diabetes Type II (DM2) interventions, HbA1C reduction methods, prediabetes education, nutrition in diabetes, and exercises in diabetes. The search included the following study types: a meta-analysis, cohort studies, systematic review, case-control study, randomized controlled study, and exercise in diabetes. To further narrow down the amount of material to a reasonable number, the inclusion and exclusion criteria were considered. The inclusion criteria of the subjects include male or female, English or Spanish, and ages 20–65 years. The publication included were those no older than 10 years and those free to use. Excluded literature was any that studies diabetes hospitalization rates and those reporting diabetes death rates. After consideration of the excluded and included criteria, the articles were narrowed to 4319 scholarly articles that were open access and Medline Journals. The current literature related to outpatient and diabetic education was mostly quantitative in nature and focused on the improvement of HbA1C levels as well as decreased hospital stays in the patient with diabetes. There was limited research found on diabetes education in the outpatient arena, especially in rural America.

Prevalence of Diabetes

According to the 2017 Center for Disease Control and Prevention Statistics Report (2017), the estimated burden of diabetes includes 30.3 million people with diabetes mellitus (DM), which was 9.4% of the United States population at that time. The report noted that 23.1 million people have been diagnosed with DM and estimated that another 7.2 million are undiagnosed (National Health and Nutrition Examination Survey [NHANES], 2015). The NHANES survey indicated the number represented 23.8% of people with DM as undiagnosed. The estimated numbers were not differentiated as Type I or Type II and included all DM. The undiagnosed numbers are most likely Type II, as DM2 made up 90–95% of all DM. Worldwide figures are staggering as well, and the World Health Organization (2016) reported an increase from 1980 at 4.7% (108 million) to 2014 at 8.5% (422 million).

The undiagnosed DM and prediabetes numbers were based on hemoglobin A1C, and fasting glucose levels held significant statistical differences between the groups (CDC, 2015). Golden et al. (2015) reported an additional 9% of the population was undiagnosed, and another 38% are prediabetic, with an average HbA1C of 5.7%–6.4%. The group reported that without intervention, most would progress to diabetes, especially if obesity was an issue as well.

In 2015 the CDC reported 1.5 million new cases of DM. This represents 6.7 people per 1,000. More than half of these were adults aged 45 to 64 years. The incidence of prediabetes was estimated at 33.9% of United States adults aged 18 or older (84.1 million people) in 2015. However, only 11.6% of these patients were aware they had the disease (CDC, 2017). Education level was found to be an essential environmental factor in the development of diabetes. Incidence doubled in those with less than high school education versus those with greater than 12th-grade education level (CDC, 2015).

Risk Factors and Complications of Diabetes Mellitus

Several risk factors are known to predispose an individual to DM (CDC, 2015). The risk factors found to be pertinent in those 18 years or older included smoking, obesity or overweight, physically inactive, hypertension, hyperlipidemia, and hyperglycemia. The following percentages were reported:

1. Smoking - 13.9% -18.1% of adults were current smokers, and 34.5% previously smoked at least 100 cigarettes per lifetime (confidence interval [CI] 95%).
2. Obesity or overweight - 87.5 were obese or overweight with a body mass index (BMI) of at least 25 kg/m^2. Reported severe obesity in 17.8 of diagnosed adults, obesity in 4.5%, and 26.1% were overweight (95% CI). The BMI levels were severe obesity (BMI 40.0 kg/m^2 or greater), obesity (BMI 30.0 kg/m^2-40.0 kg/m^2), and overweight (BMI 25.0-30.0 kg/m^2, respectively).
3. Physical inactivity - of adults diagnosed 40.8% defined as getting less than 10 minutes weekly of moderate or vigorous activity in each of the categories of physical activity based on work, leisure, and transportation (95% CI).
4. Hypertension (HTN) – Defined as a very significant risk factor at 73.6% indicates a systolic greater or equal to 140 mm Hg or diastolic of 90 mm Hg or higher and prescribed medications for HTN (95% CI).
5. Hyperlipidemia - 58.2% aged 21 or older with no cardiovascular disease (CD) and were eligible for statins and prescribed lipid-lowering agents. Large percentages (66.9%) had CD and were eligible and prescribed lipid-lowering agents.
6. Hyperglycemia - 15.6% had an A1C > 9% (CI 95%).

Diabetes risk factor prevention, education, and proper control results with a healthier diet and exercise are essential. Medical compliance improves diabetes outcomes and decreases DM-related complication rates (Asif, 2014).

The risk for stroke individuals due to DM and hypertension (HTN) increased by 2–4 times than that of the average population with only HTN. DM is the leading cause of end-stage renal disease, as well as the loss of sight in patients aged 20–74 years (Murphy et al., 2016). A vast majority of individuals with DM also report having peripheral neuropathic pain (60%–70%). Lower limb amputations are up to 45 times more common in people with diabetes than nondiabetics. Early intervention is necessary for any foot issues (Diabetes Monitor, 2019). Swerdlow et al. (2005) reported increased risks of liver, pancreatic, endometrial, renal, and colorectal cancers in patients with DM2.

Golden et al. (2015) advised that diabetes mellitus is the seventh leading cause of death with an age-adjusted mortality rate of 24.9/10,000 per CDC report. The CDC reported the crude death rate was approximately 78.7 to 10,000 and that those with racial, ethnic minority, or low socioeconomic status are at higher risk for death. Additionally, White et al. (2009) reported DM as the sixth leading cause of death in 2008. An increase in fatalities noted from DM in one year from previously reported cause rankings. The worldwide death rate is said to be 1.5 million annually. However, hyperglycemia has been linked to an additional 2.2 million deaths annually through increased risk from related conditions such as cardiovascular disease (WHO, 2021). White et al. (2009) reported DM as the sixth leading cause of death in 2008. Risk factors, complications, and co-existing illnesses all lead to an increased financial burden to those with DM as well as insurance companies.

Cost of Diabetes

The costs of DM as a diagnosis have grown continuously to correspond with the annual increase of affected individuals. In 2000, the yearly financial burden was $100 billion annually, which increased to $174 billion in 2007 (White et al., 2009). The American Diabetes Association (ADA; 2013) reported that the cost of the diabetes-related diagnosis was up to $245 billion in 2012. The most recent data collected reflects the cost is up to $327 billion (CDC, 2020). The numbers represented a 40.85% increase in the cost of DM in five years. From 2012 to 2017, it increased by over 40% (CDC, 2020).

The cost of diabetes considers hospitalizations, admissions and readmissions, medication, and other treatment costs of healthcare organizations. The individual with DM faces a significant expense for the increased cost of medication, monitoring materials, and diagnosis-related illnesses and injuries that cause loss of employment and workdays lost. The estimated annual financial burden per person with DM was $13,700, with $7,900 attributed to DM alone (ADA, 2013). Structured education practices are essential to aid in minimizing the financial burden of the patient.

Value of Outpatient Diabetes Education and Questionnaires to Evaluate

Early support and education soon after diagnosis of diabetes or prediabetes lead to improved understanding of the disease process, according to the literature reviewed. Self-care is improved when the disease is better understood, leading to better outcomes. The value of self-care puts control for disease management in the patient's hands, rather than the health provider, and aids in owning it and better goal setting. Taking responsibility leads to success and improved long-term outcomes.

The review of the literature found a definite gap in the literature related to DM and outpatient education in the United States. Several countries, such as The United Kingdom, China, Canada, and Australia, have organized programs. In the United States, there appears to be a lack of educational programs to support the patient in skills instruction, such as self-glucose monitoring procedures. Patients with Type 2 DM often are lacking in knowledge and skills needed to control the condition. Less than half of the patients achieve adequate control, which increases complications and drives healthcare cost increases (Dulal et al., 2014).

The need for program start-up increases in rural areas where many individuals remain undiagnosed, undertreated, or unaware of the disease process and the risks presented by the diabetes diagnosis. The promotion of self-care is lacking and could save lives as well as resources. A study by Zheng et al. (2019) compared and analyzed the effects of a self-management program with a typical one-day education program for individuals with diabetes. Sixty patients with Type 2 DM were divided evenly, 30 randomly placed in the control group (n=30) receiving the typical one-day education, which included general DM knowledge on disease process, treatment options, monitoring by checking blood glucose, and healthy lifestyle. They also were educated about preventing, detecting, and treating potential complications of the disease and the development of a personal treatment plan.

