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Use of Evidence-Based Telehealth to Reduce Complications in Adults with Type 2 Diabetes in a Rural Health Facility

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Use of Evidence-Based Telehealth to Reduce Complications in Adults with Type 2 Diabetes in a Rural Health Facility

A DNP Project Submitted to the
Graduate Faculty
Of Jacksonville State University
In Partial Fulfillment of the
Requirements for the Degree of
Doctor of Nursing Practice

By

Joni Goss Kelley

Jacksonville, Alabama

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Abstract

Background: Formal education for type 2 diabetes mellitus (T2DM) patients is essential, especially in rural areas where diabetes is approximately 17% higher than in urban areas (Bolin & Ferdinand, 2018). In 2019, diabetes was listed as the direct cause of 1.5 million deaths, and 48% of all deaths due to diabetes occurred before 70 years (American Diabetes Association, 2021). According to the American Diabetes Association (2021), approximately 550,149 people in Alabama, or 14.1% of adults, have been diagnosed with diabetes. An additional 119,000 people in Alabama have diabetes but are unaware, significantly increasing their risk of complications (American Diabetes Association, 2021).

Purpose: The DNP project aimed to identify whether implementing Chronic Care Management (CCM) for T2DM patients in rural areas would help reduce the participants' hemoglobin A1C. Diabetes is an increased concern for rural communities compared to urban communities because of risk factors prevalent in rural communities and access to various services. These risk factors include obesity, physical inactivity, poor diet, older age, and lack of access to healthcare. Statistics show that in rural areas there are fewer healthcare providers, higher rates of uninsured, and fewer transportation options (Rural Health Information Hub, 2020).

Methods: Chronic Care Management developed by the Centers for Medicare and Medicaid Services was utilized. As part of the patient's standard treatment, hemoglobin AlC levels are drawn every three months on diabetic patients. The intervention was monthly phone calls for three months with qualifying patients. To qualify, patients must have Medicare and/or Medicaid and at least 2 chronic conditions. Topics of discussion included blood glucose readings from home and medication reconciliation. The goal was that the participants' AlC levels show a 1% or

greater improvement when redrawn at three months, decreasing the likelihood of experiencing or worsening type 2 diabetes complications.

Results: To test the hypothesis that CCM had no effect on A1C, against the idea that CCM improved A1C, a paired t-test was performed to account for the matched-pairs of data. At the 0.05 level of significance, the results indicate that a mean difference exists between the A1C values before and after participation in CCM ($t = 4.52$, $df = 29$, $p < 0.001$). This implies that CCM is effective in significantly reducing A1C values for patients with Type 2 diabetes.

Conclusion: Management of chronic conditions in family practice is essential. The DNP project proved that extensive monitoring and management of type 2 diabetes results in improved patient outcomes. The project also displayed that the majority of T2DM patients also carry a diagnosis of hypertension, or other chronic conditions. Sustained, tedious monitoring of patients with chronic conditions can aid in preventing major complications. Ongoing implication of CCM displays the foundations of nursing such as promoting health and wellness, preventing illness, and restoring health (Cruz, n.d.).

Keywords: Adult, type 2 diabetic, rural areas, Rural, Diabetes prevention, Diabetes management, toolkit, education, Chronic Care Management, hemoglobin A1C

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Use of Evidence-Based Telehealth to Reduce Complications in Adults with Type 2 Diabetes in a Rural Health Facility

The DNP project aimed to identify whether monthly phone calls and implementation of CCM for T2DM patients in rural areas helped reduce the participants' hemoglobin A1C and diabetic complications. Diabetes is an increased concern for rural communities compared to urban communities because of risk factors prevalent in rural communities and access to various services. These risk factors include obesity, physical inactivity, poor diet, older age, and lack of access to healthcare. Rural areas have fewer healthcare providers, higher rates of uninsured individuals, and fewer transportation options (Rural Health Information Hub, 2020).

Background

Formal education for T2DM diabetic patients is essential, especially in rural areas where the prevalence of diabetes is approximately 17% higher than in urban areas (Bolin and Ferdinand, 2018). According to the Centers for Disease Control and Prevention's National Diabetes Statistics Report, as of 2020, an estimated 34.2 million people (10.5% of the population) had been diagnosed with diabetes in the United States. In 2016, 12.6% of the population had been diagnosed with diabetes in nonmetropolitan counties, compared to 9.9% in metropolitan counties. In one region of the U.S., referred to as the “diabetes belt,” the prevalence of diabetes is approximately 11.7% of the population. The diabetes belt spans over 644 counties in 15 states. More than one-third of the counties in the diabetes belt is within the Appalachian Region, and most states in the diabetes belt are more rural than the U.S. average (Rural Health Information Hub, 2020). The DNP project facility lies within the Appalachian Region.

Rural residents have higher rates of diabetes risk factors than urban populations, including being overweight/obese, having high blood pressure, having high cholesterol, and

being physically inactive. Diabetes is about 17% more prevalent in rural areas than urban ones. However, despite this higher prevalence, CDC researchers found that 62% of non-metropolitan counties do not have a Diabetes Self-Management and Education Support (DSMES) program (Centers for Disease Control and Prevention, 2018).

Needs Analysis

According to the World Health Organization (2023), the number of people with diabetes rose from 108 million in 1980 to 422 million in 2014. Diabetes is a significant cause of blindness, lower limb amputation, heart attacks, stroke, and kidney failure. In 2014, 8.5% of adults aged 18 years and older had diabetes. In 2019, diabetes was the direct cause of 1.5 million deaths, and 48% of all deaths due to diabetes occurred before 70 years (World Health Organization, 2023). According to the American Diabetes Association (2021), approximately 550,149 people in Alabama, or 14.1% of adults, have been diagnosed with diabetes. An additional 119,000 people in Alabama have diabetes but are unaware, significantly increasing their risk of complications (American Diabetes Association, 2021). With diet, exercise, medication compliance, and regular screening and treatment, the detrimental effects of diabetes can be delayed or avoided.

