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Telehealth in Patients with Type 2 Diabetes Mellitus

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TELEHEALTH IN PATIENTS WITH TYPE 2 DIABETES MELLITUS

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Abstract

Description: Type 2 diabetes mellitus (DM2) is an epidemic that has many factors involved in its management to maintain control. Patients with DM2 require routine evaluations and blood work to provide comprehensive care. COVID-19 caused major shifts in traditional care which sparked an increase in the utilization of technology like telehealth. Telehealth can be an effective tool used to manage diabetes and help attain better glucose control, but its effectiveness during the COVID-19 pandemic warrants further investigation.

Purpose: The purpose of this project was to determine if telehealth visits were more effective in reducing Hemoglobin A1c (HbA1c) in adult patients with DM2 versus usual care.

Summary: Literature review has shown that telehealth sessions are more effective than usual care in improving HbA1c. The clinic site transitioned from in person visits to telehealth visits to accommodate patients during the COVID-19 pandemic. After transition of the clinic to telehealth, there was no scheduled program evaluation to determine its effectiveness in diabetes management. A retrospective program evaluation was implemented to evaluate the effectiveness of telehealth versus usual care in the management of patients with DM2, which revealed no statistically significant differences.

Clinical implications: There have been few retrospective reviews on the effectiveness of telehealth on diabetes versus usual care, specifically for telehealth programs implemented during the COVID-19 pandemic, therefore it was necessary to evaluate outcomes in relation to usual care to determine effectiveness. Although there were no significant differences in outcomes between telehealth and usual care for DM2 in the study population, telehealth still holds promise as an effective tool in the management of DM2.

Keywords: diabetes, telehealth, retrospective review

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Chapter I

Introduction and Discussion of Phenomenon of Interest

Healthcare is a constantly changing arena of new medical management, practice guidelines and patient care technologies. Patient care technology has seen significant progress, and its use has grown significantly, from the use of diagnostic imaging to electronic documentation. Over the last decade, telemedicine has moved to the forefront of healthcare, especially after the SARS-CoV-2 (COVID-19) pandemic. Telehealth was originally started to improve access to care for rural and underserved communities, but it has evolved and is now being used in all aspects of care (Gajarawala & Pelkowski, 2020). Due to increasing pressure for healthcare systems and organizations to provide quality care while managing costs, telehealth offers significant advantages. Telehealth can provide access to quality care and resources without higher net costs (Gajarawala & Pelkowski, 2020). Being able to reach a large population without the traditional barriers to care like transit, childcare arrangements, and time off work, makes telehealth an accessible and convenient option. The COVID-19 pandemic challenged many aspects of the healthcare system. In order to continue care for patients with and without COVID-19 safely, both inpatient and outpatient health facilities added telehealth to their everyday practice. Telehealth has increased in use by 38 times since before the pandemic (American Hospital Association [AHA], 2020). This rapid implementation helped to reduce the transmission of COVID-19 to healthcare staff and healthy patients while still allowing for access to quality care (Gajarawala & Pelkowski, 2020).

Continuous access to care is a vital component of healthcare maintenance. In America, 6 out of 10 adults have a chronic disease (CDC, 2021b). Changing modifiable risk factors and making necessary dietary modifications can help prevent most cases of chronic diseases. There

are 5 lifestyle related chronic diseases, of which diabetes ranks among the highest with regard to risks of premature death (Baena-Díez et al., 2016). The increasing incidence of diabetes is a great public health concern, causing tremendous health and financial implications. Type 2 diabetes (DM2) affects over 34 million people in the United States, which is about 10.5% of the population (CDC, 2021a). Over the past 20 years, these numbers have more than doubled as Americans have become more overweight and obese (CDC, 2021a). DM2 is the 7th leading cause of death, with medical costs doubled compared to non-diabetics, costing over 300 billion yearly (CDC, 2021a).

Diabetes can lead to many complications including cardiovascular disease, kidney disease, neuropathy, and retinopathy. Typically, adults with type 2 diabetes have routine follow up visits every 3 months with visits ranging from 15 to 20 minutes. If they have more than one chronic disease or other concerns, there is little time for education. About 2.2 million deaths in 2019 were attributed to high blood glucose (WHO, 2021). Diabetes is mostly a self-managed disease, and many factors can contribute to having lack of glycemic control.

