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REVIEW, APPROVAL AND ACCEPTANCE

The document mentioned above has been reviewed and accepted by the student's advisor, on behalf of the advisory committee, and by the Assistant Dean for MSN and DNP Studies, on behalf of the program; we verify that this is the final, approved version of the student's DNP Project including all changes required by the advisory committee. The undersigned agree to abide by the statements above.

Mary Cho, Student

Dr. Judith Daniels, Advisor

DNP Inquiry Project Report

Evaluation of a Diabetic Point of Care Education in Primary Care

Mary Cho

University of Kentucky

College of Nursing

April 22, 2019

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Abstract

BACKGROUND: Diabetes education is the cornerstone of managing diabetes. The education can be delivered in group or individual sessions. Given that group classes are not always well received, a brief five-minute point of care education was developed and incorporated into patients' routine diabetic appointment. The effectiveness of the method is yet to be determined. **PURPOSE:** The purpose of this Doctor of Nursing Practice (DNP) project was to evaluate the effectiveness and acceptability of a recently implemented diabetic point of care education as compared to patients' usual care in an urban primary care clinic. **METHODS:** An outcome evaluation using a retrospective chart audit was conducted. Data analyses included changes in A1C between the groups. A nine-point DPC education questionnaire survey and provider interview were administered to assess satisfaction with the program. **RESULTS:** A total of 80 patients comprised each group with no statistically significant demographic differences at the baseline. No significant changes in A1C between the groups were found after three DPC visits 3 months apart. Approximately 67% of DPC patients were satisfied with the educational format. Open responses from both patients and providers regarding the program revealed three common themes: (a) the need for motivation, (b) simpler instructions, and (c) individualizing the material. The participants also cited lack of resources, complexity of disease management, and physical impediments as barriers to diabetic education. **CONCLUSION:** Although no changes in A1C were noted between the groups, patient satisfaction rates were high for point of care education. Based on their responses, initial knowledge level and screening for diabetes distress are recommended for an individualized educational plan. Furthermore, patients' readiness and motivation must be considered, with more time allotted for the LDE during or after the provider visit. Patients were clearly interested in receiving education tailored to their needs.

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Introduction

The incidence of diabetes has dramatically increased over the past 20 years. Globally, there are 422 million people living with diabetes, and this number is expected to increase to 629 million by 2045 (WHO, 2016). In the U.S. there are 23.1 million people living with diabetes and approximately 86 million people diagnosed with prediabetes, putting them at risk for developing diabetes within 5 years (CDC, 2017). The medical cost of diabetes management heavily burdens the U.S. federal budget. In 2017 an estimated \$327 billion was spent on diabetes which was a 26% increase since 2012 (ADA, 2018). Although a pharmacological approach is often needed, the main therapy for diabetic management is daily life style modification in diet and physical activities. Healthcare providers are key sources of information for patients as they learn to manage their disease process. This education can be delivered in a number of ways from diabetic classes to individual education provided at their routine health visits. The purpose of this project was to evaluate the feasibility and efficacy of a recently implemented diabetic point-of-care education program within an urban primary care clinic.

Background

Diabetes remains one of the top 10 leading causes of death in the United States (CDC, 2017). Type 2 diabetes mellitus (T2DM), is accounts for 95% of the diabetic population. It is caused by the progressive destruction of beta cells in the pancreas due to insulin resistance (ADA, 2018). Common risk factors for T2DM include obesity, hyperlipidemia, hypertension, family history of diabetes, sedentary life style, depression, and being an ethnic minority (NIH, 2018).

T2DM is associated with microvascular and macrovascular diseases. These systematic vascular failures mainly involve the kidneys, nerves, eyes, and cardiovascular system (Chawla,

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Chawla & Jaggi, 2016). The risk of mortality associated with macrovascular complications, especially cardiovascular disease (CVD), is two to three times higher among diabetic patients (Yu & Suissa, 2016). The pathophysiology for both diabetes and CVD reveals uncontrolled hyperglycemia, hyperlipidemia, and hypertension (Buttaro, Trybulski, Bailey, & Sandberg-Cook, 2016). The current 2019 American Diabetes Association (ADA) guideline recommends systolic blood pressure less than 140 mmHg and diastolic blood pressure less than 90 mmHg. If the patient is at high risk for cardiovascular disease the systolic target should be 130 mmHg and a diastolic of 80 mmHg. These are modifiable risk factors, if left untreated, may lead to the development of coronary artery disease, myocardial infarction, or stroke (Buttaro, Trybulski, Bailey, & Sandberg-Cook, 2016).

The other complications associated with uncontrolled diabetes are equally detrimental to patient. Chronic distal symmetric polyneuropathy (DSPN) is the most common types of diabetic neuropathy. It is caused by cellular injury due to poor glycemic control, which in turn leads to irreversible damages to nerve cells (Pop-Busui, Boulton, Feldman, Bril, & Ziegler, 2017; ADA, 2017). DSPN is a major contributor to diabetic foot ulcers, charcot neuroarthropathy, and amputation (Buttaro, 2016). Similarly, diabetic retinopathy, which is retinal microvascular damages due to hyperglycemia, is a leading cause of blindness in the United States (Pop-Bushi et al., 2017). Diabetic nephropathy is another life-threatening microvascular complication characterized by the presence of proteinuria due to damages in glomerular filtration capacity (Chawla, Chawla & Jaggi, 2016). The severity of diabetic nephropathy often parallels the duration of diabetes and degree of hyperglycemia managements (Chawla, Chawla & Jaggi, 2016).

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For these reasons, the 2019 ADA guidelines recommend weight loss for initial diabetes management. The targeted goal is a seven percent weight loss via intensive behavioral lifestyle intervention, diet management, and 150 minutes of moderate to intensive physical exercise a week (ADA, 2019). Once the patient is placed on oral or injectable hypoglycemic agents, self-glucose monitoring strategies should be taught by healthcare providers. Initially, those not on insulin may find the glucose monitoring helpful in evaluating their glycemic control. Once the patient is prescribed insulin, home glucose monitoring is essential part of their treatment management. Performing self-glucose monitoring has been shown to improve blood glucose levels and reduce serious complications (ADA, 2019; Beck, Riddlesworth, & Ruedy, 2017). The recommended goal for glycemic control is a pre-prandial glucose level between 80 to 130 mg/dL and postprandial glucose level less than 180 mg/dL (ADA, 2019).

In order to minimize the long-term complications associated with T2DM aggressive glycemic control with lifestyle adjustments and medication is essential. Successful control of diabetes has been difficult to achieve (Powers, Bardsley, Cypress, Duker, & Vivian, 2016). The barriers in diabetes management include the complexity of the illness process, patient adherence, tolerability to therapy, and socioeconomic issues (Power et al., 2016). This requires the patients to be fully engaged and willing to make the necessary life style adjustments. Healthcare providers must employ every measure to help the patients navigate their disease process. Patient education has been shown to improve their diabetic management (Chrvala, Serr, & Lipman, 2015; Power et al., 2016). Therefore, the purpose of this project was to evaluate the diabetic point-of-care education in an urban intercity primary care clinic.

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Literature Review

A literature review was conducted using PubMed. Keywords used for this search included: “Diabetes,” “T2DM,” “DSMES,” “Education,” and “Self-management.” The inclusion criteria were articles that were written in English, were published between January 2014 and April 2019, include human subjects research with a population who are at risk for or have type 2 diabetes, and evaluate the current approaches to health promotion among diabetic patients. The study designs include systemic reviews, meta-analyses, randomized controlled trials, retrospective cohort studies, and qualitative interview studies.

