IMPLEMENTING TELE-COACHING DIABETES EDUCATION TO IMPROVE SELF-CARE AND CLINICAL OUTCOMES FOR PATIENTS WITH TYPE 2 DIABETES

by

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A Scholarly Project Presented in Partial Fulfillment

of the Requirements for the Degree

Doctor of Nursing Practice

Southern Adventist University

December 2021

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Abstract

Background: Type 2 diabetes (T2DM) requires initial and continuous patient education for lifelong management due to the complexity of the disease. However, diabetes education is not very well-supported in the office setting due to the providers' limited time per patient. However, with the aid of technology-based intervention, patients can be more supported and educated, leading to better T2DM control.

Aims: The purpose of this scholarly project was to evaluate the effectiveness of diabetes education through tele-coaching in patients with T2DM for improved self-care and clinical outcomes, including hemoglobin A1c (A1c) and body mass index (BMI).

Method: A mixed-method, single group quasi-experimental study and a post-intervention qualitative interview was conducted on 14 patients with T2DM and A1c greater than 6.5%. The intervention consisted of weekly tele-coaching diabetes education via phone calls or Zoom and action prompt text messages twice a week for 8 weeks. After completing the intervention, an individual interview with four structured interview questions was performed to explore the participants' tele-coaching experience.

Results: Eleven participants completed the study. After 8 weeks of intervention, the BMI change from pre- to post-intervention was not statistically significant, and the effect size was small ($t(10) = 1.174$, $p = .268$, $d = 0.35$). The A1c from pre- to post-intervention was also non-significant, and had a small effect ($V = 33.50$, $p = .213$, $d = 0.43$). However, the diabetes self-care activity score from pre- to post-intervention was statistically significant and the effect was large ($V = 4$, $p = .006$, $d = 0.92$). The post-intervention interviews show that tele-coaching diabetes education had positive impacts on the participants' diabetes self-care and their motivation through more frequent support in reminding them for continuous self-care. However, 4 out of 11 participants preferred in-person office visits over tele-coaching.

Conclusion: Diabetes self-care activity significantly improved after tele-coaching diabetes education, but A1c and BMI did not improve substantially. Patients perceived that tele-coaching was supportive, but some still preferred in-person education.

Keywords: Type 2 diabetes, hemoglobin A1c, weight loss, diabetes self-care, diabetes education, tele-coaching.

Acknowledgements

I would like to acknowledge and sincerely thank my Scholarly Project advisor, Dr. Jill Buchholz, for guiding and anchoring me throughout this research project. In addition, I gratefully thank my academic advisor, Dr. Holly Gadd, and Scholarly Project Second Readers, Dr. Beth Scott and Dr. Kristina Hall, for their great support and advice. Completion of this research project could not have been achieved without their guidance and support.

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Chapter 1: Introduction

Type 2 Diabetes Mellitus (T2DM) is the most common type of diabetes, making up about 90-95% of all diagnosed diabetes (Centers for Disease Control and Prevention [CDC], 2020). Historically, lifestyle modification and pharmaceutical agents have been promoted as the treatment of choice, however, uncontrolled T2DM remains a persistent healthcare issue. It is well known that T2DM has and continues to undergo vigorous research, there is still the challenge of linking research to T2DM control. Inherent in the treatment of T2DM is the need to address the importance of diabetes education and motivate the patient to perform diabetes self-care that will manage the disease and promote health and wellness.

Background and Significance

Diabetes mellitus is a chronic disease that is the seventh leading cause of death in the United States (CDC, 2020). According to the 2020 CDC diabetes report (2020), the incidence of T2DM was 34.2 million. This is about 10.5% of the total population (CDC, 2020). It is a debilitating chronic disease that can gradually cause various health complications, including heart disease, high blood pressure, stroke, kidney disease, eye damage, nerve damage, slow wound healing with other skin conditions, sleep apnea, and even Alzheimer's disease (Mayo Clinic, 2019).

What is more overwhelming is the cost of T2DM. In 2017, the total estimated cost of diagnosed diabetes was $327 billion, of which $237 billion was for the direct medical expenses, and $90 billion resulted from indirect costs related to diabetes, including absenteeism, reduced productivity, chronic disability, and early mortality (American Diabetes Association [ADA], 2018). Though this disease is well-known in society with many available resources and various

medication treatments, it still ranks high in the cause of death. In fact, a total of 7.8 million hospitalization cases were reported in 2016 (CDC, 2020).

Due to the complexity of the disease, diabetes needs extensive patient education to control and manage the disease. According to Healthy People 2030, the national baseline data showed that 51.7 percent of adults 18 years and older with diabetes diagnosis ever received formal education on diabetes self-management and support in 2017 (Office of Disease Prevention and Health Promotion, n.d.). Their new target for Healthy People 2030 is to increase the proportion of formal diabetes education by 55.2% (Office of Disease Prevention and Health Promotion, n.d.).

Typically, patient education is achieved during the office visit, however, sufficient patient education is not always feasible due to the allotted time per patient visit. According to the study that measured the length of patient visit and its time component with primary care physicians, the mean patient visit length was 16.6 minutes, and the direct face-to-face time length was 9.2 minutes (Young et al., 2018). Primary care providers have very limited time to educate their patients during their visits, especially for diseases that involve extensive self-care management.

Having established that diabetes requires life-long management and diabetes education is a key element to initiate the change, the ADA also advocates strategies such as technology-assisted interventions like telehealth, smartphone, and web-based applications to effectively implement diabetes education through Diabetes Prevention Program (American Diabetes Association, 2019). With the aid of technology-assisted intervention as a bridge that connects the patient and the health care provider, increased communication and diabetes education could be achieved until the patient fully understands and adapts to T2DM and efficiently performs diabetes self-care.

Problem Statement

Diabetes is a chronic disease that is well-known to healthcare providers. However, patients often do not recognize the seriousness of the condition due to a lack of diabetes education. Patients' knowledge about diabetes is crucial because they will have to continually manage and live with the disease.

Thus, initial and continuing patient education is essential in living with a chronic disease like diabetes. Patients' participation in the initial structured diabetes education and reinforcement of the knowledge in self-care will increase the patient's active involvement in care, improve patient outcomes, and decrease or delay the progression of other health complications.

Purpose Statement

The purpose of this scholarly project was to evaluate the effectiveness of diabetes education through tele-coaching in patients with T2DM for improved self-care and clinical outcomes, including hemoglobin A1c and BMI.

Research Question

PICO Question

P – Patients with type 2 diabetes mellitus (T2DM) with A1c $\geq 6.5\%$

I – Tele-coaching diabetes education

C – Same population with pre-and post-intervention outcomes

O – Improved A1c, BMI, and self-care

For patients diagnosed with type 2 diabetes mellitus with hemoglobin A1c $\geq 6.5\%$, does tele-coaching for diabetes education improve hemoglobin A1c, weight loss, and self-care?

Theoretical Framework

Theoretical frameworks functioned as blueprints of this scholarly project. It provided the backbone of the implemented intervention and enabled the DNP student to focus on the chosen variables. The theoretical frameworks chosen for this scholarly project are the Health Belief Model (HBM) and CREATION Health. The Health Belief Model (HBM) is a theoretical framework for predicting preventive health behaviors and developing interventions based on the expected health behaviors (Glanz et al., 2015). The key concepts are the following:

- Perceived susceptibility (one's belief that they are susceptible to the condition)

- Perceived severity (one's belief that the disease will result in serious outcomes)

- Perceived benefits (one's belief that healthy choice would reduce the susceptibility or severity of the condition)

- Perceived barriers (one's belief that obstacle presents in taking health action)

- Cue to action (the exposure to the factors that facilitate or assist in initiating an action)

- Self-efficacy (confidence in acting)

CREATION Health is a faith-based theoretical framework representing the health promotion model of AdventHealth. CREATION Health provides all aspects of health that affect an individual's life: choice, rest, environment, activity, trust in God, interpersonal relationships, outlook, and nutrition (AdventHealth, n.d.). This theoretical framework optimally represents the idea of this project in combination with the HBM. Before cueing to action in HBM, the patient will evaluate each element of CREATION Health and modify them to change their behaviors and eventually meet their goals. For instance, the perceived susceptibility, in this case, would be the patient's belief that he is susceptible or vulnerable to health complications such as heart disease, stroke, kidney disease, eye damage, slow wound healing, and nerve damage due to

uncontrolled T2DM. The perceived severity would be the patient's belief that his condition will result in bad outcomes if he does not manage his blood glucose and maintain healthy lifestyle habits. Perceived benefits would be the patient's belief that controlling his diabetes through diabetes education and making healthy lifestyle choices would reduce the risk of health complications from uncontrolled T2DM. Perceived barriers would be the patient's belief that there is an obstacle in making a healthy choice such as inadequate time for education or support. The patient will reflect on CREATION Health and evaluate their current state. Cue to action would be the factors that would trigger the patient to start working on diabetes self-care such as health knowledge gained from diabetes education. The patient will modify the factors that need improvement to achieve their perceived goals. Self-efficacy would be the patient's confidence in performing and accomplishing diabetes self-care.

Figure 1

The Health Belief Model and CREATION Health
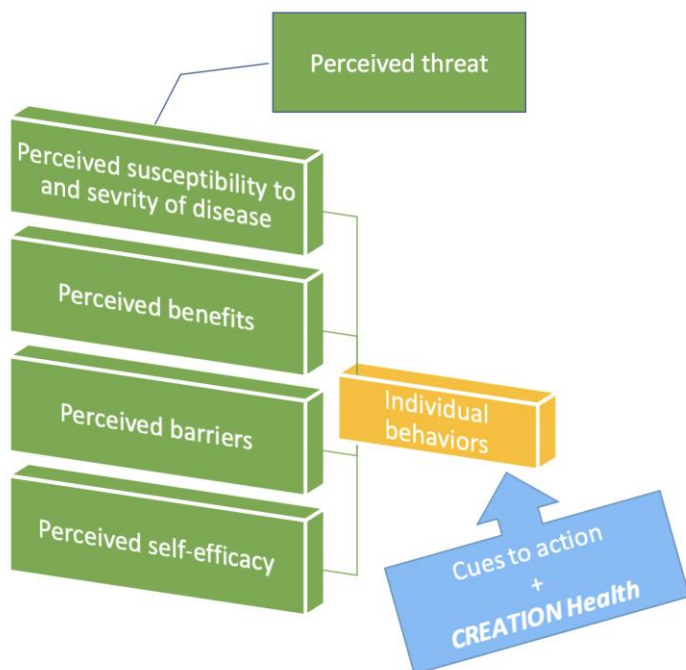
Definition of Terms

Telehealth

Telehealth is the way to provide health care services using technology services such as telephone, text message, virtual conference, e-mail, and patient portals (Imlach et al., 2020).

Tele-coaching

In this study, "Tele-coaching" is an integrated term to describe an act of providing education via any means of telehealth.

Action prompts

In this study, action prompts are reminding messages to perform self-care activities through text messages.

Diabetes Self-Management Education and Support (DSME/S)

DSME/S refers to the process of enabling diabetes self-care ability, skills, and knowledge and provides support to continuously implement and sustain diabetes self-care activities (Power et al., 2015).

Hemoglobin A1c (A1c)

Hemoglobin A1c is a diagnostic lab test that measures average blood glucose for the past three months for T2DM and prediabetes and is used in managing diabetes (National Institute of Diabetes and Digestive and Kidney Diseases, n.d.).

Body Mass Index (BMI)

Body Mass Index is a screening measurement for weight categories, determining health risks that may lead to other health issues (CDC, n.d.).

Self-care

"The ability of individuals, families, and communities to promote health, prevent disease, maintain health, and to cope with illness and disability with or without the support of a healthcare provider" (World Health Organization, n.d., What do we mean by self-care? section, para. 1).

Chapter 2: Literature Review

Cumulative Index to Nursing and Allied Health Literature (CINAHL), ClinicalKey, Google Scholar were used as databases to search related articles. The peer-reviewed articles published between 2015 to 2020 were browsed. The search keywords were selected based on the PICO question. There were 447 articles that resulted from the keywords including type 2 diabetes, self-care, self-management, education, hemoglobin A1c, telehealth, and telephone. The articles focused on the correlation between adherence to self-care and type 2 diabetes. The effects of telephone on improving hemoglobin A1c were finally chosen among the filtered articles for this paper. Articles written in foreign languages other than English and editorial were excluded.