Evaluating clinical outcomes is vital to a healthcare facility's performance. It's a necessary step to ensure that patients' healthcare needs are met, and effective interventions are being implemented. Performance indicators help to determine if patients are meeting their treatment goals. When performance indicators fall below target, the healthcare team is informed, and revisions are made to reach performance targets. A key performance indicator for DM2 patients is glycosylated hemoglobin (HbA1c or a1c). Glycosylated hemoglobin is a blood laboratory test that measures the average glucose levels for the prior three months and is reported as a percentage. The National Committee for Quality Assurance (NCQA) categorizes diabetes performance indicators by grouping patients according to HgbA1c percentage. Diabetes is

considered under good control if the HbA1c is below 9%, and poorly controlled if it is above 9% (National Committee for Quality Assurance [NCQA], 2022). These findings are used to inform the facility and its providers about how well the patients are controlling their glucose. When there's an increase in poorly controlled diabetes percentages this indicates that more needs to be done to aid patients with their diabetes management.

Problem Statement

Usual Care

During the COVID-19 pandemic, healthcare facilities everywhere had to adjust from usual in-person care to telehealth care to limit transmission of the COVID-19 virus. A federally qualified health center (FQHC) in the western United States provided usual care for chronic disease management via 15-minute, one-on-one in-person visits. These usual care visits entailed discussing diabetes and other chronic and acute problems, laboratory review, and medication management. Patients were checked in by the receptionist then waited for the medical assistant (MA) to complete intake. During patient intake, the MA would obtain their vital signs, including blood pressure (BP), heart rate, temperature, weight, and height. After intake, the patients were placed in a treatment room to be evaluated by a provider. The provider would review the history and complete a physical examination, discuss their previous laboratory findings including HbA1c, and evaluate their blood glucose management. Other concerns and chronic diseases would be addressed as indicated. Lab orders and medication refills would be completed with additional laboratory review and discussion to occur in 1-2 weeks when results were available. Follow-up visits occurred every three months to determine progress with HbA1c. Visits sometimes occurred sooner if deemed necessary by their provider.

Telehealth

After the pandemic began, all visits were transitioned to telehealth. Telehealth visits were carried out over the phone for a duration of 15 minutes. Patient check-in was completed by reception over the phone. The call was then transferred to the MA for intake. Telehealth intake included collecting home blood glucose readings and medication refill requests. Upon completion of the intake, the call was transferred to the provider. The provider would discuss home blood glucose management and review the most recent HbA1c findings. Other concerns and chronic diseases would be addressed as indicated. Lab orders and medication refills would be completed with additional laboratory review and discussion to occur in 1-2 weeks when results were available. Patients were advised to follow up in three-month intervals, sooner if necessary. The telehealth visits differed from usual care visits in that the patients were not physically examined, and their vital signs could not be obtained. Otherwise, visits were the same length, and the same information was discussed.

Significance of the Problem

Diabetes is an epidemic that has many factors involved in its management. Patients struggle with managing their disease and making time for medical appointments. Glucose control is vital to prevent diabetes associated complications. Higher glucose levels are associated with shorter life spans, cardiovascular disease, renal disease, and increased risk for developing cancer (Baena-Díez et al., 2016).

The COVID-19 pandemic caused significant disruption in traditional medical care. During the beginning of the pandemic, administration got together and developed a set of guidelines for staff to follow. Patients were only allowed to enter the healthcare facility for lab draws after being a screening. No in-person care was provided.

Transitioning from usual care to telehealth required adaptation. Although telehealth has been used for years, it was never used as extensively as it was during the pandemic. After the transition to telehealth exclusively, there was a unique opportunity to evaluate its effectiveness for the management of DM2 in this patient population. Evaluating the effectiveness of telehealth to determine if it is more or less effective in controlling chronic diseases, like diabetes, is an important component of providing high-quality care. Providers must continuously evaluate all treatment modalities to ensure their patients are receiving quality care.