DSMES Benefits

One strongly supported approach to address the barriers of diabetic management is the utilization of diabetes self-management education and support (DSMES) in conjunction with medication therapy. DSMES is a national standard program to help patients navigate the management of diabetes based on evidence-based education (Powers et al., 2016). This program delivers ongoing education on skills and knowledge that are essential to sustain diabetic selfcare. In state of Kentucky, there are 95 American Diabetes Association (ADA) recognized and American Association of Diabetes Educators (AADE) accredited DSMES organizations (KDN, 2019). There are four critical times in DSMES Algorithm Action Step: the time of diagnosis, annual assessment, identification of new complicating factors, and transition. This can be found in the appendix A.

At the time of diagnosis, the healthcare provider (HCP) must offer an overview of what diabetes is, address immediate needs, such as medication safety and hypoglycemia, and then focus on treatment plans and goals (Powers et al., 2016). Afterward, patients can be referred to a DSMES program which is a standardized curriculum about diabetes self-management lead by a

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registered nurse, dietitian, or licensed diabetic educator with DSMES training. This program is based on AADE7 self-care behaviors (Beck et al., 2017). DSMES format is either in a classroom setting or can be individualized with material presented at routine clinic appointments. During the follow-up appointments, DSMES member may review the current diabetic management, recognize participant's success, and tailor self-management strategies to promote sustainability (Beck et al., 2017). In addition, DSMES members may communicate with primary healthcare provider or the endocrinologists regarding the patient progress and plan. DSMES is an essential component to the treatment plan as it guides and reinforces self-management patterns, addresses barriers, and supports sustainable plans. These structural approaches help both healthcare providers and patients to maintain continuity of the diabetic management.

There has been significant research demonstrating the effectiveness of DSMES. Chrvala, Serr, and Lipman (2015) meta-analysis that included 118 randomized control trials revealed an average reduction in A1c of 0.74 points among those who received DSMES within one year. A further reduction in A1c of 0.88 points was noted in those patients who attended both individual and group sessions (Chrvala, Serr, & Lipman, 2015). Moreover, within this group, the patients who had 10 or more hours of education showed the highest improvement in their A1c by 1.01 points. Though DSMES is recommended at the time of diagnosis, all participants, regardless of duration and baseline A1c, may benefit from this educational program. Chrvala, Serr, & Lipman (2015) suggested that the best time to implement DSMES is when the patients are already engaged and motivated to make changes in their lives.

The implementation of DSMES have also shown its cost effectiveness due to reduction in comorbidities. Prezio, Pagan, Shuval and Culica (2014) collected the 20-year horizon effectiveness of DSMES in 180 uninsured Mexican Americans. Their results indicated a

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significant reduction in A1c and a decrease in peripheral diseases, such as diabetic foot ulcers and amputations. The authors also found a promising association between DSMES and a long-term cost savings. Similarly, a retrospective cohort study revealed that patients who received DSMES were 29% less likely to be admitted to hospitals (Silveira, Fleck, Sonnenfeld, Manna, & Brock, 2018). The estimated savings from lower rates of inpatient stay were \$35,900 per 100 DSMES participants.

There is a high prevalence of emotional distress among patients with T2DM (Bădescu, Tătaru, Kobylinska, Georgescu, & Zăgrean, 2016). Diabetes Distress (DD) is a significant emotional distress associated with day-to-day demands of diabetes management (Schmitt, Reimer, Kulzer, Haak, & Hermanns, 2016; Beck et al., 2017). According to data from 2017 Diabetes Care, prevalence of distress related to diabetes management among those with prediabetes and T2DM is as high as 45% (Beck et al., 2017). Furthermore, such psychosocial comorbidity has been linked to impaired glycemic control, decreased self-efficacy, higher A1c, and decreased quality of life (Schmitt et al., 2016). Evidence supports that DSMES improves one's quality of life by empowering patient efficacy and supporting the continuation of healthy coping strategies. This decreases the rates of diabetes distress and depression (Powers et al., 2016; Sturt, Dennick, Due-Christensen, & McCarthy, 2015).

The ultimate goal is to help patients make informed decisions and become proactive members of their healthcare team. Furthermore, this suggests HCP to shift away from the traditional medical model to a patient-centered approach in order to accommodate each individual's unique needs. (Powers et al., 2016). Patients with Medicare Part B members are eligible for up to 10 hours of diabetes education by various providers within one year, then two hours of continuous education the following years (CDC, 2018).

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DSMES Barriers

Despite the substantial benefits of DSMES utilization, the program has not been optimized. According to the statistics published by ADA in 2016, both inpatient and outpatient clinics utilization of DSMES stands at 7% among commercial insurance and 5% for Medicaid and Medicare patients. From the providers' and administrators' perspectives, DSMES requires collaboration among the patient's multidisciplinary team. They report this is time-consuming during limited office hours, and often results in costing the clinic more than the insurance reimbursements (CDC, 2018). Furthermore, providers' and patients' lack of awareness on the availability and benefits of the DSMES program further decreases the number of referrals and participation rates (CDC, 2018).

In the patient's perspective, low participation rate is associated with two barriers: not able and not willing to attend the class. Those who would like to attend but are unable cite factors such as transportation, physical impairments, lack of time, and financial barriers. More concerning are patients who are unwilling to participate in DSMES (Horigan, Davies, Findlay-White, Chaney, & Coates, 2017). Factors include lack of perceived benefits, emotional denial, health literacy, and competing social priorities (Horigan et al., 2017).

Local Problem in Identifying Self-Management

An urban primary care clinic in central Kentucky identified diabetic self-management as a significant problem for both patients and providers. The clinic reported the total number of patients with diabetes increased from 269 to 325 in 2017, nearly a 20% increase within one year. The clinic employs a licensed diabetic educator (LDE) who is available to provide one-on-one patient education outside of their routine appointment. In conversation with NG, a licensed diabetic educator, one-on-one education has not been well utilized due to high no-show rates,

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low adherence to medication regimens, socioeconomic factors, and lack of public resources for lifestyle changes. In addition, patients were typically not interested in coming for a separate appointment with a LDE due to issues in transportation, work schedules, and childcare. For this reason, the clinic's quality improvement teams designed the diabetic point of care education that would occur simultaneously with their routine diabetic appointments.

Diabetic Point of Care Program

The urban primary care clinic implemented a project entitled Diabetic Point of Care (DPC) education. The program which ran from January 2018 to July 2018 included diabetic's seen by the three family nurse practitioners (FNP) during this time frame. The LDE was charged with identifying diabetics who were scheduled to be seen and provide diabetes education based on the DSMES in small manageable increments. The FNPs were interested in examining the effectiveness and impact of the DPC education. The proposed evaluation plan was designed by the clinic's quality improvement team. Variables such as patient demographics, patient satisfactions, barriers to self-managements, and areas for an improvement, as well as determining the impact on hemoglobin A1c levels, were examined.

Intervention Group

A total of 91 patients were included in this group. Patients were scheduled with their primary provider every 3 months wherein point of care A1c was obtained. This group received usual care by the FNPs. Usual care included review of their A1c, medication adjustments, lab orders, five to ten minutes of lifestyle counseling on healthy diet, exercise, and weight checks. In addition, referral to LDE, dietitian, endocrinologist, ophthalmologist and podiatrist were made based on the complications. Patients with an existing diagnosis of T2DM were to be identified by the LDE each day and included in the intervention group. The plan was for the LDE to engage

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patients in a 5-minute conversation about the diabetes and would receive a handout to reinforce the point of care topics. The goal was also to introduce the LDE and enhance her availability in helping patients achieve their A1c goal.