The intervention group of 30 received a 2-session diabetes self-management program in addition to regular education. The instruction included both theory and practical manners. The first session completed the same as the control group at the first clinic visit, the second at the next visit set up two days later. Each first class was 45 minutes in length. The second class consisted of a group education with videos and entertaining PowerPoint presentations presenting comprehensive education such as diet and exercise guidance and knowledge information related

to hypoglycemia treatment, foot care, medication, and blood glucose monitoring. The second class also consisted of 5–10 minutes of one-on-one nutrition guidance developed for Chinese based on American Diabetes Association guidelines regarding food exchange lists. It provided visuals for portion control and calorie counts as well as individualized exercise guidance lasting 60 minutes and the development of a personalized exercise prescription.

The groups completed two questionnaires both before and after the three months of the trial. They were the Problem Areas in Diabetes (PAID), which addresses the patient's distress related to DM2 and feelings, and the Summary of Diabetes Self-Care Activities (SDSCA), which addresses the general knowledge about diabetes and control. Fasting blood glucose (FBG) levels, two-hour postprandial glucose levels (PPG), and HbA1C before and after levels were assessed and indicated a statistically significant difference pre versus poststudy (Zheng et al., 2019).

The effects of the outpatient diabetes self-management education program were favorable when the SDSCA and the PAID and glucose levels of the two groups when compared before and three months after. The scores of SDSCA and PAID, FBG, PPG, and the HbA1C in the intervention group were improved in a significant ($p < 0.01$) manner after the intervention as compared with the control group. In China, Zheng et al. (2019) mentioned that most diabetic education studies and programs are aimed at the inpatient. Although only two sessions were initiated with the control group, there was still a significant improvement in the DM patient's overall health and wellness (Zheng et al., 2019). The group discusses some barriers in the study in that the most effective education programs involve more than two sessions and over a longer time period. However, due to increased time demands, cost, and the patient's inability to attend long-term due to transportation and inability to pay for attendance (Zheng et al., 2019). The SDSCA is much like the tool I will utilize in the proposed project (Appendix A).

A similar study by Speight et al. (2015) looked at the benefits of a structured form of diabetes education delivered as routine care in the Type I Diabetic (TIDM). The program is OzDAFNE, a five-day program that educates the person with diabetes on insulin adjustment related to the food eaten. The acronym stands for Dose Adjustment for Normal Eating. The study took place from April 2007 to February 2012.

The 506 participants from baseline to follow-up resulted in a decreased occurrence of severe hypoglycemia, with participants reporting at least one episode (24.7% of participants pre-intervention versus postintervention, only 12.1% ($p < 0.001$). Severe DM distress per PAID scores was also reduced from 29.3% to 12.6% ($p < 0.001$). Hospital admissions for diabetic keto-acidosis (DKA) were decreased significantly from 41% before education to 1.2%. The Hemoglobin A1C (HbA1C, A1C) pre-intervention was 8.4% to 8.2%. Those with an A1C pre 9.7 to post of 9.0% ($p < 0.001$). The improvement due to educating the individual with diabetes in a structured manner with more direct contact demonstrated improved findings in every area studied by reduced PAID scores, reduction of hospitalizations for DKA, reduced hypoglycemic events, and reduced HbA1C. This study was conducted in Australia (OzDAFNE) and continues as routine DM practice today.

A practice gap was identified as America lacks organized programs such as this. Structured education in DM1 patients was found efficient in decreasing all five areas explored. Severe hypoglycemia and DKA requiring a hospital stay were reduced by half as a result of the interventions. HbA1C reduced by 0.7%, which is a low percent and does not include the fact that many had significant decreases that averaged with some with a slight reduction. Outpatient education is proven to benefit the diabetic patient's overall health in the area of fasting glucose reduction as well as HbA1C improvement. The null hypothesis is found false. The significance

of the proposed project and the usefulness of this study to prove or disprove that a clinic-based education program assists the Type 2 diabetic could be marginal as this study included Type 1 diabetics on insulin pen injections. The assumption could be made in this example that if the intervention helps the Type I diabetic, it is also valuable to the Type II diabetic, and this could be proven as DM1 patients have significant compliance issues when compared to Type II diabetics in practice.

A randomized clinical study on the use of education and self-monitored blood glucose (SMBG) in the DM2 not on insulin was conducted at St. Carlos Hospital in an endocrinology outpatient clinic and reported by Duran et al. (2010). The study used a prospective randomized control testing model with an intervention group of 62 Type II diabetics. The study total was 99 patients (45 men and 54 women). Patients had to meet the inclusion and exclusion criteria that included: 1) newly diagnosed after two fasting blood glucose levels >125 mg/dl; 2) ages 18–80 years old; and 3) less than six months since the first fasting glucose of >126 mg/dl and were excluded if severe (HbA1C was > 8% at diagnosis) as well as if they had a life-threatening disease or were unable to perform SMBG. The control group received standard treatment based on HbA1C levels, and both were treated pharmacologically with 850 mg of Metformin taken on the same schedule. The intervention group received intensive education teaching SMGB to adhere to lifestyle changes and the simultaneous dose of Metformin.

Those that received intensive outpatient education proved significant to the proposed project as the HbA1C and BMI were both decreased in the intervention group. Several involved in the group experienced remissions. The findings support structured education based on SMBG, and lifestyle changes may lead to empowerment and develop a self-care lifestyle needed for lifetime control in Type II DM. Intensive treatment from the moment of diagnosis is best and

facilitates beta-cell recovery. SMBG based education and pharmacological intervention are better than conventional HbA1C algorithms in new Type II diabetics.

A unique and rare study located by Contreras et al. (2017) discussed management and education of the diabetic as a stepping stone to self-care, self-efficacy, and empowerment, aimed at improving outcomes related to lifestyle changes and choices. The only way to decrease complications is through glycemic control, which is managed by the patient, not the provider. Education described as therapeutic meaning included in the curriculum is a set of activities needed for management such as proper nutrition, exercise, foot care, self-monitoring, and is presented in a structured environment responsible for the empowerment and self- care needed for achieving metabolic control goals. They reported and advised that the patient must incorporate the term "care" into daily routine and lifestyle to promote well-being and self-preservation.

Barriers to Outpatient Education in Diabetes

Cauch-Dudek et al. (2013) stated that barriers to education include lack of participation in diabetes self-management education (DSME) of such a program in Canada, where only 20.6% attended out of 9,568 patients. The authors found that those diagnosed with DM as inpatients were less likely to participate in DSME. Powers et al. (2015) surmised that inpatient follow-up was less than adequate after discharge and affected the attendance of the patient. Younger patients were more likely to attend, as well as those of higher economic status and those free from mental illness. Those in rural areas were found by Powers et al. (2015) to be more likely to attend. The programs had better attendance when individualized for access and convenience.

The review of the literature uncovered a gap in the literature related to DM and outpatient education in the United States. Several countries in literature, such as the United Kingdom, China, Canada, and Australia, have organized programs. In the United States, there also appears

to be a lack of educational programs to support the patient in skills instruction related to self-monitoring in a personalized manner. The need for program start-up increases in rural areas where many individuals remain undiagnosed, undertreated, or unaware of the disease process and the risks presented by the diabetes diagnosis. The promotion of self-care is lacking and could save lives as well as resources.

Self-Care Theory and Outpatient Diabetes Education

The ability to care for oneself is essential to maintain health and wellness and recover from illness. There is no uniform word meaning self-care, often expressed as "self-management," "compliance," and "adherence" (Lu et al., 2016). In chronic illness, education is the key to assisting a patient to better health. Diabetes education is often only taught as an inpatient when complications have occurred or wellness is absent. Teaching diabetes education at the outpatient clinic level allows the patient to maintain self-care goals, manage disease processes, and prevent complications related to uncontrolled diabetes. The provider's purpose in education is to determine the patient's ability to care for self, thus increasing patient autonomy with concepts of illness prevention, health promotion, and maintenance (Orem, 2001). The advanced practice nurse (APN) primary goal is to aid the patient in returning to pre-illness stability. By providing diabetic education, the nurse assists the patient in maintaining control and independence, thus improving their level of self-care agency.

Self-Care Deficit and Nursing Systems of Care

Self-care deficit is defined as the extent to which a patient is unable to care for themself. Systems of care are related to the levels of self-care deficit. These levels include wholly compensatory, partially compensatory, and supportive-educative. The APN role is to teach skills such as self-monitoring of glucose and skills needed, such as foot examination, which are

accomplished through demonstration and return demonstration. The supportive-educative patient is said to have a full self-care agency (Orem, 2001) and will most effectively learn when educated on diabetes management, health promotion, resource referrals, and illness prevention.