Evaluating the effectiveness of treatment is an important aspect of providing high-quality care. There are multiple ways to evaluate the effectiveness of implemented programs, including retrospective reviews. Retrospective reviews use management data after program implementation to evaluate program effectiveness. Government agencies and other foundations have supported the use of retrospective review to build evaluation capacity, which essentially conducts evaluations and uses them to improve results (Kidder & Chapel, 2018). One major framework developed by the Centers for Disease Control (CDC) has been used since 1999 and has aided in improving numerous programs throughout the organization. Over the years, the framework has been revised to be applicable to different organizations everywhere. Program evaluation can aid in determining the effectiveness of the program and provide information on ways to improve it.

Purpose Statement

The purpose of this project was to determine if telehealth visits are more effective than usual care in reducing HbA1c in adult patients with DM2 through program evaluation. The following question guided the author in the completion of this study. What is the HbA1c in adult patients with diabetes managed via telehealth versus usual care?

Chapter II

Review of Literature

Using a thorough search strategy, articles with relevant data were found regarding the research topic. The keywords used to search for articles in the Cumulative Index of Nursing Allied Health (CINAHL) were: telehealth, telemedicine, office visit, in-person, program evaluation and diabetes. The keywords used to search for articles in PubMed were: telehealth, in-person, face to face, program evaluation, linear regression, and diabetes. The keywords used to search for articles in Medline were: telehealth, telemedicine, face to face, in-person, program evaluation, review and diabetes. The keywords used to search for articles in Cochrane were: telehealth, in-person care, and diabetes. The synonyms for telehealth (telemedicine, telecare, and telepractice) and diabetes (diabetes type 2, diabetes mellitus, and diabetes mellitus type 2) were used interchangeably in all search engines. Synonyms for face-to-face (in-person, in-person care, office visit, appointment, and usual care), and program evaluation (linear regression, review, program review) were also used interchangeably for all search engines.

Through these search outcomes, articles were included if they were of high-quality evidence, including randomized control trials, cohort studies, and reviews. Only articles with a comparison to usual care were kept. Any type of health care provider was accepted, regardless of medical license type or specialty. No country or state was used to exclude an article. Articles with secondary interventions like diet or nutrition counseling were excluded. Articles with systematic reviews or opinions were excluded. After refining through all the search outcomes, 15 articles were found and subjected to full review. Telehealth, including phone calls or video calls, was compared to usual care. The majority of the studies were randomized control trials and used telehealth as the intervention with usual care as the control group. Although usual care was rarely

defined in detail, it was typically described as care the targeted patient population would be expected to receive as part of the normal practice (Yorganci et al., 2020). For the purposes of this study, usual care is defined as 15-minute one-on-one in-person visits every 3 months, or sooner if deemed necessary by a provider. The remaining studies were retrospective reviews comparing telehealth visits to routine care visits over a period of time (Levin et al., 2013; Wong et al., 2021; McLendon et al., 2019; Dutta et al., 2021; Tourkmani et al., 2021). Limited studies were found in the U.S. in the last 10 years, therefore most of the studies were from international sites. Four of the studies were carried out in the United States (U.S.), with the remaining studies conducted in Europe and the Middle East (McLendon et al., 2019; Egede et al., 2017; Kobe et al., 2022; Carter et al., 2011).

Eight studies were executed in low socioeconomic communities, similar to the research question population. The remaining studies did not mention the socio-economic status of its patients. Ethnicities varied across the articles, depending on the region in which the study was completed. All articles included patients that had DM2, except for the article by Levin et al. (2013) and McLendon et al. (2019), which included both DM1 and DM2 patients. Sample sizes varied with a range from 40 to 2186 participants, while the studies averaged between 150-300 participants. The mean baseline HbA1c ranged from 7.9-10%, with averages between 8-9%. The length of studies varied from 3 months to 7 years, with the average being held over 6 months.

Review of the Literature Supports the Problem Statement and the Significance to Nursing

The reports from these studies indicated several statistically significant findings linked to the research question. All of the studies had a P value at or below 0.05. All of the studies found a significant improvement in HbA1c, with only 1 study concluding no significant differences between groups (Dutta et al., 2021). All of the studies indicated confidence levels

above 90%. The main type of analysis used in the studies was a linear regression model or analysis of variance (ANOVA). Telehealth sessions were either phone visits or video visits. All studies used HbA1c as primary or secondary outcomes. Several other outcomes were studied including weight loss, low-density lipoprotein (LDL), and blood pressure (Rasmann et al., 2015; Hansen et al., 2017; Wild et al., 2016; McLendon et al., 2019; Warren et al., 2018).