The DPC program was to provide information on strategies to improve their A1c and knowledge regarding diabetes at three consecutive routine visits. The initial packet was called “S.W.E.E.T.S. are your Diabetes Lifesavers” with 15g of Lifesavers™ candy (Hodorowicz, 2010). The acronym stands for stress control, weight control, eating healthy, exercise, taking medication, and self-monitoring blood sugar (Hodorowicz, 2010). This packet included information on each topic. The second packet included patient guides from the *Living with Diabetes*, a magazine from the American College of Physicians (ACP, 2017). At the third visit, a handout on from the ADA daily foot care called taking care of your feet, was given to the patient at the end of the FNP visit (ADA, 2019). See appendix B.

After each appointment where an A1c reading had been obtained, each participant received follow-up phone calls by the LDE based on their A1c level. Participants with an A1c between 6.5–7 received a follow-up phone calls six weeks after the visit. Those with A1c 7.1–8.0 were called within four weeks, and those with A1c greater than 8.1 were called one to two weeks in regard to their care. During these phone calls, the LDE asked about the individual’s diabetes self-management routines to identify any barriers or concerns. The educator then provided a brief education on personal strategies to improve diabetic management. At the end of each phone session, the patient’s name and medical record number were recorded in a LDE’s log book. In addition, the date of DPC encounters, name of the material received, the A1c level, and follow-up phone calls were also logged.

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Control Group

The control group consisted of 80 randomly selected patients who came to the clinic for usual diabetic care during the study period. These patients were identified as being under the care of FNPs but not available for the intervention group. Reasons such as timing of the visit and availability of the LDE affected the number of patients that she was able to interact with during the study period. The usual care provided by the FNPs were evaluated the were same as the intervention groups.

Theoretical Framework

A theoretical model is a blueprint of evidence-based research. It provides support on linkages between the variables and their relationship (Grant & Osanloo, 2014). For this DNP project, the Chronic Care Model (CCM) was chosen to guide further understanding of the variable of interest.

Chronic Care Model (CCM)

CCM is a theoretical model that allows healthcare providers to promote a transition between the time of diagnosis to the lifetime management of a chronic illness (ADA, 2017). There are six components of CCM: (a) self-management support, (b) decision support, (c) delivery system design, (d) community resources and policies, and (e) organizational support and a clinical information system (Adams & Woods, 2016). However, this particular project focused on only four components: (a) self-care support (b) the delivery system design, (c) clinical decision support, and (d) organization of healthcare system.

Self-care support is one of the most crucial parts of CCM. It empowers the patient to be at the center of the multidisciplinary team and make informed decisions on their daily diabetic management. This strategy should include ongoing patient education on health issues related to

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T2DM. The focuses are on setting priorities and goals of the therapy, developing an individualized care plan, and scheduling follow-up appointments (Baptista, Wiens, Pontarolo, Regis, & Correr, 2016).

CCM's delivery system design is an essential component. It is defined as forming a multidisciplinary team with clear roles and tasks (Baptista et al., 2016). One of the barriers to diabetic care is the lack of communication between members of the health care team, which can lead to a delay in care. Examples of collaboration between different levels of care may include ongoing self-glucose monitoring by a patient, regular assessment of the diabetic therapy by a primary care provider, and referrals to LDE self-management education.

Clinical decision support further improves the shared decision-making process between the multidisciplinary team and the patient. For example, sharing information regarding utilization of the DSMES Algorithm Action Step could align the treatment at the level of individualized patients, healthcare providers, and organization (Beck et al., 2017). Another way to promote shared decision-making is to conduct an evaluation of any new delivery method to DSMES. Once the problem has been identified, interdisciplinary team members should explore viable options and engage in shared-decision making. This was the purpose of the DPC evaluation project.

Lastly, organization support is critical for the success of any new method for patient delivery (Baptista et al., 2016). In the incorporation of the DPC program, the clinic's key stakeholders ie., primary care provider, program providers, and clinic manager must share common values to achieve success. Critical to this support is ongoing evaluation of new patient care strategies. This demonstrates the shared value of maintaining patient flow, cost effectiveness, and patient care outcomes.

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Purpose

The purpose of this Doctor of Nursing Practice (DNP) project was to evaluate the effectiveness and acceptability of a recently implemented diabetic point of care education as compared to patients' usual care in an urban primary care clinic. The following objectives were identified by the quality improvement team:

- Describe the demographics among the diabetic patient population in the urban primary clinic who participated in the program between January 2018 through July 2018.
 - Explore the relationship between the DPC education and patients' glycemic control.
 - Enhance a therapeutic relationship between the patient and the licensed diabetic educator to facilitate a supportive environment.
 - Examine the participants' satisfaction rate and helpfulness of the program.
 - Examine the healthcare providers' acceptability of the program and any perceived barriers.
- These objectives were evaluated against usual care provide to diabetic patients. Ultimately, the goal was to determine if the DPC program realized positive changes in the health delivery system, and ultimately improve patient's overall health outcomes.

Method

Study Setting

Implementation of the project was requested by an urban primary care clinic in Lexington, Kentucky. The clinic serves patients who live near the clinic and are primarily on public assistance. The clinic serves high number of African American and white. Services range from pregnancy care to primary care across the age continuum. Approximal 300 patients are seen weekly by the primary care staffs. Currently, there are three FNPs and three physicians.

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Study Population

The study population included patients who were seen by FNPs at the urban primary care clinic for diabetic management from January 2018 through July 2018. All patients who were diagnosed with diabetes in January of 2018 and were over the age of 18 were eligible to participate in the DPC project. The exclusion criterion targeted patients who had conditions that could interfere with glycemic control (See Appendix C). A total of 80 patients met the inclusion criteria for the study and became members of the intervention group. A control group of 80 patient were identified using the ICD code (E11. 9), T2DM without complications, and had been seen by the FNPs within the same time span. They met the same inclusion and exclusion criteria as the intervention group.

Study Design

There were two phases to this descriptive study. The first phase was an outcome evaluation using a retrospective chart audit of the electronic medical records (EMR) from January 2018 through July 2018. All patients in the intervention and control groups were assigned a unique study numbers to ensure deidentification. The audit included patient demographic measures (see Appendix D and E). After the baseline was established for each member of the two groups, A1c from two consecutive visits, three months apart were examined. In addition, the list of baseline oral and insulin hypoglycemia agents was collected (Appendix F). Number of follow-up phone calls and DPC encounters were recorded.

The second part of this evaluation included a nine-point DPC education questionnaire survey developed to assess patient satisfaction with the DPC program (see Appendix G). The first six questions were centered on overall satisfaction with the program. Responses were on 5-point Likert scale ranged from very satisfied to very dissatisfied. The last three questions were

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open responses. These questions asked if the patient found the material helpful, the individual's personal challenges to implement diabetic self-managements, and areas for program improvement. A total of 12 patients from the intervention group were able to participate in the survey. This was due to patient availability, not wanting to interfere with clinic operation, and reaching saturation of repeated responses. Control group surveys were attempted but due to no show rates these patients could not be captured.