Chronic disease management and diabetes are significant healthcare cost drivers in the United States. In the U.S., people with diabetes have 2-3 times the health care costs compared to those without diabetes (Afable & Karingula, 2016). The total cost of diagnosed diabetes in the United States in 2017 was 327 billion dollars. People with diabetes have medical expenses approximately 2-3 times higher than those who do not have diabetes. Total direct medical expenses for diagnosed diabetes in Alabama were estimated at $4.2 billion in 2017. In addition,

another $1.7 billion was spent on indirect costs from lost productivity due to diabetes (American Diabetes Association, 2021).

In the rural health clinic used for the DNP project, the current state of managing T2DM patients includes routine follow-up visits and lab draws every three months. The desired state is to decrease A1C by increasing education and confidence in the patients to manage their health in a better way. In a nationwide study of 5,145 people with T2DM, those who shed just 5-10% of their weight (for someone weighing 175 pounds, that is a loss of 9 to 17.5 pounds) were three times more likely to lower their A1C (a test of long-term blood sugar control) by 0.5 percent, a significant drop. They were also 50% more likely to reduce their blood pressure by 5 points and twice as likely to lower their triglycerides by 40 points than those whose weight remained the same (Johns Hopkins Medicine, n.d.).

Weight loss and increased physical activity decrease insulin resistance, improve glucose tolerance and glycemic control, lower blood pressure, and reduce the risk of cardiovascular disease, and are particularly important for diabetes prevention and treatment. Current recommendations for weight loss and physical activity are to lose 5–10% of initial body weight and to accumulate at least 30 minutes of moderate physical activity over most days of the week (Delahanty, 2022). During monthly phone calls with participants, diet, physical activity, and medication compliance will be topics of interest.

Problem Statement

The PICOT question for the DNP project is: Among insured adult patients with type 2 diabetes (Population), how effective are monthly telephone calls as part of Chronic Care Management (Intervention) in lowering A1C (Outcome), compared to patients' A1C (Comparison) prior to entering the program (Time)?

Chronic Care Management developed by the Centers for Medicare and Medicaid Services was utilized in the DNP project. The intervention was monthly phone calls for three months with qualifying patients. To qualify, patients must have Medicare or be dually enrolled in Medicare and Medicaid and be diagnosed with at least two chronic conditions expected to last at least 12 months or until the death of the patient, and that place the patient at significant risk of death, acute exacerbation, or functional decline. A hemoglobin A1C level was drawn prior to initiating phone calls. Topics of discussion included blood glucose readings from home and medication reconciliation. The goal was for the participants' A1C levels to improve when redrawn at three months, decreasing the likelihood of experiencing or worsening T2DM complications.

Aims and Objectives

This study aimed to evaluate whether implementing CCM helped lower T2DM patients' A1C levels within three months. This was done by recruiting eligible patients and obtaining informed consent before moving forward. After this was accomplished, times and dates were set for monthly phone calls between the patient and the principal investigator (PI).

Phone calls were approximately 15 minutes long, and home blood glucose readings, medication compliance, diet, and exercise were discussed. For patients whose home glucose readings were elevated out of the normal range, medication adjustments were made if the patient agreed. Advice to follow a diabetic diet and incorporate daily exercise into their routine was given. After three months, a follow-up A1C reading was obtained to conclude the project.

Review of Literature

The literature review was conducted to evaluate if there is a correlation between a formal diabetes education program in rural areas and improved glycemic control in patients. Keywords

such as adult, type 2 diabetic, rural, Diabetes prevention, Diabetes management, toolkit, education, Chronic Care Management, and hemoglobin A1C were used. Studies were gathered from the following electronic resources: CINAHL, PubMed, Cochrane Library, and Google Scholar. The search was limited to English-language literature published within the last five years.

In a 2018 study, Laiteerapong et al. found in the U.S., an estimated 1.4 million adults are newly diagnosed with diabetes every year, presenting a vital intervention opportunity for healthcare systems. Laiteerapong et al. (2018), also found that in a real-world setting, people with lower hemoglobin A1C levels after diagnosis had significantly lower vascular complications later, a phenomenon known as the 'legacy effect' of glucose control. Her research noted the importance of early intervention for the best outcomes, as those with low A1C levels just one-year after diagnosis had significantly lower vascular disease risk than those with higher A1C levels (Laiteerapong et al., 2018).

The study concluded that among patients with newly diagnosed diabetes and ten years of survival, HbA1c levels ≥6.5% for the first year after diagnosis was associated with worse outcomes. Immediate, intensive treatment for newly diagnosed patients may be necessary to avoid irremediable long-term risks for diabetic complications and mortality (Laiteerapong et al., 2018).

One study conducted by Eroglu and Sabuncu in 2021 used a randomized controlled trial design. It was carried out to examine the effect of education on diabetes self-management and self-efficacy in patients with T2DM. Data were collected using the information form, Diabetes Self-Management Questionnaire (DSMQ), and the Self-Efficacy Scale for patients with T2DM (DSS). The individuals in the experimental group were given education. Both groups were

reminded about the control time of their metabolic values on the phone in the third and sixth months. This relates to CCM that was implemented for the DNP project – education was given to T2DM patients via phone calls for three months. The study concluded that a significant increase in diabetes self-management and self-efficacy and a significant decrease in metabolic values resulted from education and phone reminders given to individuals with T2DM (Eroglu & Sabuncu, 2021). This study showed results that mimic the goal of the DNP project.

Like the previous study, the aim was to elucidate the impact of diabetes self-management education on the all-cause mortality risk of T2DM patients. The evidence suggests that diabetes self-management education can reduce all-cause mortality risk in T2DM patients (He et al., 2016). This displays another positive outcome for educating diabetic patients.

A study published by the Journal of General Internal Medicine examined patient experiences with CCM services. As of 2015, the Centers for Medicare and Medicaid Services (CMS) pays for CCM services for Medicare beneficiaries with two or more chronic conditions. CMS requires eligible providers first to obtain patients' verbal (and, prior to 2017, written) consent to ensure that patients who participate in CCM services understand their rights and agree to applicable cost sharing. CCM providers must also enhance patients' access to continuous and coordinated care, including ongoing care management (Wilson et al., 2018).

The key results showed that most patients reported no concerns about being asked to participate in CCM. Most patients had secondary insurance (or Medicaid) covering any CCM coinsurance. Therefore, they could not confidently say whether they would participate if they had to pay for CCM services out-of-pocket. Reasons for participating included having insurance that covered the copay and peace of mind about having access to the CCM team. Patients reported multiple benefits of participating in CCM services, including better access to their

primary care team, improved continuity of care, and improved care coordination. Most patients reported no downside to participating in CCM services, although some felt they were relatively healthy and questioned whether they needed CCM services (Wilson et al., 2018). Overall, these were positive results of the DNP project, as patients were recruited to participate in CCM services.

