TEXT MESSAGING TO IMPROVE GLYCEMIC CONTROL FOR ADULT HISPANIC PATIENTS WITH TYPE 2 DIABETES IN A FREE MEDICAL CLINIC

By

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Has been approved

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Dedication

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Abstract

The cost of treating diabetes in the United States has placed an economic burden on the country. The number of Hispanic people residing in the United States is rapidly growing. Many of these individuals suffer from socioeconomic strain leading to poor medical care, often resulting in poor diabetes outcomes. A review of literature revealed that the incorporation of innovative, culturally relevant interventions, such as face-to-face education, and tailored text messaging, are inexpensive ways to improve glycemic control in this patient population. **Purpose:** This DNP project sought to address social determinants of health experienced by this population by providing diabetes education in the clinic setting and supporting that education by text communication to improve glycemic control. **Method:** Using Plan-Do-Study-Act, the 12-week, evidence-based practice project was conducted in a free medical clinic serving Hispanic patients. Convenience sampling was carried out and consisted of 27 patients, between the ages of 18 and 70, with an elevated hemoglobin A1C (HbA1c) (M=9.9593%). Each participant received a brief diabetes education session and then communicated with the DNP student through personalized, bidirectional, biweekly text messages over 12 weeks. The Health Belief Model was used as a theoretical framework for this project, as concepts of this model were applicable to personal influences experienced by this patient population. **Results:** Data analysis utilizing a paired t-test revealed that basic diabetes education, accompanied by tailored, bidirectional, biweekly text messages, improved HbA1c results by 0.8562% in this Hispanic patient population (M=9.1 %, SD=1.79899, p<0.001).

Keywords: diabetes, T2DM, uncontrolled, text messaging, self-efficacy, Hispanic, glycemic control

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Text Messaging to Improve Glycemic Control for Adult Hispanic Patients in a Free Clinic

Chapter One: Introduction and Overview

The United States currently spends approximately $3.8 trillion on healthcare, and that number continues to rise. Expenditures associated with diabetes total $237 billion, or 6.25% of total US healthcare spending (O'Connell & Manson, 2019). Over the next decade, the financial burden of morbidity and mortality related to diabetes is expected to increase to $622 billion annually (Rowley et al., 2017). To put that into perspective, it is estimated that ending world hunger would cost only $5 million per year over five years (Chichaibelu et al., 2021). Nearly 35 million Americans have been diagnosed with diabetes, comprising 10% of the US population, and a large percentage of those people are of Hispanic ethnicity (O'Connell & Manson, 2019). The prevalence of diabetes is expected to increase by nearly 54%, and the associated mortality rate is expected to rise by approximately 38% over the next decade (Rowley et al., 2017). This has become a concern in the healthcare community as the Hispanic population is anticipated to incorporate nearly one-fourth of the US population by the year 2030 (Statistica, 2021; United States Census Bureau, 2021).

T2DM results from ineffective body regulation of blood sugar which is also termed blood glucose (Punthakee et al., 2018). The prevalence of type 2 diabetes (T2DM), or diabetes, in the Hispanic population is twice as high as those of non-Hispanic descent. In addition, the Hispanic population demonstrates a higher incidence of poor diabetes control leading to substandard health outcomes (Rotberg et al., 2015). Hispanic ethnicity is any individual from Cuba, Mexico, Puerto Rico, South America, Central America, or other locations of Spanish culture (United States Census Bureau, 2020). It is up to the healthcare provider to recognize obstacles that contribute to poor diabetes outcomes and be innovative in discovering ways to effectively

overcome barriers to treatment success. The use of mobile health technology (mHealth), defined as communication technology in healthcare, is one such innovation that has been growing in popularity throughout research (Park, 2016). Research has discovered that mHealth is an effective communication technique, and some have found it to be highly favored by the Hispanic patient population (Dobson et al., 2017). Given that patient-provider communication is essential to achieving success in diabetes self-management, this scholarly project sought to determine if tailored, bidirectional text messages occurring between office visits, would effectively support diabetes education that would reduce hemoglobin A1c (HbA1c) in Hispanic diabetic patients with poor glycemic control.

Background of the Project

Project Significance

Many Hispanic patients with diabetes experience social determinants of health that affect health outcomes such as (a) economic instability, (b) limited access to healthcare, (c) lack of social support, (d) environmental obstacles, and (e) educational limitations, leading to health illiteracy (Artiga & Hinton, 2018; Cartwright, 2021; O'Connell & Mansion, 2019). In addition, ineffective communication is also a deterrent to achieving acceptable health outcomes in this population, specifically in those diagnosed with diabetes (Weaver et al., 2017). Evidence-based diabetes self-management guidelines provide specific topic areas that guide T2DM treatment; however, they do not account for social issues or environmental issues experienced by patients (Qaseem et al., 2018).

Effective patient-provider communication, offering accountability and disease management support, has proven to be successful in accomplishing treatment goals for Hispanic patients dealing with health disparities, which are simply differences in health outcomes

associated with economic, social, or environmental factors (Healthy People, 2021; Smith-Miller et al., 2017). Healthcare communication with text messages has proven to be a successful treatment innovation. Statistically, text messaging is the preferred method of contact for consumers in the US, and 90% of those with text capabilities, prefer text correspondence to a phone call. Eighty-one percent of the US population sends and receives text messages regularly, and it has been determined to be the most widely used method of communication amongst adults under the age of 50 (The Local Project, 2021).

Project Site

La Clinica Guadalupana is a small, non-profit Catholic charity clinic located in Clearwater, Florida, serving nearly 500 uninsured patients. Most of those patients, approximately 99%, are of Hispanic ethnicity. The mission of the clinic is to serve Christ in those who are uninsured and need medical care. Limited resources have threatened the fulfillment of that mission, as diabetes outcomes, at the clinic do not meet healthcare standards. Healthcare standards for evaluating effective diabetes management are determined by monitoring HbA1c levels. The HbA1c is a laboratory value that indicates the average blood glucose level in the prior three months, where a value of 5.7% or less is considered normal for persons without diabetes, and a value of 7% or less is defined as glycemic control in diabetic patients (American Diabetes Association, 2021a; Little et al., 2019; Medline Plus, 2021).

The clinic is staffed by volunteer medical providers and healthcare students, two Catholic nuns, and one full-time advanced registered nurse practitioner (a master's degree-prepared registered nurse who can diagnose and treat illness and disease) (Eriksson et al., 2018). Currently, nearly one-fifth of the clinic patient population has been diagnosed with diabetes, and approximately 75% of those diagnosed have a HbA1c greater than 8%. Compliance with

treatment plans, specifically insulin administration, is an obstacle, although brief instruction regarding diabetes management occurs during each clinic visit. There was no protocol, policy, or workflow design, that maintained open communication with diabetic patients between visits that supported diabetes education and instruction that occurred in the clinic setting. Restrictions related to clinic resources had inhibited adequate diabetes follow-up for the patients at the clinic.

Project Background

Poor glycemic control (high blood glucose) leads to (a) cardiovascular, (b) neurological, (c) renal, and (d) vision complications, which all contribute to a shorter life expectancy and poor quality of life, as well as significant financial strain (Ausili et al., 2017; Dobson et al., 2015). Current T2DM management guidelines suggest providing (a) appropriate pharmaceutical treatment, (b) laboratory monitoring, and (c) diabetes education that will promote high-quality patient outcomes. These evidence-based elements will maintain a HbA1c of less than 8% and limit the development of complications associated with poor glycemic control (Qaseem et al., 2018). In the Hispanic population, the diagnosis of diabetes is viewed as a "death sentence" (Cameron et al., 2017). This cultural perception is related to limited access to healthcare, often leading to a late diagnosis of diabetes after serious complications have already developed. Many of these patients refuse the use of insulin as they associate it with a negative stigma, such as amputations, dialysis, and death. Providing and supporting diabetes education alleviates these fears, empowers individuals, facilitates disease management, and, in turn, improves patient outcomes (Cameron et al., 2017; Smith-Miller et al., 2017).

Project Concept

Interactive communication by text messaging is a cost-effective way to sustain communication between office visits and support instruction provided in the office setting

(Dobson et al., 2017). The use of mHealth technology has proven to be widely accepted by the Hispanic population, in general, as well as the patients at La Clinica Guadalupana. Although economic challenges exist in this population, mobile phones are an affordable, socially acceptable method of communication for those of lower socioeconomic status (Marko-Holguin et al., 2019; Vangeepuram, 2018). The clinic director noted some specialty volunteer providers carried out telehealth visits during the COVID-19 pandemic. They discovered that clinic patients accepted this healthcare communication method, as many verbalized the need to occasionally cancel follow-up clinic visits due to financial constraints associated with lack of transportation and the need to take time off from work. Corresponding by mHealth, in support of healthcare, has alleviated missed visits for the clinic patients and provided more effective healthcare access to support disease management.

Statement of the Problem

La Clinica Guadalupana faces the obstacle of inappropriate follow-up to support diabetes management after diabetes instruction has occurred during a clinic visit. Three-fourths of the diabetic population at the clinic display a HbA1c greater than 8%. In addition, social determinants of health experienced by the clinic patients have further inhibited the opportunity for appropriate follow-up. Insufficient resources at the clinic have hindered communication with the diabetic patients between visits after disease instruction has occurred. Failure to meet patient needs will lead to long-term complications resulting from poor glycemic control. In addition, the cost associated with these ailments leads to an increased financial burden for the individual, the community, and society (Ausili et al., 2017; Dobson et al., 2015).

Purpose of the Project

The purpose of this evidence-based practice project was to determine if patient-provider communication by text message effectively supports diabetes education and improves glycemic control in Hispanic patients. Little published research focuses specifically on Hispanic patients with diabetes; however, some studies have found that mHealth texting is a successful intervention in Hispanic patients who suffer from other chronic illnesses (Dobson et al., 2017). Additionally, a review of the project target population by the current professional staff indicates acceptance of mHealth communication. The research literature supports the need to address diabetes management in Hispanic patients and provides data that confirms the success of mHealth as an intervention for varying cultures and ethnicities (Dobson et al., 2017). Research gaps exist regarding inconsistent findings associated with the quality and quantity of messages being sent. Suggestions for further studies include tailoring the time and number of the text messages may be more successful and provoke a better response from the participants (Dobson et al., 2017). This project sought to determine if tailored, bidirectional text messages would effectively improve care outcomes in Hispanic patients with poor glycemic control.

Research Question

As Hispanic patients diagnosed with diabetes often suffer from poor disease follow-up and care outcomes due to limited access to care and other social determinants of health, the project team sought to answer the following question:

> Would tailored, bidirectional text messages that support diabetes management education improve glycemic control in Hispanic diabetes patients with a HbA1c greater than 8%?

PICOT Question

The framework for this project was driven by a focused question that included the population of interest (P), the intervention (I), a comparison that is usually to current practices (C), the outcome that was expected (O), and over the timeframe of the project (T) (Gallagher-Ford & Melnyk, 2019). These terms are often communicated in the acronym PICOT. For this project, the PICOT question is as follows: In adult Hispanic diabetic patients with poor glycemic control (P), does intermittent mHealth patient communication by text message (I), compared to current communication practices (C), improve glycemic control (O) within twelve weeks (T)?

Theoretical Framework

The variables and associated elements of this project consist of concepts such as demographic characteristics, availability of social and financial support, health care access and interaction, personal belief, cultural opinions, and the presence of barriers to care, all of which influence the patient's confidence and motivation to participate in diabetes self-management. The Health Belief Model, a public health model established in 1950, is an effective tool to utilize when working with health education and an appropriate framework to guide this diabetes management intervention, as many concepts mirror those present in this patient population (Shabibi et al., 2017).

The concept of demographic variables is significant due to the prevalence of diabetes in the Hispanic population, and the age of T2DM onset typically occurs in adulthood. Many of these individuals have already predetermined beliefs about the diagnosis of diabetes based on the experiences of others who suffer from the disease and often verbalize a feeling of hopelessness (Shabibi et al., 2017; Smith-Miller, 2017). Psychological characteristics, such as social pressure,

cultural stigma, and the patient's personality related to confidence in disease management, go hand in hand with genetic and demographic concepts.

The elements of demographics and psychological beliefs in the framework can influence the concept of patient perception of the disease, which, in turn, can either facilitate or inhibit the level of motivation in attempting diabetes management (Shabibi et al., 2017). Many patients do not believe they are susceptible to complications associated with diabetes, while others do not consider the severity of the disease due to the absence of symptoms during the early stages (Smith-Miller et al., 2017). Diabetes education in the clinic setting can provide instruction on these issues and display the benefits associated with maintaining glycemic control. In addition, the clinician must discover and address the perceived barriers that may be discouraging the patient from participating in self-management activities, such as financial strain, lack of social support, limitations in time due to various lifestyle commitments, or peer pressure (Smith-Miller et al., 2017).

To promote success in diabetes self-management, the healthcare provider addressed each area to uncover any underlying concepts that needed clarification or support. Providing effective, culturally appropriate diabetes education facilitated health motivation and led to action (Shabibi et al., 2017; Smith-Miller et al., 2017). As the patient demonstrated active diabetes self-management techniques, the text message communication acted as cues to action, triggered patient actions and decisions, and facilitated change that led to improved treatment outcomes (Shabibi et al., 2017) (see Appendix A).

Significance of the Project

The significance of this project is associated with the prevalence of diabetes in Hispanic patients, the growing Hispanic population in the US, the statistical evidence of morbidity and

mortality associated with poor diabetes management, as well as the associated financial burden experienced by stakeholders at all levels (Dobson et al., 2015; O'Connell & Manson, 2019). For these reasons, healthcare providers must develop efficient, cost-effective interventions that are acceptable for patient use and successfully improve diabetes outcomes. Technological advances in mHealth have provided a wealth of intervention tools for both providers and patients to utilize to support diabetes management (Park, 2016). Unfortunately, local free clinics are not privy to those tools due to limited funding and equipment. In addition, many electronic or cell phone applications, also called apps, and electronic devices, are costly, posing limited healthcare access for those who may be of low socioeconomic status (Garge et al., 2018). Text messaging, however, is an affordable option that is available to most of the US population. Utilizing this cost-effective intervention has proven to (a) facilitate communication, (b) support disease management, (c) empower the patients, (d) enhance the patient-provider relationship, and (e) improve health equity for those diagnosed with diabetes (Cameron et al., 2017; Nelson et al., 2020).

Definitions

Bidirectional text message: Text communication, by phone or hand-held device, permitting sending and receiving messages (Dobson et al., 2017).