Three nurse practitioners and one LDE, who participated in DPC project, were asked to participate in post intervention interview (see appendix H). The provider's overall satisfaction of the project and future recommendations were identified. This interview was analyzed via a qualitative analysis method.

Procedure and Data Collection

This study was conducted under the clinic's umbrella IRB for quality improvement projects. Data collection was achieved via a retrospective chart review. All patients were de-identified and given a unique study number. The data was collected and stored on an encrypted password-protected, secured server at the clinic. The data will be kept for 7 years per the University Kentucky IRB policy.

After they verbally agreed to participate in the survey, participants completed anonymous post intervention surveys regarding the DPC project that was held between December of 2018 through February 2019. Interview participants also shared their perspectives on DPC education. Data collection was conducted via a one-on-one, in-person interview in a password encrypted computer.

Data Analysis

Chart Review

Univariate descriptive statistics were used to summarize the baseline demographics in frequencies for nominal and ordinal values. For continuous variables, mean and standard deviation (SD) were used to analyze the value obtained. The association between the demographic data and the point of care A1c was evaluated using bivariate descriptive statistics. The paired t-test was used to describe the changes in A1c over a 6-month period within the group. Comparisons were made between the intervention and the control group. Afterward, the Pearson's Product Moment Correlation was used to test the relationship between nominal and ordinal values, such as gender, ethnicity, and marital status, with the changes in A1c. Lastly, an Independent sample t-test was applied to examine the link between the number of DPC encounters with the changes in A1c level over time. Data analysis was conducted using SPSS 25. The statistical significance was set at P value <0.05.

Provider and Patient Interview

The interviews were analyzed using qualitative descriptive analysis. Common themes in all the interviews were identified. Verification of the themes were made through an independent review of the interviews by an experienced qualitative researcher.

Results

From the list of T2DM, who are paneled to the FNP, 80 patients met the criteria for inclusion in the DPC program intervention. The control group was identified by the ICD 10 code of T2DM without complication (E11.9) and numbered 199 eligible patients. From this group, 80 patients were randomly chosen by selecting every other patient from the list generated by the clinic.

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Demographic Characteristics

A total of 80 patients met the inclusion criteria for the DPC program intervention. Their demographic characteristics for the intervention and control groups are located in Appendix D and E. The intervention group had a higher proportion of females (56%, n= 36), African Americans (53%, n= 43), and the majority were single (59%, n=23). The ages ranged from 28 to 85 with a mean age of 59. The control group had a higher number of females (71%, n=57), African Americans (55%, n=44), and the majority were single (43%, n=35). The ages ranged from 40 to 84 with a mean age of 58. Using an independent Chi-square test the significant differences were in gender ($p=0.048$) and marital status ($p=0.01$) between the two groups. Appendix F is a list of the baseline oral and injectable hypoglycemic agents for each group. There were no differences between the two groups in the types of hypoglycemic agents prescribed.

In the study period (January 2018-July 2018), there were 140 DPC encounters. Only 23% (n= 32) of participants completed all three visits, 27% (n= 38) completed two visits, and 50% (n=70) completed only one visit. A total of 59 follow-up phone calls were made by the CDE between January 2018 and July 2018.

Hemoglobin A1c Level

For the intervention group, the baseline A1C was 7.48 and for the control group it was 7.43. There was no statistical difference between the intervention and control group in their baseline A1c ($t=-1.413$, $p= 0.16$). The average change in A1c from the baseline to 6 months between the intervention and the control group [$M=-0.08$ (SD=1.51) vs. $M=0.19$, (SD=1.28)] was not statistically significant ($p=0.38$). The A1c at 3 and at 6 months for patients in the intervention group who received all three DPC visits were compared with those in the control

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group who completed the same number of routine visits. There were no statistically significant changes in A1c between those who attended all three education at three month [M=-0.14, (SD=0.59) vs. M=0.14, (SD=1.04), p=0.32], and at six months [M=0.07, (SD=1.08) vs. M=0.09, (SD=1.26), p=0.97]

In terms of the intra-group differences within the intervention group, those who attended all three visits when compared to those who attended twice or once at 3 months [M=-0.14, (SD=0.6) vs. M=0.1, (SD=1.1), p=0.4] and at 6 months [M=0.07, (SD=1.1) vs. M=0.04, (SD=1.3), p=0.094] revealed no change .

Follow-up Phone Calls

There were 157 number of patients with A1C between 6.5 through 8. A total of 59 phone calls were made based upon the A1c and the study protocols. Problems with the CDE's availability and patients not answering their phones impacted the number of completed calls.

Intervention Group Survey

Twelve patients from the intervention group completed the survey. The majority reported being either very satisfied (42%, n=5) or satisfied (33%, n=4) with seeing the LDE at the end of their routine diabetic appointment. Only 25% (n=3) were neutral with none being dissatisfied. All patients reported taking home the education materials. The most helpful packet was the strategies on how to eat a healthy diet, followed by S.W.E.E.T.S., and how to do a foot exam. Only 17% (n=2) could recall the contents from the handouts that were given to them. None of those questioned remembered receiving a follow-up phone call. In terms of being satisfied with the diabetic information that was given, 67% were either very satisfied or satisfied.

The last three questions on the patient survey were open responses. A number of themes were identified. When asked how to improve the diabetic education program, the respondents'

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answers revealed three themes: (a) the need for motivation, (b) simpler instructions, and (c) the need for new information. Several comments reflecting these themes include,

“I still don’t have any motivation to apply [the information given] in everyday matters. It is like a flipping coin. I may do it, or I may not.”

“I would like the simpler instruction. I only glanced at the book and just skipped through it.”

“The information that [was provided] I already know. I grew up seeing what I should do to management my diabetes.”

“I expected more information than what I’ve received. I want to know about the pharmacology aspect of medication.”

The second open response question addressed the patients’ biggest challenges managing diabetes which resulted in three overarching themes: (a) lack of resources, (b) the complexity of the disease managements, and (c) physical impediments. Examples representing these themes include,

Lack of Resources

“I am on boost. So I can’t control diet. I have a fixed income, so I have just enough money to buy medications for other chronic illnesses that I have. I take more than 10 medication a day.”

“I do not have family support or social support either”

“Healthy food choices are expensive, does not last long, meals are expensive”

“Medications are taking up more than 50 percent of my incomes and health management is causing me high stress.”

Complexity of Disease Management

“Managing food is hard. I do not cook because of my disability. My sister cooks for me and it is really up to her. Also, I am supposed to check my finger stick 3 times a day, but I only have 10 fingers, it hurts, and causes more stress.”

“Life style changes, making healthy food options, and weight control is hard. I am not ready to get rid of my soda and this is the quality of life for me.”

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“Educations are helpful, and I would like to know more about the treatment options and healthy diet strategies. However, knowing and implementing it [lifestyle] in to the day-to-day groove is different, and I am having hard time implementing it to my life as I should be.”

“I lack on resource, my priority is other urgent issues, and don’t have room in my head to address diabetes. It is causing me distress.”

Physical Impediments

“I have many other co-morbidities. For example, I had a stroke recently and my priority is recovering my speech and muscle weakness.

“I recently had a bariatric surgery and since then I have lost a lot of weight but also no energy to exercise nor make healthy diet choices. I have lack of appetite so usually I eat what I can eat.”

“[Food is] hard to chew because of my bad teeth. I have limited incomes and prices of good food are expansive.”

The last open response question was about attending the LDE classes. Only two interviewees attended the class. The other patients cited two prominent reasons for not attending the formal classes: (a) availability of the online information, and (b) and convenience. The following statements represents these two themes.