Chapter Summary

The need for and benefit of outpatient education for individuals with prediabetes and diabetes is apparent in a review of the literature. Outpatient clinic-based education presents a viable alternative to reduce complications and decrease hospitalization as well as allow some prediabetics to have complete remission from the disease due to appropriate diet, exercise, and monitoring of the blood glucose levels as well as A1C levels. Diabetic education can decrease the total amount spent on the disease in our country, considering the reviewed studies and positive outcomes noted. Reimbursement on the organizational level can be increased with better compliance due to visits that decrease hospital stays and less costly complications. The education must be provided in an engaging, personal, and convenient manner to empower the diabetic patient towards self-care, as this is the key to success in managing diabetes.

Chapter 3: Methodology

In the study of outpatient clinic-based diabetes self-management education (DSME), there are several essential interventions and methods utilized to obtain and analyze data. Institutional Review Board (IRB) approval, which ensures the protection of the human subjects (patients), was obtained before the start of the educational events. The training was completed related to IRB as well as verified by university officials. Fliers and handouts that explained the purpose of the project proved useful to recruit subjects and publicize the project. The educational sessions were convenient, inviting, and engaging. Attendance was encouraged and was vital to a successful project. The use of a tool or questionnaire to discover a patient's knowledge about DSME was measured before and after the intervention. It was important to consider the time since diabetes diagnosis. The goal for successful education is that education presented early in the disease provides the best outcome to master self-care interventions.

Project Design and Purpose

The proposed project utilized a pre/posttest design that measures Hgb A1C levels before and after the diabetic self-management educational programs. The study utilized several statistical formulas to analyze the data and reports changes from preeducation to the posteducation period. Independent variables studied include the Hemoglobin A1C measurement and fasting glucose: before the study and again at three months postevent. The dependent variable numeric represented how many clinic education classes the prediabetic or diabetic patient attended.

A power analysis computed to analyze an appropriate sample size was needed for the study to be an accurate and fair assessment of results. Tentatively, this analysis revealed a sample size of at least 24 participants. Attendance was scored as no classes attended = 0, 1–2;

classes attended = 1, 3–4; classes attended = 2, 5–6; classes = 3; and 7–8 classes = 4. The statistical test used to evaluate the results was the ANOVA/Chi^2 for repeated measures and specifically the McNemars for nominal data. To study the relationships between changes and correlations in the number of classes attended and changes in A1C/Fasting/ glucose, Pearson's Rho if Pearson's and assumptions met along with two variables and scale data. The other measuring tool was the pre and posttest DSMQ evaluation. The DSMQ was statistically analyzed by the paired *t* test to analyze for changes. I stored data collected in the project securely in a password-protected computer used only for personal use. The data will be kept for the minimum required time according to IRB guidelines.

The purpose of this project was to provide and evaluate the effectiveness of outpatient diabetic education. The program will teach (through demonstration and expert speakers) the patient with diabetes Type 2 and prediabetes to better care for themselves with thorough instruction of DSME. The goal is to show improvement in knowledge of diabetes care as well as reduction of glucose averages with improved A1C levels.

Measurement Tools

The Diabetes Self-Management Questionnaire (DSMQ) developed by Schmitt et al. (2013) is a tool that would be best utilized in diabetic outpatient instruction as it includes the monitoring of HbA1C, which is the standard of care to monitor in outpatient diabetes management (see Appendix A). The 16-item questionnaire was developed based on self-care principles with four subscales: 1) glucose management, 2) dietary control, 3) health-care use, and 4) sum scale (a global measure of self-care ability). The tool was useful for both Type 1 and Type 2 Diabetics and can be used with prediabetes to gauge understanding. In literature reviews, it was found effective in comparison to all previous tools as it was the first to include HbA1C.

Studies have verified an overall internal consistency with consistent sub-scales and confirmed designed scale structure with appropriate fit in confirmatory factor analysis with parallel Summary of Diabetes Self-Care Activities Measure (SDSCA). It was verified to be a reliable and valid instrument to gauge self-care abilities and behaviors associated with control of diabetes and stronger than the SDSCA when HbA1C levels were standard of follow-up care and DM control (Schmitt et al., 2013). The SDSCA (Toobert et al., 2013) is brief as well, but the scoring is not as specific to HbA1C as the DSMQ. The tool is all-inclusive in evaluating self-care and self-deficit in diabetic clinic patients. The ability to assess the patient's self-care and knowledge is necessary to succeed in an outpatient diabetic education program. The tool used should be easily understood by the patient. The focus can be patient-centered and include those items where deficits present to aid in better glycemic control.

The author of the DSMQ, Andrea Schmitt, developed the tool in Germany and noteworthy that few found were written by U.S. authors. Written permission was obtained via email from the author, and a permission letter was signed (see Appendix B). The tool was useful and applicable to meet the overall goal of the project, evaluate participant learning needs before and after the program. The data collected from the DSMQ were combined with pretest and posttest measurements of Hemoglobin A1C (HbA1C) and fasting glucose levels.

Data Collection

Data collection and the use of an adequate system to separate and evaluate the data were completed with the Excel spreadsheet. Data of interest included demographics, age, sex, pre-intervention DSMQ, HbA1C, and fasting glucose, all gathered before and during the initial meeting. The data were obtained by contacting the referring health care provider for the results. Each participant was assigned a research number, and all identifying information was removed to

protect privacy. Data collected outside of my facility utilized the assigned number to obtain the needed data as well. At the conclusion of the six-week program, a second DSMQ was given immediately for comparison. Three months after return visits to the patient's provider and after intervention fasting glucose and A1C were obtained and logged, along with a second repeated DSMQ that measured the patient's ability to retain the education and apply lifestyle changes. Data and results were then logged on the spreadsheet and were computed.

Data collected in the project were stored securely in a university drive identifying me as the researcher and owned by the university for future use if needed. The storage system provided and maintained by the online graduate school for doctoral student research data and supported by the university's IT department for security purposes and kept for the minimum required time according to IRB guidelines. The analysis of data compared preeducation with posteducation and concluded the actual benefit of outpatient education in this setting.

Timing of DSME and Secondary Considerations

Diabetic Self-Management Education (DSME) has added benefits when completed in the first six months of diagnosis, according to a joint position statement by the American Diabetes Association of Diabetes Educators and the Academy of Nutrition and Dietetics by Powers et al. (2015). They advised the Diabetes Education Algorithm, which defines four points in time-critical to self-management. The algorithm outlines a time frame in the DM continuum when the introduction of crucial points is vital and include: 1) at diagnosis, 2) annually, 3) when factors complicating present, and 4) when changes or transitions occur (insurance coverage change, age-related changes, or living situational changes). There are guiding principles utilized to assist with a plan for the DSME. DSME provided by the health professional along with an ancillary team and community-based assistance and resources included is appropriate in the proposed project.

Methodological Appropriateness

Powers et al. (2015) reported that formal programs used in the past with the type I diabetic patient incorporated into the rural office setting should be casual and comfortable but just as informative. Project Diabetes, a state-funded initiative administered by the Tennessee Department of Health active until 2015, provided guidance and strategy for clearly stated goals such as 1) make physical activity routine, 2) support community programs that increase physical activity, 3) increase access or opportunities for exercise, 4) increase access to healthy food choices, and 5) educate on options other than sugar-sweetened beverages.

Patient guidance is provided in verbal, written, and electronic means to promote the best communication. DSME instruction and guidance programs are recognized as reimbursable when specific standards are met, including details such as when provided by those credentialed, time constraints followed, and certain documents completed and coded (Powers et al., 2015). Cost containment during the project improvements included the use of volunteer speakers. The growth of the program could take place with referrals and possibly with future visits to other local clinics along with grant funding applications. Success would be verifiable through improvements in outcomes, stabilization of the disease through confident self-management observations. The potential for the study to yield successful as well as effective results was increased in pre- and posttest design as results are truly quantitative and measurable.

Feasibility and Appropriateness

In order to be successful, the proposed project was required to be feasible and appropriate in several areas, including program time and length. The length of the program was the pilot that was approved for 10 hours at diagnosis plus two additional hours for reinforcement of instruction. The actual videos were approximately 20 minutes in length, with a total of four. The

video sessions were sent weekly or bi-weekly based on confirmation that the last video was watched. The surveys (DSMQ) collected guided the topics to evaluate newly diagnosed strengths and weaknesses by gauging current understanding.

Patient incentives given for follow-up education and participation of more than 10 hours would further encourage the patient. When outpatient DM education is fully implemented, annual re-education and audits recommend updated education related to status changes or setbacks. Annual reassessment would include disease progression issues, evaluation of yearly screening needed for the diabetic such as eye or foot exam. Preventative care such as influenza or pneumonia vaccines would be an integral part of the education and annual reviews. The project is feasible and obtainable through adequate organization and presentation that meets outpatient DM education standards.