Chronic illness: A slow progressing non-communicable disease with long-lasting effects, lasting longer than three months, that cannot be prevented by vaccines or cured by medications (Bernell & Howard, 2016).

Diabetes self-management: Individual's ability to adopt behaviors that monitor and support the management of their diabetes including nutrition and activity to support blood

glucose control, medication compliance, blood glucose monitoring, problem-solving, and recognizing complications (Beck et al., 2017).

Diabetic: An individual diagnosed with diabetes (American Diabetes Association, 2021b).

Low-socioeconomic status: The level of an individual's social and economic status in society often associated with income and level of education (Suwannaphant et al., 2017).

Patient-provider communication: Verbal or written interaction between the healthcare provider and the patient regarding patient health and treatment (Spooner et al., 2016).

Self-management education: Instruction on (a) monitoring, (b) problem solving, (c) complications, (d) nutrition, (e) activity, (f) medication and (g) basic disease pathophysiology (Beck et al., 2017).

Tailored text message: Text communication by phone or hand-held device that occurs during the receiver's preferred time of the day (Dobson et al., 2017).

Text message: Electronic alpha-numeric communication sent and received between cellular phones or hand-held devices (Park, 2016).

Nature, Scope, and Limitation of the Project

The nature of this project was to utilize a cost-effective, widely accepted communication tool to support diabetes management in Hispanic diabetic patients at a free clinic for patients with poor glycemic control. The project design was customized to the clinic patient population to facilitate successful completion and accurate data collection. The nature of the project included information on the scope, limitation, and delimitations, as described below:

- Scope – The project team evaluated the effect of tailored, bidirectional text messages on glycemic control. Inclusion criteria were determined as only Hispanic diabetic patients

between the ages of 18 and 70, who had been seen at La Clinical Guadalupana within the previous twelve months, and who had a HbA1c of 8% or higher. A short diabetes group education session occurred with the participants, in the clinic setting, within the first week of implementation. The following week, the initiation of tailored, bidirectional text messages began and continued throughout the following 12-week period. Glycemic control was measured by comparing the pre-intervention HbA1c, with the post-intervention HbA1c, which was completed during week 12 of the project. Additional inclusion criteria consisted of the participants having access to an electronic device that would send and receive text messages and agreeing to that interaction. Participants were made aware that patient deidentification would occur during the text communication, and a consent was signed accordingly. Finally, the participants were provided with a home blood glucose monitor (an electronic device that measures blood glucose) and demonstrated proper techniques for checking their blood glucose (US Food and Drug Administration, 2019). All data will be collected at the clinic, and the entire project, from implementation to data analysis, was completed within 14 weeks.

- Limitations – Factors that limited the validity of the project were the potential failure of the participant to respond to the messages. Other issues that limited the project's success were participant attrition and failure to obtain the final HbA1c result. The charts of those participating in the project were flagged because there were several volunteer providers at the clinic who served on varying days of the week. Any information regarding diabetes management techniques that contradicted previous instructions was clarified during the text interaction. Finally, although project team members are somewhat fluent in the

Spanish language and translators are readily available at the clinic, it was considered that some information regarding diabetes instruction was lost in the translation process.

- Delimitations – This intervention was not intended to determine if text message communication about diabetes was a preferred method of communication for this patient population. It was simply meant to maintain open communication that supported disease self-management techniques that would improve diabetes outcomes. Since obtaining and maintaining glycemic control is the best way to prevent morbidity, mortality, and financial strain associated with diabetes complications, the project team chose to utilize improvement in glycemic control as an indicator of success (Ausili et al., 2017; Dobson et al., 2015). When determining participant inclusion criteria, it was decided to include only those individuals with a HbA1c of 8% or greater, as research reports that those with a lower HbA1c had minimal improvement in glycemic control with this intervention. In evaluating the effect on glycemic control, the project team considered averaging glucose readings from reported fasting glucose (glucose level obtained after fasting for eight hours) and two-hour postprandial glucose (glucose level obtained two hours after eating), which is the guideline for determining glycemic control, outside of the HbA1c standard (American Diabetes Association, 2021b; Herath et al., 2017). It was determined, however, that variations in participant reporting, the possibility of poor procedure technique, and potential issues with comprehension may skew the findings and alter the validity of the project. Utilizing the HbA1c reading was determined to be a more accurate and evidence-based data tool to evaluate this intervention. Other forms of communication, such as email, or the use of smartphone applications to support diabetes

education, were also considered; however, it was determined that text messaging was a more readily available option for this patient population (The Local Project, 2021).

In addition to the information listed, the clinic has limited financial and personnel resources. The patient records were all kept in hard copy files, and they utilized only paper charting for documentation and scheduling. Reviewing charts and determining historical compliance with follow-up visits and lab results was labor-intensive and time-consuming for the project team. In addition, many patients required additional time with education when they received a new home blood glucose monitor to use during the initiation of the study.

Conclusion

Uncontrolled diabetes in the US is causing both a physical and financial burden on the country (O'Connell & Manson, 2019). The likelihood of developing diabetes is twice as high in individuals of Hispanic origin than in non-Hispanic white individuals. It is anticipated, within the next 10 years, that more than 25% of the US population will be of Hispanic descent (Statistica, 2021; United States Census Bureau, 2020). Many of these individuals experience social and political barriers that lead to disparities in health outcomes. With U.S. healthcare spending at an all-time high, and the prevalence of diabetes causing concern, it is essential to discover cost-effective, successful ways to provide healthcare for this patient population that will help address these issues (Ausili et al., 2017; Dobson et al., 2015). Regular communication between healthcare providers and patients has proven to facilitate high-quality patient care outcomes (Peimani et al., 2018). Text messaging is an inexpensive, widely accepted form of communication that has been sporadically researched to determine its effectiveness and acceptance in disease management (Dobson et al., 2018; Park, 2016). There are gaps in that research regarding the quality and quantity of text communication and its effectiveness in

Hispanic diabetic patients (Dobson et al., 2017). This project sought to determine if tailored, bidirectional text messages to support diabetes education would improve glycemic control in Hispanic patients with a HbA1c greater than 8%.

Chapter 2: Literature Review

Research has determined that Hispanic individuals living in the US experience a higher incidence of T2DM, often accompanied by inadequate levels of glycemic control. Haider et al. (2018) maintain that lifestyle adjustments, and a level of motivation with self-management, are key factors in reducing complications associated with poorly controlled diabetes. Often, diabetes management education, acquired in the clinic setting or classroom, is not supported due to poor access to healthcare associated with varying social variables (Fortmann et al., 2017). Literature has demonstrated that alternative interventions, such as text message communication, have proven to support diabetes self-management and improve glycemic control in these individuals (Greenwood et al., 2017; Wang et al., 2019). Furthermore, research has determined it is a cost-effective, readily available diabetes support intervention, proven to be an acceptable form of healthcare interaction for diabetes management. Gaps in research exist with respect to determining the quality and quantity of messages that support the greatest improvement in glycemic control (Burner et al., 2018; Dobson et al., 2017). Additionally, there is little research available to determine its effectiveness in the Hispanic population.

Conceptual Framework

The Health Belief Model (HBM) is the theoretical framework that guided this project toward understanding the effect of text message communication on glycemic control in Hispanic patients with diabetes (see Appendix A). The major tenets of the HBM are as follows: (a) demographic components (genetic, social, and economic elements that affect disease management), (b) psychological components (attitudes and beliefs about the disease and self-management), (c) perception variables (awareness of susceptibility or severity of the disease, perceived barriers and benefits to disease management), (d) motivation (inspiration to take part

in disease management), (e) action (taking part in disease management), and (f) cues to action (elements to occur to trigger action) (Shabibi et al., 2017). There are several factors that contribute to effective disease self-management and glycemic control in Hispanic patients with diabetes (Yin et al., 2020). This model assists in determining the relationships between basic demographic, psychological, and social elements of an individual or population while factoring in the patient's understanding and perception of various aspects of the disease that may determine motivation and action toward disease management (Shabibi et al., 2017). The intervention in this project, text message communication, supported the individual's action toward disease self-management by serving as the cues to action, the supporting concept in this theoretical framework.

Concepts: Demographic and Psychological

The demographic elements of the HBM are significant in the Hispanic patient population. Literature offers those issues such as genetic influence on the development of diabetes, low levels of health literacy, inadequate economic support, and limited healthcare access can affect levels of motivation that may inhibit individuals from becoming active in disease self-management (Burner et al., 2018; Whittemore et al., 2020; Yin et al., 2020). In addition to demographic concepts in the framework, Whittemore et al. (2020) established those psychological obstacles experienced by many diabetic Hispanic patients, such as fear, tension, and depression, further impede action steps necessary to maintain glycemic control. Support obtained through interaction with healthcare providers and family members has proven to help address these issues (Burner et al., 2018).

Concepts: Perception

Many Hispanic patients diagnosed with diabetes do not recognize a link between lifestyle issues, such as nutrition and activity, and diabetes management (Whittemore et al., 2020). Often, if there are no symptoms associated with poor glycemic control, these individuals do not perceive the severity of diabetes (Garcia, 2019). In addition to perceived severity, the element of perceived susceptibility has also been studied in this patient population and found to be a substantial indicator of action steps toward diabetes self-management (Rochefort, 2020). Literature has provided an individual's perception of barriers to self-management, such as access to care, transportation challenges, economic instability, and lack of social support, have further inhibited success in glycemic control (Yin et al., 2020).

Concepts: Motivation, Action, Cues to Action

Addressing the elements associated with the concept of perception facilitated motivation that led to action. For instance, improving access to care by excluding the need for frequent clinic visits, utilizing diabetes management interventions that are cost-effective, and providing social support required to support self-efficacy in Hispanic patients with diabetes, encouraged motivation to action. Research showed that individuals who actively participate in text message interactions with healthcare providers, serving as HBM cues to action, displayed improved glycemic control and had improved levels of self-efficacy with diabetes self-management (Burner et al., 2018; Fortmann et al., 2017).

Related Studies

To support this project and determine the potential effects of text messaging to promote diabetes education and improve glycemic control in Hispanic patients with uncontrolled diabetes, a thorough review of literature was performed using the PubMed database. The literature search

was initiated by using the medical subject heading (MeSH) term diabetes, and then controlled vocabulary terms were added as follows: type 2 diabetes, text message, glycemic control, and Hispanic. The search term, type 2 diabetes, led to other MeSH terms such as noninsulin-dependent diabetes mellitus, also called NIDDM, and adult-onset diabetes. The term text message resulted in word options that would further refine the search, such as short message service, SMS, and texting. The search provided very few options for the phrase glycemic control, and blood glucose control was the basic alternative term listed. Finally, when searching for varying terms for the word Hispanic, the term Latino was the most appropriate option. Varied combinations of these terms and associated Boolean Operators were utilized to discover the most appropriate literature pertaining to text messaging as an intervention to improve glycemic control in Hispanic diabetic patients.

Text Message, Diabetes Management, and Glycemic Control

The keywords diabetes and text messaging combined yielded 289 studies published within the past five years. Applying filters that provided literature with available abstracts and free full-text studies further refined the search, and the number returned decreased to 78. Searching literature in which these two terms appeared in the title or abstract led to 202 research articles associated with these topics. A filter was applied to include only level 1 research, and systematic reviews, narrowing the search results to 25 studies. To further refine the search, the term control was added, which led to citation matching of three additional studies. Upon further narrowing of the search criteria to include only the MeSH terms yielded no additional results. After reviewing all 28 studies and excluding those elements and populations not associated with this project, this review of research returned six topic-specific, systematic reviews by

Arambepola et al. (2016), Dobson et al. (2017), Greenwood et al. (2017), Haider et al. (2019), Sahin et al. (2019), and Wang et al. (2020).

The systematic reviews obtained in this search discussed randomized controlled trials, in addition to other systematic reviews of the topic variables. All studies reviewed were assessed for heterogenicity and bias, using Funnel plots, as well as Begg and Egger tests. The reviews either utilized the Preferred Reporting Items for Systemic Review and Meta-analysis (PRISMA) or the Assessment of Multiple Systematic Reviews (AMSTAR 2) to determine the quality of the studies being evaluated. Findings concluded that, despite the varying degrees of text message characteristics, glycemic control was improved between 0.1% and 0.8% in patients participating in a text message intervention to support diabetes management. All but two studies focused on T2DM. In Wang et al. (2019), as well as in Greenwood et al. (2017), both Type 1 and type 2 diabetes were included. Both found the change in glycemic control was more pronounced in the T2DM patients than those diagnosed with type 1 diabetes. Upon reviewing the results, it was evident there was a deficiency in the presence of a theoretical framework in most of the studies chosen; however, those studies that did incorporate a theoretical framework utilized the Behavioral Learning Theory, the Transtheoretical Model of Change, the Information and Motivation Behavioral Skills Model, and the Health Belief Model. In addition, most of those studies yielded more substantial findings than those without a theoretical foundation (see Appendix B).

All systematic reviews and meta-analyses discovered in this review of literature displayed findings from a total of 81 randomized controlled trials (RCT) and systematic reviews, with varying quality and quantity of text communication interventions. The findings revealed that text messaging correspondence between the patient and the healthcare provider improved

glycemic control, to varying degrees, depending on the dose of text message delivered. Some reviews discovered that tailored, bidirectional messaging seemed to prompt a larger improvement in HbA1c levels and were preferred by patients during post-intervention surveys; however, some found that unidirectional messages were as effective in those of higher-income status. Many reviewers and researchers expressed the need for future research in this area to determine the dose of text communication that will lead to the most improved patient outcomes.

Text Message, Diabetes Management, and Hispanic Patients

Literature has revealed that text messaging as an intervention is an effective mode of healthcare delivery for the general population; therefore, it is important to establish if research also supports utilizing this intervention to improve glycemic control in Hispanic individuals with diabetes. The same basic literature search was performed, utilizing MeSH suggested variations of the terms type 2 diabetes, text message, with the addition of the MeSH terms Hispanic and/or Latino. Filters for the publishing time frame between 2016 and 2022, as well as available abstract and free full text, remained; however, the filter for systematic reviews was removed, as no results with generated with that criterion. The initial return was seven studies. Of the seven studies, only two studies addressed topics covered in this project, Burner et al. (2018) and Fortmann et al. (2017). A final search was performed to capture additional studies associated with this population by adding the MeSH term low-income, which resulted in one additional study carried out by Whittemore et al. (2020), focusing on Hispanic patients, text intervention, and diabetes management.