Presentation of Literature

The literature review for this study focused on diabetes education and telehealth with its efficacy and its effects on A1c, BMI, and self-care. The concepts of diabetes education, telehealth, A1c, BMI, and self-care are co-related. This literature review will introduce the efficacy of the method and its outcomes.

Diabetes Self-Management Education and Support

Adult patients with diabetes have higher hospitalization and 30-day readmission compared to the patients who do not have diabetes, which inadequate knowledge in diabetes and its self-care is thought to be partially attributing (Nasser et al., 2019). Also, it is reported that only less than 7% of diabetes patients with private insurance and 1.7% of Medicare beneficiaries with diabetes received diabetes self-management education and support (DSME/S) in 2012 (Nasser et al., 2019). DSME/S refers to the process of enabling diabetes self-care ability, skills,

and knowledge and provides support to continuously implement and sustain diabetes self-care activities (Power et al., 2015).

Fajriyah et al. (2019) conducted a systematic review and analysis of 15 studies that evaluated the effectiveness of DSME/S programs on the physiological, psychological, and social respects of patients with T2DM. The findings of the review showed favorable effects of DSME/S on all aspects. Physiologically, there was an improvement in blood glucose, A1c, weight, waist circumference, blood pressure, cholesterol, and low-density lipoprotein (LDL). Psychologically, it decreased anxiety, stress and improved confidence and self-reliance. Lastly, DSME/S was noted to promote motivation and knowledge with diabetes self-care activities through enhanced family and social support.

Interestingly, the mode of interventions of the selected studies varied, though the fundamental concept of those interventions was DSME/S. Those included nurse-led intervention, independent self-intervention, group discussions, or peer education. This showed how DSME/S could be presented and utilized in flexible formats while having the same purpose to provide diabetes education and improve clinical outcomes. Another point to recognize is that different health professionals conducted those studies. They included professional nurse educators, nurses, physicians, endocrinologists, certified nutritionists, registered dietitians, pharmacists, and community health workers. The researchers in each study were either the same kind of health professionals or a multidisciplinary team that involved different health professionals in a group. It is well-noted that DSME/S is not limited to only one health professional as an instructor but also other relevant health professionals.

According to the CDC (2020), Hispanics ranked second highest among the ethnic group with diabetes. A systematic review and meta-analysis based on the 13 RCTs suggested that more

significant improvement in A1c was observed in Hispanic patients with the culturally adapted

DSME designs that incorporated multimodal providers and had minimal subject loss throughout

the studies (Ferguson et al., 2015). The studies included in this review and analysis performed

DSME interventions that varied in participants setting, mode of education delivery, number of

sessions, total contact hours, and the intervention providers. As observed with the previous

studies with the general population, Hispanic patients also had favorable results that indicated

effectiveness in multimodal DSME designs that incorporated telephone intervention, which

suggests strengthened in-person DSME supplemented by the telephone contact (Ferguson et al.,

2015).

Reportedly, African Americans are another vulnerable group to have T2DM. Among this

ethnic group, 12.7% have T2DM. They are more prone to have uncontrolled T2DM, which leads

them to develop diabetes complications such as nephropathy and retinopathy, distress, and

hospitalization related to those complications compared to the non-Hispanic whites

(Cunningham, 2018). A systematic review and meta-analysis that evaluated the African

Americans' A1c and quality of life after implementation of DSME showed no significant

difference in A1c level but significant enhancement in quality of life between the control and

intervention groups (Cunningham et al., 2018).

Similar to Ferguson et al.'s research, 12 out of 14 studies from Cunningham et al.

(2018).'s review indicated that the study authors incorporated culturally tailored interventions for

the African American patients, and 7 of those studies incorporated the same ethnic DSME

providers and provided dietary education based on the African American's diet preferences.

However, in contrast to the studies on the Hispanic patients, African American patients had non-

significant improvement in A1c, even though both ethnic groups received culturally tailored

DSME. Also, the authors of this review questioned whether the clinically significant quality of life improvement can be well-explained by the statistically significant improvement in quality of life.

According to the 21 meta-analyses that reviewed the DSME/S' efficacy on T2DM reported that A1c reduction varied depending on the length of follow-up periods, which ranged from 1 to 24 months, and the longer the follow-up period was, the less effective the DSME/S was on A1c reduction (Hermanns et al., 2020). Also, this review suggested that though diabetes education is already a traditional intervention as part of diabetes management, it is now shifting its focus from the knowledge and treatment adherence method to a motivational self-care-centered approach (Hermanns et al., 2020). This implicates that the knowledge and compliance of the treatment are essential but helping patients motivate and enable themselves to perform diabetes self-care would be more beneficial in the long term.

In a systematic review and meta-analysis of 25 studies on technology-based DSME/S, conducted by Greenwood et al. (2017), 18 out of 25 reviews had a statistically significant drop in A1c as a result. The primary technologies used in those reviews were mobile phones and secured message systems. Other types included email, text message, video conference, mobile apps, and wireless electronic devices. The main diabetes self-care areas evaluated in the studies were a healthy diet, physical activity, and lab monitoring. Greenwood et al. (2017) reported that the most effective interventions, which resulted in decreased A1c, utilized two-way communication between the patient and the health care team, patient-recorded health data, individualized education, and feedback. This result implicates that the efficacy of DSME/S can be achieved when all those elements occur accordingly until patients and their clinicians accomplish the goals.

Efficacy of Telehealth

Telehealth facilitates health care services through technology services such as telephone, text message, virtual conference, e-mail, and patient portals (Imlach et al., 2020). In this project, the term "tele-coaching" will be used, which will function to coach diabetes management through telehealth methods. Tele-coaching via phone, text message, and video conferencing can work as systems for T2DM control and its long-term management (de Vasconcelos et al., 2018).

Studies have shown significant improvement in diabetes management through telecommunication, and the benefits of this progress also include improved health care service performance at a reduced cost (Sarayani et al., 2018). According to Odnoletkova et al. (2016), a mixed-method study combined in a randomized clinical trial (RCT) with T2DM patients showed that many participants (97.5%) were satisfied with five monthly, nurse-led tele-coaching sessions via phone. In their qualitative interview, participants reported that regular recurring contact and management by the program's coach helped them with lifestyle modification. Also, they said that tele-coaching via phone was comfortable, time-efficient, and adaptable. Overall, improved understanding of diabetes and clinical outcomes with high patient satisfaction were noted. There was increased efficiency in diabetes education in nurses' view but providing tele-coaching only by phone was a challenge. They suggested that initial in-person contact would be beneficial in building rapport between the nurses and the patients. The general practitioners appreciated the tele-coaching diabetes education program, but several reported barriers. Those barriers include practitioners' reluctance in referral, managerial problems, hesitation in tele-coaching benefits and losing control, and non-readiness in accepting innovation.

Telehealth usage has become more noticeable since the worldwide pandemic with COVID-19 in 2020. In mixed-method research that interviewed patient experiences and

preferences on telehealth, high patient satisfaction was reported in general practice during the pandemic's lockdown period (Imlach et al., 2020). The stated reasons for high satisfaction were convenience and safe access to health care services without risking exposure to the virus from other people in the office. The study reported that the telehealth visit worked best for non-acute problems and when there was already an established rapport between the patients and the providers. However, the telehealth visit was not ideal for the problems that required physical examination. Patients who prefer face-to-face consultation or those with unidentified diagnoses preferred in-office visits.

Effects on A1c and BMI

The purpose of diabetes education is to promote learning opportunities for disease management to control diabetes and prevent or delay patients from developing complications from uncontrolled diabetes as much as possible. With telehealth's known convenience and efficacy, tele-coaching can help fill in the lack of diabetes education in patients with T2DM and improve their clinical outcomes such as A1c and weight loss.

In an RCT with patients with T2DM, tele-coaching intervention showed improvement in A1c, fasting blood glucose, high-density lipoprotein (HDL) levels, abdominal girth, body mass index (BMI), and blood pressures (de Vasconcelos, 2018). According to de Vasconcelos et al. (2018), the study supports the hypothesis. However, there is still not enough satisfactory level of studies showing the effectiveness of tele-coaching in making significant improvements with blood glucose control, weight loss, or reduced complications.

A systematic review to evaluate the effectiveness of interventions on clinical outcomes in patients with T2DM discussed that the findings showed a significant improvement in A1c following online tele-coaching interventions (Celik et al., 2020). However, the secondary

outcomes such as blood pressure, total cholesterol, diabetes distress, depression, and self-efficacy were not significant.

While some studies support the effectiveness of tele-coaching in improving A1c, some studies did not show significant improvement. Sandy et al. (2017) conducted a study to compare the effectiveness and time efficiency of telephonic care management and face-to-face program in patients with type 2 diabetes. Both the face-to-face group and telephonic case group achieved improvement in lowering A1c. Still, the results were similar between the two groups, despite the telephonic case group having more frequent follow-up. Also, in an RCT, the combination of telephone-delivered education and behavioral skills intervention did not significantly improve A1c compared to the control group (Egede et al., 2017).

In observations of the effects of tele-coaching on BMI, text messages effectively motivate patients, which promotes weight loss. In an RCT with patients with prediabetes, text messages and the in-person Diabetes Prevention Program (DPP) had more significant weight loss than patients who only received DPP classes (Fischer et al., 2016). Also, another randomized clinical trial in a parallel group of overweight or obese patients showed individually designed weight loss intervention or education through daily text messages with monthly phone calls had the best effect on weight loss (Godino et al., 2019).

A systematic review that evaluated the effectiveness of DSME intervention for patients who live in rural areas showed comparably improved metabolic effects, most commonly A1c, in both telehealth and in-person groups (Lepard et al., 2015). The observation made from this review is the association between the distances and number of samples and contact frequency with attendance rate and metabolic improvement. It was noted that the participants were less likely to drop out from the studies when the in-person intervention settings were closer, and the

attendance rates were higher with better metabolic controls when the participants had more frequent contact with the DSME providers (Lepard et al., 2015).

Effects on Self-Care

It is assumed that improved self-care will lead to improved clinical outcomes. In a randomized control trial study, the usefulness of tele-coaching via phone was studied in T2DM patients post-discharge from inpatient rehabilitation to determine blood glucose control, behavior, and emotion between the control and intervention groups (Döbler et al., 2018). After individual meetings with the patients, the intervention group was assigned individualized educational modules and a personalized action plan. In intervention group showed notable improvement, especially with A1c and physical activity. Also, their cardiovascular risk was reduced, and the result indicated improvement in mental well-being, disease burden, depression. On the other hand, a systemic review by Celik et al. (2020) showed that online self-care interventions did not show significant changes in self-efficacy, depression, diabetes distress, blood pressure, and total cholesterol, while A1c was improved.

Literature Gaps

In implementing telehealth to manage T2DM in the literature, several different methods were noted in implementing telehealth. Most of the literature focused on one delivery method of telehealth, such as the phone call or text message, and rarely combined two modalities. Also, most studies showed that the tele-coaching implemented in the studies is led by nurses, pharmacists, diabetes educators, and other coaches. However, it was difficult to find studies directly utilized by the practitioners to facilitate diabetes education to improve patients' self-care and outcomes.

Summary of Literature Review

       The literature discusses the point that tele-coaching effectively provides diabetes education and the continued management of the disease. Though not every piece of literature has significantly different results, it was clear that it helps with patients' motivation with lifestyle modification and thus improves clinical outcomes eventually, which is encouraging. The most significant barrier to tele-coaching is technical difficulties, the telehealth system's unfamiliarity, and lack of policy with support. Also, there is always the risk of breach of private information while using the technology, which causes anxiety and hesitation to try telehealth methods for health care services willingly. However, with the evolving world and the current pandemic problem, where nobody knows when this will end, the healthcare system will need to consider seriously working on the improved telehealth system. Tele-coaching is very promising in improving self-care and clinical outcomes in T2DM patients. Hopefully, tele-coaching will become a more frequently used method to continue to provide long-term care and patient education efficiently.