A quantitative study was conducted by Shambray (2021) to evaluate the impact of phone calls on patient outcomes using the Chronic Care Management program (CCM). Results showed a decrease in HbA1C in the group ages 56-65 over three months. The age group of 46-55 remained about the same with an average mean of pre-HbA1C 7.20 and decreased to HbA1C 7.17 during the three months. Data revealed that if the study was continued over a year, the probability of a potential decrease (61.8%) may increase and show statistical significance (Shambray, 2021).

Over time, T2DM can lead to various complications, many of which can be severe if not identified and addressed promptly. People with diabetes are at increased risk of cardiovascular disease, which can lead to problems like heart attack, stroke, or even death. Evidence shows that keeping blood glucose levels near normal reduces the risk of cardiovascular disease in people with type 1 diabetes. While it is less clear whether this is the case for people with T2DM, managing blood glucose remains a central part of management as it very clearly reduces the risk of eye, kidney, and nerve damage (Wexler, 2023).

There are several eye problems related to diabetes; the most common is "diabetic retinopathy." In diabetic retinopathy, the small blood vessels in the lining at the back of the eyeball grow abnormally and leak, leading to vision loss and eventually blindness if not treated. Other eye problems associated with diabetes include diabetic macular edema, glaucoma, and

cataracts. Regular eye exams are essential for detecting retinopathy and other eye problems at an early stage when the condition can be monitored and treated to preserve vision (Wexler, 2023).

Diabetes can decrease blood flow to the feet and damage the nerves that carry sensation; this nerve damage is known as "diabetic neuropathy." Because people with neuropathy may lose their ability to sense pain, they are at increased risk for developing potentially foot-related severe complications such as ulcers. Foot complications are prevalent among people with diabetes and sometimes go unnoticed until symptoms become severe. Diabetes can also alter the normal function of the kidneys. Kidney problems related to diabetes are called "diabetic kidney disease." Over time, this can lead to chronic kidney disease and even kidney failure (Wexler, 2023).

The overview above of complications related to T2DM further enhances the need for proper education and management of the chronic disease. It has been demonstrated in the studies discussed in this literature review that CCM can help to reduce T2DM complications. The goal is to avoid these complications altogether. However, if complications exist, with proper monitoring and early detection using CCM, severe consequences can be delayed or avoided.

Theoretical Framework

The DNP project was guided by the theory of interpersonal relations in nursing, published by Hildegard Peplau in 1952, and Betty Neuman’s systems model. In Peplau's theory, nursing is defined as an interpersonal, therapeutic process that takes place when professionals, specifically educated to be nurses, engage in therapeutic relationships with people who need health services (Hagerty et al., 2017). The nursing model identifies four sequential phases in the interpersonal relationship: orientation, identification, exploitation, and resolution.

Peplau’s interpersonal model examines the process between the nurse and patient that works toward a mutual goal. The DNP project followed this process when initially developing

goals with the patient and during the program's implementation to help prevent diabetes complications. The orientation phase defines the problem. It starts when the nurse meets the patient, and the two are strangers. After defining the problem, the orientation phase identifies the type of service the patient needs. The patient seeks assistance, tells the nurse what they need, asks questions, and shares preconceptions and expectations based on past experiences. Essentially, the orientation phase is the nurse assessing the patient's health and situation (Petiprin, 2020b).

For the DNP project, orientation began with patient recruitment. The problem was defined as T2DM with at least one other chronic condition. The patient gave consent, and services were provided using Chronic Care Management. A pre-project A1C was drawn to assess the patient's health.

The next phase is identification. During this phase, the patient feels a sense of belonging and capability when dealing with the problem. The nurse and the patient determine how they will work together. The care plan is also developed in this phase. This phase began at the initial visit after the patient agreed to participate in the study.

The third phase is exploitation, in which the patient uses the services offered by the nurse and attempts to accept total value from the relationship that has been established (Peplau, 1991). CCM services were in process during this phase, and the nurse-patient relationship flourished.

The final phase is resolution. It is the termination of the professional relationship since the patient's needs have been met through the collaboration of the patient and the nurse. This displays the evaluation of the nursing process. The patient moves toward independence due to the gradual freeing from needing help to have the strength and ability to stand alone (Peplau,

1991). The nurse and patient evaluate the situation based on the goals and whether they were met (Petiprin, 2020b).

A study was conducted to promote participation in self-care management among patients with diabetes mellitus by applying the theory of interpersonal relations. It ultimately showed that Peplau's Theory significantly promoted patient participation in self-care management (Fernandes & Shobha, 2017).

Betty Neuman's systems model is based on the patient's relationship to stress and reaction. In this model, the nurse's role is to maintain stability and promote wellness by using three levels of prevention: primary, secondary, and tertiary (Petiprin, 2020a). The DNP project used primary prevention by promoting wellness and aiming to prevent medical problems. Secondary prevention was used by initiating CCM for diabetic patients. Finally, tertiary prevention was seen when the patients continued to be monitored after the completion of CCM.

The Plan-Do-Study-Act (PDSA) method was used to test the implemented change. Going through the prescribed four steps guides the thinking process into breaking down the task, evaluating the outcome, improving on it, and testing again (Agency for Healthcare Research and Quality, 2020). Stakeholders for the project include the preceptor (doctoral-prepared nurse practitioner, office manager, and part owner), patients and their families, and the medical doctor at the rural family practice. The preceptor granted access to data.

Project Design

The purpose of QI projects is improvement or innovation in healthcare outcomes. The DNP quality improvement (QI) project used a quantitative, quasi-experimental design. The quasi-experimental approach is beneficial because it does not require randomization or a control group. The design is practical and capable of measuring a change in health-related outcomes

after treatment or intervention when it is not feasible to use an actual experiment (Moran et al., 2019).

The quantitative study was proposed to evaluate the impact of monthly phone calls on patient outcomes using Chronic Care Management. After three months of participation in the project, a quantitative analysis was conducted using the data collected. A desirable outcome was an A1C and diabetic complications reduction. The quantitative research study aimed to determine the relationship between an independent variable (Chronic Care Management) and a dependent variable (hemoglobin A1C).