All three studies that met the criteria for this project were randomized controlled trials, with populations ranging from n=26 to n=126. Each of the studies was carried out between three and six months and utilized unidirectional text messages to provide diabetes management

support and education. Improvements in HbA1c levels after participating in the text intervention ranged from 1.0%-1.77%, and changes were more statistically significant than those noted in the control groups. All three studies reported a high level of acceptability and satisfaction with this intervention in the Hispanic participants. Each study suggested that future research focus on culturally tailoring the intervention to fit the lifestyle and needs of the individuals. To summarize, all three determined this intervention to be successful in improving glycemic control in Hispanic patients (see Appendix B).

Summary of Review

Based on this review of literature, it can be determined that text messaging to support diabetes control is a successful intervention. After narrowing the literature search to include studies that contained only variables like those present in this project, there were several high-quality research studies evaluated, and all determined that text messaging facilitated improvement in glycemic control for diabetic patients. There were no reports of poor satisfaction ratings in post-intervention surveys, and seven of the nine studies reported high levels of patient satisfaction with this intervention. Seven out of nine reviews also suggested text messages tailored to the patient's lifestyle and preference may further improve participation and outcomes, and more than half of the studies suggested bidirectional messages may be more effective than unidirectional. Finally, one-third of the studies evaluated the utilization of this intervention in Hispanic individuals and determined it is an effective communication tool for improving glycemic control in this population. This project seeks to implement an intervention to improve glycemic control in Hispanic individuals based on findings in this literature review.

Methodological Framework: Plan-Do-Study-Act

This project was carried out by incorporating the four stages of the Plan-Do-Study-Act (PDSA) framework, often utilized in evidence-based practice projects (Chen et al., 2020; Moran et al., 2020). The concept of *plan* focused on the development of a plan or intervention that addressed a practice improvement issue. The *do* portion of the guide was carried out by testing the intervention, accompanied by some data collection and adjustments, prior to full intervention implementation. Analysis of findings was designated as the *study* portion of the framework, and was utilized to determine if changes were necessary. The intervention was fully implemented under the concept of *act* (see Appendix C).

Stage: Plan

At La Clinica Guadalupana, it was necessary to carry out an evidence-based practice project, as HbA1c levels are >8% in two-thirds of the diabetic patient population, despite medication management and brief diabetes education sessions during clinic visits. The current protocol at the clinic was for diabetic patients to travel to a local hospital and attend a diabetes self-management education session. Many patients experienced financial strain caused by lack of transportation, as well as stress related to work absences that were necessary if they chose to attend a formal diabetes education course. Finally, some individuals were forced to decide between purchasing medication for diabetes management or buying food for their families (Fortmann et al., 2017).

Problem

A SWOT analysis was carried out to determine the cause of poor glycemic control in the clinic patients. This framework guided a project or workflow analysis by identifying the strengths (S), weaknesses (W), opportunities (O), and threats (T) that may be present in a process

(Namugenyi et al., 2019). The strengths (S) of the current policy were determined as healthy patient-provider rapport, staff willingness to participate, availability of instrumentation, and the presence of Spanish-speaking clinic employees. Weaknesses (W) were established as the current policy was not appropriate for this patient population, no provider-patient communication between visits, paper charts made it difficult to track, financial challenges with transportation to the education session, cultural beliefs about diabetes, and perceived stigma associated with the diagnosis. The opportunities (O) in this analysis were determined to be the willingness of this population to utilize technology for communication with the clinic, the availability of technology tools, on-site diabetes education, and the opportunity to update clinic policy that will improve patient outcomes. Finally, potential threats (T) were established as organizational culture resistance to change, language barrier, cost of supplies, need for additional staff training, technology breakdown, and potential threats to patient privacy through the text application being utilized for this intervention (see Appendix D). Taking these things into consideration, the goal of this project was to initiate an evidence-based protocol change that would incorporate a tailored, bidirectional text message communication into the treatment plan of patients with a HbA1c >8 %. The intervention would support diabetes education and improve HgbA1c results by 0.75% within 12 weeks of the initial diabetes education session.

Solution

It was necessary to establish workflow and designated assignments that were sustainable for the clinic, to ensure a solution. Current team members responsible for interacting with the patients were the clinic director, an advanced practice nurse (APRN), the clinic nurse, a staff medical assistant, volunteer nursing students, and the two nuns that translated and performed clerical duties. The workflow of the project was adjusted to fit the schedule of clinic team

members. The project team determined that culturally tailored diabetes education at the point of care was a more appropriate measure to enhance knowledge of diabetes management in this patient population. In addition, interactive support of diabetes education occurred, between visits, to improve disease management and glycemic control, which would inhibit the development of complications. Research discovered that text message communication is an effective and acceptable form of healthcare interaction for Hispanic patients that has proven to improve glycemic control. The project plan was to incorporate a brief, evidence-based, culturally tailored diabetes self-management education video for patients to view in the clinic setting, followed by customized, bidirectional, biweekly text messages to reinforce the teaching and offer support in the interim between visits.

Stage: Do

To facilitate this project and potentially eliminate obstacles and barriers that may inhibit success, the project team showed the diabetes educational video to 28 scheduled diabetic patients who agreed to participate in the project. After determining the patient preference of a time for text message receipt, an initial introductory text message was sent, during the visit, to confirm receipt and prompt a response. Any time constraints or process measure adjustments were determined and addressed during this stage.

Stage 3: Study

The major variable being addressed in this project was glycemic improvement in the clinic population with elevated HbA1c levels. Upon completion of the project, each participant received a follow-up HbA1c to determine if the project goal was met. The team compared the post-intervention reading with the pre-intervention, or baseline result, to determine the level of improvement using a paired t-test.

Stage 4: Act

Throughout the intervention, patient-reported data related to disease management, the number of text responses received, inquiries, and affirmations about lifestyle management of diabetes were monitored and documented on an excel spreadsheet. Upon completion of the project, a follow-up HbA1c was performed to determine the effectiveness of the intervention.

Summary

Conceptual frameworks and appropriate methods of quality analysis must be used to support the validity of evidence-based healthcare interventions in the clinical setting. The Health Belief Model was an appropriate framework for this diabetes management project. The Plan-Do-Study-Act method for solving problems, improving processes, and supporting change provided a framework for this intervention implementation and analysis. An analysis of high-quality research also supported the success of this healthcare intervention. Utilizing suggested MeSH terms in varying combinations assisted in the discovery and evaluation of findings that supported text messaging as an intervention to improve glycemic control for those with diabetes. This review of literature demonstrated that text messaging to support diabetes education could improve glycemic control, as evidenced by several Level 1 systematic reviews addressing these variables. There was limited level 1 research, however, to support the use of this intervention in the Hispanic population. In addition, although text message communication has proven to improve glycemic control, gaps in research must be addressed to determine the characteristics, quantity, and frequency of text messages that will yield the highest quality diabetes outcomes.

Chapter 3: Methodology

The aim of this project was to improve glycemic control in Hispanic individuals with uncontrolled diabetes by using tailored, bidirectional text messages to support diabetes education based on the Association of Diabetes Care and Education Specialist curriculum (ADCES7) and the National Standards for Diabetes Self-Management Education and Support (DMSMES) (Beck et al., 2017; Derner et al., 2021) (see Appendix E). Barriers to providing effective diabetes education in this patient population are associated with deficient healthcare access, economic strain, health illiteracy, and cultural perceptions of diabetes (Smith-Miller et al., 2017). Effective patient-provider communication has been successful in offering disease management support to accomplish diabetes treatment goals for Hispanic patients experiencing social determinants of health (Smith-Miller et al., 2017). The purpose of this DNP project was to address those obstacles by evaluating current practice policy, developing an ADCES7 text communication tool (Text Connect), implementing the intervention at the practice site, and evaluating the outcomes by measuring HbA1c results. A degree of improvement in HbA1c was expected in this communication intervention. A review of project design, as well as population sample, project setting, tools and instrumentation, data collection and analysis, and ethical considerations, were discussed.

Project Design

This project was an evidence-based quality improvement intervention, as it sought to incorporate a system change intended to facilitate improvements in healthcare outcomes (Moran et al., 2020). Quality improvement projects focus on target populations and practice specific interventions. The purpose of this project was to incorporate a text message diabetes support intervention based on the evidence-based ADCES7 curriculum that included self-management

support for coping, nutrition, activity, medication management, self-glucose monitoring, risk reduction, and disease problem-solving techniques (Derner et al., 2021; Kolb, 2021). The goal of this evidence-based project was to establish if tailored, bidirectional text message communication between office visits, would effectively support diabetes education and improve HbA1c in Hispanic diabetic patients with poor glycemic control.

Population

The population addressed in this project was diabetic Hispanic patients, at a free clinic, with a HbA1c greater than or equal to 8%. To evaluate the success of this project, data was collected in the form of HbA1c results obtained before the project initiation and again after completion. Data analysis helped determine goal achievement in this intervention.

Framework

The Health Belief Model was used to define variable relationships in this communication intervention, as it utilizes several concepts that affect motivation to participate in disease self-management in this patient population (Shabibi et al., 2017) (see Appendix A). The text intervention addressed the issues in this patient population that align with the concepts in this theoretical model. The PDSA framework was used to guide the planning, implementation, and evaluation of this project (Chen et al., 2020; Moran et al., 2020) (see Appendix C).

Intervention

The ADCES7 education curriculum video, an evidence-based intervention guided diabetes self-management guidelines, was used in the Text Connect intervention. Text Connect incorporated a tailored biweekly text message activity to determine if patient-provider communication will improve glycemic control in diabetic Hispanic patients. It was anticipated the project timeline would extend for twelve weeks, with enrollment and baseline data collection

occurring in the first two weeks and post-intervention data collection occurring during week 12 (see Appendix F). Two weeks prior to implementation, the procedure for the text activity was reviewed and approved by both the clinic director and a subject matter expert (SME). This intervention was established based on project site documentation of substandard glycemic control in the Hispanic patients at the clinic and scientific evidence that diabetes self-management education, supported by text communication, would improve glycemic control (Dobson et al., 2017).

During week one, chart audits were completed, and potential participants were contacted, with a goal of enrolling 40 participants in the Text Connect project (see Appendix G). Actual enrollment was 28 participants, allowing for very little attrition to ensure statistical significance. During week two of implementation, participants who agreed to participate were informed of the program details in Spanish and signed the informed consent, which was also provided in Spanish (see Appendix H). Baseline data were obtained, including vital signs, med reconciliation, and HbA1c. The ADCES7 education video was viewed by participants, and a single text message was sent to ensure there are no technological issues. Participant preference of time of text receipt was established and documented. Beginning week three and extending through week 11, tailored text messages were carried out, self-blood glucose readings were reported, and reinforcement of topic areas covered in the ADCES7 education session occurred (see Appendix F).

Week 12 was comprised of post-intervention data collection of HbA1c. All results were documented on an excel spreadsheet, saved on a secure hard drive, and stored in a locked cabinet at the clinic in the reception area. Within one week of intervention completion, all data was compiled and sent to a statistician, and final data analysis and outcome determination was

completed within two weeks after completion of the intervention. All project findings and outcomes were presented to the clinic director and staff during week 14.

Sample and Setting

The population for this project was Hispanic patients at a free medical clinic with uncontrolled diabetes. Inclusion criteria were determined as only Hispanic patients, between the ages of 18-70, who had been seen in the clinic since January 2021, with the most recent HbA1c result of greater than or equal to 8%. Exclusion criteria were established as any individual that was not Hispanic, had HbA1c less than 8%, did not fall within the age range, and had not been seen at the clinic since January 2021. A total of 252 charts were reviewed, and by utilizing inclusion and exclusion criteria, the number of potential participants was narrowed based on inclusion criteria. Potential participants were contacted, with an enrollment goal of 40 participants, to achieve a power of 0.80 and a confidence level of 95% ($p < 0.5$), allowing for 20% attrition (Mateo & Foreman, 2014). Only 28 individuals met inclusion criteria and agreed to participate, allowing for very little attrition.

Direct Care Staff

Direct care staff at the project site was comprised of advanced practice registered nurses (APRN), licensed practical nurses (LPN), medical assistants (MA), and nursing students. For regular office visits, the LPNs, MAs, and nursing students were responsible for obtaining chief complaints during visits, performing medication reconciliation, and obtaining objective findings such as vital signs and any ordered lab work. The full-time APRN and volunteer physicians were responsible for determining the effectiveness of disease treatment by evaluating lab results. The clinic director, an APRN, as well as one LPN and one MA, were the only full-time employees at the clinic. Volunteer providers filled in, as needed, to provide necessary care to the clinic

patients. The DNP project leader received approval to carry out the project at this site and led all data collection and diabetes education during the initiation and completion of the intervention (see Appendix I).

LPNs, MAs, and Student Nurses

In implementing this project, both full-time and volunteer LPNs, and MAs, as well as nursing students, performed regular intake and triage information upon arrival to the clinic. After data was collected, these individuals were instructed to direct those diabetic patients falling under the inclusion criteria to a meeting room for diabetes education, discussing self-management concepts included in the ADCES7 curriculum. The DNP project leader was responsible for sending pre-determined follow-up text messages to support the information provided in a short educational video and report responses to the APRN for follow-up.

Advanced Practice Nurses

Both the full-time APRN, as well as volunteer APRNs, were responsible for evaluating treatment plan effectiveness and adjusting medication, if necessary, during regularly scheduled visits. Also, they answered any questions the participants had about information obtained in the diabetes education session at the initiation of the project. These individuals also responded to patient reports of abnormal blood sugar results or symptoms that could not be addressed through the text intervention.

Setting

The project site was a free medical clinic. La Clinica Guadalupana is a small, non-profit Catholic charity clinic located in Clearwater, Florida, serving nearly 500 uninsured patients. Most of those patients, approximately 99%, are Hispanic in origin, with the remaining 1% being uninsured non-Hispanic Americans or Turks. The clinic is currently staffed by volunteer

providers and healthcare students, in addition to one full-time nurse practitioner, one LPN, and two Catholic nuns.

Stakeholders

It is important to identify individuals, or key stakeholders, who played a part in the project, as they could potentially be affected the outcomes of the project (Moran et al., 2020). Stakeholders are those who may have an interest in project implementation and outcomes. The clinic director, clinic staff, the Catholic diocese, and BayCare Hospital's diabetes education program were affected by this DNP project, as they are all responsible for diabetes outcomes in this patient population.

Chart Audits

The DNP project leader carried out chart audits to determine inclusion criteria. Based on reports from the clinic director regarding the high number of patients with suboptimal glycemic control, chart audits occurred on the 252 diabetes patient charts. All clinic visit notes were kept on paper, and there was no electronic medical record (EMR) platform at the clinic. All patient documentation was kept in the reception area, which was only accessible to clinic staff and locked when the clinic was closed to maintain privacy. The clinic director allowed the DNP project leader full access to patient charts. A short chart audit checklist was used to determine inclusion and exclusion criteria and to obtain patient contact information (see Appendix G). After the audit, the charts and audit checklist were replaced and locked in the storage area, as described.