Chapter 3: Methodology

This project aims to observe the difference in self-care and clinical outcomes after providing tele-coaching diabetes education and patient perceptions of tele-coaching. This chapter describes two types of study methods done to obtain the results. First was a quantitative approach to measure A1c, weight to calculate BMI, and self-care. The second method was a post-intervention qualitative interview of participants to explore their experience. The procedure of the study involves the pre-intervention phase, intervention phase, and post-intervention phase.

Purpose and Objectives

The study's purpose was to evaluate the effectiveness of tele-coaching in patients with T2DM for self-care and clinical outcomes. The study's objectives were as follows: (a) to determine the efficacy of tele-coaching by comparing pre-and post-intervention A1c, BMI, and self-care, (b) to explore patients' perceptions on tele-coaching diabetes education and its impact on future health management, and (c) to emphasize the necessity of diabetes education by involving various methods of delivery.

Hypotheses

H_0 = Tele-coaching does not improve A1c, BMI, and self-care in patients with T2DM.

H_a = Tele-coaching improves A1c, BMI, and self-care in patients with T2DM.

Design

The project's final design was a mixed-method, quasi-experimental study to perform one group pretest-posttest research and post-intervention interviews. The study included quantitative and qualitative measures. Quantitative measures include pre-and post-intervention A1c, weight to calculate BMI, and self-care scores. The qualitative measure includes a post-intervention

individual interview with four structured interview questions on the participants' tele-coaching experience.

Initially, the methodological approach of this project was a quasi-experimental study with quantitative data only. However, due to the limitation in sample recruitment, the post-intervention qualitative interview was added to explore the value of tele-coaching diabetes education from the patient's standpoint.

Setting

There were two sites recruited for this project. The first site was a primary care office in Ooltewah, Tennessee. The second office was a community-funded medical clinic. They accept low-income and uninsured patients in Chattanooga, Tennessee, which also functions as a primary care practice. Initially, the office in Ooltewah was the only recruitment site, but with a low number of samples, the second office in Chattanooga was added. Due to the nature of the study involving tele-coaching, the DNP student and the participants met in person twice at their own primary care offices for the pre-and post-intervention measurements. The research site permissions were all obtained before the meetings with the participants (see Appendix D). Besides the two face-to-face meetings for measurement and interviews at the offices, every educational session was done through tele-coaching. There was no restriction on settings during the intervention. Typically, each participant utilized their residence as a setting.

Sample

The project's participants were recruited following the inclusion and exclusion criteria of the study. The study's inclusion criteria were the following: patients from either office, both sexes, adults age older than 18, diagnosis of T2DM with hemoglobin A1c (A1c) equal or greater than 6.5%, understanding English, access to the internet, email address for zoom, owning a

smartphone or any regular phone with a text message function, and owning a glucometer with its supplies such as lancets and strips. Exclusion criteria were the presence of any physical or mental medical conditions that do not enable a participant from performing self-care activity or have medical conditions that may put a participant at risk for injury or worsened the condition by increased physical activity and changed diet, type 1 diabetes, and T2DM with A1c less than 6.5 percent.

Protection of Human Subjects

Before the study, the DNP student completed the Collaborative Institutional Training Initiative (CITI) Program training (see Appendix C). The CITI training provided the research ethics education to conduct a research study safely. After the CITI training, this Scholarly Project's research approval was requested from the Institutional Review Board (IRB) of Southern Adventist University. The IRB decided that all human subjects are protected with minimal to no risk in the process after reviewing the application, which addressed informed consent, benefits versus risk, voluntary participation, procedures, and tools, and approved this scholarly project (see Appendix A).

Abiding by the Health Insurance Portability and Accountability Act (HIPAA) of 1996, the HIPAA release consents to access the medical record were obtained prior to the study. All participants' confidential information was safely saved and locked as electronic documents in the computer. Also, the login information to electronic records was never disclosed or left unattended. Any confidential documents were never disclosed to anybody else or discarded as regular trash. Their medical records were never accessed unnecessarily. All the personal identifiers were not shared with anybody, and each participant was assigned a unique code such as P1, P2, or P3.

All participants were fully informed about the procedure before signing the informed consent (See Appendix B) during the pre-intervention meeting. Participants' agreement on audio recording for the post-intervention interview was obtained with informed consent. The study incentive was not discussed to cohort someone to participate during the recruitment process. It was only discussed during the pre-intervention phase after the participant confirmed to join the study. It was explained that incentive is only applicable to those who complete the study, and it is an opportunity to draw a Walmart gift card. Only one person wins the $50 Walmart gift card, and the rest of the group draws a $20 Walmart gift card.

Instruments

The primary technology used for tele-coaching was smartphones or regular cell phones with a text message function throughout the intervention phase. Those who owned smartphones and opted to do online face-to-face sessions had to download the "Zoom" free smartphone application. Zoom is a smartphone application that offers video conferences. Those who did not own smartphones or did not want to use Zoom chose to do the weekly tele-coaching sessions through phone calls. Text messages were used for the action prompts sent out twice a week.

The weight measurement was done with a portable digital weighing scale. This scale was newly purchased before the study, and it was a stainless-steel scale with 400 lbs capacity from Taylor. Since the participants were recruited from two offices, a portable digital scale was used to stay consistent with the baseline weight obtained before the intervention. Checking the A1c, the A1CNow+ from pts Diagnostics was used. The A1CNow+, the portable hemoglobin A1c monitor, is an easily handled instrument by health care professionals and patients. It is officially approved by the International Federation of Clinical Chemistry and Laboratory Medicine and the National Glycohemoglobin Standardization Program for its use (Jiang et al., 2014). According to

the study that tests the accuracy of the A1CNow+, the A1CNow+ test results showed a minimally negative bias. Still, they had good matching values with the reference values of the high-performance liquid chromatography (HPLC) test, which is the current lab work to check hemoglobin A1c at the lab with venous blood samples ($p = .01$) (Jiang et al., 2014). This portable device is chosen as an instrument to check hemoglobin A1c over the HPLC due to possible financial burdens in patients, limited reimbursement, and easy accessibility with proven accuracy for hemoglobin A1c check specifically for this project.

Obtaining the A1c with this portable A1c monitor is similar to the typical blood glucose monitor patients use. With every A1c test, each participant sanitized their hands with alcohol-based hand sanitizer before a fingerstick with a lancet to obtain a small blood sample of 5 μL, and the test took 5 minutes to result. Each test required opening a new cartridge, blood chamber, and lancet, so there was no blood contamination between each test. Also, the DNP student sanitized her hands with alcohol-based hand sanitizer and wore clean disposable gloves during each test. The clean disposable gloves were changed out after each test. The DNP student was the only person handling the monitor, and the monitor was cleaned with bleach wipes between each participant. The DNP student purchased the monitor and its supplies, and there was no cost to the participants.

The Summary of Diabetes Self-Care Activities (SDSCA) Questionnaire measured the participants' diabetes self-care activities (see Appendix H). The SDSCA measure assesses the essential aspects of diabetes self-care activities, including diet (general and specific), physical activity, blood sugar monitoring, foot care, smoking, and medication compliance. This was a self-report questionnaire where the participants marked the frequency of each self-care activity,

they performed over the past seven days. The DNP student used the revised SDSCA scale from the article, "The Summary of Diabetes Self-Care Activities Measure: Results from 7 studies and a revised scale" by Dr. Toobert et al. (2000) because the revised scale had additional self-care activity items to measure. Twelve questions from the SDSCA questionnaire were used for this project, including the original 11 items and one additional item to measure medications compliance. The scoring was done by adding the mean scores of each item. This measure was examined for its validity, reliability, and normative data with 1,988 participants who have diabetes from seven different studies. The result showed high inter-item correlations between the scales except for specific diet ($M = 0.47$), moderate test-retest reliability correlations (mean = 0.40), and the effectiveness of the measure's subscales was validated by correlations with different measures of diet and physical activity (mean = 0.23) (Toobert et al., 2000). The DNP student was granted permission to use this measure by Dr. Deborah Toobert, one of the article's authors that reviewed the validity of the SDSCA measure (see Appendix E). The instrument was obtained after paying $25 to the Oregon Research Institute because the National Institutes of Health no longer support it.

The post-intervention qualitative interview questions were added due to the limited number of samples for the study. The purpose of the post-intervention interview was to explore the participants' experience perceptions on tele-coaching diabetes education. The DNP student sought advice on developing validated interview questions. The final interview questions were reviewed and approved by the DNP Academic expert in the School of Nursing at Southern Adventist University. This qualitative interview consisted of four themes: two most meaningful takeaways, two most difficult challenges, tele-coaching versus in-person office visits, and impact on future health and diabetes care. Each theme was asked with following questions:

- Theme 1: Two meaningful takeaways. "What are the top two useful or meaningful takeaways from this diabetes education program?" This first question was asked to explore what benefited them the most through this tele-coaching program.

- Theme 2: Two most difficult challenges. "What are the two things that were too difficult to implement?" This question was asked to explore the most challenging areas for the participants to implement the knowledge they gained from the tele-coaching program.

- Theme 3: Tele-coaching versus in-person office visits. "How did you feel about phone or Zoom tele-coaching versus in-person office visit interactions?" This question was asked to explore the participant's perception about tele-coaching compared to the in-person office visit.

- Theme 4: Impact on future health and diabetes care. "What impact do you anticipate this diabetes education will have on your health and diabetes care in the future?" This question was asked to assess how the participants could utilize the diabetes knowledge they gained from this program.

The DNP student purchased the monitor and its supplies, and there was no cost charged to the participants. There were no grants to support the study's financial aspects, and all the expenses, including the instrument and the incentive gift card purchases for the study, were solely covered by the DNP student.

Study Intervention

The intervention involved an 8-week tele-coaching diabetes education program with weekly 20-minutes individual Zoom or phone call sessions, and action prompts were sent out through individual text messages twice a week. For this project's diabetes education, an educational handout titled, Basics of Diabetes was used for every tele-coaching session. This

educational handout was obtained from the Scripps Health website (www.scripps.org) with an inference to use it without formal permission because it was an open resource that can be downloaded as a PDF file. The handout was designed for the health care providers to use for patient education. The topics included are diabetes types and monitoring, healthy diet, physical activity, medications, reducing risk, problem-solving, healthy coping, action plan, and resources. With each session, two topics from the diabetes handout were covered:

- Week 1: During this week, the types of diabetes with its monitoring and a healthy diet were covered. Patients learned the differences among type 1, type 2, prediabetes, and gestational diabetes. They learned the rationale for checking blood sugar and when and how to check them. The reference range for blood sugar (glucose level) and hemoglobin A1c. Symptoms of hyperglycemia and hypoglycemia with the recommended actions to take. Also, sharps disposal was discussed. For healthy eating, patients learned about different nutrition groups, including carb serving, portion sizes, food labels, facts about sugar, and effects of alcohol on diabetes.

- Week 2: On this week, physical activity and medications were covered. For physical activity, participants learned why they needed to exercise and discussed what exercise they could do. The frequency and length of exercise and the safety tips for exercise were discussed. For diabetes medications, patients learned about the classification of their diabetes medicines, how it works, and how to take them. They learned the differences between the pills and injectable diabetes medication, including insulins. The insulin syringe and pen instructions and how they are stored were discussed with insulin education.

- Week 3: The third week covered reducing risk and problem-solving. Reducing risk included how diabetes affects the heart, feet, kidneys, eyes, teeth, gums, sexual health, and depression and ways to minimize the risks. Patients learned about the standard of care for diabetes, heart and blood vessel diseases, foot care, and smoking cessation. For problem-solving, patients learned what to do if they get sick in terms of eating and drinking, taking medication, checking blood sugar, and when to call the doctor. Also, diabetic ketoacidosis (DKA) was discussed with its causes, warning signs, and seriousness.

- Week 4: The fourth week covered a healthy coping and action plan. Healthy coping addressed the emotional impact of diabetes and coping skills. Action plans include setting goals in diabetes self-care. In addition, online resources for diabetes management were introduced.

- Week 5: The fifth week reinforced concepts of exercise routines and a healthy balanced diet, particularly limiting the snacks in between the meals. Also, self-care progression was discussed, and any questions that the participants had were answered.