Limitations and Obstacles

The challenges presented for the education program included implementation barriers and a possible lack of patient participation. Participation was encouraged with entertaining and informative speakers, door prizes provided by sponsors for meals, and other incentives for attending as many sessions as possible. To properly empower the patient with DM, the education was presented in a personal and convenient manner towards self-care as this was the key to success in managing diabetes. A hopeful sign for the project in rural communities like the setting for this project noted by Powers et al. (2015) was that patients in rural areas were more likely to attend. A possible obstacle or limitation of the results was that other treatments provided simultaneously could potentially skew results if they too improve levels such as medication addition or changes. Other obstacles were related to recent development in coronavirus infections and limited gathering numbers in public places that have been mandated. Coronavirus

guidelines prevented any face-to-face contact for the project and prerecorded video sessions were used for all educational events. The project was delayed due to the current pandemic, and IRB was delayed as well to adjust all research to a non-face-to-face platform.

IRB Approval and Process

The organization in which the participants were recruited required no additional IRB approval. However, permission and blessing were obtained and granted in a written manner with a support letter provided by the clinic (Appendix C). A support letter from the clinic (Appendix D) was received, and this clinic owner has agreed to refer participants as well as distribute flyers and assist with data collection before and after the program. This provider welcomed me to use her conference room as well if a meeting place was needed. In the absence of a formal IRB, compliance to ethical standards for safety in research guided all procedures to ensure protection and risk reduction of participants.

The IRB process is necessary for the protection of human subjects and my transparency and accountability as the researcher. The proposed project could not ensue until IRB training was completed and after successful approval based on Abilene Christian University guidelines and standards. Confidentiality was maintained by all speakers and participants, and each participant signed a consent that explained their rights as a human research participant that clearly explained risks, benefits, and right to refuse or discontinue participation at any time. Although risks perceived were minimal to none, planning for this was still an important part of the IRB process.

Interprofessional Collaboration

Collaboration between participant's care providers guided the referral and data collection process as well as provided a future communication base to discuss results and disseminate results to potentially improve current practices. Ancillary contracts were made to a registered and

licensed dietician certified in diabetic education from the Veteran's Administration, a final year pharmacy, physical therapy, and physician's assistant student. Speakers were volunteers recruited with their respective specialty focus in mind. Due to the non-face-to-face nature, there was no question and answer session held. No hands-on skills training could be provided, and all sessions were prerecorded videos. Each participant received a donated glucose meter for future use.

Practice Setting

The setting for face-to-face education was large enough to hold 20–40 participants comfortably. A public setting such as a church fellowship hall or a local community center is preferable and helped assure that participants were at ease. The presence of others with the same illness and public venue ensured the patient they were not just at another doctor's appointment. The goal was to make the setting attainable and centrally located to those in attendance for convenience as well as transportation. If gatherings were limited (due to pandemic guidelines), as they are not currently in my rural area, the presentations were changed to electronic means and non-face-to-face.

Target Population

There were no special populations involved in this project. All participant's cultures, religious beliefs, emotional state, and education levels were taken into consideration to individualize the education to the participant's equivalent grade level. The patients considered were those newly diagnosed with Type 2 diabetes as well as prediabetes between the ages of 20 years and 65 years of age. Type 2 diabetics are those with HbA1C >/= 6%. The prediabetic A1C is 5.5–5.9%, with borderline elevated fasting glucose over 100 mg/dl. Recruiting took place utilizing flyers in several rural West Tennessee outpatient and urgent care clinics. The

participants were English speaking. However, in the presence of Hispanic patients, there was access to translation if needed.

Risks and Benefits

Risks were perceived to be minimal, with no harm to the participants. The only foreseeable risk possible was the potential for anxiety related to the new diagnosis, along with feeling overwhelmed with new information. Anxiety due to the self-care responsibility needed for adequate control of the disease could exist. In cases of extreme anxiety or distress, access to counseling was readily available and attainable. Other risks involved follow-up as scheduled with the health care provider and the face-to-face visit and risk of being exposed to coronavirus.

Benefits were more likely in this project as the patient with diabetes was empowered and equipped to better deal with an otherwise difficult disease process. The program was planned to utilize a group format and the completion of Health Insurance Portability & Accountability Act (HIPAA) forms from each participant. This concept was canceled due to restrictions due to COVID-19 pandemic guidelines. The alliances with others that had the diagnosis were projected to be beneficial offer a higher level of accountability. A secondary benefit was the knowledge that their participation could help others through the research and subsequent improvement of standards of care.

Timeline for Project

The timeline for the outpatient diabetes instruction program began with the statement of a problem with the current process for education diabetes in the United States and a thorough literature review of the problem and discovery of current practices. Preliminary planning included the development of a plan for measurement tools and obtaining permission to use the

tool. Support from the current clinic of practice was garnered. IRB training was completed and obtained from the university IRB approval process.

The IRB process was completed as required, and at this point, flyers for participant recruitment distribution began. When an adequate number of participants were committed and assigned an identifying research number, dates for the education program were provided to them. Data collection began with preproject A1C and fasting glucose obtainment from the current provider.

The lesson plan was prearranged, and a program was developed with collaborating experts who presented the material. The first session involved disclosure to participants as to the purpose of the program, HIPAA document signage, brief introduction as well as completion of initial DSMQ. The focus of each class was set up and prepared by each presenter. The videos were viewed over a 6-week period. The last meeting involved requesting a repeat DSMQ. Three months after the last event, HbA1C and fasting glucose were obtained and placed into a data bank. This process was repeated once again at the 3-month, postevent date. All data collection ceased after this point, and available data were entered into the Excel spreadsheet to conduct the appropriate statistical calculations. Evaluation and calculation of results took place and were documented accordingly. After this pilot program, long-term visits to other sister clinics would provide training for others to replicate this service. The ultimate future endeavor would be a free-standing DSME clinic.

Summary

The need for outpatient education and benefits provided for the patient with prediabetes and diabetes is apparent in a review of the literature. The benefits of early intervention in diabetes and prediabetes are well documented and lead to improved disease understanding as

well as improved self-care and, in turn, better management of the disease. Outpatient clinic-based education presents a viable alternative to reduce complications and decrease hospitalization as well as allow some prediabetics to have complete remission from the disease due to appropriate diet, exercise, and monitoring of the blood glucose levels as well as A1C levels. Diabetic education presented in outpatient clinics can decrease the financial burden of the disease nationally at the organization level and an individual patient level considering the reviewed studies and positive outcomes noted.

Assessment of morbidity and mortality in chronic illness is key to avoiding complications that can alter the quality of life and overall health. Prevention is vital to avoid this phenomenon. One fundamental way to avoid complications in diabetes is to maintain a normal or as normal as possible blood glucose (National Institute of Diabetes and Digestive and Kidney Disease [NIDDKD], 2019). Primary prevention is education in self-care measures that are needed daily to control blood glucose. With knowledge and tactics to maintain consistently normal glucose, the patient can manage this disease with the healthcare provider's support. One way to keep up with the glucose over time is the A1C level, which is currently the most utilized and reimbursable test (NIDDKD, 2019).

The pre and postintervention study is a comparative method of evaluating the success of the intervention, and the *t* test is the statistical computation to assess the changes. Correlation is also an accurate method of discovering whether most exposure is better than minimal in education. Pearson's Rho is the most precise method to figure this (Landry, personal communication, 2019). Approval to conduct the research study was obtained in conformity with the Abilene Christian University IRB (ACU Office of Research & Sponsored Programs, 2020).

Chapter 4: Results

This project was a pretest, posttest design and quantitative in nature to study the impact of outpatient education of the patient diagnosed with Type 2 DM. Diabetes education was limited to video sessions due to corona virus guidelines that prevented face-to-face teaching. The results compared pre and postintervention results of the A1C, a 3-month average of blood glucose level marker (ADA, 2021), and helped accept or reject the null hypothesis that there was no significant difference between pre- and posttest levels. The data analysis used for this project was the two-tailed *t* test for parametric analysis found a critical value of significance. I completed a second analysis utilizing the number of sessions attended and a comparison (correlation) on whether more education had a more significant effect on A1C reduction. The SPSS Version 25.0 was utilized for these calculations with data from the Excel spreadsheet, including differences in the A1C levels. The research study satisfied the requirements (assumptions) for the statistical 2-tailed *t* test. The dependent variable is continuous; the observations are independent of one another, the dependent variable has no outliers, and is normally distributed (Statistics Solutions, 2021). Statistical significance is looking at the *p*-value and ensuring the probability is as specific as possible 95%. Practical significance is also required due to the sample size and is unproven in this case. This is evidenced because more patients had a decreased A1C than those who did not. But the variance in improvements will cancel some changes out. Also computed was a correlation of the number of classes attended to changes in A1C. Utilizing Pearson's Rho, a correlation was found. The DSMQ screening was not used for comparison due to the inability to get a significant number returned. The DSMQ was instead utilized to discover weak areas in the patient's diabetic knowledge and plan the video sessions around these focuses. The correlation significance of the number of videos viewed versus A1C

change significantly stresses the importance of education presented in more than one session and improved health in the DM2 patient. Although the change was found statistically insignificant, various issues could have pushed it to a significant level. Based on the *t* test, the null could not be rejected. Perhaps a significant critical value could present in a control group study.