Recruitment Methods

All patients falling under the inclusion criteria were approached by phone, and the project was explained to each potential participant, offering the opportunity to opt out if they chose. An

overview of the ADCES7 topic areas was discussed and details of the tailored text message intervention to support their diabetes self-management and potentially improve diabetes outcomes were provided (Dobson et al., 2017; Derner et al., 2021). The patients were informed that a $20 gas card would be provided to reimburse them for travel to the clinic for pre- and post-intervention clinic visits. When the patients agreed to participate, a clinic visit was scheduled for the first week of project implementation.

Instrumentation

ADCES Education Session

The purpose of this ADCES7-based video education session was to provide basic diabetes self-management education in the clinic setting (Derner et al., 2021; Kolb, 2021). The Spanish version of this curriculum was used for this 15-minute educational video, constructed by the DNP student (Gupta et al., 2020). It took approximately two hours to prepare the video. Should an information technology professional construct this, the cost would be approximately $100/hour. Participation in this session in the clinic setting during a scheduled visit helped alleviate transportation and economic conditions that may inhibit patients from participating in diabetes education at BayCare Hospital. This evidence-based diabetes educational curriculum was centered around the DMSMES guidelines. The video content and the content of follow-up text messages were approved by the clinic director and a Spanish language instructor.

Text Connect Activity

The purpose of this ADCES7-based text communication was to support information obtained during the video education session between clinic visits. The bidirectional culturally and informationally approved text messages occurred biweekly, on Mondays and Thursdays, for 11 weeks and were tailored to the patient's preferred time of the day. The content of the messages

reviewed information obtained in the video education session, inquired about nutritional changes, activity levels, and blood glucose levels, and provided medication reminders, problem-solving guidance, and diabetes self-management encouragement (see Appendix J).

WhatsApp Platform

Communication occurred by utilizing the WhatsApp technology platform, as it is free to the patients and is compatible with international mobile data plans (Boulos et al., 2016). The texts were sent from a password-protected laptop computer, and the messages were deleted each day after data collection is complete. The participants were informed that the text messages would be sent under the name Conectar (Spanish for Connect), not to be associated with a healthcare facility. No names or identifying elements were included in the messages. The clinic director reported that all clinic patients had the app on their phones, making this tool readily available and free to participants. There were no elements of the application that support confidentiality; however, de-identifying the patient and the clinic and deleting the messages after text interaction helped maintain patient privacy.

ReliOn Confirm (Micro) Blood Glucose Monitor

Each patient was provided a ReliOn Confirm home blood glucose monitor and supplies to perform self-blood glucose testing that coincided with ADCES7 education. The monitors were provided, free of charge, through private donations. The cost of this monitor was $14.98, and 100 test strips were $9.00. This monitor has been tested for validity and was found to be 97% accurate in comparison to serum blood draw (Klonoff et al., 2018).

A1C Now Hemoglobin A1c Monitor

The pre-and post-intervention HbA1c results were obtained using the A1C Now point of care HbA1c monitor, which was provided by anonymous donation. It has been tested and

displays 100% accuracy when compared to venipuncture serum analysis of HbA1c collected in a lab (Szablowski et al., 2018). This monitor is Clinical Laboratory Improvement Amendment (CLIA) waived, meaning the device has been approved for use at the point of care, and regulatory oversight has not been deemed necessary (Centers for Disease Control and Prevention, 2021).

Data Collection

The participants were assigned a specific number to de-identify them during the intervention and data analysis. Data collection was completed by documenting participation in the ADCES7 educational video session. The pre-and post-intervention HbA1c results were documented as well. Notations regarding text responses from participants were documented throughout the intervention. All data was kept on an excel spreadsheet, in addition to confirmation of text interaction two times per week. This information was stored on a secure hard drive, and after analysis, the data was transferred to the statistician for verification upon completion of the intervention. The hard drive was cleared and destroyed after project completion and dissemination. Statistics Solutions was used to verify the data analysis and was only provided raw data that was devoid of any identifying information. Statistical Package for the Social Sciences (SPSS) Statistics Version 25 was used to analyze and display findings (Statistical Solutions, 2021).

Data Analysis Methods

The results obtained from the pre-and post-intervention HbA1c were collected by the DNP student and analyzed. Descriptive statistics displayed the significance of this intervention by comparing baseline and post-intervention HbA1c results and providing descriptive data on glycemic control results. A paired t-test was carried out to compare the pre-and post-intervention

HbA1c readings, using a significance level of p=0.05. It was assumed that the Text Connect intervention, supporting ADCES7 education, would improve glycemic control for diabetic Hispanic patients in this free medical clinic by at least 0.75% (Mateo & Foreman, 2014). The analysis compared HbA1c baseline readings obtained before the Text Connect intervention (independent variable) to the HbA1c readings after the intervention (dependent variable).

Data Management Methods

Documentation regarding completion of the educational session, pre-intervention HbA1c results, and monitoring of text message response were kept on an excel spreadsheet deemed the communication log throughout the intervention (see Appendix J). Participants were de-identified for documentation purposes, as well as during text communication throughout the project. Paper charts of those participating in the project were flagged with a sticker to set them apart from other patient charts. The charts were then stored in a separate locked file cabinet, which was approved by the clinic director. The chart audit tool was documented on a password-protected laptop computer, transferred to a secure hard drive, and stored in the locked file cabinet. The file cabinet was in the reception area authorized for clinic staff use, as well as the DNP project leader, and was secured when the clinic was closed. When the project dissemination is complete, the content of the hard drive will be cleared, and the device will be destroyed.

Ethical Consideration

As in research, it is important to protect the rights of any human subject participating in DNP projects. The Institutional Review Board (IRB) at Aspen University established this project was an expedited review, as it involved direct patient contact, but the potential harm did not exceed the care that would be experienced during ordinary care for diabetes management (Mateo & Foreman, 2014) (See Appendix K). This project was deemed to be one of minimal risk to

participants, and the probability or magnitude of harm or discomfort anticipated during this project would not be greater than any ordinarily encountered in daily life or during the performance of routine physical or psychological examinations or tests. Project initiation commenced when approval was obtained from Aspen University IRB since this clinic did not have an IRB. Project approval at the clinic was obtained from the director in writing (see Appendix I).

The project description was explained to each patient, and informed consent was signed by those participating in the project. This evidence-based quality improvement practice change was to improve patient outcomes at the clinic; therefore, the staff, both employed and volunteer members, were mandated to participate in implementation by providing the ADSES7 curriculum-based video and obtaining objective data, as indicated. The staff was not compensated for participating in this intervention; however, the patients were given a $20 gas card, established as reimbursement for travel to the clinic to collect pre- and post-intervention data. A summary of the proposed budget can be found in Appendix L.

Internal and External Validity

This DNP project encountered various threats to validity, both internal and external in nature. Potential internal validity threats included attrition and testing bias (Mateo & Foreman, 2014). The anticipated sample size was small and allowed for 0% to maintain the sought-after confidence interval of 95%. Selection bias was a threat, as the review of literature determined that those individuals with higher HbA1c levels were more responsive to this intervention. Testing bias may have occurred, as those participating in this study may have reported disease management data in the text message responses, they felt the project team might have been seeking, even though it may not be accurate.

External validity may have been threatened by population validity and possible selection bias (Mateo & Foreman, 2014). For example, it was difficult to apply the results of this project to varying individuals or populations, as this project addressed social elements that affected this population's health. Applying this to Hispanic individuals in alternative settings, insured individuals, or those who may not be experiencing social restraints may not render the same results. Selection bias may threaten external validity since the selection of individuals for this project was based on the presence of a HbA1c of 8% or higher. Including all individuals with elevated HbA1c may have added to the level of external validity and generalizability.

Conclusion

This evidence-based QI project determined the effectiveness of a text message communication intervention, Text Connect, and how it supported diabetes education and improved glycemic control in Hispanic patients. The DNP project leader used the Health Belief Model and the PDSA framework to guide the intervention. The clinic staff, both volunteers and employees, facilitated this project by collecting data, ensuring the educational video is observed, and answering patient questions. Chart audits occurred to construct a list of potential participants who were recruited based on predetermined inclusion criteria. The tools utilized to carry out this intervention and facilitate data collection include an ADSES7 video education session, Text Connect interactive communication, the A1C Now monitor, ReliOn self-glucose monitor, a cell phone, and the WhatsApp texting platform. Informed consent was provided and signed, and participants were de-identified throughout the intervention The Text Connect intervention consisted of tailored bidirectional, biweekly text messages to support the education received in the clinic. Baseline HbA1c results were compared to post-intervention results after participation in Text Connect. Data collected for the project was stored on secure devices and destroyed post-

intervention. Results were calculated and analyzed by the DNP student and verified by statistics professionals to determine if glycemic improvement occurred.

Chapter 4: Results and Discussion of Findings

This project focused on utilizing text messaging communication to support diabetes education and improve glycemic control in Hispanic individuals with uncontrolled diabetes affected by social determinants of health (Smith-Miller et al., 2017). The intervention sought to provide patient-provider communication between clinic visits to allow for feedback and encouragement supporting the evidence-based diabetes education information received in the clinic setting (Beck et al., 2017; Derner et al., 2021).

Summary of Methodology

The PDSA framework was used for project planning, implementation, and evaluation (Chen et al., 2020; Moran et al., 2020) (see Appendix C). The Health Belief Model was used to guide the intervention, as sociodemographic elements and participant perceptions of diabetes and the ability to manage the disease were identified as factors affecting diabetes outcomes (Shabibi et al., 2017) (see Appendix A). ADCES7 diabetes self-management education was provided in the clinic setting, followed by bi-weekly, bidirectional text messages using WhatsApp, a free encrypted texting application (Beck et al., 2017; Boulos et al., 2016; Derner et al., 2021) (see Appendix E). Bidirectional messages allowed participants to provide glucose readings and ask questions regarding self-management of diabetes (See Appendix J). The pre-and post-intervention HbA1c was documented on an excel spreadsheet, transferred to a password secure hard drive, and stored in a locked cabinet at the clinic.

Summary of Sample and Setting Characteristics

Sample

The project team carried out a chart review to determine an appropriate sample population to achieve a power of 0.80 and a confidence level of 95% (p=0.5). Only 28 individuals agreed to

participate and met inclusion criteria, 46% male and 54% female, which was significantly less than the goal of 40 participants set forth upon initiation of the project. There was 3.57% attrition, as one participant was out of the country and could not return for final data collection. The sample population for this project was Hispanic patients at a free clinic between 18 and 70 years old. The participants all had a HbA1c greater than 8% and had attended a primary care visit between January 2021 and the start of project implementation on March 7, 2022. All individuals took at least one oral hypoglycemic medication, and one was on insulin. There were no medication changes during the project intervention. All individuals came to a clinic appointment, signed the informed consent, viewed the educational video, and received ADCES7 topic flyers about exercise, diet, and medication at that time.

Setting

The clinic visit occurred at La Clinica Guadalupana, a free, non-profit, Catholic charity clinic in Clearwater, Florida. Throughout the 12 weeks following the clinic visit, the participants interacted with biweekly text messages through the WhatsApp platform during everyday activities outside of the clinic setting. The patients visited the clinic twice during the duration of the project. The initial visit to establish a pre-intervention HbA1c, and a final clinic visit occurred during week 13 to collect the post-intervention HbA1c.

Summary of Results

A literature review determined that text messaging has been a successful, well-received intervention to support diabetes management; however, there was very little literature focused on Hispanic individuals diagnosed with diabetes (See Appendix B). Many studies suggested that tailored text messages may provoke a better outcome, and bidirectional messages may be more effective than unidirectional. These suggestions were incorporated into this project.

Results

The intervention lasted 12 weeks, and 28 individuals participated in the text intervention, however, one participant was out of the country and failed to return for the post-intervention HbA1c. A pre-and post-intervention HbA1c result was collected and analyzed using SPSS. A statistician reviewed the results for final analysis and approval. The lowest HbA1c in the sample population was 8%, and the highest result was 13%. As shown in Table 1, the average or mean pre-intervention HbA1c result for the 28 participants was 9.9593%, with a standard deviation (SD) of 1.76052 and a standard mean error (SEM) of .33881. The mean post-intervention HbA1c result for the sample size of 27 was 9.1%, with a SD of 2.3661 and a SEM of .45536. The SD results inform the degree of data dispersion from the mean. The SEM displays the accuracy of the sample HbA1c distribution for each variable (Witte & Witte, 2017). The SD as well as the SEM for the individual sample analysis were acceptable and support the validity of the findings.

Table 1

Paired Sample Statistics

Variables	Mean	N	SD	SEM
Pre-intervention Hemoglobin A1c	9.9593	28	1.76052	.33881
Post-intervention Hemoglobin A1c	9.1000	27	2.3661	.45536

Note. Statistical Package for Social Sciences (SPSS) visual display of mean HbA1c, standard deviation, and standard mean error between pre-intervention HbA1c and post-intervention HbA1c.

Table 2 displays the results of a descriptive statistical analysis using a paired *t*-test. The analysis confirms a text intervention to support diabetes education between clinic visits for this

sample population improved glycemic control by 0.85926 %, with a low probability (p<.001) this HbA1c improvement would occur by chance (Witte & Witte, 2017). The SD in the comparison analysis was 1.79899, and the SEM was calculated to 0.34622. Both were acceptable and support the validity that this text intervention improved HbA1c levels in the project sample (Witte & Witte, 2017). The results were measured using a 95% confidence interval (CI) and both the lower and upper differences, .14760 and 1.57091 respectfully, indicated a high level of confidence this intervention produced an improvement in the mean HbA1c (Witte & Witte, 2017). Another descriptive statistic confirming the success of this intervention is the *t*-value. *T*-value results greater than two indicate a significant difference between variables (Witte & Witte, 2017). Table 2 displays a *t*-value for this intervention of 2.482. Finally, the degrees of freedom (*df*), or the highest number of independent values or variables that may vary in the analysis, essentially matches the sample size, further adding to the validity of these results (Witte & Witte, 2017).

Table 2

Paired Samples t-test Comparison Pre- and Post-intervention HbA1c Results

Mean	SD	SEM	95% CI Differences Lower	95% CI Differences Upper	*t*-value	*df*	Probability (p-value)
.85926	1.79899	.34622	.14760	1.57091	2.482	26	<.001

Note. Statistical Package for Social Sciences(SPSS) visual display of descriptive statistics revealing change in the mean HbA1c after the 27 participants completed a 12-week text intervention.