- Week 6: The sixth week reiterated the importance of medication adherence and reducing risk through proper diabetes self-care.

- Week 7: The seventh week reviewed the concepts of problem-solving related to controlling blood glucose and healthy ways of coping with the disease burden.

- Week 8: The eighth week reinforced the importance of sustainable action plans and utilization of resources. Lastly, any questions or concerns were addressed.

A simple command related to diabetes self-care activity was sent out to the participants for the action prompts twice a week. Each text was individualized for the participants' needs. Examples

of action prompt included "This is action prompt message. Please try to avoid snacks in between your meals and drink less juice," or "Please make sure to check your blood sugar and take your diabetes medicine." Action prompts functioned as reminders and motivators for diabetes self-care activities.

Procedure

The study procedure involved three phases: pre-intervention, intervention, and post-intervention, with data collection. The pre-intervention phase encompasses consents, initial measurements, tele-coaching tool demonstration, and tele-coaching schedule. The intervention phase includes tele-coaching education and action prompt. The post-intervention step involves final measurement, post-intervention interview, and incentive.

Pre-intervention phase: Initial meetings with participants were made at the offices, and the appointments were made over the phone before the initial meeting. Each meeting lasted about 30 minutes per participant. First, the consent and HIPAA Authorization forms were obtained (see Appendix F). The information on the consent form was explained in detail to each participant. Then, height, weight, A1c, the SDSCA questionnaire, and a demographic survey were obtained. Height was obtained by patient statement since it is a fixed number, unlike weights. The demographic survey asked about gender, age range, ethnicity, marital status, education, and employment status (see Appendix G). After the survey and the tests were done, the DNP student educated the participants on downloading and using Zoom on their smartphones for those who chose Zoom. Then, the DNP student had them do a return demonstration. Lastly, the participants selected available appointment times and days for the weekly tele-coaching session for the following 8-weeks.

Intervention Phase: As discussed under the study intervention, two topics from the diabetes education handout were covered each week for the first four weeks. Those topics were repeated for the rest of the four weeks. Participants joined the sessions via zoom or phone calls. If a participant missed a session, they had to reschedule for the missed session. The action prompts were sent twice a week to each participant via text messages during this intervention period.

Data Collection/Post-intervention Phase: The study data was collected during the post-intervention phase. The post-intervention phase began once all the participants completed eight weeks of tele-coaching. Upon completion, each participant had a face-to-face post-intervention meeting with the DNP student back at the office by making an appointment. Participants' weight and A1c were rechecked through the same process as the initial/pre-intervention meeting. Participants answered the SDSCA questionnaire again to measure their post-intervention diabetes self-care activities. Lastly, each participant answered qualitative interview questions, and their responses were audio recorded for future review. Lastly, all participants have given thank you cards and Walmart gift cards as an incentive.

Plan for Data Analysis

In analyzing the collected data, the IBM SPSS Statistics software was used. Pre- and post-intervention scores were analyzed using descriptive statistics for A1c, BMI, and SDSCA scores for the quantitative analyses. Each measure was tested for whether it met the assumptions for a paired-samples *t*-test. These assumptions are that the data at both time points are normally distributed, tested using the Shapiro-Wilk test, and have equal variances, tested using Levene's test. A Wilcoxon signed-rank test, a non-parametric equivalent that does not have distributional assumptions, was used if the normality assumption was not met. If variances were found to be equal, a Student's paired-samples *t*-test was used; otherwise, Welch's *t*-test was used. The

statistical significance was set α = .05. Additionally, effect sizes were measured using Cohen's *d*, a measure of standardized mean differences between two groups. Following Cohen's (1992) guidelines, small, medium, and large effects were defined as *d* = 0.20, *d* = 0.50, and *d* = 0.80, respectively.

Scientific Merit

The study's methodology was approved by the IRB at Southern Adventist University to ensure that the project's study design is safe to perform. Considering the risks and benefits of this study, the study's design had minimal risk. Also, it was methodologically reasonable and safe to answer the research question. The procedure consisted of patient education to achieve improved self-care behavior and clinical outcomes, measured by the scientifically validated tools.

Statement of Mutual Agreement with the Agency

In obtaining consent to involve both offices, the office manager, the executive director of the clinic, and the providers were contacted before the recruitment of participants. The project proposal and IRB approval were shared with the administration of each clinic and obtained official consents to recruit patients from their clinics and utilize their available office space for pre-and post-intervention meetings.

Summary of Methodology

To best fit the study into the purpose of the study, evaluating the effectiveness of tele-coaching to improve self-care and clinical outcomes in T2DM patients, a quasi-experimental pretest-posttest was used. It was a single group study to compare the results before and after the tele-coaching intervention. A qualitative interview to obtain patient perceptions was added to the quantitative data due to the small sample size. Thus, the study was modified to a mixed study,

single sample quasi-experimental study. Participants' agreement to participate in the research study and their pretest data were obtained before the intervention. The intervention consisted of 8-weeks of tele-coaching with weekly Zoom/phone call sessions and action prompt text messages twice a week. After the eight weeks, participants were evaluated for the posttest data. At the end of the evaluation, participants who completed the study were given a thank you card and an opportunity to draw a Walmart gift card. Only one person won the $50 Walmart gift card, and the rest of the group drew a $20 Walmart gift card.

Conclusion

Many modifications have been made to the methodology until the intervention was started. Due to the limited number of people recruited and the participants' preferences on the mode of delivery, phone call options in addition to Zoom had to be included. Also, a qualitative method had to be added due to the small number of people to bring increased meaningfulness to the study. Designing the best research method was very challenging because the method had to be ideal for the population, settings, time, and the study's goals. In conclusion, designing the suitable method for this was experienced as one of the most crucial parts of the study.

Chapter 4: Results

The total implementation time of this Scholarly Project took twelve weeks, from July 2021 through October 2021 including pre-and post-intervention measurement period. This chapter will consist of quantitative (BMI, A1c, and diabetes self-care score) measurement outcomes and qualitative post-intervention interview responses. Also, the description of the sample, demographics, project variables, analysis of project question, and hypothesis will be covered.

Description of the Sample

The total number of recruited participants was 14 at the beginning of the study. One participant dropped out at the beginning of the intervention, and two participants dropped out towards the end. The final number of participants who completed the study was 11. Among the 11 participants who completed the study, four joined the weekly session via Zoom, and seven opted to participate via phone calls. All of them participated in twice a week, text message action prompts.

Demographics

Among the 11 participants, the majority were middle-aged Caucasian females, followed by African American females. Also, the majority were married, and they were high school graduates. Employment-wise, most of them were either non-employed or retired.

Table 1

Demographics

Gender	Age	Ethnicity
Female: 9 (81.8%)	25-34: 1 (9.1%)	Caucasian: 5 (45.5%)
Male: 2 (18.2%)	45-54: 3 (27.3%)	Hispanic/Latino: 2 (18.2%)
	55-64: 3 (27.3%)	African American: 3 (27.3%)
	65-74: 2 (18.2%)	Asian/Pacific Islander: 1 (9.1%)
	75 and older: 2 (18.2%)	

Marital Status	Education	Employment Status
Single:2 (18.2%)	No schooling completed: 2 (18.2%)	Non-employed: 4 (36.4%)
Married: 6 (54.6%)	High school graduate: 5 (45.5%)	Part-time employed: 2 (18.2%)
Widowed: 2 (18.2%)	College credit-no degree: 2 (18.2%)	Full-time employed: 1 (9.1%)
Divorced: 1 (9.1%)	Bachelor's degree: 1 (9.1%)	Retired: 4 (36.4%)
	Master's degree: 1 (9.1%)	

Project Variables

The independent variables were tele-coaching diabetes education, including weekly Zoom/phone sessions and twice a week action prompts. The study's dependent variables were BMI, A1c, and diabetes self-care score.

Table 2 presents the descriptive statistics for the three measures at each time point and the *p* values for the Shapiro-Wilk tests of normality (note that $p > .05$ is indicative of normally distributed data). As both time points for A1c and post-intervention SDSCA were not normally

distributed, the pre- vs. post-intervention comparisons for A1c and SDSCA scores were conducted using Wilcoxon signed-rank tests rather than paired-samples *t*-tests. Additionally, the Levene's tests were non-significant for BMI ($F(1, 20) = 0.02$, $p = .893$). It was assumed that both measures met the assumption of homogeneity of variances. As such, Student's paired-samples *t*-tests were used for these analyses.

Table 2

Descriptive Statistics of BMI, A1c, and SDSCA Score at Pre- and Post-Intervention

Measure	Time Point	*M* (*SD*)	Shapiro-Wilk *p*
BMI	Pre-intervention	30.18 (5.91)	.132
	Post-intervention	29.87 (6.08)	.164
A1c	Pre-intervention	9.01 (2.22)	.007
	Post-intervention	8.40 (1.96)	.007
SDSCA	Pre-intervention	26.27 (5.96)	.223
	Post-intervention	32.50 (3.94)	.030

The paired-samples *t*-test investigating whether BMI changed from pre- to post-intervention was not statistically significant, and the effect size was small ($t(10) = 1.174$, $p = .268$, $d = 0.35$). The Wilcoxon signed-rank test examining changes in A1c from pre- to post-intervention was also non-significant, and had a small effect ($V = 33.50$, $p = .213$, $d = 0.43$). Lastly, the Wilcoxon signed-rank test examining changes in SDSCA score from pre- to post-intervention was statistically significant: scores increased across time, and the effect was large ($V = 4$, $p = .006$, $d = 0.92$). Figures 1-3 are box plots showing the changes in measures across time.
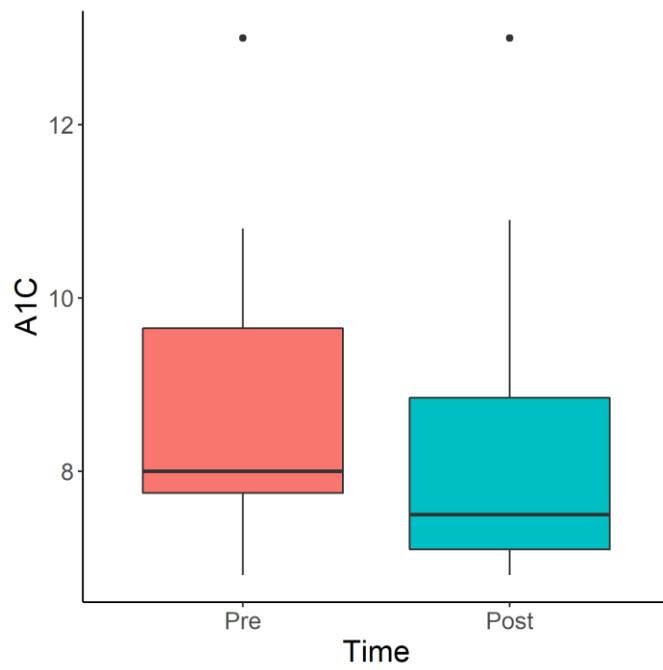
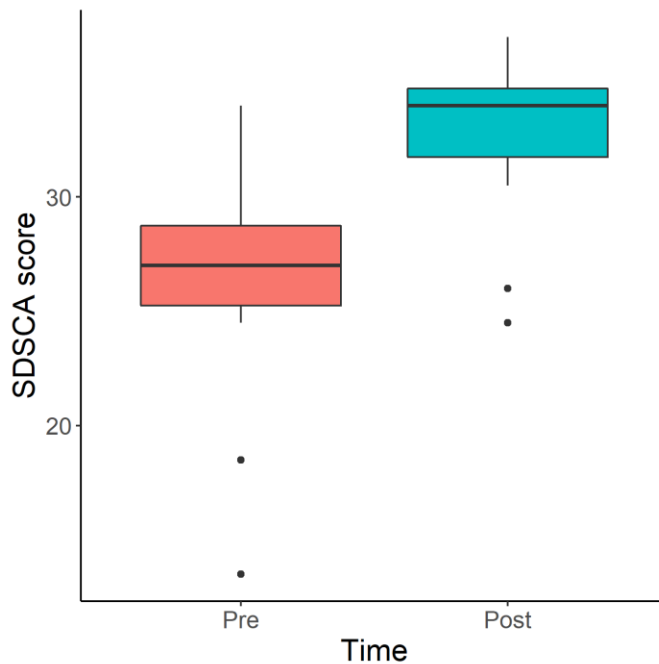**Figure 2**