The expected sample size is 30 participants due to the size of the chosen clinic and the nature of the project. A statistician was secured to assist with the data analysis. With a large enough sample population gathered, a paired t-test was utilized. A paired t-test compares a single population before and after an experimental intervention. The location chosen for the DNP project see 15 or more patients daily. Approximately 70% of these patients qualify for this research.

The Plan-Do-Study-Act (PDSA) cycle guided the QI project. The PDSA method was chosen to evaluate an implemented change in a process. Going through the prescribed four steps guided the thinking process by breaking down the task into steps and evaluating the outcome, improving on it, and testing again (Agency for Healthcare Research and Quality, 2020).

The plan included implementing Chronic Care Management (CCM) to reduce A1C and complications in T2DM patients. The next step was the initiation of CCM for qualifying patients. The study segment included monthly blood sugar and diet monitoring while comparing pre- and post-A1C levels. Finally, necessary changes were set in motion depending on what information was found during the study.

Quantitative research was utilized for the DNP project due to various positive aspects. The first positive aspect is objectivity. This type of research is numerical; therefore, it cannot be easily misinterpreted. This allows the manager to evaluate its results. Secondly, in quantitative research, the project manager uses statistical data to interpret the impact of the intervention. The forms of statistical data analysis permit the manager to understand a vast number of data characteristics (Health Research Funding, n.d.).

The third benefit is fast data collection. The data in quantitative research can be analyzed in a relatively small amount of time. Using statistically valid models, a survey can immediately be generalized to the whole residents. The final advantage discussed in quantitative research is the planning method for messages and programs. With reliable details provided in quantitative research, a trusted group of statistics can offer assurance when creating plans (Health Research Funding, n.d.).

For the DNP project, quantitative research was seen in data collection. Hemoglobin A1C, a numerical value, was collected pre- and post-CCM implementation. The two values were compared and analyzed statistically.

There are also advantages to quasi-experimental design. The most significant advantages of quasi-experimental studies are that they are less expensive and require fewer resources than individual randomized controlled trials (RCTs) or randomized cluster trials. Quasi-experimental studies are also pragmatic because they evaluate the real-world effectiveness of an intervention implemented by healthcare staff rather than the efficacy of an intervention implemented by research staff under research conditions. Therefore, quasi-experimental studies may be more generalizable and have better external validity than RCTs (Schweizer et al., 2016).

Methodology

Setting

The location of the project implementation was a rural health clinic in the southeastern United States. Rural communities have limited access to healthcare and have reduced numbers of primary care providers (Buerhaus, 2019). This location comprises a nurse practitioner, two medical assistants, one lab assistant, and a receptionist. It provides comprehensive family care and cares for walk-in and urgent care needs. In 30 days, 75 patients were diagnosed with "type 2 diabetes with unspecified complications." Additionally, 178 patients were diagnosed with "type 2 diabetes without complications" in the same time frame. Therefore, at least 29% of diabetic patients within this facility are experiencing complications.

Timeline

The project was developed initially in the summer of 2022. Before project implementation began in the fall of 2022, the facility wrote a letter of support for the DNP project (see Appendix A). The Principal Investigator was also required to attend Collaborative Institutional Training Initiative (CITI) (see Appendix B). Institutional Review Board (IRB) approval was sought and approved by Jacksonville State University in November 2022 (see Appendix C). Data collection lasted from December 2022 to March 2023; the analysis was completed in March 2023. The project lasted nine months when considering the timeline from start to finish (see Appendix D).

Population

The target population consisted of T2DM patients ages 21-65 years old. There were no restrictions regarding gender or ethnicity. All qualified patients were encouraged to participate.

Inclusion/Exclusion Criteria for the Population

Inclusion criteria:

- Participants must be covered by Medicare or dually enrolled by Medicare and Medicaid and have two or more chronic conditions, including T2DM.

Exclusion criteria:

- Patients covered by any other insurance were excluded. Patients who did not have access to a glucometer or a telephone were excluded. Patients unable to speak English were excluded.

Recruitment

Participants were recruited by reviewing the EHR and confirming patients with the appropriate insurance and diagnoses. During patient recruitment, when a patient agreed to participate, a day and time was set up for the first phone call based on the patient's preference and availability. Subsequent phone calls were set up in the same fashion prior to the conclusion of the present phone call. The patient was reminded that private health information would be discussed during each phone session. If there were people in the home whom the patient did not want to share health information with, they were encouraged to seek a private room in their home to complete phone calls or, if they preferred, an alternative time for a return call.

Informed Consent

A participant recruitment flyer and consent form were provided. The patient was allowed to ask questions to the principal investigator before deciding to participate in the study. The patient was informed in person and in writing that participation is not mandatory and will not affect their care in the chosen clinic. Participants can decline to participate in the DNP Project by

notifying the PI listed on the participant consent form. Participants were notified they will not suffer any retribution, retaliation, or harm should they wish to withdraw from the DNP Project. If they choose not to participate, they will receive the current recommended treatment and are under no obligation to participate from staff or the PI of the DNP project (see Appendix E).

Design

Chronic Care Management developed by the Centers for Medicare and Medicaid Services was utilized. As part of the patient's standard treatment, hemoglobin AlC levels are drawn every three months on diabetic patients. The intervention was monthly phone calls for three months with qualifying patients. To qualify, patients must have Medicare or Medicaid and at least two chronic conditions. Topics of discussion included blood glucose readings from home and medication reconciliation. The goal was for the participants' AlC levels to show a 1% or more significant improvement when redrawn at three months, decreasing the likelihood of experiencing or worsening T2DM complications.

Data Review Process

The data was collected using a combination of questionnaires, interviews, and lab results. After patient consent, lab results were accessed from the electronic health record (EHR). The statistician assisting in the DNP project recommended obtaining the following data: age, gender, ethnicity, chronic conditions, pre- and post-A1C levels, socioeconomic status, and insurance coverage. See Appendix F for participant information form where participants recorded information during CCM.