Theoretical Framework

An analysis of findings in this project supports the Health Belief Model idea that alleviating *perceived barriers and beliefs* about diabetes management will lead to *motivation* in disease management and improvement in diabetes outcomes (See Appendix A). Maintaining bidirectional communication served as the *cue to action* in addressing demographic concepts such as economic and social elements that often prevent appropriate diabetes follow-up (Shabibi et al., 2017). Encouragement and empowerment received through text messages triggered *motivation* toward lifestyle change that improved glycemic control.

Contributions to Scientific Body of Knowledge

As healthcare spending on diabetes and associated complications in the United States is exponential, the success of interventions such as this offers a potential treatment option for use in diabetes management (O'Connell & Manson, 2019). Hispanic diabetic patients have a higher incidence of poor diabetes control associated with social issues (Rotberg et al., 2015). There is little research addressing treatment options that are affordable, acceptable, and successful for this group of individuals. In addition, all literature posed questions regarding the need to determine the most effective quality and quantity of text messages for an intervention (See Appendix B). The findings in this project contribute to the scientific body of knowledge by providing data concerning the quality and amount of text messages that lead to improved glycemic control in Hispanic diabetic patients. The results support that tailored bidirectional text communication between clinic visits can improve glycemic control in these individuals.

Implications for Nursing Practice

This intervention differs from other DNP projects because it focuses on addressing uncontrolled diabetes by text intervention in Hispanic patients experiencing social determinants

of health. The texting platform used for this intervention was not only free but was end-to-end encrypted, supporting confidentiality and privacy (Boulos et al., 2016). This text platform was able to support diabetes education and provide encouragement with diabetes self-management at a predetermined time of the day, alleviating interruption in work schedules and the cost of transportation to the clinic or other diabetes education classes for questions or concerns. The results of this project support the effectiveness of this intervention. Primary care practices could use this intervention to support diabetes management for those individuals experiencing social hindrances that have affected health outcomes.

Conclusion

This project focused on utilizing text messaging communication to support diabetes education and improve glycemic control in Hispanic individuals with uncontrolled diabetes affected by social determinants of health (Smith-Miller et al., 2017). A review of the literature suggested this type of intervention has proven successful but indicated the need to determine an appropriate quality and quantity of messages that will improve diabetes outcomes (See Appendix B). The PICOT question posed during the initiation of the project sought to discover if adult Hispanic diabetic patients with poor glycemic control (P) who utilized mHealth text message communication (I), rather than current communication practices (C), would demonstrate improved glycemic control (O) within twelve weeks (T). The project results confirmed this tailored bidirectional text messaging was successful in improving the mean glycemic control in this sample population. Based on this knowledge, health care providers may consider using this intervention to address uncontrolled diabetes for Hispanic patients in practice.

Chapter Five: Discussions and Conclusions

This project determined that tailored bidirectional text messages would improve glycemic control in Hispanic patients with uncontrolled diabetes. For this intervention, an educational video based on the ADCES7 guidelines was provided to participants (See Appendix E). For 12 weeks, bidirectional text messages were sent twice weekly at the participant's preferred time of the day, providing encouragement, and supporting the educational information received during the initial clinic visit. A pre-and post-intervention HbA1c was collected and compared using a paired *t*-test, revealing improved glycemic control for the group. Based on the data analysis, tailored bidirectional text messages improved glycemic control in this sample of Hispanic individuals with uncontrolled diabetes.

This project tested an intervention that could be used in practice to improve glycemic control. Healthcare providers can review the findings of this project and be aware that this text intervention is an affordable and acceptable way to assist patients in diabetes self-management and improve disease outcomes. As the incidence of diabetes and the cost of diabetes management continues to grow, future research should focus on other patient populations that may benefit from this intervention. The quality and quantity of text messages sent were appropriate for this sample population; however, those with varying lifestyles and economic status may prefer an alternative number or frequency of text messages. In addition, future research could assess the degree of bidirectional text interaction and its relationship to the degree of glycemic change. Finally, subsequent research on this topic could evaluate how participant age or gender affects glycemic control when using text messaging as an intervention for diabetes management.

Discussion of Findings and Best Practices

This project focused on text messaging as a method of communication to support diabetes education and self-management in Hispanic individuals with uncontrolled diabetes who experience social variables that have affected their health. The literature review encouraged this project because little research focused on text messaging for diabetes management in Hispanic patients. Furthermore, the suggestions for future research recommended evaluating the effectiveness of bidirectional messages tailored to the participant's preference (See Appendix B).

When determining the necessity and appropriateness of this project, the team discovered the clinic did not communicate with patients between clinic visits to support diabetes education received during clinic visits. Often, the clinic patients canceled appointments due to socioeconomic issues resulting in suboptimal follow-up for patients with uncontrolled diabetes. This project set out to improve healthcare access by using a 12-week text intervention to open the lines of communication between the healthcare provider and the patient between clinic visits. The intervention provided information and encouragement for diabetes self-management that improved glycemic control for the sample population. The educational video provided during the clinic visit and the bidirectional text communication addressed limitations in healthcare access and socioeconomic barriers to care that are present in the Health Belief Model (Shabibi et al., 2017; Weaver et al., 2017). In addition, this theoretical framework guided the project by allowing the text intervention to address health perceptions and beliefs that were hindering the participant's motivation to participate in diabetes self-management (See Appendix A).

Implications for Practice

It is essential for nurses caring for Hispanic patients with uncontrolled diabetes to consider this intervention as a possible solution to improving glycemic control. As the incidence

of diabetes continues to grow, an efficient, cost-effective intervention such as this is a valuable tool to improve disease outcomes, reduce complications, and address healthcare costs associated with diabetes. In addition, as diabetes is known to carry a stigma and is often seen as a death sentence in this population, experiencing empowerment and the ability to successfully self-manage this disease could help minimize future complications and alter the perception of future generations (Cameron et al., 2017). Research has determined that even a 1% reduction in HbA1c can significantly reduce both microvascular and macrovascular complications associated with poor glycemic control and maintaining a HbA1c of 7% or less can add up to 3 ½ years to one's life (Kianmehr et al., 2022; Sinha & Ghosal, 2021). By implementing this project, we improved glycemic control in this patient population by 0.8562%.

Implementing this intervention in the primary care practice setting for diabetes is a straightforward process. When considering patients who may benefit from this intervention, the literature suggests improvement in glycemic control is less significant in those with HbA1c of less than 8%. Many of these individuals have some knowledge about diabetes management and are compliant with treatment plans and diabetes self-management. Implementing this intervention in practice would require performing a baseline HbA1c to determine the current level of glycemic control. Should the patient meet the criteria for the intervention, an interview would determine the text timing and frequency that works with the patient's lifestyle. Finally, the patient and provider must agree on the text platform utilized for the intervention. It is important to note the scalability of this intervention is questionable, as it was carried out in a small free clinic, under controlled conditions, with only 27 participants. In addition, the communication occurred twice a week and was tailored to the participant's preferred time of the day. Health care

providers must consider the time and effort required for this intervention if scaling to a larger patient population and expecting results such as those obtained in this project (Milat et al., 2020).

Plan for Dissemination

A dissemination plan for the findings of this project could occur through multiple channels. Initially, the content of this manuscript will be condensed and adjusted to meet the publication criteria for a journal article. Publication in diabetes or endocrinology journals, specifically open access journals, will better disseminate the findings and offer a possible solution for healthcare providers looking to improve diabetes outcomes for their patients. Dissemination may also occur through poster presentations, as this is a condensed method of displaying ways this intervention improved diabetes outcomes and should be considered for use in practice (Bradshaw & Vitale, 2021; Edwards, 2015). Finally, podium presentations offer an in-depth presentation of the findings and allow for questions and answers that provide clarity that could facilitate the use of this intervention in practice (Bradshaw & Vitale, 2021; Edwards, 2015).

Sustaining Change

The financial burden of this intervention is minimal if the WhatsApp texting platform is used to communicate with the patients. To sustain this process at La Clinica Guadalupana and any clinic choosing to implement this intervention into practice, the program director must develop a schedule for text communication. Medical personnel must be available to text during the time and day agreed upon by the patient and provider to answer potential questions related to the medical management of diabetes. The project coordinator must establish admission guidelines to determine which patients qualify and are appropriate for the program. In addition, they must determine the duration and criteria for individual completion of the program. Clinics

choosing to implement this intervention may choose another technology platform for text communication if the WhatsApp platform is not readily available.

Recommendations for Future Projects and Practice

Future projects in this area should focus on evaluating the effectiveness of this intervention for diabetes management in non-Hispanic patient populations. This intervention could be examined for use with other chronic disease processes, as well. This project did not consider variables such as evaluating comparisons in glycemic control between those patients who were prescribed insulin versus those taking only oral hypoglycemic medications. Furthermore, future research could focus on the degree of bidirectional text response compared to the extent of glycemic change. Another consideration for future research is an exploration of the scalability of this intervention. Should this treatment option be studied on larger, more diverse populations and in varied healthcare settings, it could be a significant asset for improving diabetes outcomes on a larger scale (Milat et al., 2020). Finally, the WhatsApp platform was utilized for this intervention. It is free and provides some security due to its end-to-end encryption. Nursing informatics researchers could focus on developing a free, more secure texting platform for patients and providers to use for disease management support to improve outcomes.

DNP Essentials

The DNP Essentials were established as an educational guide for doctoral education. It is important for nursing students to focus on addressing these essentials during their doctoral education (Zaccagnini & Pechacek, 2021). All eight essentials were addressed in this DNP project. DNP Essential I, a focus on scientific underpinnings, was displayed by incorporating evidence-based guidelines for diabetes management to evaluate the effectiveness of this project

and diabetes education throughout the text intervention. In addition, research has proven that patient-provider communication is essential in achieving high-quality patient outcomes. Text messaging to improve diabetes outcomes has been evaluated in research and proven to be a successful intervention for diabetes management. DNP Essential II, centered around leadership for quality improvement, was addressed by assessing the current clinic organizational process to determine the most effective way to address the breakdown causing poor diabetes outcomes. Patient safety and disease outcomes were improved through this process by utilizing a cost-effective technology tool. DNP Essential III, a focus on clinical leadership and analytical methods for evidence-based practice, was carried out as data analysis, and a paired *t*-test was used to clearly display the effectiveness of this text intervention in improving diabetes outcomes in this sample population. The results of this project can be evaluated and contribute to the body of knowledge focused on the utilization of technology to improve disease management. DNP Essential IV, which centers around information systems/technology in transforming health care, was addressed by using a cost-effective technology communication platform to support diabetes education, provide encouragement, and improve diabetes outcomes. DNP Essential V, addressing health care policy for advocacy in health care, was met by analyzing the health disparities present in this patient population and advocating for an intervention in the organization that addressed social determinants of health to improve diabetes outcomes for the sample population. DNP Essential VI, focusing on interpersonal collaboration for improving patient and population health outcomes, was achieved through collaboration with clinic staff to ensure appropriate follow-up was scheduled. Also, collaboration with translators facilitated communication for those who did not speak English and with the volunteer providers to develop diabetes treatment plans for the project participants. DNP Essential VII, concerning clinical

prevention and population health for improving the nation's health, was displayed in this project as we discovered this text communication as a successful intervention for diabetes outcome improvement in Hispanic individuals with uncontrolled diabetes who experience social variables that affect their health. This intervention supported diabetes self-management that will, in turn, prevent complications associated with uncontrolled diabetes. Finally, DNP Essential VIII, regarding advanced nursing practice, was met by facilitating patient-provider communication and using evidence-based guidelines to monitor and support diabetes self-management through a text message intervention, which improves the sample population's health outcomes.

Conclusion

This DNP project sought to improve glycemic control for Hispanic individuals, between the ages of 18 and 70, with HbA1c 8% or greater, using text messages for diabetes support and encouragement between office visits. The intervention was carried out in a Catholic charity clinic in Clearwater, Florida. The Health Belief Model was used to guide this intervention as demographic, socioeconomic, and psychologic factors contributed to altered beliefs and perceptions about diabetes, thus inhibiting motivation for self-care. The stages of Plan-Do-Study-Act were used as a methodological framework to direct the intervention steps. After a short diabetes education session, the participants were provided with biweekly, bidirectional text messages tailored to their preferred time of the day that supported diabetes self-care. This intervention improved patient-provider communication addressed social determinants of health, and improved healthcare access. A paired *t*-test comparing pre-and post-intervention HbA1c levels revealed that the text intervention improved glycemic control in this sample population, confirming this intervention was successful in improving diabetes outcomes.