BMI at Pre- and Post-Intervention
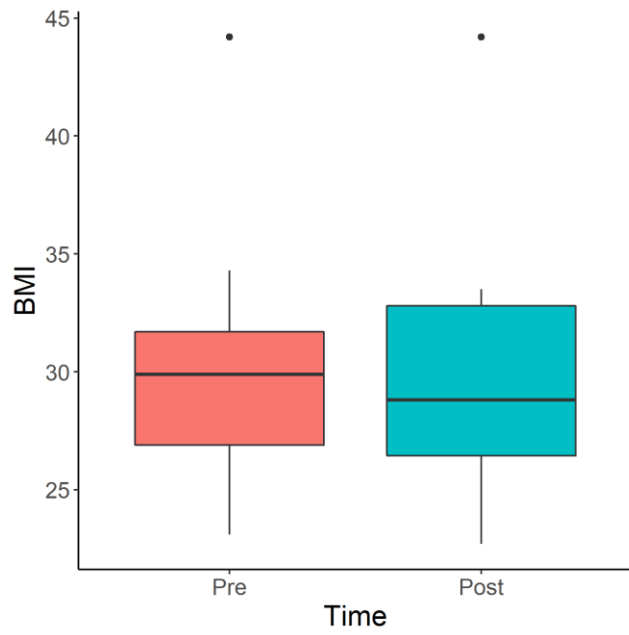
Figure 3

A1c at Pre- and Post-Intervention

Figure 4

SDSCA Score at Pre- and Post-Intervention

Each participant proceeded with a qualitative interview after the eight weeks of tele-coaching intervention. This qualitative interview consisted of four themes. For the validity of the questions, the DNP Academic expert in the School of Nursing at Southern Adventist University reviewed and approved the questions developed by the DNP student. Following are the questions that were asked of the participants and their responses. All participants' real names were not reported in this study. Instead, the assigned unique codes were used to represent participants.

Question #1: Two most meaningful takeaways

The majority (90.9%) of the participants stated that diet and exercise were the most valuable takeaways from the tele-coaching.

"Learning about carb counting, nutrition labels, serving sizes, and healthy food choices was very helpful." [P1]

"Information on healthier eating helped a lot, but I also learned that exercise needs to go along with the diet as well." [P8]

Besides the diet and exercise, one participant mentioned that learning about her diabetes medications and their classification, mechanisms of action, the purpose of the medicine, and side effects helped a lot in better understanding the treatments. She stated that it helped her with medication compliance. Another participant mentioned that the resources provided, such as links to the American Diabetes Association and the Academy of Nutrition and Dietetics, were beneficial. She stated that the healthful recipes obtained from those resources are helpful because each recipe displayed the nutrition facts, ingredients, and cooking instructions.

Question #2: Two most difficult challenges

Participants' responses showed that diet change (72.7%) and motivation for exercise (54.6%) were the topmost difficult areas. Mainly mentioned statements related to motivation were "Making up my mind to exercise" [P3], "getting up and do it" [P5], "carving up the time after work and dealing with kids and just trying to get it done" [P7], "It was all matter of will power and knowledge" [P8], "getting up and moving around" [P11]. Also, unexpected family deaths affected a participant's motivation. Following the diet and exercise, three participants also mentioned that checking blood sugar regularly and complying with medication regimens due to side effects and insurance coverage was challenging.

Question #3: Tele-coaching versus in-person office visit

Seven participants (63.6%) preferred tele-coaching education instead of receiving education through an in-person office visit. Four participants (36.4%) preferred in-person visits or stated that they were about the same. Many participants who liked tele-coaching indicated that it is convenient and time-efficient, especially when working and raising children. Also, other

opinions included being more personal, casual, and risk-free from COVID-19 exposure. Those who preferred in-person visits agreed with convenience and time-efficiency, but it would be easier to learn it is done face-to-face and has no distraction from kids and other family members while they are in the office. Four participants (36.4%) directly mentioned that action prompts sent twice a week helped them get reminded and motivated to make plans into actions.

Question #4: Impact on future health and diabetes care

All eleven participants (100%) expressed that this tele-coaching diabetes education will positively impact their future health and diabetes care.

Participants 1, 3, and 11 stated that the educational handout and resources provided for the study would be helpful.

"It will be helpful with booklet, recipes, other resources." [P1]

"I like the information you gave me so that I can refer back to it. This education gave me more in-depth information about diabetes." [P3]

"It motivated me to do better. Resources will be helpful." [P11]

Participants 5 and 8 expressed that they hope to come off the diabetes medicines.

"I hope I can get back to where I'm supposed to be without the medicines." [P5]

"It will help with weight loss and cardiac health. I hope to get rid of diabetes medicines." [P8]

Other responses include:

"It will be helpful, and it will happen if I do it." [P4]

"It will have a good impact if I follow through. The more I do it; it is getting easier." [P6]

"It has already made a difference." [P7]

"It will help me, especially in understanding medicines." [P8]

"I can even teach and support somebody else." [P10]

Analysis of Project Questions and Hypotheses

The hypothesis for this study was that tele-coaching improves self-care and clinical outcomes in T2DM. The results of the study partially support the hypothesis. The BMI and A1c did not significantly change, and the effect sizes were small. On the other hand, SDSCA showed an increase in participants' diabetes self-care score after the intervention, which resulted in statistical significance with a large effect size. From qualitative aspects of the study, the participants' responses showed that the education has already started to impact the participants' diabetes self-care and their motivation, and tele-coaching has shown more frequent support in reminding the people for continuous self-care.

Though this project was designed to educate the participants and support them in improving their A1c, BMI, and self-care, it also seems to impact their friends and families who have diabetes positively. During the weekly sessions and final evaluation phase, several participants stated how they were able to share the information they received from this study with their friends and families who suffered from similar problems and encourage them to make changes in their diabetes management journey. Though this unintended phenomenon cannot be explained through numbers, it is a positive impact that good education and support can bring out to a larger population.

Conclusion

The length of the intervention for this study was only 8-weeks. Though the numbers for clinical outcomes did not show significant changes, the participants' behavior towards their diabetes self-care started to change. The knowledge about diabetes self-care varied from person

to person, from no knowledge to some understanding. Their length of having T2DM also ranged from zero to ten plus years. Regardless of their backgrounds and circumstances, participants expressed that they gained in-depth knowledge about diabetes and tackled their problems more tactically. Weekly phone or Zoom calls with frequent action prompt messages have conscientiously engaged them more to self-care.

Chapter 5: Discussion

Relationship of Outcomes to Research

The study's overall purpose was to evaluate whether diabetes education through tele-coaching effectively improves A1c, BMI, and self-care in patients who have T2DM. The results of the quantitative data showed that diabetes self-care showed a statistically significant improvement, whereas the A1c and BMI were not statistically significant after the 8-weeks of intervention. In addition to the quantitative data, qualitative evaluation has been added at the end of the study to evaluate each patient's perception of tele-coaching diabetes education, including meaningful takeaways, challenges, preference between tele-coaching and in-person office visits, and future impacts on health and self-care. The interviews implicated that diabetes education through tele-coaching may be effective in the self-care management of diabetes. Though four out of 11 participants preferred in-person interaction over tele-coaching, all the patients expressed positive changes and anticipate better self-care and health in the future.

Observations

In this study, there were no unexpected outcomes. Instead, some patients' results were as expected based on the observation made during the intervention phase. There were five (45.5%) patients whose A1c did not change or increase post-intervention outcomes. In BMI, there were four (36.4%) patients whose BMI did not change or improve. There were two (18.2%) patients whose self-care score went down. When speculating about the results, the individuals who had these outcomes experienced acute illnesses such as COVID-19 infection that required hospital admission, other upper respiratory diseases, ankle fracture, other exacerbated chronic conditions, multiple unexpected family deaths, minor surgeries, lawsuits, or failure in medication adjustment from their primary care provider. These factors are strongly suspected of affecting the outcomes

by limiting self-care activities that need to be carried out. Thus, it is complicated to say that the statistical approach explains everything about the sample and its outcomes. Statistics allow people to see the facts and trends of the collected data in numbers, but managing diabetes requires looking beyond the numbers.

Since there were two sites where the patients were recruited, a new portable weighing scale was purchased and used to measure the patients' weights to be consistent pre-intervention and post-intervention. However, there was some difference between the office scale and the portable scale, despite the DNP student placing the portable weighing scale on the hard surface when measuring the weights. The focus of the measurement was more on the weight loss after the intervention; however, there were some challenges in measuring the accurate weight because the patients had different clothing each time. Also, some other factors such as food consumption before weight check or certain medical conditions requiring diuretics may have affected the weight.

The SDSCA questionnaire was a valuable instrument to assess whether each patient increased in the number or the frequency of each category of diabetes self-care. However, answering the questionnaire can be confusing because it only asks about the frequency of self-care done for the past 7 days. Ideally, patients should do all aspects of diabetes self-care, including diet, exercise, taking medications, foot care, and checking blood sugar daily. Still, self-care activities may be affected by certain factors such as illnesses or unexpected events. The questionnaire intends to look at the increased frequency of self-care activities. However, a limitation is still presented. So, it would be difficult to conclude that those who did not have increased self-care scores did not improve from their baseline.

Certain demographical characteristics were notable during the intervention period. Gender-wise, it was observed that females were more active in tele-coaching interaction during the study. They were more likely to discuss their experience, express their feelings, and ask questions more than the male participants. Also, they were more likely to text back and report their progress through text messages, though it was not asked to do. Age-wise, participants aged 45 to 64 were more motivated to self-care improvement than the other age groups. Education-wise, participants with no schooling completed had more difficulty understanding the materials. Additionally, retired, and full-time employed were more likely to improve self-care and the measurements. There was no notable observation made with ethnicity or marital status.

Limitations

One of the limitations was the small sample size. The recruitment process started with 87 potential participants, and it was finalized with 14 confirmed. The initial 87 people were only selected based on the diagnosis of T2DM and A1c $\geq$ 6.5%. Then, all 87 people were individually called to confirm whether they met the rest of the inclusion criteria and were willing to join the study. Some people still declined to join the study among those eligible for the study. The reasons include scheduling difficulty, indifference in research participation, or experience of participating in another tele-coaching program.

Another limitation of the study was the short intervention period. Typically, patients recheck their A1c at the office every 6 to 12 months as part of the follow-up. It takes at least 3 months to recheck A1c. However, due to the time limitation of the implementation period, a total of eight weeks was offered before the recheck.

One of the most common concerns of the patients was a technical difficulty. Zoom was chosen for the mode of delivery to see each other's faces to increase familiarity, connection, and

interaction. Not all patients owned smartphones where they could download Zoom, and even if they owned smartphones, electronic tablets, or computers, not all of them were confident using those electronic devices. Some of them expressed confusion and frustration operating the devices to use Zoom. Also, an unstable internet connection or signal became a problem for those who decided to join through Zoom. This technical difficulty led some participants to transition to regular phone calls instead of Zoom.

Implications for Practice, Policy, and Education

Though T2DM is a chronic disease listed as one of the top causes of death in the United States, many patients are still reluctant to make improvements in disease management, which is hugely impacted by self-care, or they may not know the importance of diabetes self-care and how to perform self-care activities properly. As it is very well known that diabetes is a silent killer and people die from diabetes complications, patient education needs to be provided as soon as the diagnosis is made and reinforced as much as possible. Though it is mainly dependent on the patient to pursue improved diabetes self-care, it is the provider's responsibility to follow the optimal goal for diabetes through continuous education and reinforcement with motivation. With the advancement of educational platforms with telehealth, patients can easily access diabetes education. Primary care providers can overcome the gap in diabetes education by choosing the most suitable educational mode of delivery, including telephone, text messages, video conferences, emails, online programs, or smartphones.

One way to efficiently sustain and promote patient education is to create or purchase educational materials such as visual handouts. That serves as an excellent reference for the patients to go back and educate themselves and remind them to manage themselves better. The more visually pleasant and easy to read, the better it is for the patient's understanding. Also,

developing a simple way to remind and encourage the patient for self-care management will be very helpful. People need to be constantly reminded until self-care becomes part of their lifestyle. Leaving a voice message, text message, or email will all work without causing time constraining or cost.