Several studies found unique outcomes. The study by Levin et al. (2013), found high patient satisfaction with the conversion of usual care to telehealth. The study by Kaur et al. (2015), found an increase in quality of life in the telehealth group. Although all studies showed an improvement in HbA1c, 2 studies found an improvement in cholesterol as well (Rasmann et al., 2015; McLendon et al., 2019). Blood pressure was noted to improve in the study by Wild et al. (2016) and McLendon et al. (2019). Interestingly, the study by Hansen et al. (2017), found no improvement in either blood pressure or cholesterol.

Synthesis of Available Evidence

The studies reviewed provided ample data to support the effectiveness of telehealth in managing DM2 patients. The studies that found improvements in HbA1c have some notable similarities. They all involved at least 3 telehealth visits, with one visit held every month. The visits were carried out over a minimum of 3 months, which is necessary to determine the new 3-month average HbA1c. The visits were at least 15 minutes long, consistent with the typical telehealth visits held at the study site.

There was use of a clinic-based provider in all the mentioned intervention arms. Using employees who already work at, and have rapport with, the patients could contribute to patient trust and adherence to the treatment. This familiarity with staff can also increase the likelihood of patients agreeing to participate in the study. Most studies were conducted in underserved

communities, which is an advantageous factor in these studies since the population has a low knowledge base of health (Lazar & Davenport, 2018). This allows for a wider spectrum of learning to occur. The findings in these studies infer that telehealth visits are more, or as, effective as usual care in improving glucose in diabetics.

There was one study that found no difference between groups, but both groups found significant improvement in HbA1c (Dutta, 2021). This demonstrates that telehealth intervention is at least as effective as usual care.

Needs Assessment and Description of the Project

Population Identification

The population consists of patients with DM2 at a Federally Qualified Health Center (FQHC) in the western U.S. All patients who had at least 1 usual care visit prior to their telehealth visits were included and data was monitored over an 18-month period.

Identification of Project Sponsor and Key Stakeholders

Key stakeholders were patients, healthcare providers, clinic administrators, and quality improvement analysts working in the FQHC. All patients with DM2 who had telehealth visits were included. All the adult healthcare providers that see patients in the clinic will be included, totaling 18. The clinical administrators oversaw the project to monitor progress and ensure confidentiality of patient information. The quality improvement analysts aided in extracting and providing the data. They also provided information on previous programs and their outcomes. Visit time frames and usual care follow-up visits were included.

Organizational Assessment

Outcome based performance measures are used currently to evaluate diabetes care measures. HbA1c is considered controlled under 9% and uncontrolled over 9%. No current program evaluation exists to evaluate the effectiveness of telehealth visits versus usual care.

Assessment of Available Resources

Since this was a retrospective review of existing program data, no additional resources were required. The quality improvement analyst that extracted the data is also the quality management manager at the FQHC.

Scope of the Project

The project evaluated data for 6 months prior to the pandemic (usual care phase), 6 months during transition to telehealth (transition phase), and 6 months after transitions to telehealth (telehealth phase). The data included all diabetic patients who had a HbA1c drawn at the clinic. The data was analyzed to determine if there was a significant improvement in HbA1c in telehealth versus usual care.

Chapter III

Theoretical Underpinnings of the Project

Program evaluation has been a long-standing method that dates back to the 17th century, although it has come into more modern development in the 20th century. Program evaluation refers to collecting, analysing, and using data to examine how effective and efficient programs are and to contribute to continuous program improvement (Kidder & Chapel, 2018). One widely used and beneficial framework for program evaluation was developed by the CDC. The Framework for Program Evaluation in Public Health has 6 steps and 4 standards, which guide the process of establishing and evaluating a program (Kidder & Chapel, 2018). The 4 Framework standards commits members to ensure program evaluations are carried out in feasible, useful, accurate, and ethical standards. The Framework steps focus on engaging the stakeholders involved (step 1), describing the program and purpose (step 2), and identifying the purpose and mapping out the details of the program (step 3). The last 3 steps involve gathering credible evidence (step 4), justifying conclusions (step 5), and ensuring use and obtaining feedback on the program (step 6) (Kidder & Chapel, 2018). The continuous flow of the Framework allows for evaluation and feedback on an endless cycle of improvement.