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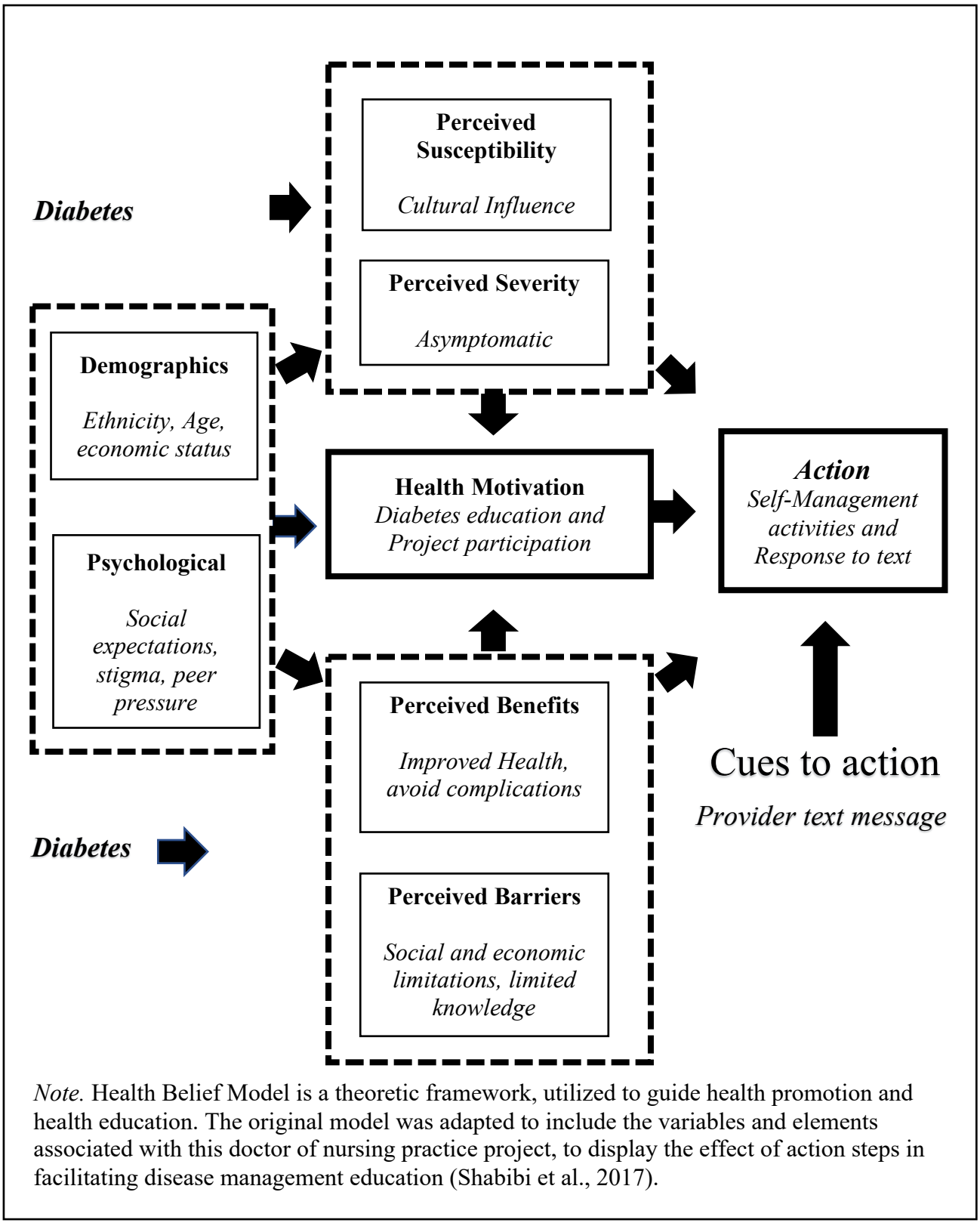
Appendix A

Health Belief Model



Note. Health Belief Model is a theoretic framework, utilized to guide health promotion and health education. The original model was adapted to include the variables and elements associated with this doctor of nursing practice project, to display the effect of action steps in facilitating disease management education (Shabibi et al., 2017).

Appendix B

Table of Evidence for Review of Literature-Text message and Diabetes Management

Citation	Conceptual Framework/ Purpose	Design/ Method	Sample	Intervention/ Comparison	Outcomes	Usefulness in Practice
Arambepola, P., Ricci-Cabello, I., Manikavasagam, P., Roberts, N., French, D., & Farmer, A. (2016). The impact of automated brief messages promoting lifestyle changes delivered via mobile devices to people with type 2 diabetes: A systematic literature review and meta-analysis of controlled trials. *Journal of Medical Internet Research, 18*(4), e86.https://doi.org/10.2196/jmir.5425	Behavioral Learning Theory, Trans-theoretical Model of Change, Information and Motivation Behavioral Skills Model	Level 1 SR and MA of RCT	n=15 RCT performed in low-, middle-, and high-income countries, participants were ≥18y, brief messaging systems were used	Systematic review of 15 RCT that studied a text message intervention to support lifestyle change when compared to usual care. IG: 9 studies utilized unidirectional text messages; 6 studies utilized bidirectional, tailored text messages CG: Usual diabetes management care	• In the meta-analysis, HbA1C decreased 0.53% with a 95% CI, p=<0.001, in the IG when compared to the CG. • There were not significant variations in results between unidirectional and bidirectional messaging • Low-income countries had more significant improvements in glycemic control. • Patient acceptability-high	• Text message to support lifestyle change improves glycemic control • Little difference was noted to reveal differences between unidirectional and bidirectional messages in outcomes • Low-income countries had more pronounced improvements in glycemic control, indicating potential value for those of low socioeconomic status • Acceptability may lead to ease of implementation in practice

Burner, E., Lam, C., DeRoss, R., Kagawa-Singer, M., Menchine, M., & Arora, S. (2018). Using mobile health to improve social support for low-income Latino patients with diabetes: A mixed-methods analysis of the feasibility Trial of TexT-Med+FANS. *Diabetes Technology & Therapeutics, 20*(1), 39-47. https://doi.org/10.1089/dia.2017.0198	NR	Level 2 Parallel, nonblind, random-ized feasibility trial carried out for three months	n-44 (n=22 per arm) Attrition n=5 Emergency room patients with diabetes, Latino, low-income, HbA1c ≥ 8%, from Los Angeles County, California	IG: Unidirectional diabetes management education, motivation, reminders, and trivia, 2 times daily (TExT-MED curriculum) Family and friends were included in the intervention, receiving the same information above under the Family and Friends network support (FANS) CG: No text messages, but diabetes management education provided in a pamphlet. Post intervention Diabetes self-efficacy was examined using the DES-SF	• IG: Reduction of HbA1c from a mean of 10.4% to 9.0%, with a CI of 95% • CG: Reduction of HbA1c from a mean of 10.1% to 9.5%, with CI of 95% $p = 0.296$ • There were no notable differences in self-efficacy between the intervention group and the control group • Patient acceptability-high	• Text message utilized to educate and motivate Latino patients who have uncontrolled diabetes have proven to lower HbA1c levels. • Acceptability may lead to ease of implementation in this patient population. • Suggestions for future research focused on evaluating the effectiveness of more personalized, bidirectional messages in this patient population to improve outcomes

Dobson, R., Whittaker, R., Dale, L., & Maddison, R. (2017). The effectiveness of text message-based self-management interventions for poorly controlled diabetes: A systematic review. *Digital Health, 3*(1), 1-12. https://doi.org/10.1177/2055207617740315	Trans-theoretical Model of Change, Health Belief Model	Level 1 SR of RCT	N=7 out of 172 potential studies (2010-2016) Levels of attrition were notable in 4/7 studies Patients with HbA1c >7%, uncontrolled diabetes Age >16y Studies reviewed: US 3 Korea 2 India 1 Iran 1	Studies included text message intervention to support DMSM to improve glycemic control IG: SMS 4-8 autogenerated, unidirectional texts per week (some tailored or random) CG: Usual care of any sort, other than SMS *Note:* The small number of studies and varying methodologies prevented the reviewers from carrying out a meta-analysis	• All studies found some decrease in HbA1c with the intervention, but only 3 were statistically significant when compared to the CG • The studies lending to more significant changes in HbA1c included individuals with higher baseline HbA1C levels. • Two of the studies that showed the most improvement was based on a theoretical framework, used higher doses of tailored SMS, and the studies lasted longer. • Patient acceptability: High	• Varying doses of text message communication may contribute to improvement of glycemic control with support of diabetes self-management. • Acceptability may lead to ease of implementation. • Utilization of a theoretical framework may play an important role in research design that contributes to improved patient outcomes with this intervention. • Future research should consider focusing on those individuals with higher HbA1c, as those individuals experienced more significant improvements glycemic control. • Future research to focus on effective dosing of text message

Fortmann , A., Gallo, L., Garcia, M., Taleb, M., Euyoque, J., Clark, T., Skidmore, J., Ruiz, M., Dharkar-Surber, S., Schultz, J., & Philis-Tsimikas, A. (2017). Dulce Digital: An mHealth SMS-based intervention improves glycemic control in Hispanics with type 2 diabetes. *Diabetes Care, 40*(1), 1349-1355. https://doi.org/10.2337/dc17-0230	NR	Level 2 Non-blind Parallel group RCT carried out for 6 months	N=126 out of 289 IG:N=63 CG:N=63 10% attrition Low-income Hispanic, uninsured 18y-75y HA1C >7.5% Federal health clinic Southern California	IG: Dulce Digital intervention: Usual care + 2-3 bidirectional text messages per day associated with meal and testing times (reminders, motivation, instruction, patient reported findings, etc.) CG: Usual care Only	IG: • Mean HbA1c decreased by 1% (p=0.03). Fasting blood glucose decreased, as well, from a mean of 184 mg/d, to a mean of 163 mg/dL CG: • Mean HbA1c decreased by 0.3%. Fasting blood glucose only decreased from 190 mg/dL to 187 mg/dL. • Acceptance of intervention: 97% approval	• Bidirectional text messages providing reminders, motivation and instruction may improve glycemic control in Hispanic adults experiencing uncontrolled diabetes. • Low-cost intervention, well received, sufficient in frequency and quality, and it facilitated improvement in diabetes management and blood sugar control in this patient population. • Suggestions for future research extending for longer durations, as well as a focus on individualizing the message quality and quantity to unique need of the individuals.

Greenwood., D., Gee, P., Fatkin, K., & Peeples, M. (2017). A systematic review of reviews evaluating technology-enabled diabetes self-management education and support. *Journal of Diabetes Science and Technology, 11*(5), 1015-1027. https://doi.org/10.1177/1932296817713506	Technology Enabled Self-Management (TES) Feedback Loop	Level 1 SR of SR	n=25 reviews Between 2011-2017 Type 1 and Type 2 Diabetes Age 1-80y Global population	IG: Secure text messaging to support diabetes management including communication, patient generated data, diabetes education and feedback in compliance with the TES Feedback Loop. CG: no text message communication intervention	A reduction in HbA1c, in the IG, fell between -0.1% and 0.8%, with the average reduction in in calculating to a 0.5% reduction. More pronounced improvements were noted in those with Type 2 diabetes, quite possibly due to higher baseline HbA1c levels. There is a growing acceptance of mobile phone utilization for health care support in Hispanic individuals.	The TES feedback loop may be a valuable tool to guide text message interventions with respect to improving glycemic control. Two-way communication is an important element to consider when supporting diabetes management in patients. Text message interventions, based on the TES Feedback Loop may be more beneficial in those with higher HbA1c levels. Additional, theory-based research should focus on evaluating the effectiveness of this intervention in non-English speaking populations

Haider, R., Sudini L., Chow, C., & Cheung, N. (2019). Mobile phone text messaging in improving glycemic control for patients with type 2 diabetes mellitus: A systematic review and meta-analysis. *Diabetes Research and Clinical Practice, 150*(2019), 28-26. https://doi.org/10-1016/j.diabres.2019.02.022	Trans-theoretical Model of Change, Health Belief Model	Level 1 SR of RCT	n=11 RCT studies Total: 1710 participants, median sample size 129. >18y with a mean age 52.2 ± 3.6 Global population Duration of studies lasting 3 months to 12 months.	IG: Text messages of varying quality and quantities regarding DMSM, in addition to usual care. CG: Usual care	IG: 9/11 studies report a mean reduction of HbA1c with an overall mean difference between the IG and the CG of 0.38% (p=<0.001). Tailored text messages were more effective in improving diabetes management CG: no statistical changes published in this review High levels of satisfaction reported in 2 studies, and not reported in 9/11 studies.	Text messaging of varying degrees and characteristics supports DMSM and improves glycemic control. Text messages centered around lifestyle and tailored to the individual's needs are more effective than standard, autogenerated messages. Text message, as a healthcare intervention to support diabetes management, may be an acceptable tool.

Sahin, C., Courtney, K., Naylor, P., and Rhodes, R. (2019). Tailored mobile text messaging interventions targeting type 2 diabetes self-management: A systematic review and a meta-analysis. *Digital Health, 5*(1), 1-21. https://doi.org/10.1177/1055207619845279	Trans-theoretical Model of Change, Health Belief Model	Level 1 SR of mostly RCT	n=13 RCT for systemic review (11 RCT and 2 pre/posttest control group design) Age range 47-65y Mostly high-income individuals with T2DM 1,328 participants	IG: received phone-based, tailored text messages to personal needs or preferences related to the timing of the messages, in addition to usual care CG: received automated/ generic text at random times and days, predetermined by researchers, not considering patient preference, in addition to usual care Messages were automated, 5 studies utilized bidirectional texting, and 8 used automated unidirectional texting to support diabetes management	IG: Tailored text messages improved HbA1C by 0.54%, (p<0.001) when compared to the CG. Non-automated text messages were well received, indicating the need for more personalized communication.	Text messaging, tailored to patient preference related to time, days, and frequency, may be useful in improving glycemic control in high income individuals. Additional research could contribute to studying these same elements in low-income individuals. More rigorous research is needed to determine the effectiveness of automated vs personalized messages. More longitudinal studies to determine the level of effectiveness.

Wang, Y., Min, J., Khuri, J., Xue, H., Xie, B., Kaminskuy, L., & Cheskin, L. (2019). Effectiveness of mobile health interventions on diabetes and obesity treatment and management: Systemic review of systemic reviews. *Journal of Medical Internet Research mHealth and uHealth, 8*(4), e15400. https://doi.org/10.2196/15400	NR	Level 1 SR of SR	n=17 SR (6 were MA) mHealth in addition to diabetes education Global studies included	IG- Evaluate the effectiveness of mHealth interventions for diabetes and obesity. CG- Usual care 11 SR focused on text messaging, and 6 focused on the use of mobile apps, monitoring devices and web-based tools Functions of the interventions were education, reminders, feedback, social support, counseling.	Through meta-analysis, the reviewers determined that HbA1c improvement raged from 0.25% to 0.48% (95% CI) in the IG, as opposed to usual care. Variations in reduction of HbA1c between intervention group and control group were noted in those individuals with HbA1c > 8%, as opposed to those with readings <8%, in whom the significance of change was greater (-0.33%) In addition, changes were greater in those with T2DM, as opposed to T1DM with this intervention. (-0.37, 95% CI)	Mobile Health technology is an effective intervention to use in practice to support diabetes management and improve glycemic control. Personal feedback obtained through text messaging, mobile apps and web-based tools facilitates diabetes disease management and glycemic control. Additional research is required to address the effectiveness of this tool on vulnerable populations experiencing low socioeconomic status. More rigorous research is needed to validate the elements of this intervention, to incorporate it evidence-based practice