Risks and Benefits

Possible risks included loss of privacy and discussing sensitive medical issues. Confidentiality of information recorded was maintained using non-specific, non-identifying data and was secured in a locked area in the Principal Investigator's (Pl) office. Raw data will be destroyed by shredding three years after completion of the DNP Project. Potential benefits to the

participants as a direct result of this research project include the reduction of diabetic complications. For every 1% reduction in AlC, the risk of developing eye, kidney, and nerve damage is reduced by 40%. In comparison, the risk of heart attack is reduced by 14% (Association of Diabetes Care & Education Specialists, 2015).

A SWOT (strengths, weaknesses, opportunities, threats) analysis was conducted and declared strengths of the organization to be large number of qualified patients for the DNP project, teamwork, and a skilled and knowledgeable staff. Weaknesses included being in a very rural area with limited resources and a rapidly growing clinic that could potentially become understaffed. Opportunities included implementation of CCM, greater patient outcomes, and billable codes for the clinic. Finally, threats included patients choosing not to participate in CCM or being unable to participate due to lack of a phone or minutes on the phone (see Appendix G).

Budget and Resources

Budget planning was optional for the DNP project due to the no costs associated. All resources used were free of charge, and there was no cost to share with the public. Participants were not compensated for participation in the DNP project.

Data Maintenance and Security

Identifying information, such as name, all patient demographics, and lab results, was confidential and was not shared with anyone outside the study. Data specific to the study was stored on a password-protected computer in the researchers' offices. Patients were identified using numbers rather than names to enhance security. Following the completion of the project, the forms will be destroyed three years after the study. The PI, project chair, DNP preceptor, and statistician had access to data.

Results

A study was conducted to determine if T2DM patients could improve A1C values by participating in a chronic care management program. Thirty participants agreed to enroll in the program; twenty participants (67.7%) were female, and ten were male (33.3%). The average age of the participants was 57.5 (SD = 5.74), ranging from 42 to 64. See Table 1. All participants had been previously diagnosed with type II diabetes; most (90%) also have secondary hypertension diagnoses. See Table 2.

The average BMI value for this sample at enrollment was 35.4 (SD = 9.22); two participants (6.7%) had average BMI values, six participants (20%) were overweight, nine participants (30%) were classified in Obesity Class I, five participants (16.7%) were classified as Obesity Class II and eight participants (26.7%) were classified as Obesity Class III. After completing the program, the average BMI was 34.8 (SD = 8.66); this was a significant reduction ($t = 3.42$, $df = 29$, $p = 0.002$) at the 0.05 level of significance. Two participants (6.7%) had average BMI values, ten participants (33.3%) were overweight, four participants (13.3%) were classified in Obesity Class I, seven participants (23.3%) were classified as Obesity Class II, and seven participants (23.3%) were classified as Obesity Class III. Table 3 illustrates the chronic care program's positive impact on BMI.

The average A1C of the thirty participants before beginning the program was 7.87 (SD = 1.86). After completing the program, the A1C of the same thirty participants was 7.15 (SD = 1.33), resulting in an average reduction of 0.71 points. The boxplot represented by Table 4 illustrates the difference in A1C before and after the intervention.

To test the hypothesis that CCM did not affect A1C, against the idea that CCM improved A1C, a paired t-test was performed to account for the matched-pairs of data. At the 0.05 level of

significance, the results indicated that a mean difference exists between the A1C values before and after participation in CCM ($t = 4.52$, $df = 29$, $p < 0.001$). This implied that CCM effectively significantly reduced A1C values for patients with type 2 diabetes.

Further testing was conducted to see how A1C values differed among the thirty participants before and after participating in the chronic care management program. Table 5 exhibits the results of independent t-tests by gender, medicine adjustments, blood sugar testing, and exercise changes.

Tests that result in p-values below the level of significance (0.05) indicate that a statistically significant difference in A1C exists. Patients who had medicine adjustments had significantly higher A1C values than those who did not need medicine adjustments at both time points. Patients who implemented exercise changes had a significantly lower A1C value before beginning CCM; no difference was detected for post-A1C values.

Discussion

Implications for Clinical Practice

Chronic Care Management will be used in clinical practice at the chosen facility to help manage T2DM patients. The findings verified the impact of this program on A1C in T2DM patients. Controlling T2DM will help in multiple ways, such as lowering patient and facility costs, increasing the quality of life, increasing length of life, and improving overall community health.

Implications for Education

If faculty and practitioners are more educated regarding this program and its implementation, they can generate proactive graduates in its use in practice.

Limitations

There were no devastating limitations in the DNP project. The facility is in an extensively rural area, which could have been a limitation due to a lack of resources. However, the project did not require an overwhelming number of resources; therefore, this was not considered a limitation. The only limitations noted in the DNP project from patients were a lack of funds for medications, insurance problems preventing medication changes, one patient with a language barrier, and a lack of desire for change in some participants.

Sustainability

The Centers for Medicare and Medicaid Services (CMS) recognizes that CCM services are critical components of primary care that promote better health and reduce overall healthcare costs (American Academy of Family Physicians, n.d.). Therefore, CCM is a billable service. Not only being able to help patients abundantly but also being able to benefit the practice monetarily markedly increases sustainability.

Plans for Future Scholarship

Plans for future scholarship include continuing to offer CCM within the facility to eligible patients and expanding to other diseases covered by the program. Plans also include expanding outside the facility to more comprehensive studies.

Another underutilized program for the management of T2DM patients in rural areas is Diabetes Self-Management Education (DSME) services. Research has demonstrated geographical disparities in diabetes outcomes and access to healthcare services. Supporting behavior changes through DSME has improved diabetes outcomes (Graves et al., 2019).

The most noticeable disparity in equity of access was for those living in rural areas. Only 44.1% of individuals in rural settings had 30-minute access to a facility, whereas 81.7% of

individuals in an urban setting had 30-minute access. Timely access to the best practice of DSME is essential in reducing diabetes mortality and disparities (Graves et al., 2019).

Conclusion

Management of chronic conditions in family practice is essential. The DNP project demonstrated that extensive monitoring and management of type 2 diabetes results in improved patient outcomes. The project also displayed that most T2DM patients are diagnosed with hypertension or other chronic conditions. Sustained, tedious monitoring of patients with chronic conditions can aid in preventing major complications. The ongoing implication of CCM displays the foundations of nursing, such as promoting health and wellness, preventing illness, and restoring health (Cruz, n.d.).