As observed from the qualitative interview, not all patients find the telehealth approach comfortable. Thus, it is still essential to know the other resources to introduce the patients to diabetes education and support. There are several diabetes resources available through health insurance programs, support groups, local lifestyle management programs, and medicine/supply assistance programs (National Institute of Diabetes and Digestive and Kidney Diseases, n.d.). Also, involving an interprofessional team is recommended. Commonly, the interprofessional team approach enables more tailored education to patients, enhances preventive care, decreases health care expenses, and results in better patient outcomes than the care provided by the single provider (Szafran et al., 2019). In fact, before the study, one of the participants already involved a dietitian and a bariatric specialist for weight loss through diet change. She had very satisfying results with her weight and lab work.

To disseminate this project's outcome, the DNP student presented the study outcomes to fellow DNP students and the faculty in the School of Nursing at Southern Adventist University. Also, the results may be shared with the health care providers at the office settings or meetings and discuss the findings with them to adjust the intervention to fit the population's needs for sustainability. This study will suggest more approachable ways to increase patient education and motivation in diabetes management through tele-coaching, thus promoting the concept of the Health Belief Model and the CREATION Health theories.

Application to Theory

The theoretical frameworks of this study are the Health Belief Model and the CREATION Health. The Health Belief Model predicts the preventive health behaviors and develops interventions based on those predicted behaviors. The concepts of the Health Belief Model are perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cue to action, and self-efficacy (Glanz et al., 2015). CREATION Health illustrates health promotion in all health aspects that affect an individual's life (AdventHealth, n.d.). The concepts of these theoretical frameworks are believed to be appropriately applied in every step of the study.

First, patients perceive that they are dealing with diabetes, which can continually worsen if not controlled (perceived susceptibility). Then, the patients understood that they would develop diabetes complications faster if they did not control their diabetes (perceived severity). The patients perceived that improving diabetes self-care can decrease A1c and BMI (perceived benefits). The patients became aware that weight loss and glycemic control through diabetes self-care will prevent them from developing diabetes complications early, even though self-care is challenging (perceived barriers). The patients decided to improve their diabetes self-care and learn about the disease through tele-coaching (cue to action). The patient learned about lifestyle choices that CREATION Health promotes, including nutrition, physical activity, choice, rest, and environment (circumstances). Also, emotional support through positive outlook, faith, and support (interpersonal relationships) was offered depending on the patients' preference. Lastly, after receiving the education repeatedly and being reminded to perform self-care frequently, the patients improved self-care (self-efficacy). Every patient was in different steps of the Health Belief Model, and not all knew how to perform the self-care properly. The DNP student had first

to assess which efforts the patients were at and guide them to ultimately reach the last two steps of the Health Belief Model, which are a cue to action or self-efficacy.

Application to Practice

Initiation of early patient education, utilization of resources, collaborative interprofessional approach, and incorporation of telehealth are the suggestions based on the outcomes and observations made throughout the study. These suggestions are not unknown to the providers; however, this study reinforces the possibility of improvement in patient outcomes. In addition to those suggestions, individualized patient education and support will be necessary. Every patient has their strengths and weaknesses in self-care, and tailored diabetes education will be essential to reinforce the areas of weakness. Not all patients with T2DM will need tele-coaching diabetes education, but it will be beneficial for patients who need tighter management and support through more frequent and personal contact.

With the emergence of the Covid19 pandemic, more telehealth or telemedicine services are reimbursed by private insurers and Medicare (Health Resources & Services Administration, n.d.). Telehealth may continue to grow as an essential modality to deliver patient care supported with increased accessibility and reimbursement policies and continuous usage by the health care providers and patients even beyond the current pandemic (Koonin et al., 2020). With the current trend of telehealth with its convenience and cost-effectiveness, it is foreseeable that diabetes education through telehealth, whether provided by the primary care provider, nurses, or diabetes educator, will be sustainable and reimbursable.

Implications for Future Study

Future research should aim for larger sample size by adjusting the inclusion criteria. This may be feasible if future studies include patients with prediabetes and T2DM. Additionally,

changing the delivery method of diabetes education would be necessary. If most of the sample population are elderly, frequent telephone calls would be a better choice than smartphone applications. Also, utilizing an advertisement approach at the potential sites would be helpful. Advertising the study with visual handouts and posters at the sites will be more approachable to the patients than the recruitment calls.

In this type of study, where patient education is the primary intervention, collaboration with the interdisciplinary team would increase the quality and efficiency of the intervention. For instance, collaborating with a dietitian and certified diabetes educator, nurses, or medical assistants during the intervention phase would allow a more structured and efficient intervention instead of a single researcher. Also, working with a bilingual researcher depending on the target population's major languages would aid in the sample recruitment and not be limited by the language barrier.

It will be helpful if future researchers can interview the patients who decide to stop participating during the study. The DNP student attempted this on the patients who chose not to continue the study, but they could not be reached. For future research, interviewing those patients will also provide good perspectives and suggestions for improvement. For future research, interviewing those patients will also provide good perspectives and suggestions for improvement. Also, having a control group and intervention group involving in-person education during the routine visits versus in-person education with tele-coaching support would provide an idea of whether tele-coaching is meaningful when received along with the traditional education method.

Conclusion

The purpose of this Scholarly Project was to evaluate the effectiveness of diabetes education through tele-coaching in patients with type 2 diabetes for improved self-care and clinical outcomes, including A1c and BMI. The study's results partially supported the hypothesis reflected by statistically significant improvement in self-care without significant changes with A1c and BMI. The encouraging implication from the participant's responses to the study was that they started to notice the difference in their confidence with diabetes self-care and appreciated the extra knowledge and support through tele-coaching. The knowledge about diabetes self-care is widely well known to people. Nevertheless, many people continuously suffer from T2DM and its complications. Health care providers, especially in primary care, desire to provide quality care, but they are limited with time. Despite the limitation, the providers' determination to educate their patients and improve the outcomes of diabetes management will impact patient motivation in their self-care disease management. For this purpose, the Advanced Practice Registered Nurses (APRNs) need to reflect on the practice gaps shortcomings of current approaches or policies and consider how utilization of telehealth, as it is becoming more supported by the healthcare and general population, can bring more efficacy in patient care and providing patient education.

References

AdventHealth. (n.d.). *CREATION Life- Live life to the fullest*. https://www.creationlife.com/

American Diabetes Association. (2018). Economic costs of diabetes in the U.S. in 2017.

    Diabetes Care, 41(5), 917–928. https://doi.org/10.2337/dci18-0007

American Diabetes Association. (2019). 3. Prevention or delay of type 2 diabetes: Standards of

    medical care in diabetes - 2020. *Diabetes Care*, *43*(Supplement 1), S32–S36.

    https://doi.org/10.2337/dc20-s003

Celik, A., Forde, R., & Sturt, J. (2020). The impact of online self-management interventions on

    midlife adults with type 2 diabetes: a systematic review. *British Journal of Nursing*,

    29(5), 266–272. https://doi.org/10.12968/bjon.2020.29.5.266

Centers for Disease Control and Prevention. (n.d.). Body mass index (BMI).

    https://www.cdc.gov/healthyweight/assessing/bmi/index.html

Centers for Disease Control and Prevention. (2020). Diabetes fast facts.

    https://www.cdc.gov/diabetes/basics/quick-

    facts.html#:~:text=Type%202%20diabetes%20accounts%20for

Centers for Disease Control and Prevention. (2020). National diabetes statistics report, 2017:

    Estimates of diabetes and its burden in the United States background.

    https://www.cdc.gov/diabetes/pdfs/data/statistics/national-diabetes-statistics-report.pdf

Cohen, J. (1992). A power primer. *Psychological Bulletin, 112*(1), 155-159.

    https://doi.org/10.1037/0033-2909.112.1.155

Cunningham, A. T., Crittendon, D. R., White, N., Mills, G. D., Diaz, V., & LaNoue, M. D.
(2018). The effect of diabetes self-management education on HbA1c and quality of life in
African-Americans: a systematic review and meta-analysis. *BMC Health Services
Research*, *18*(1). https://doi.org/10.1186/s12913-018-3186-7

Döbler, A., Herbeck Belnap, B., Pollmann, H., Farin, E., Raspe, H., & Mittag, O. (2018).
Telephone-delivered lifestyle support with action planning and motivational interviewing
techniques to improve rehabilitation outcomes. *Rehabilitation Psychology*, *63*(2), 170–
181. https://doi.org/10.1037/rep0000224

Egede, L. E., Williams, J. S., Voronca, D. C., Gebregziabher, M., & Lynch, C. P. (2017).
Telephone-delivered behavioral skills intervention for African American adults with type
2 diabetes: A randomized controlled trial. *Journal of General Internal Medicine*, *32*(7),
775–782. https://doi.org/10.1007/s11606-017-4023-0

Fajriyah, N., Firmanti, T. A., Mufidah, A., & Septiana, N. T. (2019). A diabetes self-
management education/support (DSME/S) program in reference to the biological,
psychological and social aspects of a patient with type 2 diabetes mellitus: A systematic
review. *Jurnal Ners*, *14*(3), 55. https://doi.org/10.20473/jn.v14i3.16979

Ferguson, S., Swan, M., & Smaldone, A. (2015). Does diabetes self-management education in
conjunction with primary care improve glycemic control in Hispanic patients? *The
Diabetes Educator*, *41*(4), 472–484. https://doi.org/10.1177/0145721715584404

Fischer, H. H., Fischer, I. P., Pereira, R. I., Furniss, A. L., Rozwadowski, J. M., Moore, S. L.,
Durfee, M. J., Raghunath, S. G., Tsai, A. G., & Havranek, E. P. (2016). Text message
support for weight loss in patients with prediabetes: A randomized clinical trial. *Diabetes
Care*, *39*(8), 1364–1370. https://doi.org/10.2337/dc15-2137

Glanz, K., Burke, L., & Rimer, B. (2015). Health behavior theories. In J. Butts & K. Rich (Eds.),

    Philosophies and theories for advanced nursing practice. (2nd ed., pp. 241-265).

    Burlington, MA: Jones & Bartlett Learning.

Godino, J. G., Golaszewski, N. M., Norman, G. J., Rock, C. L., Griswold, W. G., Arredondo, E.,

    Marshall, S., Kolodziejczyk, J., Dillon, L., Raab, F., Jain, S., Crawford, M., Merchant,

    G., & Patrick, K. (2019). Text messaging and brief phone calls for weight loss in

    overweight and obese English- and Spanish-speaking adults: A 1-year, parallel-group,

    randomized controlled trial. *PLOS Medicine*, *16*(9), e1002917.

    https://doi.org/10.1371/journal.pmed.1002917

Greenwood, D. A., Gee, P. M., Fatkin, K. J., & 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

Health Resources & Services Administration. (n.d.). Billing and coding Medicare Fee-for-

    Service claims. https://telehealth.hhs.gov/providers/billing-and-reimbursement/billing-

    and-coding-medicare-fee-for-service-claims/

Hermanns, N., Ehrmann, D., Finke-Groene, K., & Kulzer, B. (2020). Trends in diabetes self-

    management education: where are we coming from and where are we going? A narrative

    review. *Diabetic Medicine*, *37*(3). https://doi.org/10.1111/dme.14256

Imlach, F., McKinlay, E., Middleton, L., Kennedy, J., Pledger, M., Russell, L., Churchward, M.,

    Cumming, J., & McBride-Henry, K. (2020). Telehealth consultations in general practice

    during a pandemic lockdown: survey and interviews on patient experiences and

preferences. *BMC Family Practice*, *21*(1), 1–14. https://doi-

org.ezproxy.southern.edu/10.1186/s12875-020-01336-1

Jiang, F., Hou, X., Lu, J., Zhou, J., Lu, F., Kan, K., Tang, J., Bao, Y., & Jia, W. (2014).