Summary of the Project and Preparation

The study involved recruiting and referring patients recently diagnosed with Type 2 DM to participate in outpatient diabetic education programs. Due to the current pandemic, recruiting participants was challenging. The guidelines prevented face-to-face encounters. Because of this, Type 2 diabetics were also accepted who were not recently diagnosed in order to meet the power analysis requirements for a compelling study. I emailed a total of 10 rural healthcare providers to recruit participants and initially only received two referrals that completed and met the inclusion criteria. After including previously diagnosed DM2 patients, I was able to include 41 participants in the study. Two of the participants were excluded due to non-compliance with completing all steps of the project. A total of 39 subjects were recruited and participated fully in the study. These participants were adults between the ages of 29- and 65-years-old.

Referrals came with A1Cs, but patient consents were delayed along with the initial return of Diabetic Self-Management Survey (DSMQ) for unknown reasons. The DSMQ (Appendix A) is a tool in which the patient with diabetes rates self-care activities as to whether they apply to them in a scale fashion. The tool is useful to gather pre-intervention knowledge versus postintervention knowledge on self-care measures in DM. The answers range from applies to me all the time to does not apply to me at all. The surveys included measures regarding diet and nutrition, activity level, self-glucose monitoring, and medication adherence in diabetes. The preeducation surveys were returned by all participants. However, the poststudy (18 returned) and

the 3-month repeat study (two returned) showed very poor participation and lack of follow-through in returning. The reason for this is unknown as several reminders to return were sent in emails to the subjects. The surveys were excluded from statistical analysis due to this fact.

The DSMQ tool was analyzed and aided in gauging self-management knowledge. This was utilized as a focus for the topics included in the educational videos. The DSMQ indicated the need for education was significant regarding diet, exercise, how and when to check blood glucose. Some patients were not currently taking medication for DM2 and were exclusively following dietary and lifestyle changes and adherence. The DSMQ survey revealed which education topics that subjects lacked knowledge of, and these were included in the video sessions. A total of four videos were recorded and viewed by participants, with the following topics covered:

1. Exercise - How does exercise affect blood glucose, and what are appropriate activities to do with explanations and demonstrations. This video was completed by a physician assistant student and a physical therapy student from the University of Arkansas Medical Sciences Department.
2. Nutrition - This video included information on serving sizes, carbohydrate counting, how food affects glucose, and common diet misconceptions related to diabetes. Models were included as well as pictorial images to indicate nutritional information. This video was completed by a registered dietician that currently does diabetic education at the Veteran's Administration (VA).
3. Blood Glucose Levels - How and when to check blood glucose levels with demonstration and the importance of monitoring blood glucose. A VA dietician completed this video as well.

4. Medications used in diabetes - Information was provided to participants on various types of medication used in treating diabetes. Discussion on how the medications work in the body and any possible side effects were included in the educational videos. Finally, oral medications and injectable medications were discussed by a pharmacy student at Union University Pharmacy Department.

Data Collected

The DSMQ (Appendix A) data collected were analyzed, and a total of 41 returned before the start of video education sessions. The DSMQ indicated the need for education was significant regarding diet, exercise, and when and how to check blood glucose. Some patients were not on medication for DM2 and were under dietary and lifestyle changes treatment only. DSMQ surveys were omitted for comparison study as there was an insufficient number returned. Less than half, or a total of 18, returned the DSMQ. Due to the low return rate of the surveys, there was an insignificant amount to justify a pre and postintervention analysis. The post-3-month DSMQ was only returned by two participants, which were also excluded for statistical significance measures. The data were documented in an Excel spreadsheet but excluded from any calculations other than the total number returned.

Hemoglobin A1Cs collected on the participants through the patient's provider as per routine at the visit were included as a prestudy and poststudy result. One reading was excluded due to not returning for a repeat visit and A1C. The pre-intervention range of A1Cs for participants ranged from 6% and the highest at 15%. According to the American Diabetic Association (2021), the A1C calculation of these ranges indicated a blood glucose range from 125-384 mg/dl. A healthy A1C level is <5.5% (ADA, 2021). The poststudy A1C range was

5.7%–12.8%, and the average glucose range of 117-321 mg/dl. Overall, these numbers improved. Four returned to the prediabetic range (< 6%) at the second measurement.

Statistical Analysis

A paired *t* test was performed utilizing SPSS to consider pre and postintervention A1C and to discover overall changes and comparisons. A line graph below demonstrates the pre and postintervention A1C (Figure 2). The results after uploading to SPSS indicated a pre-intervention A1C (M = 8.838%, SD = 2.528) and postintervention A1C (M = 8.275, SD = 2.368), indicating a decrease in levels that was considered statistically insignificant, t (39) = 1.7949, p = 0.0804. A 95% confidence interval of the mean difference = 0.562 is from -0.071–1.196, standard of error difference = 0.313. Consequently, the null hypothesis is found true (See Table 1). The paired *t* test results 0, p = < 0.1 of indicated null hypothesis was found true and that in this study the diabetic education did not significantly affect the results.

Figure 2

Line Graph for A1C#1 and A1C #2

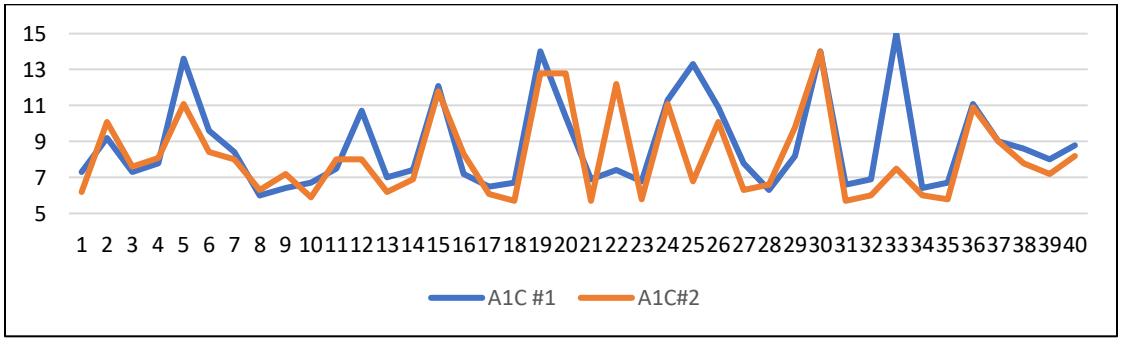


Table 1

Paired Sample t-*Test Statistics*

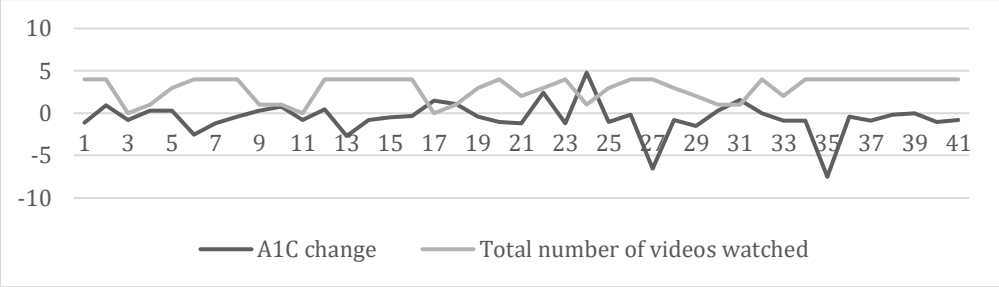
	M	*N*	*SD*	*SEM*
Preeducation A1C	8.838%	39	2.528	0.3134
Posteducation A1C	8.275%	39	2.368	0.3134

A second analysis was completed to compute the correlation of the number of videos watched to changes in A1C (both negative and positive). Two of the values were zero (number of videos viewed) and were subsequently deleted from the study and the corresponding A1C due to an error created in correlation studies when a zero is utilized. The differences between pre-intervention and postintervention A1C were documented as positive if increased and negative if decreased. Using Excel spreadsheet data and Pearson's Rho correlation and Excel correlation, the data were recorded and entered into SPSS. A Pearson correlation coefficient was calculated for the relationship between the numbers of videos (independent variable) to changes in A1C subjects (dependent variable). A negative r (39) = -0.4502, $p < .05$, indicating a negative relationship between the two variables or an inverse correlation. An area graph labeled Figure 3 demonstrates the relationship curve to the number of videos viewed and A1C result changes. The A1C decreased as the number of videos viewed increased, which indicated the possibility that repeated exposure to education can improve the A1C. This phenomenon supports the negative correlation found in the data computation.