Very few studies on program evaluation in the field of diabetes and telehealth have been done. The study by Wong et al. (2021) and McLendon et al. (2019), showed positive outcomes in program evaluation in the improvement of HbA1c in diabetics. Therefore, future program evaluations can be useful in determining effectiveness of telehealth in diabetes.

Theory to Support the Theoretical Framework for the Project

Based on the evidence the literature review presented, an implementation plan using the Framework for Program Evaluation in Public Health was drafted to evaluate the effectiveness of

telehealth versus usual care in the management of DM2 patients in a FQHC in the western United States.

Step 1: Engage Stakeholders

The first step in the Framework was to engage stakeholders. The stakeholders involved in the program were the patients, healthcare providers, clinic administrators, and quality improvement staff working in the FQHC. These groups were essential to the execution of the plan and needed to be on board. The patients benefited significantly from this project, as it aided in evaluating diabetes management. For healthcare providers it would be providing a beneficial solution for their patients in controlling their diabetes. If the program is successful, it can also later be used to see if its beneficial in aiding other chronic diseases. Having resourceful aids like this can help providers in improving patient healthcare outcomes. Clinic administrators would benefit from positive outcomes of this project by being able to entice future patients to join the clinic. Increases in performance outcomes will be great for the quality improvement staff. FQHC's are incentivized based on performance measures, this can be another positive outcome to discuss with the team and how the funds can be used to provide more resources for the clinic.

Step 2: Program Details

During the second step, the program needs to be described in detail and all stakeholders must agree on the goal and purpose. During this stage there is an opportunity to get individuals excited about the vision with details of a new plan for change. Meetings with discussion of the overwhelming number of patients with uncontrolled diabetes in the clinic (HbA1c >9%) will be held, along with the promising plan to aid in controlling glucose and changing lives. All diabetic patients from the clinic who had an HbA1c drawn in the last year will be included. Diabetic patients meeting the criteria will have data extracted from 2019 to 2021 from all 4 FQHC sites.

Their gender, HbA1c, ethnicity and age will be pulled and represented on an excel data spread. The data will then be analyzed and compared to determine if telehealth visits during the pandemic had a more significant reduction in HbA1c compared to pre-pandemic usual care.

Step 3: Evaluation Design

Step 3, focus the evaluation design, will likely be the most challenging of stages. Ensuring that all the details have been discussed and that individuals are ready and understand the process will be vital. This will be the time to motivate and increase the confidence of those involved, ensuring that they are aware of the purpose and methods of the program.

Step 4: Gather Credible Evidence

Gather credible evidence, step 4, is where the program seen as a whole picture seems credible. Credible evidence strengthens evaluation and can be improved by using multiple procedures for gathering, analyzing and interpreting data (Graetz et al., 2021). The data in this study will be computed and analyzed by a statistician, who is not a part of the FQHC, which helps eliminate bias of analyzation.

Step 5: Justify Conclusions

Justify conclusions, the fifth step, entails that the evidence gathered is justified by all stakeholders. It's agreed upon that the results may be used with confidence before using the evaluation results. The results will be discussed with the team and a group decision will be made.

Step 6: Ensure Use and Share Lessons Learned

The last and final step of the Framework is ensure use and share lessons learned. This step involves strategic thinking and effort to ensure the findings are disseminated appropriately. How will the lessons learned will be communicated to an audience and what things can be done in the future to improve the program are vital in this step. After the results have been evaluated,

the team will discuss the pros and cons of the program. Brainstorming will allow revisions of the program to be made and future programs will be used when indicated.

Plan Evaluation

To evaluate the plan, the HbA1c of all the participants will be checked and compared to baseline. The values will be compared over 18 months (2019-2020) of those who had telehealth and compared to usual care visits. Ethnicity, age, and gender will also be gathered for comparison. The values will then be calculated to determine the significance of change.