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Table 1

Age Distribution

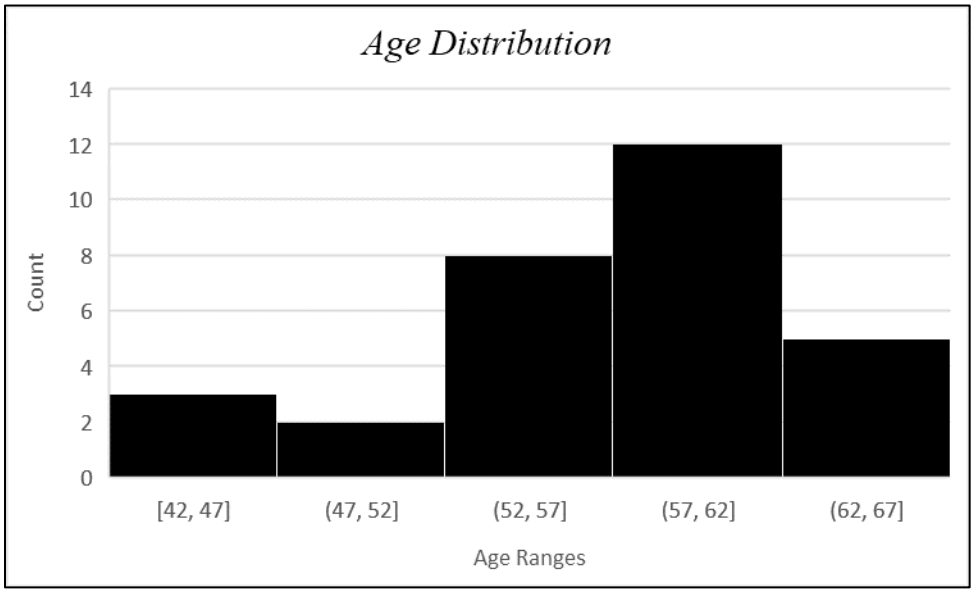


Table 2

Percentage of Patients with Secondary Hypertension Diagnosis

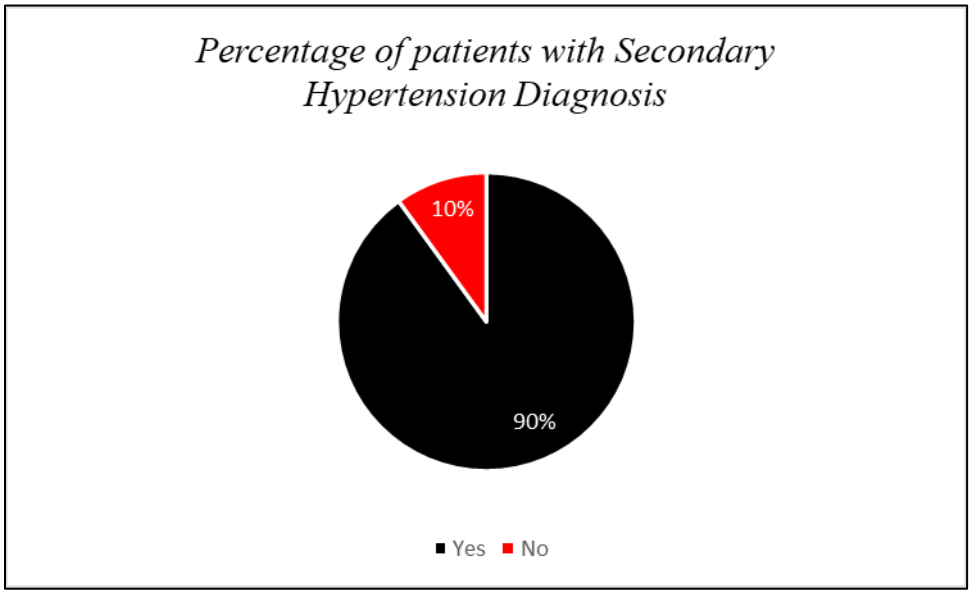


Table 3

BMI Pre- and Post-Intervention

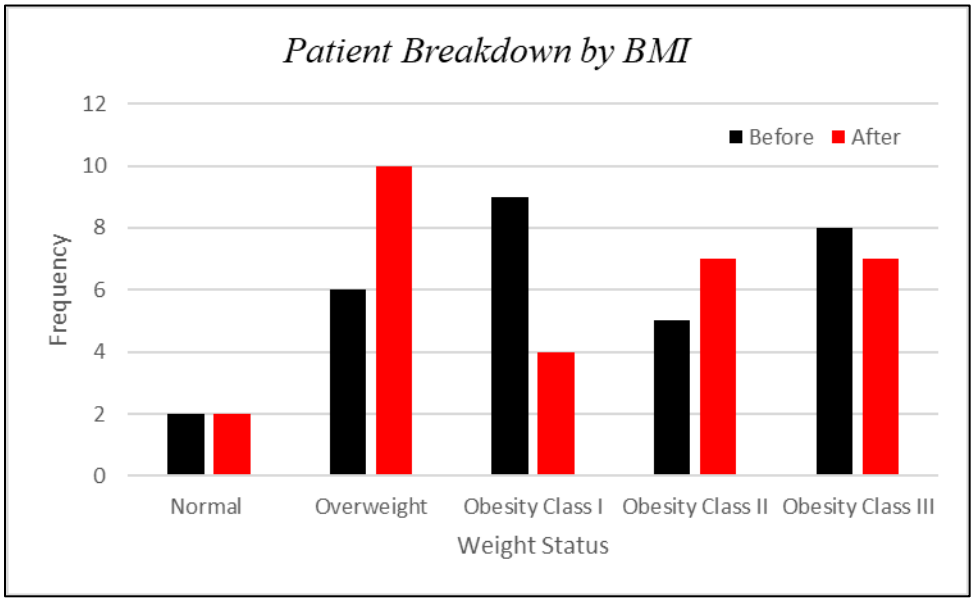


Table 4

Average A1C Pre- and Post-Intervention

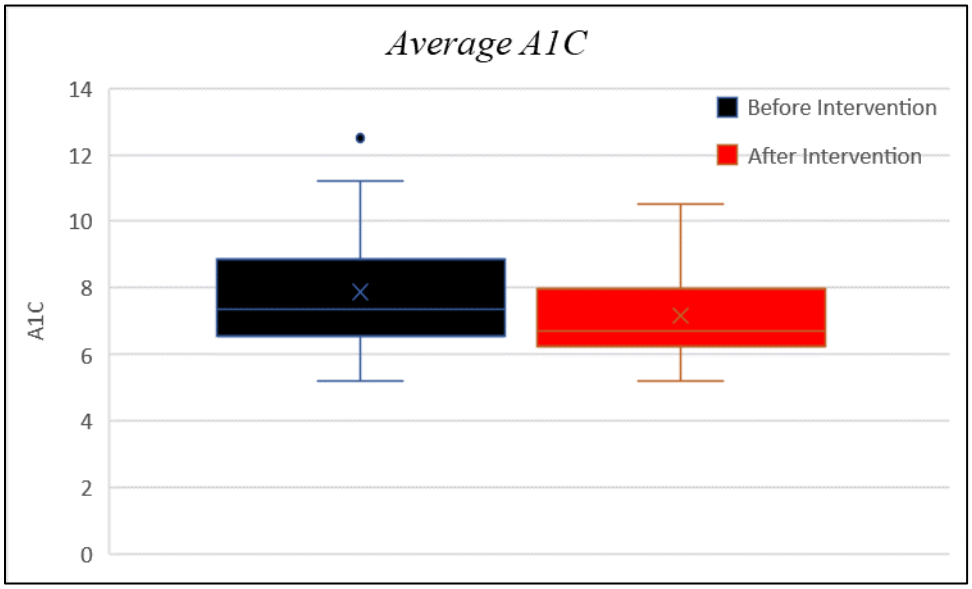


Table 5

Independent T-Tests

	Gender		p-value
	Females	Males	
Pre-A1C Value	7.35 (1.39)	8.91 (2.25)	0.070
Post-A1C Value	6.82 (1.08)	7.83 (1.58)	0.090
	Medicine Adjustments		
	Yes	No	
Pre-A1C Value	9.21 (1.76)	6.69 (0.90)	**<0.001**
Post-A1C Value	7.96 (1.49)	6.44 (0.58)	**0.002**
	Checked Blood Sugar (At Home)		
	Yes	No	
Pre-A1C Value	8.08 (1.68)	7.65 (2.06)	0.539
