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Achieving Improved Glycemic Control Among Hispanic Type 2 Diabetic Adults

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Walden University
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Abstract

Achieving Improved Glycemic Control Among Hispanic Type 2 Diabetic Adults

by

Morenike T. Oyegbami

MS, California State University Dominguez Hills, 2016

BS, Bloomfield College, 2007

Project Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Nursing Practice

Walden University

May 2019

Abstract

Type 2 diabetes is a major chronic health disease in the United States. A main concern of clinicians treating patients with Type 2 diabetes is poor glycemic control. The goal of this project was to improve glycemic control in Type 2 diabetic Hispanic adult patients in a private family practice clinic through the implementation of biweekly telephonic intervention focused on diabetes management by an advanced practice nurse/nurse practitioner. The project was guided by the chronic care model as a framework. The intervention was conducted over a 12-week period with 50 patients, ages 18 to 65. Data were collected from chart and log reviews, personal interviews, telephone calls, and use of questionnaires. Data were de-identified and used for secondary analyses. The interviews and telephone calls focused on self-care activities and daily practices related to the disease management. There were statistically significant reductions in fasting blood sugar (p=.042) and glycated hemoglobin results (p=.002) as well as improvement in diabetes self-care activities over the 12-week project timeframe. Qualitative data supported patients' recommitment to diabetes self-care management through daily blood sugar testing, attention to diet, exercise, and daily journaling. This project might lead to positive social change through improved disease management and better glycemic control. The project might also enable the Type 2 diabetic patients to make health and lifestyle choices that positively influence their day-to-day health.

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Dedication

I dedicate this project to my two sons, Jordan and Israel, for their perseverance, sacrifices, and patience throughout my educational journey. I love you both so much. This project is also dedicated to my late father, Prof. S.A Gesinde, who taught me the value of education. To my precious mother, Christianah Gesinde, you have always loved me unconditionally and taught me to work hard and never give up on my dreams. I am truly thankful for having you in my life.

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First, I want to give thanks to God Almighty for His mercies, favor, and strength. Had it not been God, I would not be where I am today. I thank all my instructors and the faculty for your guidance and teachings over the course of this program and project. Finally, to all my preceptors, especially Dr. Austin and Dolores, you believed in me and have been a great influence in my journey to become a Doctor of Nursing Practice. I sincerely appreciate you both.

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Section 1: Nature of the Project

Introduction

Type 2 diabetes is one of the major public health diseases in the United States. The risks for the disease vary across races and ethnicities as well as among different socioeconomic statuses (SES). According to the Centers for Disease Control and Prevention [CDC] (2015), diabetes was classified as the seventh top root cause of mortality in the United States in 2013. Also, Type 2 diabetes accounts for about 90-95% of diagnosed cases in U.S adults (CDC, 2015). Sadly, the Hispanic adult patient population has a higher burden for this chronic disease than most of the other patient populations in the country (American Diabetes Association [ADA], 2014). One main concern of Type 2 diabetes in this population is poor glycemic control (CDC, 2017b). The doctor of nursing practice (DNP) project was part of a pre-existing quality improvement initiative at the project site. The primary goal of this project was to evaluate the impact of an intervention targeted to improve glycemic control in Type 2 diabetic Hispanic adult patients. The intervention comprised of biweekly follow-ups and coaching telephone calls to the patients by an advanced practice nurse/nurse practitioner. The interviews and telephone calls focused on self-care activities like self-monitoring of blood glucose, medication compliance, education on diet and physical activity, and factors that serve as barriers and facilitators to achieving better glycemic control.

The DNP project was guided by the chronic care model as a framework and the use of the Walden institutional review board (IRB) quality improvement (QI) manual was employed. The scope of the DNP project was to evaluate the degree to which the

intervention impacts glycemic control. The positive social change implications of this quality improvement project were that it allowed various social issues facing the Hispanic population such as SES and health care inequality, which then aided in the efficient management of the disease and improvement of glycemic control (see Manders et al., 2016).

Problem Statement

The local nursing practice problem which was the main emphasis of this doctoral project is poor glycemic control in Type 2 diabetes which leads to poor outcomes and this is a major concern in the diabetic adult Hispanic population and for health care providers. According to the CDC (2014), Hispanics/Latinos are among the main ethnicities that have frequent diagnosis and a higher risk for the disease and its various complications. Similarly, the CDC (2017b) stated that racial and ethnic minority groups are more prone to have Type 2 diabetes during their life span and over half of all Hispanic men and women are predicted to develop the disease. The ADA (2014) reported that Hispanic people are about 50% more likely to die from diabetes than White people. Likewise, a study finding revealed the prevalence of both diagnosed and undiagnosed diabetes among all men and women Hispanic/Latino groups to be approximately 17% in comparison to 10% for non-Hispanic whites (ADA, 2014).