The negative or inverse correlation infers that as the number of videos watched increased, the A1C levels of participants showed a decrease. While this is a supportive study finding, this can only be interpreted as a possibility, as correlation does not indicate causation (Knaw, 2018). Therefore, this (i.e., number of videos viewed) cannot be assumed as a valid explanation or cause for the decrease in A1C posteducation but is a valid correlation.

Figure 3

A1C Change and Videos Viewed Graph



Question Guiding the Inquiry

The PICOT question was: In adults with diabetes (i.e., Type 2 and prediabetes) ages 20–65, what is the effect of an outpatient, clinic-based, educational program on Hemoglobin A1C and fasting glucose levels compared to adults with diabetes that only receive an inpatient educational program? The findings revealed that most participants improved A1Cs and that with repeated exposure, those improved even more. While the correlation to the number of classes was statistically significant, the weakly significant finding related to A1C improvement while decreased was found statistically insignificant. There was weak evidence against the null hypothesis, and it could not be rejected.

Reliability and Validity

The reliability and validity of the DSMQ questionnaire were addressed in the literature review and found valid and reliable but were unusable for the study due to an insufficient number of questionnaires returned. Pearson's correlation found a 95% significance for the correlation in the number of videos viewed versus A1C changes. The two-tailed *t* test was valid and reliable to a 95% confidence interval but failed to support the alternate hypothesis that the PICOT suggests statistically.

Strengths and Weaknesses

The study's strengths included the number of participants in the survey that met the power analysis for statistical significance. Other strengths of the study included the utilization of the DSMQ to identify specific diabetic management information participants needed. The strengths further included the expertise level and training of those conducting the video sessions. The food, nutrition, and blood glucose monitoring speaker is a registered dietician with a certification in education for patients with diabetes and is currently employed with the Veteran's Administration. The exercise video was completed by a second-year physical therapy student who demonstrated safe exercises for the person with diabetes. A physician assistant spoke on how exercise affects blood glucose. The two are both currently students at the University of Arkansas Medical Sciences. The speaker on diabetic medication will graduate with a doctorate in pharmacy from Union University this year. The participant's willingness to follow up with their healthcare provider for repeat evaluation as recommended could be a perceived strength of the study. The true correlation in the number of videos viewed can indicate that as education is presented on more than one occasion, improvement in A1C and DM2 is found but should be further studied to secure causation.

One weakness of the study was the educational sessions were completed virtually due to COVID-19 guidelines, and this less personal approach to education could have led to a lack of understanding of the content. The videos were recorded and not presented live, thus not allowing participants to ask questions. The possibility of interruptions while viewing the recorded educational video sessions at home or work is seen as a possible weakness. The prerecorded sessions were necessary and could have affected attention to the education while in the home environment as interruptions were possible and could have affected participant understanding of

the material and lead to impaired disease management. The lack of comradery in group-style education was also absent due to the need for video sessions to be prerecorded, which could affect the challenges one presents to the other as often one patient can present a challenge to another to improve. Another weakness of the study is the possibility of multiple factors that could have played a role in the improvement of A1C levels. While this research indicates that the educational sessions improved A1C levels, participants may have been started on medication, had medication increased, or been a part of other interventions that affected A1C measurements.

Although participation was less than anticipated, and educational sessions were not presented face-to-face due to COVID-19 guidelines, this study still showed evidence of a decrease in A1C in 28 of the 41 participants. The current pandemic has resulted in excessive screen time with jobs being remotely completed, and work obligations at home could lead to a decreased interest in more screen time with diabetic education. However, most participants still completed all four video sessions, and it was perhaps more convenient with the restrictions to stay home and virtually learn about self-management in diabetes. The type of outpatient education and presentation methods is important, and face-to-face is possibly superior to patient commitment as this is how the project was initially intended.

Chapter Summary

The impact of outpatient diabetes education on patients with DM2 morbidity and mortality was investigated and depicted in this project. The findings of the research indicated that participation in outpatient education improved A1C and that repeated exposure increases this chance of improvement. Specifically, 28 participants of A1Cs dropped out of the 39 that watched the video sessions. This improvement indicated the effectiveness of teaching self-care measures to those with DM2. Statistically, the correlation was noted with those that attended the most

sessions having the best improvement pointed out in those attending all four sessions. However, for overall A1C improvement in the group, the change was not significant. Although the change was present, it was insignificant overall, and the null hypothesis cannot be rejected with those variables. Chapter 5 includes a discussion of the interpretations, inferences, and implications of the study findings. Recommendations for the future research of the topic and suggestions for healthcare providers were also addressed.

Chapter 5: Discussion, Conclusions, and Recommendations

The project's purpose was to evaluate the impact of outpatient diabetes self-care management education in patients diagnosed with Type 2 DM. The knowledge obtained from the DSMQ survey was planned to measure a change in understanding pre- and postintervention. However, the limited return was excluded from statistical analysis. The tool was utilized to evaluate the participant's level of understanding self-care in DM. The A1C measure before and after the education was the data considered and analyzed. The changes in A1C levels were also correlated with the number of educational videos viewed. To be significant, the correlation would show a negative correlation when one (the number of classes) increased, the other (A1C) would decrease. Also included was a pre- and postintervention score (A1C) to measure whether self-care education produced a significant improvement (decrease) in A1C level. The total number of subjects at the beginning of the study was 42 adults between 29 and 65 years of age with a diagnosis of DM2. However, only 39 participants completed at least one educational video. This chapter discusses the interpretation and inference of the findings and implications of the analysis for leaders relevant to the study results. Recommendations for health care providers, as well as future research, are also discussed.

Interpretation and Inference of the Findings

The research question answered in this study focused on the impact of outpatient self-care education and improvement of glucose levels measured by the A1C. The primary findings related to the purpose of this project include that overall improvement in A1C did occur in most subjects and the more videos viewed, the better the A1C became. While improvement in A1C was noted with education, the analysis revealed it was not enough to be significant. The correlation in how many classes attended and the difference showed a negative (desired)

correlation. Therefore, the null hypothesis is not rejected for significant A1C decreases after the educational video sessions but is rejected for the correlation found related to the number of videos viewed and significant A1C decrease. With the research findings, the question guiding the research was answered.

The new knowledge or conclusions presented in this project adds to the nursing profession's body of knowledge and encourages providers to continue to or add outpatient education to the DM2 patient's treatment. Evidence was presented that education can reduce complications of DM2 through self-care education. The complications of DM2 can be life-altering and increase the morbidity and mortality of the patient. The inference was positively noted between repeated exposure to the education and reduction of glucose averages which decreases risk to the patient. The self-care theory states that the ability to care for one's self is essential to maintain health and recover from illness (Orem, 2001). The research project findings were found supportive of the self-care theory that stresses self-care is learned and can be taught to a patient.

The relevance of the applied self-care theory in the DM2 population of interest was supported by the variables that suggested repeat exposure led to even better glucose levels, with some patients returning to prediabetic ranges of A1Cs. The correlation in the number of videos viewed and decreased A1C levels support the question that education in the outpatient area can lead to improved glucose supported the alternative hypothesis. While the actual change in A1C was found insignificant, any A1C change can improve a patient's health overall. Additional studies are needed to support the question in a more significant manner and compare video watching versus in-person training that could not be completed due to pandemic guidelines.

Limitations

There were some limitations in the project. One such limitation was the difficulty of obtaining enough newly diagnosed diabetics exclusively in the project. Difficulty in the recruitment of participants led me to include new and previously diagnosed patients with diabetes. The length of the study and time intensiveness did not allow for the exclusive inclusion of only newly diagnosed patients. This could add to the insignificant change in A1C as I have found in my practice that a newly diagnosed patient will significantly improve A1C in one visit in comparison to a patient already being treated and following up. Another constraint is that full chart disclosure and other co-occurring diagnoses can affect the patient's ability to focus on education and glucose level improvements.