Assessment of the performance of A1CNow+ and development of an error grid analysis

graph for comparative hemoglobin A1c measurements. *Diabetes Technology &*

Therapeutics, *16*(6), 363–369. https://doi.org/10.1089/dia.2013.0289

Koonin, L. M., Hoots, B., Tsang, C. A., Leroy, Z., Farris, K., Jolly, B., Antall, P., McCabe, B.,

Zelis, C. B. R., Tong, I., Harris, A. M. (2020). Trends in the use of telehealth during the

emergence of the COVID-19 pandemic — United States, January–March 2020. *MMWR.*

Morbidity and Mortality Weekly Report, *69*(43).

https://doi.org/10.15585/mmwr.mm6943a3

Lepard, M. G., Joseph, A. L., Agne, A. A., & Cherrington, A. L. (2015). Diabetes self-

management interventions for adults with type 2 diabetes living in rural areas: A

systematic literature review. *Current Diabetes Reports*, *15*(6).

https://doi.org/10.1007/s11892-015-0608-3

Mayo Clinic. (2019). Type 2 diabetes - symptoms and causes.

https://www.mayoclinic.org/diseases-conditions/type-2-diabetes/symptoms-causes/syc-

20351193

Nassar, C. M., Montero, A., & Magee, M. F. (2019). Inpatient diabetes education in the real

world: An overview of guidelines and delivery models. *Current Diabetes*

Reports, *19*(10), 103. https://doi.org/10.1007/s11892-019-1222-6

National Institute of Diabetes and Digestive and Kidney Diseases. (n.d.). Financial help for

    diabetes care. https://www.niddk.nih.gov/health-information/diabetes/financial-help-

    diabetes-care

National Institute of Diabetes and Digestive and Kidney Diseases. (n.d.). The A1C test &

    diabetes. https://www.niddk.nih.gov/health-information/diagnostic-tests/a1c-test

Odnoletkova, I., Buysse, H., Nobels, F., Goderis, G., Aertgeerts, B., Annemans, L., &

    Ramaekers, D. (2016). Patient and provider acceptance of telecoaching in type 2

    diabetes: a mixed-method study embedded in a randomized clinical trial. *BMC Medical*

    Informatics and Decision Making, *16*(1). https://doi.org/10.1186/s12911-016-0383-3

Office of Disease Prevention and Health Promotion. (n.d.). Increase the proportion of people

    with diabetes who get formal diabetes education — Data methodology and measurement.

    Healthy People 2030. U.S. Department of Health and Human Services.

    https://health.gov/healthypeople/objectives-and-data/browse-objectives/diabetes/increase-

    proportion-people-diabetes-who-get-formal-diabetes-education-d-06/data

Powers, M. A., Bardsley, J., Cypress, M., Duker, P., Funnell, M. M., Hess Fischl, A., Maryniuk,

    M. D., Siminerio, L., & Vivian, E. (2015). Diabetes self-management education and

    support in type 2 diabetes: A joint position statement of the American Diabetes

    Association, the American Association of Diabetes Educators, and the Academy of

    Nutrition and Dietetics. *Diabetes Care*, *38*(7), 1372–1382. https://doi.org/10.2337/dc15-

    0730

Sandy, V., Lee, R., & Mikaelian, A. (2017). Comparing an in-person versus a telephonic type 2

    diabetes management model. *California Journal of Health-System Pharmacy*, *29*(2), 44–

    49.

Sarayani, A., Mashayekhi, M., Nosrati, M., Jahangard-Rafsanjani, Z., Javadi, M., Saadat, N.,

    Najafi, S., & Gholami, K. (2018). Efficacy of a telephone-based intervention among

    patients with type-2 diabetes; a randomized controlled trial in pharmacy practice.

    International Journal of Clinical Pharmacy, *40*(2), 345–353.

    https://doi.org/10.1007/s11096-018-0593-0

Szafran, O., Kennett, S. L., Bell, N. R., & Torti, J. M. I. (2019). Interprofessional collaboration

    in diabetes care: perceptions of family physicians practicing in or not in a primary health

    care team. *BMC Family Practice*, *20*(1). https://doi.org/10.1186/s12875-019-0932-9

Toobert, D. J., Hampson, S. E., & Glasgow, R. E. (2000). The summary of diabetes self-care

    activities measure: results from 7 studies and a revised scale. *Diabetes Care*, *23*(7), 943–

    950. https://doi.org/10.2337/diacare.23.7.943

de Vasconcelos, H. C. A., Lira Neto, J. C. G., de Araújo, M. F. M., Carvalho, G. C. N., de Souza

    Teixeira, C. R., de Freitas, R. W. J. F., & Damasceno, M. M. C. (2018). Telecoaching

    programme for type 2 diabetes control: a randomised clinical trial. *British Journal of

    Nursing*, *27*(19), 1115–1120. https://doi.org/10.12968/bjon.2018.27.19.1115

World Health Organization. (n.d.). What do we mean by self-care? *World Health Organization*.

    https://doi.org//entity/reproductivehealth/self-care-interventions/definitions/en/index.html

Young, R. A., Burge, S. K., Kumar, K. A., Wilson, J. M., & Ortiz, D. F. (2018). A time-motion

    study of primary care physicians' work in the electronic health record era. *Family

    Medicine*, *50*(2), 91–99. https://doi.org/10.22454/fammed.2018.184803

Appendix A: Institutional Review Board Approval

RE: Scholarly Project: IRB form completed

○ **irb <irb@southern.edu>**

Tuesday, June 8, 2021 at 11:15 AM

To: ⊗ Jill Buchholz; **Cc:** ⊗ Sori Jung ⌄

Dear Sori,

It is a delight to inform you that your research protocol titled "Implementing Tele-coaching Diabetes Education to Improve Self-Care and Clinical Outcomes for Patients with Type 2 Diabetes," has been approved by the Southern Adventist University Institutional Research Board according to the proposal. You are now authorized to proceed with the project as outlined. This approval expires June 8, 2022.

If you have any further questions, comments or concerns, please do not hesitate to reach out to me here at the Center for Teaching Excellence.

Robert L. Overstreet, Ph.D.

Robert L. Overstreet, Ph.D.

Director for the Center of Teaching Excellence,

Southern Adventist University

4881 Taylor Cir, Collegedale, TN 37315

robertoverstreet@southern.edu

https://www.southern.edu/administration/cte/

423.236.2085

Individualization – Developer – Empathy – Harmony – Achiever

Appendix B: Informed Consent

Informed Consent Form

Introduction:

My name is Sori Jung. I am a doctoral student at School of Nursing at Southern Adventist University. I am conducting a research study on the effectiveness of diabetes education through tele-coaching in patients with type 2 diabetes mellitus for improved self-management and clinical outcomes including hemoglobin A1c and weight loss. I am completing this research as part of my doctoral degree. Your participation is completely voluntary. I am seeking your consent to involve you and your information in this study. Reasons you might *not* want to participate in the study include inability to commit to the weekly phone or Zoom class for 8 weeks, not interested in learning about type 2 diabetes and self-care management, having expectation of personal medical advice or care, not owning a device to participate in the study such as regular phone or smartphone, blood sugar check monitor with its supplies and not having access to the internet. Reasons you might want to participate in the study include desire to learn about type 2 diabetes and desire to promote self-care management. An alternative to this study is simply not participating. I am here to address your questions or concerns during the informed consent process.

PRIVATE INFORMATION

Certain private information may be collected about you in this study. I will make the following effort to protect your private information, including not releasing your personal information to anybody else, assigning a unique code each participant instead of using a real name (example: P1) during the study, and send action prompts through individual text messages. Even with this effort, there is a chance that your private information may be accidentally released. The chance is small but does exist. You should consider this when deciding whether to participate.

Activities:

If you participate in this research, you will be asked to:

1. Meet with the researcher to check initial hemoglobin A1c, height and weight, take a survey, and answer SDSCA questionnaire prior to starting study.
2. Sign up for available phone or Zoom class session for each week for 8 weeks.
3. Participate in individual diabetes education class sessions through phone or Zoom once a week for 20 minutes.
4. Participate in action prompts twice a week. Action prompts text messages will be sent. Example: "Walk 15 minutes after dinner" or "take your diabetes medicine"
5. Meet with the researcher at the end of 8 week-program to recheck your hemoglobin A1c and weight, answer the SDSCA questionnaire, and respond to four qualitative interview questions at the end of the program.

Revised 2/15/19 – Southern Adventist University

Eligibility:

You are eligible to participate in this research if you:

1. Patient of Dr. Marquez at Tennova Primary Care Ooltewah or patients at Volunteers In Medicine.
2. Adult age older than 18
3. Male or female
4. Diagnosed with type 2 diabetes mellitus
5. Have hemoglobin A1c greater or equal to 6.5 %
6. Own a smartphone or regular phone
7. Own a blood sugar check monitor
8. Have access to the internet
9. Understand English
10. Have an email address or willing to create one

You are not eligible to participate in this research if you:

1. Have physical or mental medical conditions that does not enable you to participate in group class sessions and self-care activity. Or have medical conditions that may put you at risk for injury or worsened condition by increased physical activity and changed diet.
2. Not a patient at Tennova Primary Care Ooltewah or patients at Volunteers In Medicine.
3. Age younger than 18
4. Do not have diagnosis of type 2 diabetes mellitus
5. Have hemoglobin A1c less than 6.5%
6. Do not own a blood sugar check monitor
7. Do not understand English

I hope to include 38-50 people in this research.

Risks:

There are minimal risks in this study. Some possible risks include risk of any level of injury depending on the participant's intensity of individual exercise, overwhelming feeling with new knowledge of diabetes self-care activities, and feelings of sadness if there is no improvement with weight and hemoglobin A1c after the study.

To decrease the impact of these risks, you can: increase or promote physical activity depending on what you can safely tolerate, do warm-up exercise such as stretching prior to any physical activity, discuss about any medication adjustment or physical activity limitation

with your primary care provider, follow the outline of the topics as scheduled, review the topics from the diabetes education handouts at any time available.

Benefits:

If you decide to participate, there are no direct benefits to you.

Confidentiality:

The information you provide will be kept confidential to the extent allowable by law. Some steps I will take to keep your identity confidential are assigning a code (example: P1) to identify you and making sure all information is stored securely.

The people who will have access to your information are myself and my dissertation chair. The Institutional Review Board may also review my research and view your information.

I will secure your information with these steps: locking the computer file with a password and transporting it in a locked case.

I will keep your data for 7 years. Then, I will delete electronic data and destroy paper data.

Incentives:

To thank you for your willingness to participate, you will be given an opportunity to participate in drawing a $50 gift card to Walmart if you complete the program. Even if you did not win, you will still be given a $20 gift card to Walmart if you complete the program.

Audiotaping:

I would like to use a voice recorder to record your responses for the qualitative survey questions at the end of the program. You can still participate if you do not wish to be recorded.

Please sign here if I can record you: _____

Additional Costs:

There are no anticipated financial costs to you related to this research study.

Termination of Participation:

I may stop your participation, even if you did not ask me to, if you develop any physical and/or mental distress, miss phone or Zoom class session more than once without attempt for rescheduling, interfere other participants from participating in any way, or display any inappropriate behaviors.

If you decide to stop participation, you may do so by letting the researcher know via email: sorijung@southern.edu. If so, I will respect your decision, and I will not use the information I gathered from you. Your removal from the study, if it does occur, will be immediate. There would be no harmful consequences.

Contact Information:

If you have questions for me, you can contact me at: sorijung@southern.edu or 423-883-1589 (Research line).

My dissertation chair's name is Dr. Jill Buchholz, DNP, RN. She works at Southern Adventist University and is supervising me on the research. You can contact her at: jbuchholz@southern.edu or 423-236-2343.

If you contact us, you will be giving us information like your phone number or email address. This information will not be linked to your responses if the study is anonymous.

If you have questions about your rights in the research, or if a problem has occurred, or if you are injured during your participation, please contact the Institutional Review Board at: irb@southern.edu or 423-236-2285.

Voluntary Participation:

Your participation is voluntary. If you decide not to participate, or if you stop participation after you start, there will be no penalty to you. You will not lose any benefit to which you are otherwise entitled.

Future Research

Any information or specimens collected from you during this research may **not** be used for other research in the future, even if identifying information is removed.

Signature:

A signature indicates your understanding of this consent form. You will be given a copy of the form for your information.