“I can look it up in the internet. I can google it. I trust doctors but it is more convenient and accessible to find out this way.”

“Because I have fixed income, transportation issues, and disabilities. I am in a wheelchair.”

Provider Interview

The three FNP providers were interviewed regarding their impression of the DPC program. They identified two overarching problems with the intervention: (a) conflict in education content, and (b) motivation of the patient. Sample statements reflecting these problems include,

“Should have been more individualized. The handouts were too generic”

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“There should have been an initial knowledge inventory”

“Patients are living in the moment and not planning for the future”

“Material booklet that were given in the beginning were very heavy. It was too generic”

The last interview was with the LDE who implemented the education for the project.

From her responses, there were similar problems as noted from the patients and providers: lack of patient motivation and resources, and scheduling conflicts.

“Main source of grocery stores in the neighborhood is family dollar and family tree. Nearby stores do not sell fresh foods”

“High number of patients no show rate, appointment cancelation, and reschedules”

“I [LDE] was not able to capture the whole number of diabetic patients due to the conflicting schedules and not having master sheets of patient lists.”

Discussion

The purpose of this study was to evaluate the feasibility and efficacy of the DPC program in an urban primary care clinic setting. This program introduced diabetes self-care education in an accessible, less burdensome, and low-cost format for both healthcare providers and patients. However, statistical analysis on the overall effect of DPC education showed no differences in A1c between the two groups.

Demographic characteristics on the racial distribution were as expected because the clinic serves a large number of African Americans and Whites. The high prevalence of females in both groups further supports the research data on diabetes in which females are more likely to seek and participate in medical care (Siddigui, Khan, & Carline, 2013). The mean age of 58 was not surprising given that diabetes manifests from years of developing insulin resistance. Although the minimum age for the intervention group was 28 years old, this outlier made no significant

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differences in the mean ages between the two groups. The early onset of T2DM reflects the increasing prevalence of youth-onset T2DM and the need for achievable diabetic management (Nadeau, Anderson, Berg, Chiang, & Zeitler, 2016).

There was no variety in the types of hypoglycemic agents and delivery methods used in the two groups. A total of 32% of the patients across both groups were on insulin therapy. However, none were using insulin pumps nor continuous glucose sensors. In addition, the more novel diabetic agents were not routinely prescribed. These new devices and agents have shown to improve glycemic control, lower the risk of hypoglycemia, and improve quality of life by reducing the number of finger sticks and injections (Kruger, Edelman, Hinnen, & Parkin, 2019). The newer medications such as GLP-1s facilitate weight loss, improve cardiovascular outcomes, lower hypoglycemic risks, and require fewer injections (Yandrapalli, & Aronow, 2017; Mann, Fonseca, Mosenzon, Raz, Poulter, 2018). Per a conversation with the LDE and providers, these medications and devices were not prescribed due the patients' financial constraints. This was verified by the patients who found paying for their insulin an equal challenge.

Although the education program made no meaningful changes in the clinical outcome, this patient surveys conducted in the project provided valuable findings. The support systems were not evaluated, but the patients reported a lack of support and felt they needed motivation. Various studies have addressed the importance of social support and how it improves the diabetic managements and outcomes (Shao, Liang, Shi, Wan, & Yu, 2017; Ramkisson, Pillay, & Sibanda, 2017). Interestingly, patients voiced that they were the primary caregiver for other family members which distracted them from their own physical health issues. These caregivers often neglected their own health to compensate for their loved one's illness and responsibilities

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(Powers, 2016; CDC, 2018; Sullivan & Miller, 2015). This most likely is a prime contributor to diabetes distress (DD).

The patient responses on self-care challenges were consistent with the systematic reviews. Horigan et al. (2016) defined the cause of “declined opportunity” in which patients are unable to incorporate the diabetic self-management education. They cite reasons for this as lack of time, physical disabilities, and financial insufficiencies. The researchers further addressed that a patient’s lack of knowledge or perceived benefits of the education, emotional burdens, and cultural reasons, lead to diabetes burnout. Kristensen et al., (2018) argued that emotional distress related to conflicting values hinder an individual’s diabetes management. These negative emotional responses to the burdensome demands of diabetes are consistent with DD.

Only 38% of the patients in the DPC intervention group completed their follow-up phone calls. None of the interviewees remembered receiving a follow-up phone call. The providers and the LDE gave several reasons for this lack of recall. They thought patients had not answer their phone, and some calls became lost. It is not clear if the patients were aware of the phone calls and if the LDE was completely committed to the project as she had multiple responsibilities within the clinic. In addition, after a discussion with the providers, patients often showed concern that unnecessary phone calls may interfere with their limited phone minutes. It is not unusual for patients to not release their phone numbers to the clinic.

Current ADA (2019) guidelines recommend routine screening for diabetes distress, especially for patients who are not meeting their treatment goal. The recommended screening tools include Problem Areas in Diabetes Questionnaires (PAID) and the Diabetes Distress Scale (DDS). Each of these are evidence-based screening tools that measure an individual’s emotional concerns, such as sense of inadequacy, worry, anger, guilt, or anxiety with diabetes management

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(Venkataraman et al., 2015). DDS provides more detailed information on the complexity of the diabetes regimen. This screening tool articulates the stress related to diabetes in four categories: (a) emotional burden, (b) physician-related distress, (c) regimen-related distress, and (d) interpersonal distress (Hendrieckx, Halliday, Beeney, & Speight, 2016). These scales come in various forms and can be administered during a clinic visit. From these results, providers could then individualize care. Although patients' emotional well-being is crucial for diabetes management, the social determinants of health (health literacy, socioeconomic status, occupation) must be considered, especially in patients who are disengaged in their diabetes self-care (Clark, & Utz, 2014).

Limitation

The primary limitation of the study was not being able to capture the total number of patients in the intervention group. Only 23% completed all three visits which made it difficult to measure the true impact of the DPC project. Not having a pre-knowledge inventory impeded individualizing education and made the intervention generic. Health literacy was never considered, which may have added to DD. The clinic also did not estimate the time that the LDE would have needed to fully engage in the project. Furthermore, the intervention was not sophisticated enough to make an impact on A1c's. The duration of the study and lack of individualization most likely influenced the results. Considering that life style modification takes time to show its effectiveness, future studies should lengthen the follow-up dates.

Implications for Practice and Future Research

For future studies, all diabetic patients need to be assessed with a knowledge inventory and screened for diabetes distress. Then providers will be able to target those who have poor control of their diabetes with a focus on increase in knowledge and decrease in DD. In this

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scenario, there would be extra time built into the provider's schedules for the LDE. This would be a more efficient utilization of resources and be more manageable for providers and the LDE. Obtaining baseline data on diabetes knowledge inventory, health literacy, and resources could further identify the barriers to diabetes self-management education.

Summary

The fundamental mission of nursing practice is holistic care. Though this study did not reveal changes in A1c levels with the DPC program, several findings were realized. All participants were reminded that diabetes distress and social determinants of health impact their disease management and should not be ignored. However, this research gave a powerful voice to the T2DM community who clearly want providers to do individualized care and recognize the stress associated with the disease management. As the healthcare model is evolving into a more patient-centered care, we must view our patients as patients with diabetes, not diabetic patients. Although the sample size for this project was small, this study recognized the patients' hard work and gave them opportunities to address their barriers.