The framework presented will aid in applying this program evaluation with the diabetic population. The majority of the stakeholders will not have their routine jobs affected. Those whose daily tasks will be affected will have to assign and delegate some of their usual work to others. Although this may create more work for others, it will be temporary and will be beneficial in the long run. Improvement in glycemic control will allow more performance measures to be met and increased funding will be provided for the clinic. This will allow for a greater budget in hiring more individuals to aid with the implementation of this new program. Also, the program could bring in new patients after word of a successful telehealth program for diabetics gets out.

Chapter IV

Project Plan

Setting

A FQHC in an underserved community clinic in the western United States. The clinic accepts patients with and without insurance. Care is offered starting from newborns to geriatric patients. Services offered include preventive care, acute and chronic disease management, prenatal care, woman's health, and physical examinations. The clinic has a variety of health care professionals including nurse practitioners, physician assistants, medical doctors, and doctors of osteopathy.

Population of Interest

The target population of interest for this study were all patients with DM2. Inclusion criteria were patients who had been diagnosed with type 2 diabetes, aged 18 and older, those who had a visit in person, and an HbA1c drawn prior to the pandemic and during the pandemic. Exclusion criteria were patients under the age of 18 and those who did not have HbA1c drawn prior to or during the pandemic. We used stratified random sampling to select the 60 patients that were included for analysis.

Measures, Instruments, and Activities

Recorded measurements of patients HbA1c, age, and gender were extracted from the database. This quantitative data was extracted from the electronic medical record for analysis. This data was retrieved by entering in the desired characteristics of age, diabetes diagnosis and HbA1c. A total of 60 patients' data were obtained. The data excluded any patient identifiers and was stored securely as an excel spreadsheet. The excel spreadsheet was sent via encrypted email.

Timeline

Data was collected in the 6-month period, October 2019 to March 2020, prior to telehealth initiation (usual care phase). Data was collected in the 6-month period, April 2020 to September 2020, when telehealth was being initiated (transition phase) and then data was collected during the 6-month period post telehealth transition (telehealth phase), October 2020 to March 2021.

Project Tasks and Personnel

Administration oversaw the entire project throughout the process. The quality improvement manager was involved to extract and provide the patient data. He entered the desired characteristics, excluding patient identifiers, and provided the results on an excel spreadsheet that was stored in a secured email with limited access.

Resources and Supports

Statistician guidance along with the study by McLendon et al. (2019) was used to aid in determining power and number of patients needed. Assuming effect size ($d=0.49$) based on research (McLendon et al., 2019) power analysis using G-power $N=57$ would yield 95% power for paired T-test at 0.05 alpha level. Using random, stratified sampling a total of 60 patients was selected and analyzed.

Risks and Threats

There were no associated risks noted with usual care or telehealth in any of the articles. There was the possibility of not having sufficient HbA1c data available during the telehealth phase since patients were wary of coming into the clinic. Data was extracted without any identifiers to ensure privacy.

Evaluation Plan

A total of 60 patients were included in the usual care phase from April to September 2019 and were evaluated and an average HbA1c was obtained for each patient. The same was done for data extracted from patients during the pandemic from April to September 2020. Comparisons between the two groups were made using paired T-tests to determine if there is a significance in outcomes.

Chapter V

Summary of Implementation and Results

Diabetes is a tremendous global health concern. Patients with diabetes need routine follow up care with their providers to aid with control and maintenance of their disease. The COVID-19 pandemic had a significant impact on the delivery of healthcare. Many individuals feared infection and stayed home instead of seeking care, while others were unaware of safe treatment options. The pandemic led to a significant increase in the use of telehealth. The study site had not previously used telehealth prior to the pandemic. After the pandemic it became a full telehealth clinic with no in-person visits. This created a unique opportunity to evaluate the effectiveness of telehealth compared to usual care in person for patients with DM2. Prior research determined that telehealth led to greater improvement of HbA1c compared to usual care. Therefore, this study was conducted to determine if there were significant differences in the HbA1c in adult patients with DM2 managed via telehealth versus usual care. The results of the study may help evaluate the effectiveness of telehealth for the management of DM2.