Post-A1C Value	7.01 (0.93)	7.30 (1.66)	0.556
	Exercise Changes		
	Yes	No	
Pre-A1C Value	6.73 (0.41)	8.04 (1.93)	**0.005**
Post-A1C Value	6.40 (0.61)	7.27 (1.38)	0.061

Appendix A

Facility Letter of Support

United Doctors Sand Rock
2820 Hwy 68-W
Sand Rock, AL 01234

Monday, September 26, 2022

Dear Sir or Madam,

This letter confirms my wholehearted support for Jacksonville State University graduate nursing student Mrs. Joni Kelley. Mrs. Kelley has received our approval to focus on "Use of Evidence-Based Telehealth to Reduce Complications in Adults with Type 2 Diabetes in a Rural Health Facility" Over the coming year.

We are excited to support her as she works toward improving patient care delivery in our facility.

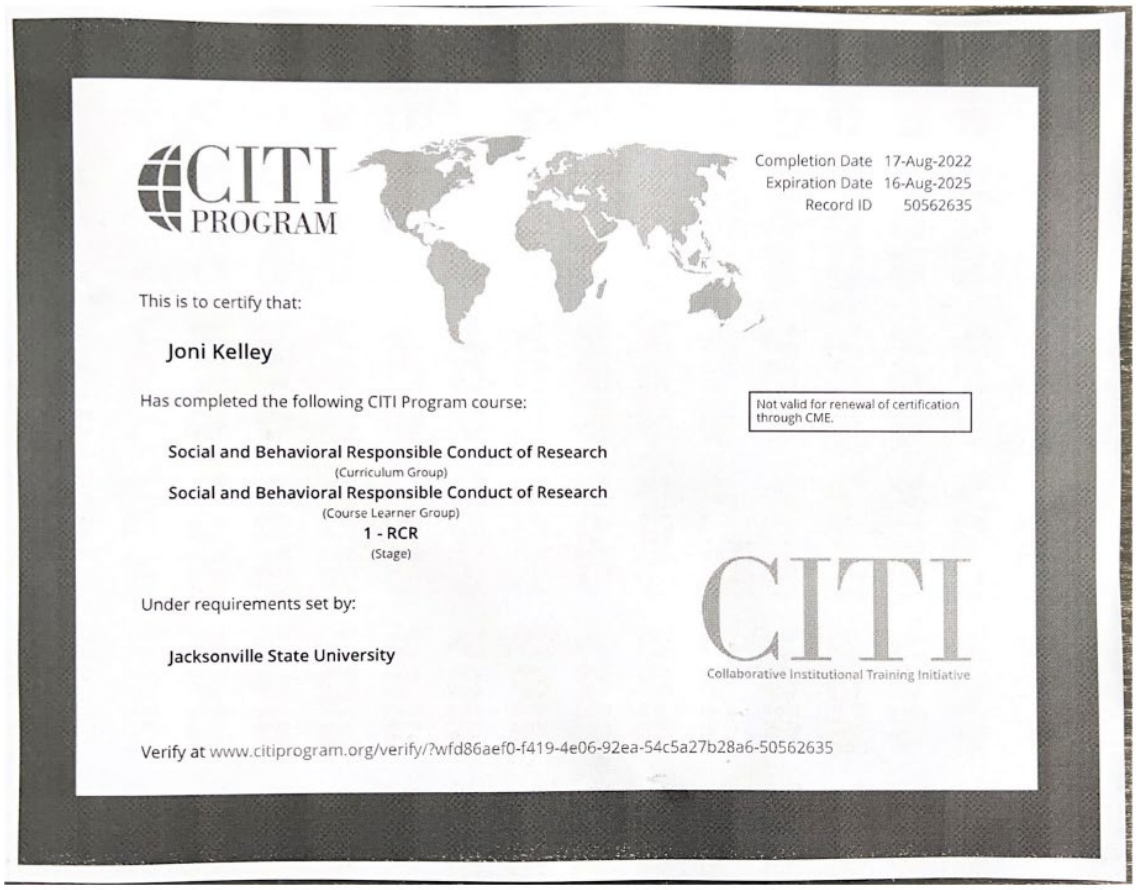
Please let me know if I can assist in any way.