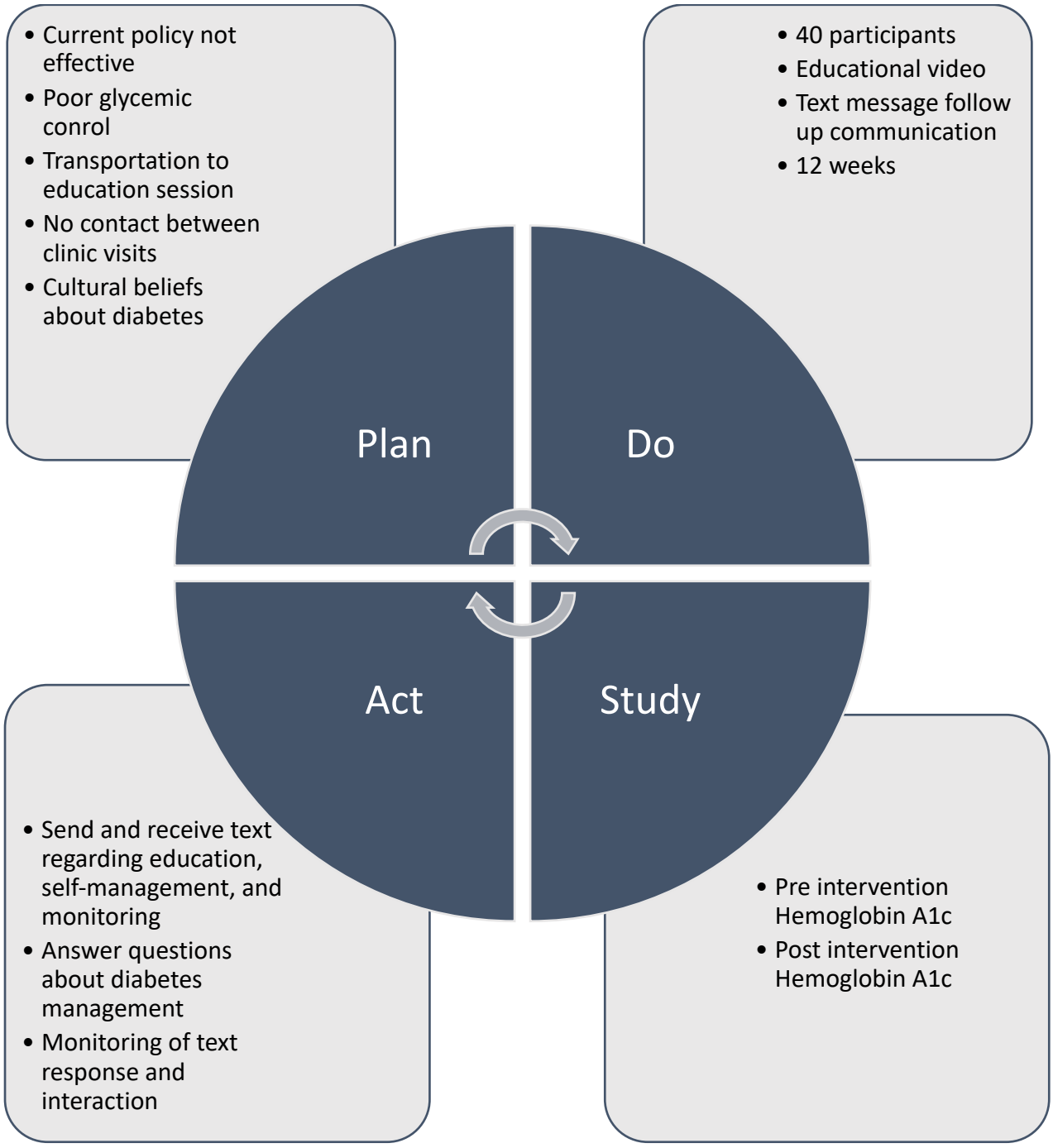
Whittemore, R., Compte, M., De La Cerda, S., Delvy, R., Jeon, S., Burrola-Mendez, S., Pardo-Carrillo, M., Lanzo-Marrufo, A., and Perez-Escamilla, R. (2020). Si, yo puedo vivir sano con diabetes! A self-management randomized controlled pilot trial for low-income adults with type 2 diabetes in Mexico City. *Current Developments in Nutrition, 4*(5), 74. https://doi.org/10.1093/cdn/nzaa074	Health Action Process Approach Framework	Level 2 RCT-Pilot	n= 47 (IG=26, CG=21) 6.4% attrition Primary care health center in Mexico City Mean age 55.5 ± 8.8 yrs Mean HbA1c 9.2% ± 1.5% Low socioeconomic status	Evaluation of the unidirectional, untailored text message program *Si, Yo Puedo Vivir Sano con Diabetes* All participants received usual care in the clinic setting weekly for 7 weeks IG: Received daily text messages (statements and images) to reinforce the education. CG: No text message, just clinic education. Data was collected at 3 and 6 months.	IG: reduction of hbA1c, at 6 months, was -1.77%, in relation to the CG with a reduction of --0.96% (p=0.11). Additional aspects of disease management, such as self-efficacy (p<0.04) and self-blood glucose monitoring (p<0.01) were noted, as well.	Culturally tailored text messages, to follow up a structured diabetes education class, can improve HgA1c levels in Hispanic patients with diabetes. Limitations of this study include restricted geographic area, and the small sample size. Researchers suggest that further research help to determine if personally tailored text messages will further improve self-management, self-efficacy, and glycemic control in this population.

Note. IG=intervention group; CG=control group; T2DM=type 2 diabetes mellitus; T1DM=type 1 diabetes mellitus; DM=diabetes mellitus; RCT=random controlled trial; MA=Meta-analysis; CI=Confidence Interval; HbA1C=glycosylated hemoglobin; NR=not reported; SR=systematic review; PC=primary care; DMSM=diabetes mellitus self-management, Usual care=evidence-based diabetes management

with physician or endocrinologist focused on diabetes education, blood glucose monitoring, physical assessment, routine lab work; DES-SF=Diabetes Empowerment Scale- Short Form.

Appendix C

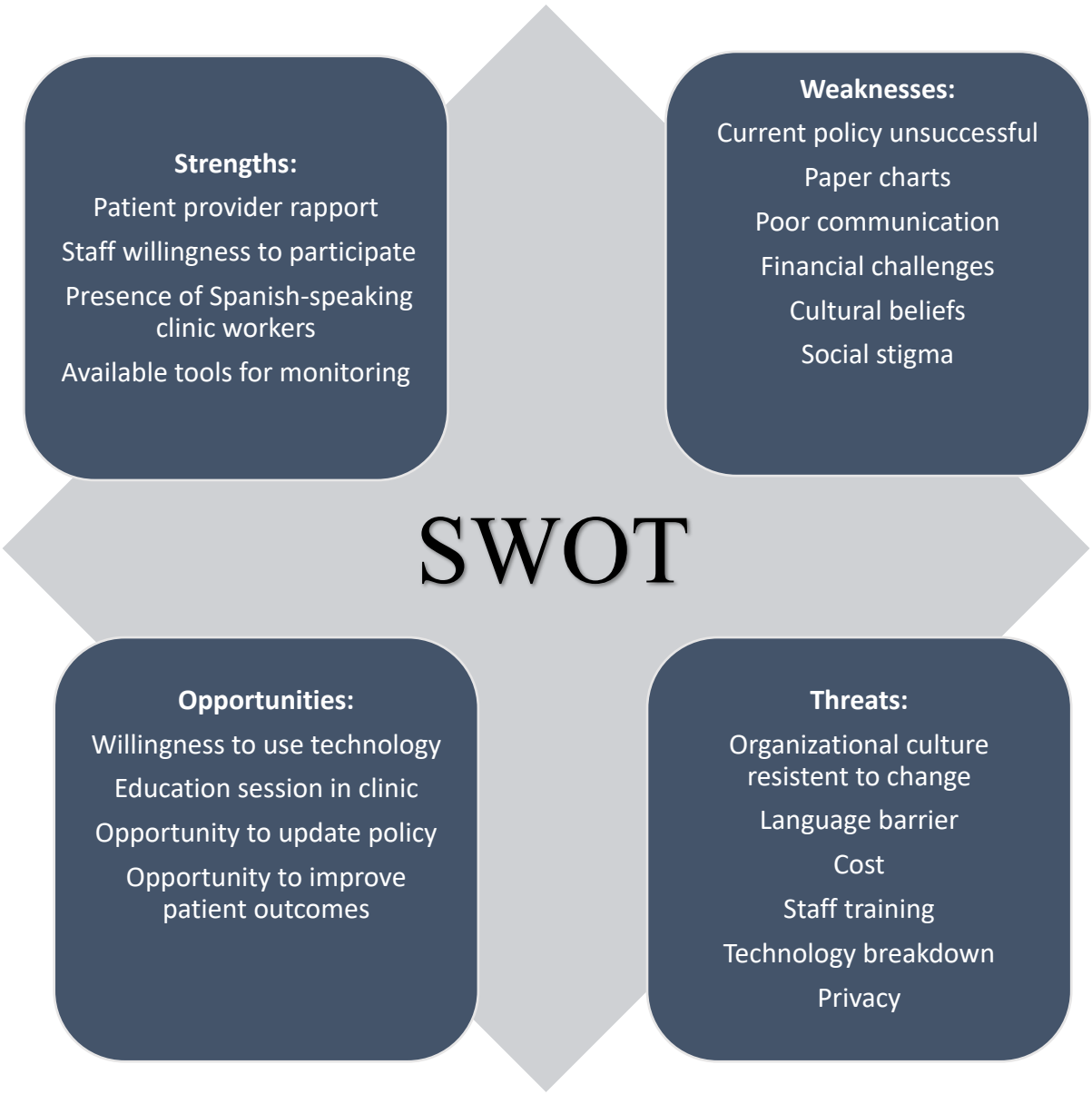
Plan-Do-Study-Act Framework



Note. Project Plan-Do-Study-Act is a quality improvement method utilized to guide and optimize practice change interventions that seek to improve process outcomes (Moran et al., 2020).

Appendix D

SWOT Analysis



Note. A SWOT analysis is a framework that guides a project or workflow analysis by identifying the strengths (S), weaknesses (W), opportunities (O), and threats (T) that may be present that may facilitate or inhibit the success of a project (Namugenyi et al., 2019).

Appendix E

Association of Diabetes Care and Education Specialist (ADCES7) Curriculum Topics

I. Introduction (Diabetes and Prediabetes):Overview of physiology diabetes and diagnostic criteria

II. Healthy Coping
   - A. Feelings
   - B. Problem solving
   - C. Stress management
   - D. Obtaining support

III. Activity
   - A. Benefits
   - B. Types
   - C. Safety
   - D. Special considerations
   - E. Barriers/facilitators

IV. Medications
   - A. Types of oral medications
   - B. Types of injectable medications
   - C. Alternative medications
   - D. Barriers/facilitators

V. Monitoring
   - A. Targets
   - B. Types of meters
   - C. Guidelines/ frequency
   - D. Goal readings
     1. Self-blood glucose targets
     2. HbA1c targets
   - E. Barriers/ facilitators

VI. Reducing risk: cardiovascular, neurological, renal, vision, dental, skin

VII. Problem solving: Hyper/Hypoglycemia symptoms and treatment

Appendix F

Project Timeline

Week/Date	Activity
Week 1 March 7-March 13, 2022	• Recruitment: Phone potential participants to inform of ADCES7 text project. • Schedule visits for the following week.
Week 2-3 March 14-March 27, 2022	• Program explanation and informed consents signed • Participants watch ADCES7 education video • Obtain baseline vital signs, med reconciliation, HbA1c • Determine participant preference for time of texts • Test text sent while in clinic
Week 4 March 28-April 3, 2022	• Text 1: Request self-blood glucose reading Diabetes coping skills • Text 2: Request self-blood glucose reading Diabetes coping skills
Week 5 April 4-April 10, 2022	• Text 1: Request self-blood glucose reading Healthy eating • Text 2: Request self-blood glucose reading Healthy eating
Week 6 April 11-April 17, 2022	• Text 1: Request self-blood glucose reading Being active • Text 2: Request self-blood glucose reading Being active
Week 7 April 18-April 24, 2022	• Text 1: Request self-blood glucose reading Taking medication • Text 2: Request self-blood glucose reading Taking medication
Week 8 April 25-May 1, 2022	• Text 1: Request self-blood glucose reading Blood sugar monitoring • Text 2: Request self-blood glucose reading

Week 9 May 2- May 8, 2022	• Text 1: Request self-blood glucose reading Risk reduction • Text 2: Request self-blood glucose reading Risk reduction
Week 10 May 9-May 15, 2022	• Text 1: Request self-blood glucose reading Problem solving • Text 2: Request self-blood glucose reading Problem solving
Week 11 May 16-May 22, 2022	• Text 1: Request self-blood glucose reading Healthy eating • Text 2: Request self-blood glucose reading Being active
Week 12 May 23-May 29, 2022	• Text 1: Request self-blood glucose reading Taking medications • Text 2: Request self-blood glucose reading Problem solving
Week 13 May 30-June 5, 2022	• Text 1: Request self-blood glucose reading Taking medications • Text 2: Request self-blood glucose reading Well-being
Week 14 June 6-Jun 12, 2022	• Text 1: Request self-blood glucose reading Final review/ encouragement • Text 2: Request self-blood glucose reading Final questions/encouragement
Week 15-16 June 13-July 3, 2022	Collect and compile data and post intervention HbA1c levels
Week 17 July 4-July 10, 2022	Data analysis of findings by DNP student, Dissemination of findings to clinic director

Appendix G

Chart Audit Tool

Name:_____ Date:_____

Project ID #_____

Phone:_____

Age: _____

Date of last visit: _____

Date of last HbA1c: _____

Result of last HbA1c: _____

Additional information:

Diabetes medications: _____

Referred to BayCare Diabetes education: _____

Documentation of attendance BayCare Diabetes Education: _____

Appendix H

Informed Consent

Informed Consent Form

Title of Study:

Introduction:

The purposes of this form are to provide you (as a prospective research study participant) information that may affect your decision as to whether or not to participate in this research and to record the consent of those who agree to be involved in the study.

Research:

Melissa Cole has invited your participation in a research study. I am completing this research as part of my doctoral degree.

Purpose of Study:

The purpose of the research is to determine if a short education session, followed by periodic text message contact f with clinic staff will assist you in managing your diabetes and improving your blood sugar or hemoglobin A1c level

Eligibility:

You are eligible to participate in this research if you: have been seen in the clinic since January 2021, are between the ages of 18-75, are of Hispanic ethnicity, and have a HbA1c (elevated blood sugar readings) >8%.

Description of the Research Activity:

If you decide to participate, then as a study participant you will be asked to: Visit the clinic for an initial evaluation, receive lab work by a fingerstick to check your HbA1c (blood glucose value), watch a short video on diabetes self-care, receive text messages 2 time a week, Mondays and Thursdays, at your preferred time, check your blood sugar at home and report the readings by text message, and return to the clinic at the end of the study to repeat the blood test to see if there is any improvement.

Approximately (40) subjects will be participating in this research study.

Risks:

If you decide to participate in this research study some risks may include pain, infection or bleeding at the puncture site when completing lab work. Time out of your day for text message response.

To decrease the impact of these risks, you can: stop participation at any time

Benefits:

Benefits of participating in this study include Improve self confidence in diabetes management, improve blood sugar readings and diabetes control, improve communication with clinic staff.