Threats and Barriers to the Project

There were no identified threats throughout the program evaluation. A barrier to the initiation of telehealth was the lack of awareness of the staff regarding the benefits of telehealth technology and how to address the needs of the patients. There was no formal telehealth training. The sample size of this retrospective program evaluation was small compared to other similar studies reviewed in the literature.

Monitoring of the Project

This was a retrospective review of existing data and there was no intervention that required active monitoring. This study was conducted due to the changes in care delivery

necessitated by the COVID-19 pandemic. Patient care was transitioned from usual in-person care to full telehealth model. There was no plan to evaluate the effectiveness of telehealth versus usual care in the study population. After literature review found improvement in HbA1c in DM2 patients, it was determined that a retrospective program evaluation could be beneficial in determining the effectiveness of care for DM2 patients during the COVID-19 pandemic.

Data Collection

The program evaluation was approved by the academic institutional review board and FQHC leadership. Data were collected for program evaluation. Demographic data included age and gender. Quantitative data included HbA1c obtained over a 6-month period prior to telehealth initiation in clinic (usual care phase), 6-month transition period (transition phase), and 6-month post transition period (telehealth phase). See Table 1 for descriptive statistics.

Table 1

Descriptive Statistics

	n
Mean Age	59
Male	24
Female	36
Usual Care Mean HbA1c	8.3
Telehealth Mean HbA1c	8.2

Data Analysis

A paired sample t-test was used to analyze the results. This type of testing was chosen due to the number and type of independent and dependent variables in the hypothesis. The

independent variable included time (usual care phase versus telehealth phase). The dependent variable consisted of HbA1c. Comparing and looking for the significance between group means of the same group of participants on 2 different occasions led to the use of the paired sample t-test. Therefore, assuming effect size ($d=.49$) based on prior research (McLendon et al., 2019) power analysis using G-power $N=57$ would yield 95% power for a paired t-test at .05 alpha level, two-tailed. Using random, stratified sampling, including age, time and gender, a total of 60 patients were selected and analyzed.

Contributions to Nursing

Discussion of the Results of the Project

The results (see Table 2) of the retrospective program evaluation found no significant differences in the HgbA1c in the telehealth phase ($M=8.2$, $SD=.016$) versus usual care phase ($M=8.3$, $SD=.017$). Paired sample t-test for the 60 patients in usual care compared to telehealth group had an outcome two-sided p-value of .575, where p-value greater than .05 shows significance. Paired sample testing (results not shown) to determine if there were significant outcomes in gender or age were also not significant.

Table 2

Results

	Usual Care	Telehealth	p-value
HbA1c	8.3	8.2	.575

The retrospective program evaluation did not find any significant differences in HgbA1c between the two groups. The study replicated a similar program evaluation study that found significant differences using a longer intervention period (McLendon et al., 2019). ANCOVA and ANOVA including the transition group date (results not shown), found no significant results. Controlling for time, age and gender did not find any significant statistical differences. Future studies using a larger sample size at the study site may lead to statistically significant differences.

Discussion of the Relationships Among the Project Results to Evidence

Identified in the Review of the Literature and the Theory Underlying the Project

Although literature review showed significant differences in HbA1c for patients who received telehealth versus usual care, those results were not replicated in this study. The telehealth group did have HgbA1c values similar to the usual care group indicating that telehealth was as effective as usual care. The average HbA1c in the usual care group (8.2%) was lower when compared to many of the articles (McLendon et al., 2019; Rasmann et al., 2015; Hansen et al., 2017; Wild et al., 2016; Lashkari et al., 2013; Egede et al., 2017; Kobe et al., 2022; Carter et al., 2011; Tourkami et al., 2021). This initial lower average could have led to non-statistically significant findings. Reasons for these lower-than-average glycemic numbers in the usual care group may be due to the randomly stratified sampling or to the COVID-19 pandemic. The sample of patients chosen were completely random, leading to the possibility that those chosen had better than average control of their DM2. A few articles had a significant amount of the demographic population consisting of younger adults (Wild et al., 2016; Wong et al., 2016; McLendon et al., 2019; Kaur et al., 2015; Kobe et al., 2022; Carter et al., 2011; Niccolucci et al., 2015; Tourkami et al., 2021), where the mean age in this study was 60 years old.