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Appendix A. DSMES Algorithm Action Step

| Diabetes Self-management Education and Support Algorithm: Action Steps | | | |
|--|--|---|---|
| Four critical times to assess, provide, and adjust diabetes self-management education and support | | | |
| At diagnosis | Annual assessment of education, nutrition, and emotional needs | When new <i>complicating factors</i> influence self-management | When <i>transitions</i> in care occur |
| Primary care provider/endocrinologist/clinical care team: areas of focus and action steps | | | |
| <ul style="list-style-type: none"> <input type="checkbox"/> Answer questions and provide emotional support regarding diagnosis <input type="checkbox"/> Provide overview of treatment and treatment goals <input type="checkbox"/> Teach survival skills to address immediate requirements (safe use of medication, hypoglycemia treatment if needed, introduction of eating guidelines) <input type="checkbox"/> Identify and discuss resources for education and ongoing support <input type="checkbox"/> Make referral for DSME/S and MNT | <ul style="list-style-type: none"> <input type="checkbox"/> Assess all areas of self-management <input type="checkbox"/> Review problem-solving skills <input type="checkbox"/> Identify strengths and challenges of living with diabetes | <ul style="list-style-type: none"> <input type="checkbox"/> Identify presence of factors that affect diabetes self-management and attain treatment and behavioral goals <input type="checkbox"/> Discuss effect of complications and successes with treatment and self-management | <ul style="list-style-type: none"> <input type="checkbox"/> Develop diabetes transition plan <input type="checkbox"/> Communicate transition plan to new health care team members <input type="checkbox"/> Establish DSME/S regular follow-up care |
| Diabetes education: areas of focus and action steps | | | |
| <p>Assess cultural influences, health beliefs, current knowledge, physical limitations, family support, financial status, medical history, literacy, numeracy to determine content to provide and how:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Medications—choices, action, titration, side effects <input type="checkbox"/> Monitoring blood glucose—when to test, interpreting and using glucose pattern management for feedback <input type="checkbox"/> Physical activity—safety, short-term vs. long-term goals/recommendations <input type="checkbox"/> Preventing, detecting, and treating acute and chronic complications <input type="checkbox"/> Nutrition—food plan, planning meals, purchasing food, preparing meals, portioning food <input type="checkbox"/> Risk reduction—smoking cessation, foot care <input type="checkbox"/> Developing personal strategies to address psychosocial issues and concerns <input type="checkbox"/> Developing personal strategies to promote health and behavior change | <ul style="list-style-type: none"> <input type="checkbox"/> Review and reinforce treatment goals and self-management needs <input type="checkbox"/> Emphasize preventing complications and promoting quality of life <input type="checkbox"/> Discuss how to adapt diabetes treatment and self-management to new life situations and competing demands <input type="checkbox"/> Support efforts to sustain initial behavior changes and cope with the ongoing burden of diabetes | <ul style="list-style-type: none"> <input type="checkbox"/> Provide support for the provision of self-care skills in an effort to delay progression of the disease and prevent new complications <input type="checkbox"/> Provide/refer for emotional support for diabetes-related distress and depression <input type="checkbox"/> Develop and support personal strategies for behavior change and healthy coping <input type="checkbox"/> Develop personal strategies to accommodate sensory or physical limitation(s), adapting to new self-management demands, and promote health and behavior change | <ul style="list-style-type: none"> <input type="checkbox"/> Identify needed adaptations in diabetes self-management <input type="checkbox"/> Provide support for independent self-management skills and self-efficacy <input type="checkbox"/> Identify level of significant other involvement and facilitate education and support <input type="checkbox"/> Assist with facing challenges affecting usual level of activity, ability to function, health beliefs, and feelings of well-being <input type="checkbox"/> Maximize quality of life and emotional support for the patient (and family members) <input type="checkbox"/> Provide education for others now involved in care <input type="checkbox"/> Establish communication and follow-up plans with the provider, family, and others |

(Powers et al., 2015.)

Appendix B. Taking care of Your Feet



Please print and share with your patients.



Please print and share with your patients.

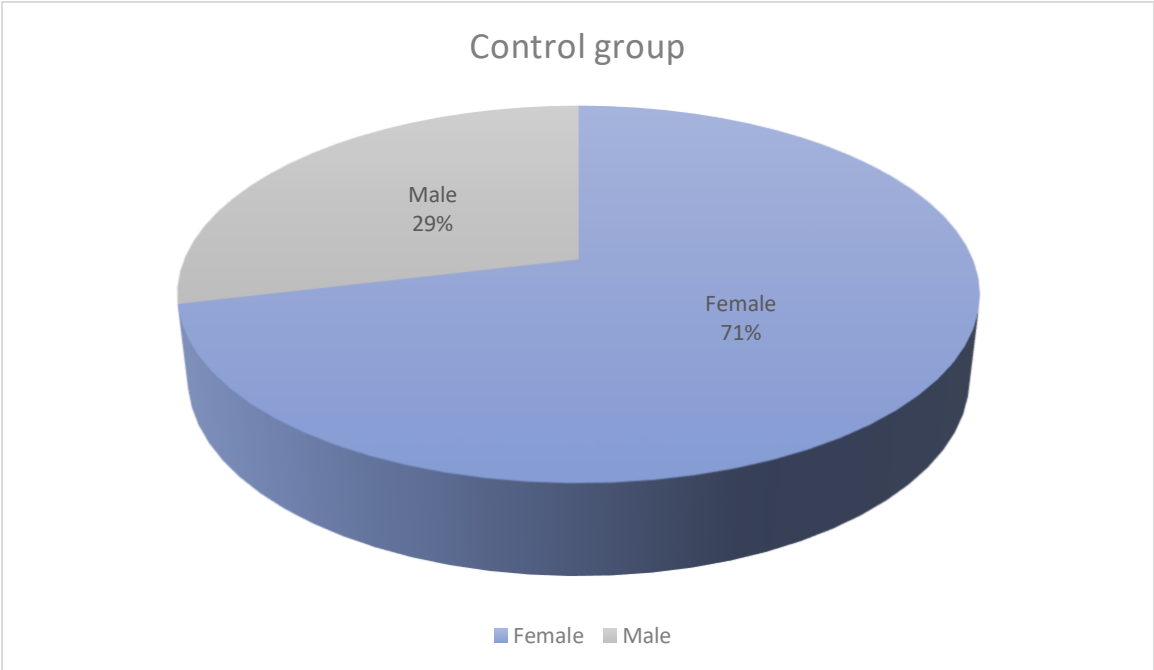
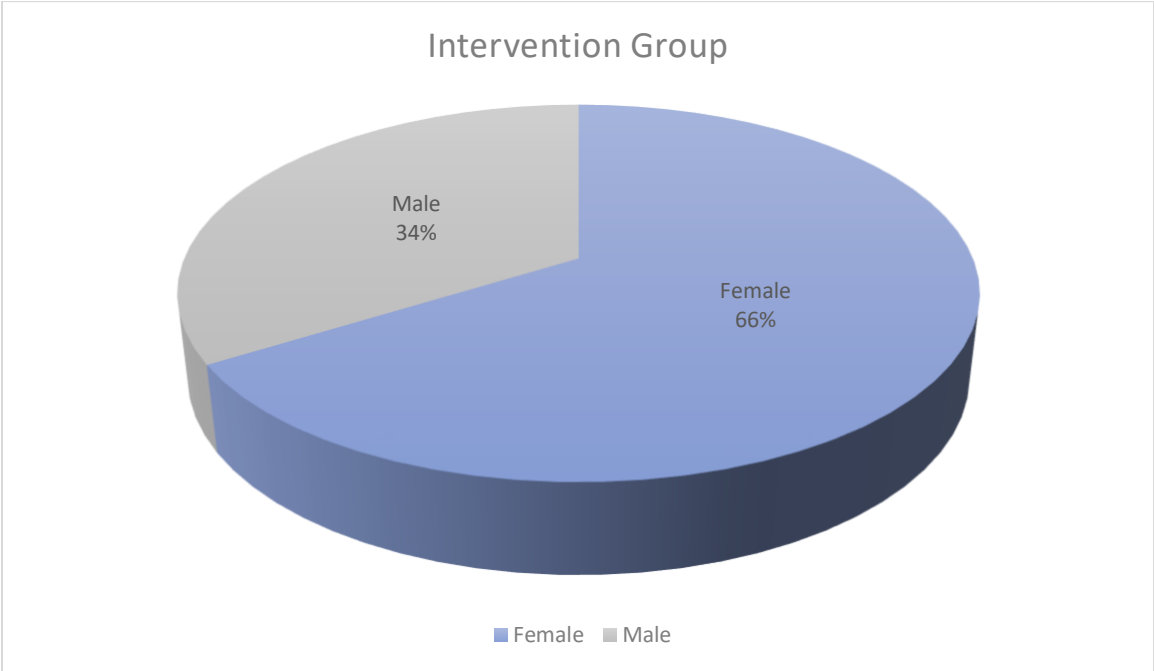
(ADA, 2019)