Implications of Analysis for Leaders

The research adds significant insight into nursing science and could increase the number of studies in the United States that relate the significance of self-care management and education to improving diabetes management. Future research could focus primarily on the patient with Type 2 DM as they are often overlooked for intensive education. Type 2 DM patients are sometimes viewed as not as severe by some providers compared to insulin-dependent diabetics. Checking and monitoring glucose in the Type 2 DM patient is critical and should not be an optional treatment as it currently is.

This project reinforces that the DNP-prepared nurse practitioners should develop a perspective of the importance of self-care management and education in those with DM2 and focus initial assessments on that knowledge level at treatment onset. The healthcare provider must note that daily monitoring of glucose is essential and leads to improved DM2 management, especially when education focuses on this premise. Healthcare providers must identify patients in

need and those unaware of self-care measures that can lead to an overall improved level of health and diminish the possibility of life-altering complications of Type 2 DM.

Implications for nursing practice can be defined based on the eight DNP Essentials. The findings and outcomes of this project improve the overall health benefit to the Type 2 DM patient. Correlation with repeated exposure to education was found and an overall improvement in A1C levels in most inclusion groups. The Essentials of the Doctoral Education for Advanced Nursing Education Practice (American Association of Colleges of Nursing, 2006) for advanced practice nurses were discussed as to how they related to the guiding implications for clinical practice and overall health improvement and wellness and reduction of dangerous complications.

Essentials of Doctoral Education for Advanced Practice Nurses

Essential 1: Scientific Underpinnings

Uncontrolled diabetes presents astronomical costs both financially and to life and limb in the patient diagnosed with diabetes. The disease predisposes patients to life-altering complications, and the number of diagnosed diabetics continues to increase annually. The literature review supported the benefits of self-care education in diabetic patients and revealed that treating before complications and costly hospital stays was beneficial. The findings provide an underpinning for the generalization of these results strong enough to incorporate and promote this intervention in the primary care or endocrinology areas that the advanced practice nurse serves. The theoretical framework guiding this project was the self–care/self-deficit theory developed by Dorothea Orem stresses the importance of self-care to disease management. Overall wellness can lead to a developing education program at diagnosis and treatment initiation that leads to decreased health consequences in this population. As nurse leaders, the nurse practitioner influences to guide the patient to a better degree of health and lessen illness

constraints by something as scientifically basic as enhanced outpatient education and improvement of self-care measures. This essential is met through nursing action or processes that positively affect health status (AACN, 2006). Through this enhanced process in self-care education, the APN is improving the DM2 patient's overall health and wellness and reducing dangerous complications.

Essential II: Organizational and Systems Leadership

Patient education is a vital aspect of diabetes management. Developing an improved means of providing self-care education in the outpatient environment can improve the patient's life and, more specifically, the prediabetic or newly diagnosed DM2. An organizational proposal to offer a new system of business that provides outpatient education to these patients could meet a need presented in the United States, especially with the increasing numbers of diabetes diagnoses annually. This system can decrease health costs associated with uncontrolled diabetes and even slow or stop the prediabetic to DM2 progression through education involving lifestyle changes.

Essential III: Clinical Scholarship and Analytical Methods

Evaluating the effects of outpatient diabetes education in the research practice setting demonstrates an effective measure to lower A1C, improve health outcomes, and reduce complications through better self-care measures and monitoring in DM2. Analytically evaluating the changes associated with this intervention leads to improvement of patient care and treatments. Careful evaluation of the DSMQ leads to understanding where the patient's level of knowledge is at the time of the survey and provides a guide for what type of intervention and self-care measure instruction is needed to improve health status through improved glucose levels.

Improvement in education leads to technological advancement and program changes that include self-care education as an intervention to meet the following essentials.

Essential IV: Information Systems and Patient Care Technology

The use of statistical techniques and information systems to better understand the results of this study has led to the knowledge that increased exposure to outpatient education increases a patient's chance to improve disease processes and reduce complications. The ability of the APN to utilize patient care technology to record and monitor patient status is a must in today's fast-evolving healthcare technological era. The utilization of technology in practice allows for improved monitoring and ease of information gathering to review effective versus ineffective interventions. It allows for the data to be transferred to share with others in healthcare and the patient. The utilization of statistical programs such as SPSS Version 25 enables the transferring and translating of data and significance to the practice of diabetic patients. The DSMQ could be added as part of patient intake upon the diagnosis of DM or prediabetes to yield further educational benefits that lead to DM improvement.

Essential V: Health Care Policy

The result of health care change and management leads to policy changes. Whether the policy changes in the APN's practice with a slight improvement or a broader shift in policy by governmental or health-related boards with a considerable improvement, the effect for the patient can be crucial. The APN can adopt a policy to start patient self-care education at diagnosis that expands to other clinics. Eventually, research and considering evidence-based improvements can lead to overall reductions in complications and healthcare costs and decrease detrimental effects of the disease process. The additions of these studied interventions lead to improved overall

public health, which should be the goal in the health reform of today, meeting societal needs and an individual's healthcare needs.

Essential VI: Interprofessional Collaboration

Inter-professional collaboration occurs between patients, nursing, ancillary staff, and providers our patients are referred to. This collaboration is a direct result of cooperation, especially in obtaining data evaluated in this study. This data collection requires communication verbally, through emails, and other electronic measures to avoid disruption of patient care and follow IRB guidelines that de-identified the subjects as needed. Due to pandemic guidelines, there was very little verbal to no face-to-face communication. Communication through electronic means is challenging and must be clear to maintain an understanding between all involved. Practitioners must be well-informed on these innovative communication methods not just during the obtaining of data but day-to-day inpatient care as our technological status in healthcare continues to advance.

Essential VII: Clinical Prevention and Population Health

The basis for this project was to improve the care of the patient with diabetes to improve health status and improve the health of a population. The method is preventative in nature. Prevention of diabetes is crucial to reducing complications and leading to an optimal level of health. The prevention of complications leads to a decrease in morbidity and mortality and a decreased financial burden of the disease. Education to the prediabetic is essential to stop the disease process and sometimes reverse the diagnosis in DM2. The evaluation and interpretation of data that improves health status is a documented foundation in the nursing process (Chism, 2016).

Essential VIII: Advanced Nursing Practice

Advanced practice nurses routinely care for diabetic patients, and improving and evaluating changes in treatments and monitoring is an evidence-based science. This project was based on the literature review and work experience that have supported that hospital education is not superior and that hospitalization should be prevented. Outpatient education should be improved and included patient and self-care management to help "own" the illness and lead to improved health. The evidence the study presents should guide practitioners to better care through better education of diabetic patients. Findings in this research project revealed evidence-based results to acknowledge the effects the patient has on their own disease process, encouraging providers to educate accordingly. The diabetic patient population continues to grow in the United States, which pushes the importance of educating to the forefront of care provided. The application of nursing science supports what the findings of the study demonstrated. The learning of the advanced practice nurse does not end, and the education of patients cared for does not either. Practice decisions should be based upon evidence. Evidence in this study empirically supports outpatient self-care education in diabetes and focuses on preventing complications and better control with repeated education exposures.

Recommendations for Future Research

Future research could include face-to-face education interventions and other methods of monitoring blood glucose, such as continuous blood glucose monitoring (CGM), which along with A1C measurement, maintains more stable blood glucose. Recently, CGM has been promoted as superior to A1C measurement in several ways. A1C is one number that reflects average blood glucose. A patient's A1C does not calculate ups and downs that affect small vessels in the heart, eyes, and kidneys or the leverage of the glucose and can involve high levels

averaged with low hypoglycemic level numbers. Recently, the American Diabetes Association (2021) has recommended CGM as an adjunct monitoring method superior to A1C measurement alone. The CGM method encourages self-care, perhaps even more significant than the finger stick glucose, and a commitment to regulating blood glucose in a better way. Education for patients with diabetes and self-care promotion is essential for promoting the "owning" of the disease (Kruger, 2021). Education research is sometimes challenging as it is critical to have the "buy in" to the condition and a commitment by the diabetic patient to be involved enough to understand the importance of participating in the intervention. Future studies should focus on best practices in diabetic education that meet the needs of patients and healthcare providers.

Conclusion

The impact of outpatient diabetes education for adults diagnosed with DM2 was evaluated and analyzed in this project. The findings revealed a correlation between the number of exposures to education and an improved A1C. Although the statistical significance was low, there were still more patients with enhanced A1Cs than those with increased numbers. Future studies should involve face-to-face and interactive events as this was electronic and video viewing only. In the presence of increased non-face-to-face encounters in health care, this study speaks to the continued value of face-to-face education.