The younger demographic can be more engaged in telehealth visits, leading to better adherence and improved glycemic outcomes. Typical clinic visits for patients with DM2 are held once every 3 months, leading to 2 visits in the 6-month telehealth phase. All the articles had at least 5 visits, this may be another reason the results were not statistically significant.

The Framework for Program Evaluation in Public Health created by the CDC can be of valued use for continued improvement. The final step in the cycle is to ensure use and sharing lessons learned. Although the articles in the literature review did not use this theory, they often discuss where there is room for improvement and how future studies can be done after understanding the outcomes. Understanding and using the outcomes of this project will be a resourceful tool for the ambulatory clinic to use. Evaluation can be done to understand where they can improve and how to better carry out another program evaluation in the future. Sharing this information with others will allow opportunities for other institutions to learn from. It can lay out the foundation for others who want to initiate a program evaluation of their own.

Discussion of How the Project Advanced or Improved Nursing Practice or Patient Outcomes

Although this program evaluation did not find significant differences between the two groups, there are still some pertinent implications for patient outcomes. Telehealth can be utilized for meeting the needs of patients during times of decreased access to care and it can be as effective as care in person. Telehealth has greatly increased in use after the start of the pandemic and is being widely used throughout the country. Learning about various ways where it may be beneficial for the patient and provider to aid with chronic conditions can be very resourceful. Telehealth allows providers to reach patients, regardless of location, and provide care. Being able to reach patients who are too sick to seek in-person treatment or live in rural

areas and cannot travel to seek care is vital. It aids in preventing hospitalizations and increasing access to care. Telehealth studies show great value for healthcare of the future.

Potential for Sustainability

The implementation of telehealth in the ambulatory clinic setting did not result in any significant outcomes. After the rates of infection decreased, the clinic went into hybrid mode. They were continuing with telehealth visits while also seeing patients face to face. Patients were given the option of being seen in person or via telehealth. It was agreed upon to use this type of hybrid setting since the retrospective program evaluation yielded no significant outcomes.

Utilization and Dissemination of the Results

Future Scholarly Activity Resulting From This Project

The program evaluation lays the foundation for future studies to further investigate benefits of telehealth in ambulatory care. Telehealth has increased tremendously in the past years due to the COVID-19 pandemic and desire to prevent spread of the virus. Many studies have shown the benefits of telehealth, especially in improving DM2. Suggestion for future studies include initiation of a formal training session including benefits of telehealth with an implementation protocol. This will allow for staff to be fully aware of expectations prior to initiating the program. Studies may be done in the future with an average HbA1c greater than 10%, similar to the research studies, to determine if significant improvement in HbA1c will be found in patients with uncontrolled DM2. The result of this study allows for future research across various chronic illnesses like hypertension and hyperlipidemia. The ambulatory clinic can continue to allow patients to decide whether they would like to have a telehealth or in person visit for their diabetes management, since results determined glycemic outcomes remained the same regardless of appointment setting.

Plan for Dissemination of Results

After data was obtained from the clinic, a change of practice was completed by the researcher. Communication faltered and the clinic did not respond to attempts to share study results. The program evaluation will be published in an academic database and be available for review. The study will allow for review and consideration by others for future studies to be completed.

Conclusion

Diabetes is a worldwide epidemic, and education is a key component of glycemic control. With the increasing use of telehealth, it opens the door for a more convenient means of healthcare access for patients. Lifestyle and dietary modifications are key components in chronic disease management. Literature review of the articles led to the conclusion that telehealth visits are resourceful in improving HbA1c in patients with DM2. They can not only improve glucose levels but in some cases also improve cholesterol and blood pressure levels. Most of the studies were held in underserved, low health literacy communities, where the greatest necessity for aid with adherence and chronic care management is needed. Being prepared to make change in an organization can be difficult, but the program evaluation framework can aid in carrying out a successful plan. Ensuring to motivate and encourage the team are vital to executing a program successfully. The implementation plan is not only cost effective but feasible to be carried out in many different health settings. Although this retrospective program evaluation yielded no significant results, the adoption of a telehealth program could aid practitioners in better managing their patients and preventing them from acquiring complications associated with uncontrolled diabetes. Many studies have shown success in using telehealth in healthcare and there are implications for future studies to build upon this foundation.

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