Sincerely,

Ashley Lackey, DNP
Chief Executive Officer

Appendix B

CITI Training Certificate



CITI PROGRAM

Completion Date 17-Aug-2022
Expiration Date 16-Aug-2025
Record ID 50562635

This is to certify that:

Joni Kelley

Has completed the following CITI Program course:

Not valid for renewal of certification through CME.

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

Under requirements set by:

Jacksonville State University

CITI
Collaborative Institutional Training Initiative

Verify at www.citiprogram.org/verify/?wfd86aef0-f419-4e06-92ea-54c5a27b28a6-50562635

Appendix C

JSU IRB Approval Letter

JSU | INSTITUTIONAL REVIEW BOARD
JACKSONVILLE STATE UNIVERSITY

Institutional Review Board for the Protection of Human Subjects in Research
249 Angle Hall
700 Pelham Road North
Jacksonville, AL 36265-1602

November 16, 2022

Joni Kelley
700 Pelham Rd. North
Jacksonville, AL 36265

Dear Joni:

Your project "Use of Evidence-Based Telehealth to Reduce Complications in Adults with Type 2 Diabetes in a Rural Health Facility" 11162022 has been granted exemption by the JSU Institutional Review Board for the Protection of Human Subjects in Research (IRB). If your research deviates from that listed in the protocol, please notify me immediately. One year from the date of this approval letter, please send me a progress report of your research project.

Best wishes for a successful research project.

Sincerely,

Lynn Garner
Associate Human Protections Administrator, Institutional Review Board

Appendix D

Project Timeline

Task	May	June	July	August	September	October	November	December
Obtained Preceptor	X							
Met with Stakeholders		X	X	X	X	X	X	X
Call with preceptor	X	X	X	X	X	X	X	X
Call with faculty		X	X	X		X		X
Received Approval of Problem by Stakeholders		X						
Gap/Needs Analysis		X						
Search of literature		X	X					
Evidence table			X					
Draft proposal			X					
Received IRB Approval							X	
Project Implementation								X
Task	January	February	March	April	May	June	July	August
Project Completion			X					
Data Analysis			X					

Disseminate Findings to Agency				X				
Present at JSU Dissemination Day							X	
Graduation								X

Appendix E

Participant Consent Form

CONSENT FOR PARTICIPATION IN A STUDY

Title of Project: Use of Evidence-Based Telehealth to Reduce Complications in Adults with Type 2 Diabetes in a Rural Health Facility

Investigator Names: Joni Kelley & Laura E. Barrow

E-Mail Contact Information: jgoss1@stu.jsu.edu, lbarrow@jsu.edu

You are being asked to participate in a research study. Before you give your consent to volunteer, it is important that you read the following information and ask as many questions as necessary to be sure you understand what you are being asked to do.

Investigators:

Joni Kelley, MSN, APRN, FNP-C

Laura E. Barrow, PhD, RN

Purpose of the Research

This project identifies patients who quality for Chronic Care Management (CCM) using criteria from of the Centers for Medicare and Medicaid Services and who are currently diagnosed with Diabetes Mellitus. The project will utilize monthly phone calls to better assist patients in managing their Diabetes. Identifying any complications of this disease early may help reduce complications and improve your overall quality of life.

Procedures

If you volunteer to participate in this study, you will be asked to agree to monthly phone calls lasting approximately 20 to 30 minutes. These calls will focus on your current illnesses, and specific questions about your diabetes will be asked. You will be asked to provide information about your daily blood glucose levels and your daily medication.

Potential Risks or Discomforts

Potential risks include loss of privacy, discussing sensitive medical issues. You will be asked to participate in phone calls at a time and location comfortable to you. Any questions involving medical issues or that is uncomfortable for you to answer may be skipped without penalty. You

may experience positive or negative feelings as you respond to questions. The phone calls will be scheduled during business hours and at your convenience. There are no costs associated with your participation in the study. You have the right to discontinue participation, temporarily or permanently, without any consequence.

Potential Benefits of the Research

There are personal benefits for participating in the study. Your participation may identify complications of your diabetes and lead to earlier treatment. The nursing profession and clinical practice standards may increase due to the knowledge obtained in this study.

Confidentiality and Data Storage

Identifying information will be confidential and not be shared with anyone outside the study. Data, specific to the study, will be stored in the researchers' offices on a password protected computer. Following the completion of the project, the forms will be destroyed three years after the study.

Questions, Participation, and Withdrawal

Your participation in this research study is voluntary. As a participant, you may refuse to participate at any time. To withdraw from the study, please contact the researchers at 256-490-3877, 256-490-3625, jgoss1@stu.jsu.edu, or lbarrow@jsu.edu.

Reasons for Exclusion from this Study

The exclusion criteria for this study include patients with the inability to speak English, no access to a glucometer, no access to a telephone, not qualifying for CCM, or with no diagnosis of type 2 diabetes mellitus.

*By signing this consent form, this allows the researcher to contact you by phone, ask interview questions, and access your lab reports. You may choose to end your participation in this study at anytime without penalty. If problems arise, please contact one of the researchers – phone numbers and email addresses may be found within this consent form.

SIGNATURE PAGE OF CONSENT FORM
FOR RESEARCH INVOLVING ADULTS
Permission Form for Research on

Use of Evidence-Based Telehealth to Reduce Complications in Adults with Type 2 Diabetes in a Rural Health Facility

Title of Project

I have read a description of the research project/study, and I understand the procedure described on the attached pages. I also have received a copy of the description.

I _____ agree to participate in the study.
Complete Name

_____ _____
Signature Date

Appendix F

Participant Information Form

Participant Information Form

Name:

Age:

Gender:

Self-identified ethnic identification:

A1C prior to entering program and initiating phone calls: _____

Self- reported glucose scores:

DATE	GLUCOSE	DATE	GLUCOSE

Self-reported medication reconciliation:

No problems identified: _____

Problems identified:

_____

_____

_____

Any actions taken by provider:

_____

_____

_____

If this is month three, follow up A1C result: _____

Appendix G

SWOT Analysis