Confidentiality:

All information obtained in this study is strictly confidential unless disclosure is required by law. The results of this research study may be used in reports, presentations, and publications, but the researchers will not identify you. In order to maintain confidentiality of your records, Melissa Cole will only identify participants with a random numerical code. No names or personal identifiers will be utilized.

The people who will have access to your information are myself, and/or, my dissertation committee, and the clinic director

I will secure your information with these steps: document the data on a password secured computer, then transfer it to a secure hard drive, which will be stored in a locked file cabinet in the reception are of the clinic in which only clinic staff have access and remains locked when not in uses. I will keep your data for 3 years. Then, I will delete electronic data and destroy the hard drive.

Withdrawal Privileges:

It is okay for you to decline to participate in this research study. You are free to stop participating at any time and there will be no penalty to you.

If you decide to stop participation, you may do so by notifying the clerical staff at La Clinica.

Your decision will not affect your relationship with La Clinica Guadalupana or otherwise cause a loss of benefits to which you might otherwise be entitled such as medical treatment or care.

Costs and Payments

There is no financial cost to you as a study participant, however, as a thank you for your willingness to participate, you will be given a $20 gas card to compensate for your travel to and from the clinic for the study.

Voluntary Consent:

Any questions you have concerning the research study or your participation in the study will be answered by Melissa Cole at melissa.cole2@hotmail.com or by phone at 304-807-6677.

If you have questions about your rights as a subject/participant in this research, or if you feel you have been placed at risk, you can contact the Institutional Review Board at IRB@Aspen.edu

This form explains the nature, demands, benefits and any risk of the research study. By clicking "I Agree' you confirm that you are 18 years or older, understand the content of this form, and agree to participate in this study.

----I Agree ---- I Do Not Agree

Printed name_____

Signature_____

Date _____

Formulario de consentimiento informado

Título del estudio:

Introducción:

La finalidad de este formulario es proporcionarle información (como posible participante en el estudio de investigación) que pueda afectar su decisión de participar o no en este estudio y registrar el consentimiento de las personas que aceptan participar en él.

Estudio:

Melissa Cole le ha invitado a participar en un estudio de investigación. Estoy realizando este estudio de investigación como parte de mi doctorado.

Objetivo del estudio:

El objetivo del estudio es determinar si una breve sesión educativa, seguida de un contacto periódico por mensaje de texto con el personal de la clínica, le ayudará a controlar su diabetes y a mejorar sus niveles de azúcar o hemoglobina A1c en la sangre

Elegibilidad:

Usted es elegible para participar en este estudio si: ha visitado la clínica desde enero de 2021, tiene entre 18 y 75 años, es de origen étnico hispano, y tiene un HbA1c (lecturas elevadas de azúcar en la sangre) >8 %.

Descripción de la actividad de investigación:

Si decide participar, como participante del estudio se le pedirá: acudir a la clínica para una evaluación inicial; hacerse análisis de laboratorio mediante punción capilar para verificar su HbA1c (valor de glucosa en la sangre); ver un breve vídeo sobre el autocuidado de la diabetes; recibir mensajes de texto 2 veces a la semana, los lunes y los jueves, a la hora que prefiera; comprobar su nivel de azúcar en la sangre en casa e informar las lecturas por mensaje de texto, y volver a la clínica al final del estudio para repetir el análisis de sangre para ver si hay alguna mejoría.

Aproximadamente (40) sujetos participarán en este estudio de investigación.

Riesgos:

Si decide participar en este estudio de investigación, algunos de los riesgos pueden ser dolor, infección o sangrado en el lugar de la punción cuando se realicen las pruebas de laboratorio. Tomará algo de tiempo de su día responder los mensajes de texto.

Para disminuir el impacto de estos riesgos, usted puede: dejar de participar en cualquier momento

Beneficios:

Los beneficios de participar en este estudio incluyen mejorar la propia confianza en el control de la diabetes, mejorar las lecturas de azúcar en la sangre y el control de la diabetes, mejorar la comunicación con el personal de la clínica.

Confidencialidad:

Toda la información obtenida en este estudio es estrictamente confidencial, a menos que la ley exija su divulgación. Los resultados de este estudio de investigación pueden utilizarse en informes, presentaciones y publicaciones, pero los investigadores no lo identificarán a usted. Para mantener la confidencialidad de sus registros, Melissa Cole solo identificará a los participantes con un código numérico aleatorio. No se utilizarán nombres ni identificadores personales.

Las personas que tendrán acceso a su información somos yo misma, mi comité de disertación y el director de la clínica

Protegeré su información con las siguientes medidas: se documentarán los datos en una computadora protegida con contraseña, y luego se transferirán a un disco duro seguro, que se guardará en un gabinete cerrado con llave en la recepción de la clínica al que solo tiene acceso el personal de la clínica y que permanece cerrado cuando no se utiliza. Conservaré sus datos durante 3 años. Después, borraré los datos electrónicos y destruiré el disco duro.

Privilegios de renuncia:

No pasa nada si rechaza participar en este estudio de investigación. Usted es libre de dejar de participar en cualquier momento y no habrá ninguna penalización para usted.

Si decide dejar de participar, puede hacerlo notificándolo al personal administrativo de la clínica.

Su decisión no afectará su relación con La Clínica Guadalupana ni causará una pérdida de beneficios a los que podría tener derecho, como tratamiento o atención médica.

Costos y pagos

No hay ningún costo económico para usted como participante en el estudio, sin embargo, como agradecimiento por su disposición a participar, se le dará una tarjeta de gasolina de 20 dólares para compensar su viaje de ida y vuelta a la clínica para el estudio.

Consentimiento voluntario:

Cualquier pregunta que tenga sobre el estudio de investigación o su participación en este, será respondida por Melissa Cole en melissa.cole2@hotmail.com o por teléfono en el 304-807-6677.

Si tiene preguntas sobre sus derechos como sujeto/participante en este estudio, o si cree que se lo ha puesto en peligro, puede ponerse en contacto con la Junta de Revisión Institucional en IRB@Aspen.edu

Este formulario explica la naturaleza, las exigencias, los beneficios y los posibles riesgos del estudio de investigación. Al hacer clic en "Acepto" confirma que tiene 18 años o más, que comprende el contenido de este formulario y que acepta participar en este estudio.

---- Acepto ---- No acepto

Nombre impreso _____

Firma _____

Fecha _____

Appendix I

Immersion Site Agreement/Clinic Approval for Project

Appendix I: Immersion Site Agreement

This IMMERSION AGREEMENT is entered into between the ASPEN UNIVERSITY INC. with its principal place of business located at 1660 S. Albion St. Suite #525 Denver, CO 80222 (hereinafter referred to as "SCHOOL") and La Clinica Guadalupana (hereinafter referred to as "AGENCY"). This agreement shall replace or supersede all other agreements between the parties.

WHEREAS, the mission of the Aspen University School of Nursing and Health Sciences is to enhance the health and quality of life for individuals, families, and communities at local, state, and national levels through excellence in teaching, scholarship and practice.

WHEREAS, the Doctor of Nursing Practice (DNP) program prepares nurses to assume leadership roles in management, education, and practice within a diverse society and across a spectrum of healthcare settings.

WHEREAS, the AGENCY is willing to share its facilities with the SCHOOL by making its resources available for the instruction of students.

NOW, THEREFORE, for and in consideration of the foregoing objectives and in further consideration of the covenants and promises hereinafter set forth, the parties hereto mutually agree as follows:

1. Upon inception, the doctoral student shall execute a form acknowledging all applicable policies required by SCHOOL and AGENCY.

2. The doctoral student participating in the immersion experience at the AGENCY will be enrolled in the doctoral nursing program and currently enrolled in a doctoral nursing course with an appropriately credentialed faculty member.

3. The doctoral student will hold a current, unencumbered nursing license. This license is on file with the SCHOOL and available upon request to the AGENCY.

4. A general orientation to the AGENCY will be provided by the Preceptor or AGENCY designee and must be attended by the doctoral student prior to beginning the immersion experience.

5. When on AGENCY premises, the doctoral student will be under the direct supervision of a specified Preceptor agreed upon by the SCHOOL and AGENCY.

6. The doctoral student and Preceptor will negotiate the specific areas of the immersion experience in alignment with the requirements of the doctoral course in which the student is enrolled.

7. The SCHOOL shall instruct the doctoral student that he/she shall follow all administrative policies, standards and practices of AGENCY while participating in the immersion experience to the extent that AGENCY's rules and regulations do not contradict the SCHOOL'S rules and regulations.

8. The SCHOOL and the doctoral student shall comply with the AGENCY'S applicable policy regarding the Health Insurance Portability and Accountability Act (HIPAA) and shall not disclose any records concerning a patient or participant to any third party without the prior written consent of the AGENCY.

9. Upon mutual agreement, the AGENCY reserves the right, upon consultation with the SCHOOL, to require the dismissal or removal from the AGENCY any doctoral student (i) whose personal characteristics prevent desirable relationships with AGENCY, (ii) whose health status is a detriment to the doctoral student's successful completion of the immersion experience or to the welfare of patient or participants or (iii) whose performance, after appropriate instruction and counseling, continues to fall below the level required to maintain practice standards.

10. The SCHOOL agrees that the faculty member may serve as consultant and on committees of the AGENCY when requested by the AGENCY.

11. There will be no exchange of monies between the AGENCY, the SCHOOL, the Preceptor, or the doctoral student.

12. The doctoral student will be responsible for personal transportation, meals, laundry and health care needs in the performance of this agreement.

13. To the extent permitted by applicable law, each party does hereby covenant and agree to indemnify and hold harmless the other party, its appointed boards and commissions, officials, officers, employees, students, and subagents, individually and collectively, from all fines, claims, demands, suits or actions of any kind and nature by reason of its acts or omissions occurring in the performance of this Agreement. Nothing in this Agreement or in its performance shall be construed to result in any person being the officer, agent, employee or servant of either party when such person, absent of this Agreement and the performance thereof, would not in law have had such status. Nothing in the execution of this Agreement or in its performance shall be construed to establish a joint venture by the parties hereto.

14. In addition to those laws specifically mentioned in this Agreement, AGENCY shall comply with all applicable policies of SCHOOL applicable to it and comply with all applicable laws and rules.

15. Both parties, in connection with any service or other activity under this Agreement, agree not to unlawfully discriminate against any person on the grounds of race, color, religion, sex, sexual orientation, gender identity, national origin, ethnicity, age, disability, political affiliations or belief. The SCHOOL and the AGENCY will comply with Title VII of the Civil Rights Act of 1964, Americans with Disabilities Act (ADA) of 1991, Title IX of the Education Amendments Act of 1972 and Section 504 of the Rehabilitation Act of 1973.

16. The SCHOOL and AGENCY will maintain in effect during the entire term of this Agreement, at their sole respective cost and expense, at least $1,000,000 of commercial general liability insurance on a standard comprehensive occurrence form. The SCHOOL and AGENCY will make certificates of insurance available to each other upon request. The SCHOOL and AGENCY will maintain in effect during the entire term of this Agreement, at their sole respective cost and expense, Medical Errors & Omission coverage.

17. This agreement is for a period of 3 years unless terminated by either party upon giving 30 days advance written notice to the other party.

Aspen University Inc.

By: Dr. Sherry Raber, DNP, MMHC, MSN, RN

Print Name: Dr. Sherry Raber, DNP,MMHC,MSN,RN

Title: DNP Program Coordinator

Date: 8.24.2021

Agency

By: Maureen Green

Print Name: Maureen Green

Title: Director La Clinica Guadalupana

Date: 8/23/2021

Student: Submit this completed form directly to ProjectConcert. Directions can be found in DNP Handbook under "Instructions Uploading Documents to ProjectConcert." If your site has its own site agreement, secure a copy and submit to the Coordinator for review.

Appendix J

Sample Text Messages Content and Response Log

Question	Comment/Response
What was your blood glucose reading this morning?	
Did you remember to take your medications?	
Often setting an alarm or planning to take them with regular activity helps.	
What was your greatest concern about your eating today?	
Can you list some non-starchy foods you ate today?	
Can you tell me what you had for breakfast/lunch/ supper?	
Remember to drink your more water rather than soft drinks, or sweet beverages.	
What physical activity were you able to do this week?	
What extra movement did you add into your day?	
Remember, parking farther from the store or taking the stairs will increase activity.	
Are you finding any barriers that are preventing you from managing your diabetes?	
How often are you checking your blood sugars?	
Can you tell me what you should do if you get a high or low glucose reading at home?	
Remember checking your blood sugar will show you how foods affect your blood sugar.	
What symptoms do you have when your blood sugar is high or low?	

What areas of your diabetes management do you need the most assistance?	
Remember, if you are stressed you can try to take a walk.	
Don’t forget to do a foot exam this week.	
If you could do anything different in your diabetes management, what would it be?	
Remember if your finger is sore, stick the side area, there are less nerves there.	

Appendix K

IRB Approval Letter

IRB Review Form
DNP

IRB Case Number: 3MC2-11F2

Name of Candidate: Melissa Cole

DNP Project Title: Text Messaging to Improve Glycemic Control for Adult Hispanic Patients with Type 2 Diabetes in a Free Medical Clinic

Approval Expires on: 2/12/2023

Application Type:

__Exempt Review
_X_ Expedited Review
__Full Review

Application Status:

_X_ Approved
___ Not Approved
___Approved with Amendment

The student/researcher understands and agrees to maintain the confidentiality of any entity agreeing to assist with providing data; to obtain informed consent from any human participants in the study; and to retain and safeguard written consents and the data for a period of five years from all entities, presenting copies to Aspen University, to the participants, and to authoritative bodies when appropriate.

2/12/2022

Heather Frederick, IRB Chair

All questions or concerns should be directed to IRB@aspen.edu. This includes immediately reporting any unexpected adverse events or alterations in risk levels for participants within 48 hours of occurrence of such events.

Aspen University
1660 South Albion Street, Suite 525
Denver, CO 80222

Appendix L

Proposed Text Connect Budget

Item	Description	Cost	Responsibility
Staffing	2 hours per week for text interaction	$155.70	Clinic
Direct Expenses	ReliOn Glucose Monitors $14.98 x 40	$599.20	Donated
	ReliOn Glucose Strips $14.16/ 100 strips x 3300 (daily blood sugars for 40 people)	$467.28	Donated
	Gas Card for transportation $20 x40	$800.00	Grant
	A1C Now supplies (192.99 x2)	$385.98	Grant
Indirect Expenses	Statistician oversight	$300.00	Student
	Preparation of Power Point Estimated Cost $200	$0.00	Student
	Total Project Expense	**$2,708.13**	