DIABETIC POINT OF CARE EDUCATION IN PRIMARY CARE

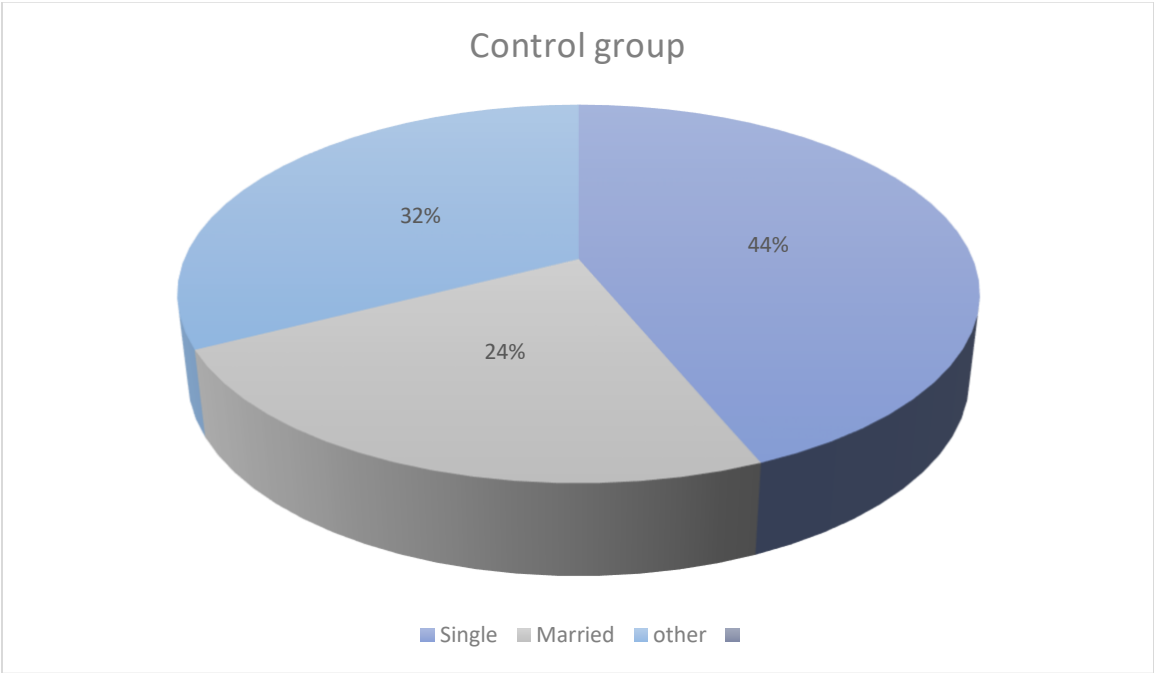
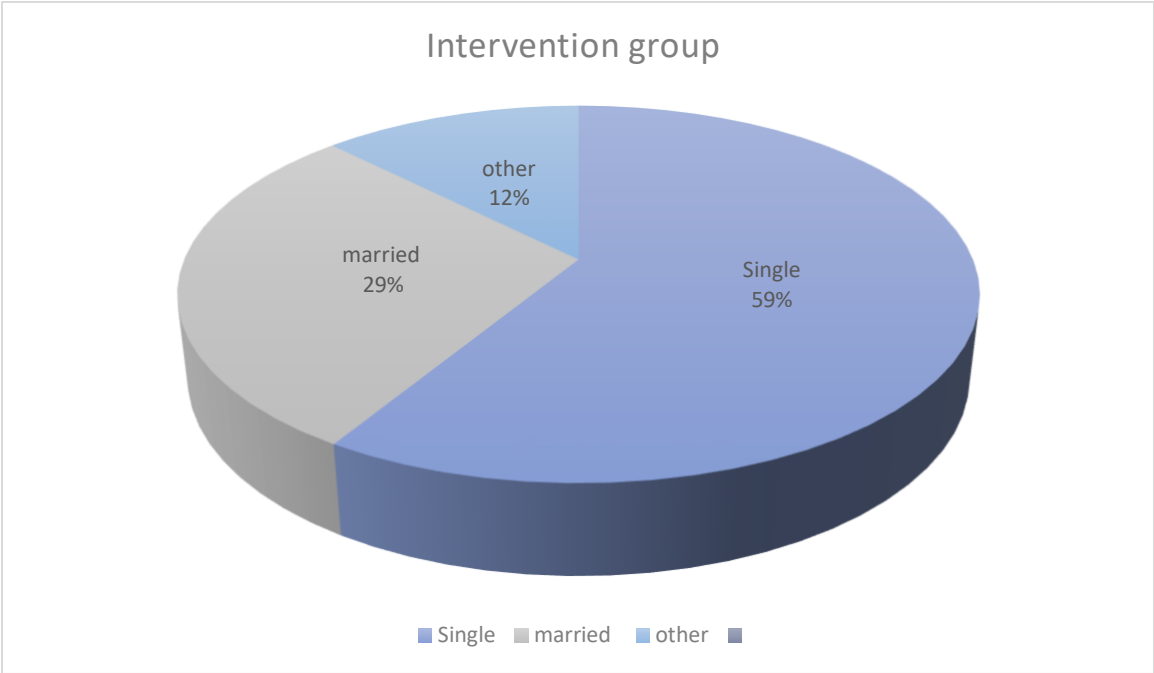
Appendix C. Exclusion Criterion

| Diagnosis | ICD-10 code |
|-----------------|-------------|
| Dialysis | Z99.2 |
| Anemia | D64.9 |
| Liver cirrhosis | K74.60 |
| Cystic fibrosis | E84.0 |