The presence of a control group may exhibit a more significant change in A1C scores in those with outpatient educational experiences. Nationally, the need for more studies regarding the significant improvement in diabetes when the patient is actively involved, and bought-in to self-care and monitoring is evident with a limited number of studies in the United States. This need can be disseminated through oral means in training events for providers that treat patients with diabetes. Other ways to announce the meaning of this study and the need for more of its

kind could be accomplished through technical, video, or journal articles to earn continuing education credits required of the practitioner. The need for healthcare reform through outpatient self-care education was found in research and reinforced in this project. The advanced practice nurse is challenged to promote patient education to meet needs in rural areas.

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Appendix A: Diabetes Self-Management Questionnaire

The following statements describe self-care activities related to your diabetes. Thinking about your self-care over the last 8 weeks, please specify the extent to which each statement applies to you. Note: If you monitor your glucose using continuous interstitial glucose monitoring (CGM), please refer to this where 'blood sugar checking' is requested.	applies to me very much	applies to me to a consider-able degree	applies to me to some degree	does not apply to me
1. I check my blood sugar levels with care and attention. ☐ *Blood sugar measurement is not required as a part of my treatment.*	☐3	☐2	☐1	☐0
2. The food I choose to eat makes it easy to achieve optimal blood sugar levels.	☐3	☐2	☐1	☐0
3. I keep all doctors' appointments recommended for my diabetes treatment.	☐3	☐2	☐1	☐0
4. I take my diabetes medication (e. g. insulin, tablets) as prescribed. ☐ *Diabetes medication/insulin is not required as a part of my treatment.*	☐3	☐2	☐1	☐0
5. Occasionally I eat lots of sweets or other foods rich in carbohydrates.	☐3	☐2	☐1	☐0
6. I record my blood sugar levels regularly (or analyze the value chart with my blood glucose meter). ☐ *Blood sugar measurement is not required as a part of my treatment.*	☐3	☐2	☐1	☐0
7. I tend to avoid diabetes-related doctors' appointments.	☐3	☐2	☐1	☐0
8. I do regular physical activity to achieve optimal blood sugar levels.	☐3	☐2	☐1	☐0
9. I strictly follow the dietary recommendations given by my doctor or diabetes specialist.	☐3	☐2	☐1	☐0
10. I do not check my blood sugar levels frequently enough as would be required for achieving good blood glucose control. ☐ *Blood sugar measurement is not required as a part of my treatment.*	☐3	☐2	☐1	☐0
11. I avoid physical activity, although it would improve my diabetes.	☐3	☐2	☐1	☐0
12. I tend to forget to take or skip my diabetes medication (e. g. insulin, tablets). ☐ *Diabetes medication/insulin is not required as a part of my treatment.*	☐3	☐2	☐1	☐0
13. Sometimes I have real 'food binges' (not triggered by hypoglycemia).	☐3	☐2	☐1	☐0
14. Regarding my diabetes care, I should see my medical practitioner(s) more often.	☐3	☐2	☐1	☐0
15. I tend to skip planned physical activity.	☐3	☐2	☐1	☐0

16. My diabetes self-care is poor.	☐3	☐2	☐1	☐0

DSMQ – United Kingdom/English - Original version
DSMQ_AU1.0_eng-GBori

Appendix B: Permission to Use DSMQ Agreement Letter

ePROVIDE™: Your User Agreement - Diabetes Self-Management Questionnaire - 4425

file:///C:/Users/RA%20S/Documents/DSMQ%20email%20permission%20AOL%20Mail%20(49463).html

eprovide (eprovide@mapi-trust.org) To: you Sat, June 8, 2019 at 0948

UA_General_Terms_Licensing_MRT... (559 KB)

UA_special_terms_Ruth_Ann_Slay...pdf (25 KB)

Dear User,

Thank you for using the online distribution on https://eprovide.mapi-trust.org for the use of this COA.

Please find attached your completed User License Agreement.

This COA may be under specific conditions of use and copyright ownership.

By accepting the General and Special Terms of this User License Agreement, you have acknowledged that you will respect these conditions, and especially:
• You will only use the COA in the context of use that you have indicated
• You will not modify the COA
• You will not translate the COA without contacting Mapi Research Trust beforehand for possible specific conditions
• You will not distribute the COA to other third parties

We invite you to refer to the attached Terms for complete information and conditions of use.

Should you have any questions, please contact us at eprovide@mapi-trust.org.

Best regards,

Appendix C: Letter of Support for Urgent Team Clinic

RE: letter of support

Nancy Becker ([redacted])

To: you + 3 more Details

I am not available today as I'm working on a project with a very tight deadline. Belinda will you work with Ruth Ann and Dr. Fowler to see if we can get this done today. Looks like a very worthwhile endeavor.

Nancy

Nancy Becker
Division Vice President
[redacted]

Mission: To serve our communities with the highest quality, affordable and convenient urgent and family care, delivered by our exceptional and compassionate teams.

Valued Behaviors:
- **Integrity:** Acting in an honest and ethical way
- Service: Providing patients with a "value" experience
- Relationships: Treating all individuals with dignity and respect
- Excellence: Pursuing continual improvement in who we are and what we do
- Results: Insisting on optimal performance
- Measurement: Analyzing outcomes in everything we do
- Communication: Sharing information proactively

CONFIDENTIALITY NOTE: This e-mail and any attachments may contain confidential information. If you are not the intended recipient, be aware that any disclosure, copying, distribution or use of confidential information is prohibited. If you have received this e-mail in error, please notify the sender immediately by ret delete this copy from your system. Thank you for your cooperation.

From: Nickie Brown
Sent: Monday, February 3, 2020 12:03 PM
To: Nancy Becker <[redacted]
Cc: slayton1988 <[redacted]; Belinda Bridges <[redacted]
Subject: FW: letter of support

Appendix D: Letter of Support From Referring Clinic Owner

Sheryl Wright, MSN, RN,APRN
[redacted]

To Whom It May Concern:

The population of patients diagnosed with diabetes tends to grow each year. With that growth, comes the realization of the staggering prices of medications, completely changing eating habits, and the daunting task of checking glucose levels multiple times a day. Diabetic education is greatly needed in this population of patients and their families. Ruth Ann Slayton is planning on the development of a clinical diabetic education program to help patients in the clinic setting. Much to my delight, she has asked for me to participate and I gladly accepted.

With the lack of clinical diabetic education available to patients, I feel this project will help my clients succeed in getting and keeping their diabetes under control. I have agreed to supply Mrs. Clayton with client information, approved by the patient, to participate in clinical diabetic education. I will also distribute flyers to patients about diabetic education and information that will benefit them greatly. I feel Mrs. Slayton's project can benefit so many patients and diminish worry and apprehension in making lifestyle changes to improve their health outcomes.

Sincerely,

Sheryl Wright, FNP

Sheryl Wright, MSN, RN,APRN

Appendix E: Flyer for Recruitment and Project Explanation for Participants

Different speakers for every video event

Nutrition Specialists discuss diabetic approved yummy recipes you can enjoy!

Exercise Trainers teach easy exercises to lower blood sugars

What about diabetic medications? Are they necessary?

Those attending video sessions are entered for prizes

First 20 to register receive a free glucose meter compatible with smart phone

BEGINNING THIS NOVEMBER (SOONER IF YOU GET SIGNED UP TODAY)

LEARN TO MANAGE DIABETES TYPE 2 OR PREDIABETES*

DIABETES EDUCATION RESEARCH OPPORTUNITY

What is it? 4-videos of diabetic training that teach **self-management** of Type 2 diabetes or Prediabetes. Each session is approximately 15-45 minutes in length and presented without contact.

Where is it? A **SAFE** location wherever there is access to online video (smart phone) or internet(even at home).**When is it?** After you sign up and consent. Video links will be emailed to you.

How do I join? Ask your Primary care provider to help you sign up

*This is a research project conducted by Ruth Ann Slayton FNP. It is voluntary and participants can withdraw at any time. Must be between ages 18-65 and recently diagnosed in the last year.

Appendix F: IRB Approval Letter

ABILENE CHRISTIAN UNIVERSITY
Educating Students for Christian Service and Leadership Throughout the World

Office of Research and Sponsored Programs
320 Hardin Administration Building, ACU Box 29103, Abilene, Texas 79699-9103
325-674-2885

Dear Ruth Ann,

On behalf of the Institutional Review Board, I am pleased to inform you that your project titled

(IRB# 20-110)is exempt from review under Federal Policy for the Protection of Human Subjects.

If at any time the details of this project change, please resubmit to the IRB so the committee can determine whether or not the exempt status is still applicable.

I wish you well with your work.

Sincerely,

Megan Roth

Megan Roth, Ph.D.
Director of Research and Sponsored Programs