Participant Signature   Printed Name   Date

_____   _____   _____

Researcher Signature   Printed Name   Date

_____   _____   _____

Appendix C: CITI Training Certificate

Completion Date 12-Apr-2021
Expiration Date N/A
Record ID 41940307

This is to certify that:

Sori Jung

Has completed the following CITI Program course:

Responsible Conduct of Research
(Curriculum Group)
Responsible Conduct of Research
(Course Learner Group)
1 - RCR
(Stage)

Not valid for renewal of certification through CME.

Under requirements set by:

Southern Adventist University

CITI
Collaborative Institutional Training Initiative

Verify at www.citiprogram.org/verify/?wfc3208bd-1369-4fff-8297-24c5ae114676-41940307

Appendix D: Site Approvals

Tennova™
Healthcare
Primary Care- Ooltewah

Obadias Marquez, MD
6059 Arbury Way Ste. 101
Ooltewah, TN 37364
Phone: 423-238-8880
Fax: 423-238-8881

June 2, 2021

To Whom It May Concern:

It is with great pleasure to grant permission to Sori Jung to perform her studies at the Ooltewah office of Obadias Marquez, MD. She will have ample private space to accommodate her study program.

For further questions please feel free to reach out to the office.

Sincerely,

Becky Montgomery, BSHA
Practice Administrator
423-284-3213- cell

Approval from VIM

Holly Gadd   Today at 5:01 PM
To: Sori Jung

Good afternoon, Sori:

I met with administration and the medical director at VIM today. They have no problem with you adding VIM as a site for implementing your scholarly project. You may attach this email to your IRB form B as confirmation. Sharon Stewart, the clinic administrator said she can write a letter confirming this if you need it.

Next steps – get the IRB form and modifications done, approved by Dr. Buchholz and then submitted.

Keep moving forward at Dr. Marquez's office. Set up a time to meet with me to gain access to the VIM Amazing Charts system and identify individuals who you can contact for your project.

Progress!

Holly Gadd, PhD, APRN, FNP-BC
Dean & Professor, School of Nursing
AdventHealth Endowed Chair of Nursing Education
Southern Adventist University
PO Box 370
Collegedale, TN 37315
Office location: AdventHealth Hall #2305C
Office phone: 423-236-2942
Office fax: 423-236-1940

Feel free to schedule an In-Person or ZOOM meeting with me

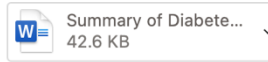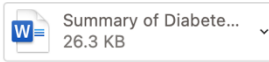**Appendix E: Summary of Diabetes Self-Care Activities Questionnaire Approval**
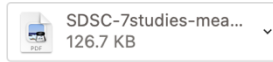
[ext] Permission to use the Summary of Diabetes Self-Care Activities Questionnaire in your research

○ Deborah Toobert <Deborah@ori.org>

Wednesday, April 28, 2021 at 10:18 PM

To: ○ Sori Jung

| SDSC-7studies-mea... 126.7 KB | Summary of Diabete... 26.3 KB | Summary of Diabete... 42.6 KB |

⤓ Download All   👁 Preview All

↩ You replied to this message on 4/28/21, 10:55 PM.   Show Reply

Dear Sori,

Thank you for your payment of $25 for permission to use the Summary of Diabetes Self-Care Activities Questionnaire (SDSCA) in your study. Now that we have received your payment, you have our permission to use the English version of the Summary of Diabetes Self-Care Activities Questionnaire in your research project and we will be able to provide answers to any questions you may have. We have attached the 2000 Diabetes Care article with the SDSCA psychometric information. At the end of the article, there is an appendix with the English version of the questionnaire, and the scoring information. We have also attached a user-friendly copy of the English version of the SDSCA instrument.

If you need a translation of the SDSCA please contact me first, as the SDSCA has been translated into many languages. There will be no further charge.

Please be sure to check our website first for the most frequently asked questions:

http://www.ori.org/sdsca

We wish you every success with your research,
Deborah

Appendix F: HIPAA Forms

HIPAA AUTHORIZATION FORM

I, _____, hereby authorize the use or disclosure of my protected health information as described below:

1. AUTHORIZED PERSONS TO USE AND DISCLOSE PROTECTED HEALTH INFORMATION

Tennova Primary Care Ooltewah is authorized to disclose the following protected health information to my Doctor of Nursing Practice student researcher, Sori Jung at Southern Adventist University of Collegedale, Tennessee 37315.

2. DESCRIPTION OF INFORMATION TO BE DISCLOSED

The health information that may be disclosed is:

Medical records

All past, present, and future periods of health care information may be shared.

3. PURPOSE OF THE USE OR DISCLOSURE

The purpose of this use or disclosure is for the Doctor of Nursing Practice student's research project.

4. VALIDITY OF AUTHORIZATION FORM

This Authorization Form is valid beginning on June 01, 2021 and expires at the end of the research project.

5. ACKNOWLEDGMENT

I understand that the information used or disclosed under this Authorization Form may be subject to re-disclosure by the person(s) or facility receiving it and would then no longer be protected by federal privacy regulations.

I have the right to refuse to sign this Authorization Form. If signed, I have the right to revoke this authorization, in writing, at any time. I understand that any action already taken in reliance on this authorization cannot be reversed, and my revocation will not affect those actions.

By: _____   Date: _____
    _____

HIPAA AUTHORIZATION FORM

I, _____, hereby authorize the use or disclosure of my protected health information as described below:

1. AUTHORIZED PERSONS TO USE AND DISCLOSE PROTECTED HEALTH INFORMATION

Volunteers In Medicine is authorized to disclose the following protected health information to my Doctor of Nursing Practice student researcher, Sori Jung at Southern Adventist University of Collegedale, Tennessee 37363.

2. DESCRIPTION OF INFORMATION TO BE DISCLOSED

The health information that may be disclosed is:

Medical records

All past, present, and future periods of health care information may be shared.

3. PURPOSE OF THE USE OR DISCLOSURE

The purpose of this use or disclosure is Doctor of Nursing Practice student's research project.

4. VALIDITY OF AUTHORIZATION FORM

This Authorization Form is valid beginning on July 15, 2021 and expires at the end of the research project.

5. ACKNOWLEDGMENT

I understand that the information used or disclosed under this Authorization Form may be subject to re-disclosure by the person(s) or facility receiving it and would then no longer be protected by federal privacy regulations.

I have the right to refuse to sign this Authorization Form. If signed, I have the right to revoke this authorization, in writing, at any time. I understand that any action already taken in reliance on this authorization cannot be reversed, and my revocation will not affect those actions.

By: _____   Date: _____

Appendix G: Demographics Survey

Demographic Survey (Please circle as applicable. Please DO NOT indicate your name or code)

Gender: Male   Female

Age: 18-24
25-34
35-44
45-54
55-64
65-74
75 years old or older

Ethnicity: White
Hispanic or Latino
Black or African American
Native American or American Indian
Asian/Pacific Islander
Others _____

Marital Status: Single
Married
Widowed
Divorced
Separated

Education: (highest degree achieved)

no schooling completed
high school graduate
college credit-no degree
Associate degree
Bachelor's degree
Master's degree
Doctorate degree

Employment Status: non-employed
part-time employed
full-time employed
retired

Appendix H: Summary of Diabetes Self-Care Activities Questionnaire

Summary of Diabetes Self-Care Activities Questionnaire

The questions below ask you about your diabetes self-care activities during the past 7 days. If you were sick during the past 7 days, please think back to the last 7 days that you were not sick.

Diet

Number of Days

1. How many of the last SEVEN DAYS have you followed a healthful eating plan? ☐0 ☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7

2. On average, over the past month, how many DAYS PER WEEK have you followed your eating plan? ☐0 ☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7

3. On how many of the last SEVEN DAYS did you eat five or more servings of fruits and vegetables? ☐0 ☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7

4. On how many of the last SEVEN DAYS did you eat high-fat foods, such as red meat or full-fat dairy products? ☐0 ☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7

Physical Activity

5. On how many of the last SEVEN DAYS did you participate in at least 30 minutes of physical activity? *(Total minutes of continuous activity, including walking).* ☐0 ☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7

6. On how many of the last SEVEN DAYS did you participate in a specific exercise session (such as swimming, walking, biking) other than what you do around the house or as part of your work? ☐0 ☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7

1

Blood Sugar Testing

7. On how many of the last SEVEN DAYS did you test your blood sugar?

Number of Days

☐0 ☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7

8. On how many of the last SEVEN DAYS did you test your blood sugar the number of times recommended by your health-care provider?

☐0 ☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7

Foot Care

9. On how many of the last SEVEN DAYS did you check your feet?

☐0 ☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7

10. On how many of the last SEVEN DAYS did you inspect the inside of your shoes?

☐0 ☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7

Smoking

11. Have you smoked a cigarette, even a puff, in the past SEVEN DAYS?

☐0 No   ☐1 Yes ≡ 11a. How many cigarettes did you smoke on an average day?

Number of cigarettes:

_____

2

Medications

6A.   On how many of the last SEVEN DAYS, did you take your recommended diabetes medication?

☐0   ☐1   ☐2   ☐3   ☐4   ☐5   ☐6   ☐7

Appendix I: Scholarly Project EOP SLO Synthesis

Every step of the scholarly project, including development, progression, implementation, and evaluation, has taught meaningful lessons. They enabled the DNP student to synthesize, formulate, and perform the research study and helped to learn the importance of teamwork and collaboration with other professionals of the expertise. Conducting a research study was challenging as a novice student researcher. However, the support and advice from the academic nursing experts were tremendously helpful. From this experience, it was learned that teamwork and collaboration in research and practice settings are valuable tools. Particularly related to the topic of this scholarly project, it is essential to work with other health care professionals to delegate and perform research more effectively, utilizing their levels of expertise and abilities as resources.

In the beginning stage of the research development, it was not easy to decide the direction of the study. Nevertheless, collecting and reading the literature and synthesizing them helped a lot in finding the focus of the study. Integrating the literature was crucial for discovering the evidence to apply the findings in evidence-based practice.

Through this research study, the DNP student had an increased understanding regarding health promotion. The importance of diabetes education in type 2 diabetes has been long aware because it is highly associated with sedentary lifestyles and unhealthy diets. Type 2 diabetes is possibly preventable, and if it is intervened early in the prediabetes stage, it is even reversible through lifestyle modification. However, despite many available diabetes education programs, they are not extensively utilized in primary care. Also, the overall prevalence of type 2 diabetes does not seem to decrease. The method of tele-coaching diabetes education was used as an intervention for this scholarly project because there was a gap noted between diabetes education

and the patient outcomes, and it was promoted to be utilized as an alternative modality to provide diabetes education and support to the patients who struggle to keep their diabetes under control.

As reflected in the literature, tele-coaching was a safe, effective, and efficient method to provide patient-centered education when applied as an intervention in this research project. The telephone or Zoom allowed a more personal and relaxed environment, especially when each participant was in their comfortable places like their own home. Though it was distant learning, frequent communication with the participants allowed more open conversations about their diabetes management journey.

Cultural competency was a very needed skill in this research project. Patient education was noted to be hugely affected by different cultures. This could be related to their diet, health beliefs, health practices, language barrier, and many more. Health belief alone could often affect their medication adherence and diabetes self-care activities. Thus, it is inevitable that patient education will need to be individualized while being culturally competent. Cultural competency also needs to be reflected in educational materials. Depending on the practice location, there could be various people whose first language is not English. Keeping the resources that can provide educational information in different languages would be very helpful and considerate towards the patients, eventually promoting health in patients whose English is not their primary language.

T2DM is a constant, unresolved health problem that advanced practice nurses must continuously deal with, especially in the primary care setting. Advanced practice nurses do not lose their roles as patient advocates and educators even after achieving a higher level of education. Instead, the ability to carry out those roles and be advanced practitioners will be more enhanced. With the mission to improve patient education and overall community health, the

findings from this scholarly project will be disseminated through the opportunities of

professional meetings and practice with the healthcare stakeholders. The recipients who would

benefit from this would be patients, other healthcare providers or professionals, insurance

payors, pharmaceutical representatives, or policymakers. With the high prevalence of T2DM,

sharing the findings with the local communities would also be helpful. Hopefully, disseminating

the results from this scholarly project can prompt other people to realize the need for quality

improvement in patient education.