Appendix D. Sample Characteristics: Gender

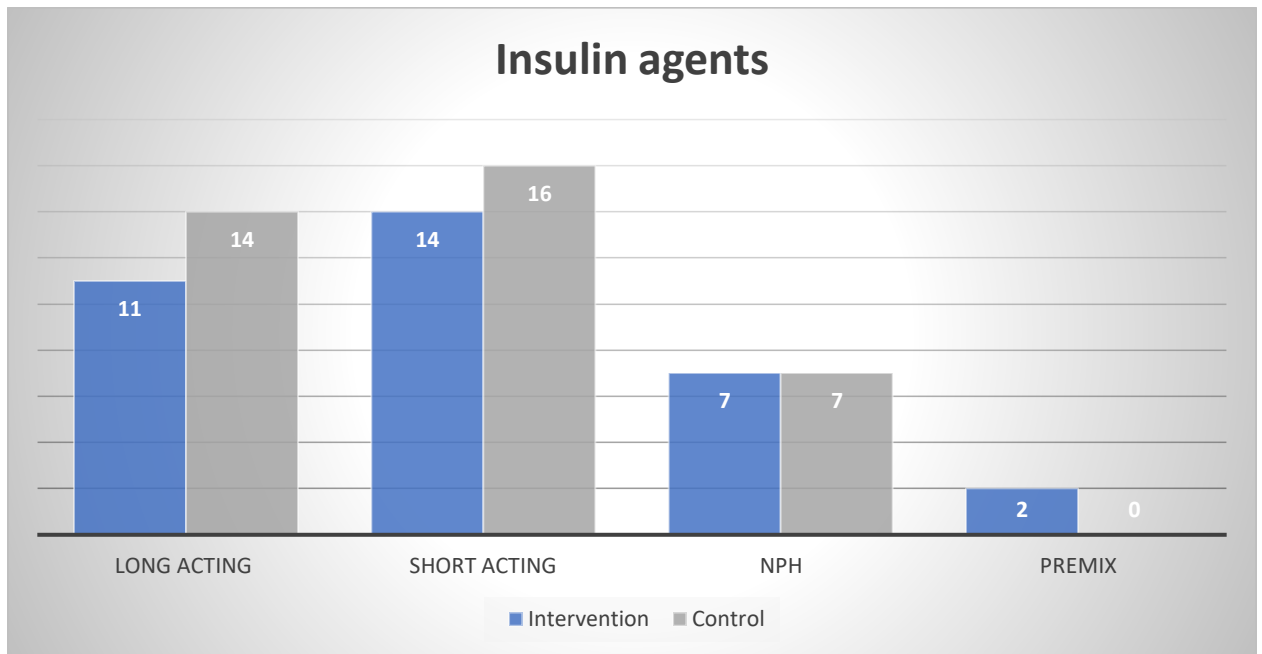
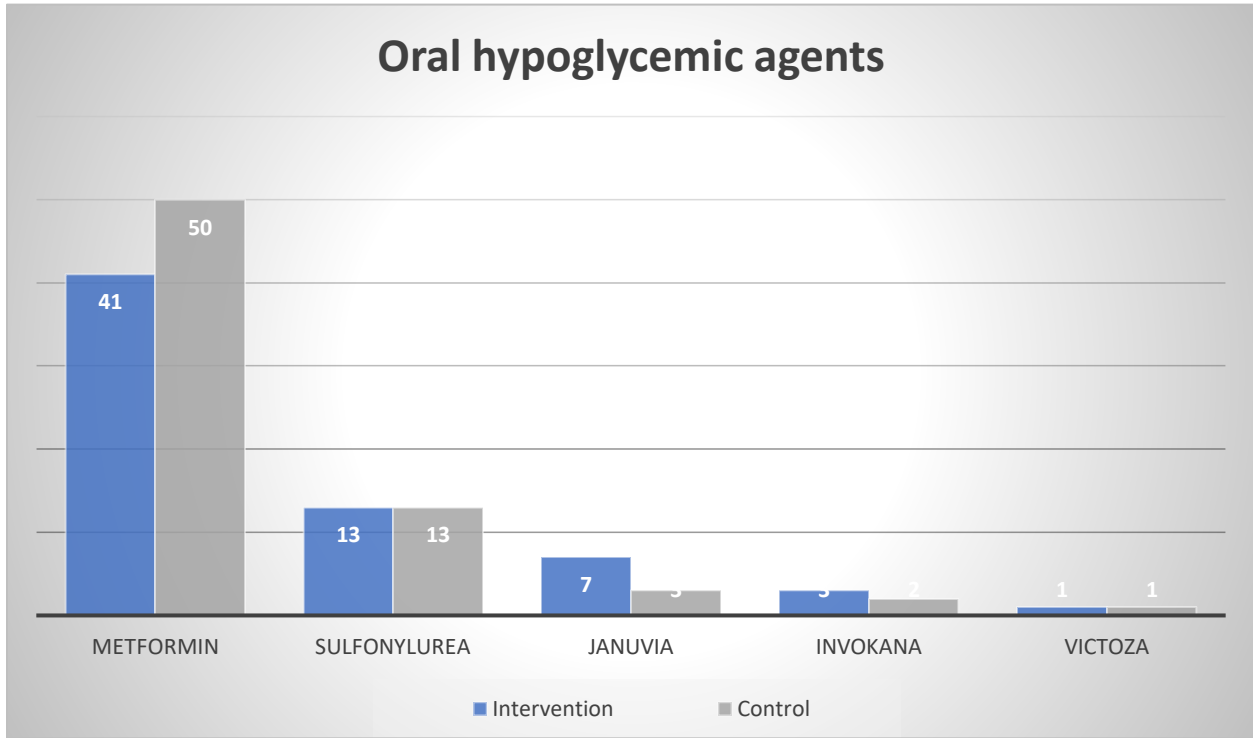


Appendix E. Sample Characteristics: Marital Status



DIABETIC POINT OF CARE EDUCATION IN PRIMARY CARE

Appendix F. Baseline Hypoglycemic Agents



DIABETIC POINT OF CARE EDUCATION IN PRIMARY CARE

Appendix G. P DPC Education Questionnaire Survey

- 1) How did you like having the diabetic educator see you at your routine appointment for your diabetes?
 - a. Very satisfied
 - b. Satisfied
 - c. Neutral
 - d. Dissatisfied
 - e. Very dissatisfied

- 2) Did you take home pamphlets or some other educational materials from the visit?
If you selected no, go to number 5.
 - a. Yes
 - b. No

- 3) Which of the materials were most helpful?
 - a. S.W.E.E.T.S. are your “Diabetes Lifesavers” packet
 - b. American College of Physicians Living with Diabetes magazine
 - c. Healthy eating strategy
 - d. Monitoring daily foot exam reminder handout
 - e. Other(s). Please explain:

- 4) Can you recall one thing from the handout given to you by the diabetic educator that you did not know prior to receiving the handout?

- 5) What did you like and dislike about the follow-up phone calls made by the diabetic educator between your office appointments? If you did not receive any, skip this question.

- 6) Are you satisfied with the information on diabetes given to you by the diabetic educator?
 - a. Very satisfied
 - b. Satisfied
 - c. Neutral
 - d. Dissatisfied
 - e. Very dissatisfied

- 7) What would we do to improve diabetic education?

- 8) What are the biggest challenges you have with managing your diabetes?

- 9) Have you ever been to a CED class (diabetic education)?
 - a) Yes b) No

Appendix H. Provider Interview Questions

1. What were some of the barrier to implementing the DPC education? Please explain.

2. What are some of the limitations to providing DPC education? Please explain.

3. Overall satisfaction

- a. How would you rate the overall performance of the DPC education handout project?

- b. What would you recommend to improve DCP education?