The local relevance of the need to address this problem is that improved glycemic control is vital in the management of Type 2 diabetes because it increases the quality of life of the patient, reduces morbidity and mortality rates, and decreases health care costs (Bilous & Donnelly, 2014; Manders et al., 2016). The setting that was the subject of the

QI intervention and the DNP project is a privately-owned family practice clinic in a popular city in Los Angeles County that has a significant number of Hispanic adult patient population with Type 2 diabetes. Glycemic control has always been a problem for these patients due to varied reasons, which have impacted their health outcomes in significant ways. Out of the 413 registered patients at the chosen site for this project, 305 are adults while the rest are children. About 200 of the 305 are documented to have Type 2 diabetes. Of these, 105 are Hispanics, 54 are African Americans, and the rest are Caucasians or from other ethnicities. The Healthcare Effectiveness Data and Information Set (HEDIS) data used at the site is standard and covered glycated hemoglobin (HbA1c) control, retinal eye exam, blood pressure control, and medical attention for nephropathy (National Committee for Quality Assurance [NCQA], 2018). Before the project, the average HbA1c for the Type 2 diabetic adult Hispanics at the clinic was 9.9%, which signified poor glycemic control, compared to 7.9% for the non-Hispanics. These results were used to guide the clinic in developing quality initiatives, educational programs, and evaluating performances.

Purpose

In the Hispanic population, Garcia et al. (2016) reported some lack of knowledge in diabetes prevention and management due to socioeconomic disparities. Lower levels of education, employment, income, and wealth are found in this population when compared to other ethnicities or races (Garcia et al., 2016). Each of these factors have different kinds of influences on health behavior and result in the development of chronic diseases such as diabetes. The purpose of this project was to assess the effect of an evidence-based

intervention, such as the implementation of biweekly phone calls, to Type 2 diabetic Hispanic adult patients' glycemic control. Blood sugar levels that are well controlled can enhance these patients' quality of life, result in fewer long-term complications including mortality and morbidity (American Association of Diabetes Educators [AADE], 2014b). This project also provided insight to the primary care providers at the site as well as involved stakeholders regarding the various barriers these patients encounter in managing their diabetes and living healthier lives.

The present process at the outpatient clinics includes rudimentary steps in managing Type 2 diabetics. For example, upon diagnosis, patients are provided with dietary instruction, journaling tools, and patient education regarding daily blood sugar testing using a glucometer. Follow up with these patients is typically, once a month; if a patient misses a clinic appointment, there is little or no follow up. This lack of attention to the detail of patient care management represents a significant gap in practice (Ba-Essa et al., 2018). As a result, patients exhibit high HbA1c levels, often do not follow through with self-blood glucose monitoring, recommended dietary changes, or exercise activities (Ba-Essa et al., 2018). Also, some of these patients miss their clinic appointments and are not followed up with as expected, which leads to poor management of their diabetes and poor health outcomes. Therefore, the guiding practice focused question for this project was: Will the implementation of an evidence-based QI intervention, such as biweekly telephone interventions/calls by the advanced practice nurse, in addition to their standard treatment regimens, yield better glycemic control among adult Hispanics with Type 2 diabetes? This doctoral project dealt with the above gaps-in-practice by examining the

various cultural practices and beliefs and socioeconomic barriers these patient population face which hinders their health outcomes, and then offered evidence-based intervention(s) to address them. Some major causes of diabetes in Hispanics include stress, diet and eating habits, and cultural beliefs or behaviors (Concha, Mayer, Mezuk, & Avula, 2016). Stress from work contributes to unhealthy eating habits. Inquiring from these patients what their causation beliefs and emotional statuses are aided in the prioritization of their diabetes treatment and management (Concha et al., 2016).

Nature of the Doctoral Project

The nature of the project in the effort to improve glycemic control among this patient population was to evaluate an evidence-based intervention that included bi-weekly phone calls in addition to the standard treatment plan, for a selected number of Type 2 diabetic Hispanic adults. The QI intervention included biweekly coaching sessions which focused on addressing knowledge deficits regarding diabetes, self-care activities like blood glucose monitoring, diet and exercise education, and troubleshooting any problems that hindered success.

The intervention was carried out over a 12-week period with a convenience, random sampling of patients (n=50), ages 18-65. As stated before, the participants were recruited from a family practice clinic and selected based on Hispanic ethnicity, a diagnosis of Type 2 diabetes, a willingness to carry out self-blood glucose monitoring daily as educated, and expression of readiness to engage in telephonic calls with the advanced practice nurse on a biweekly basis. Patients with mental health disorders or cognitive impairment, acutely ill, or with limited life expectancy, and those pregnant

were excluded from the project. Replacement glucometers were ordered for some of the participants as deemed fit. The intervention comprised of initial individual face-to-face meetings with the patients chosen to participate in the project, then biweekly follow-up telephone calls. The interviews and telephone calls focused on self-care activities such as blood glucose self-monitoring, medication compliance, diet, physical activity education, and factors that serve as barriers and facilitators to achieving better glycemic control.

The QI plan involved two nurse practitioners who participated in the intervention and managed 25 participants each, making a total of 50 patient participants. Patients were encouraged to test their sugars in the morning (fasting) and throughout the day. The self-reported fasting blood glucose values and HbA1c results were used as the DNP project evaluation measures and were provided to the APRNs after de-identification for secondary analysis regarding the 12-week intervention. The goal of the QI intervention was to have both HbA1c and fasting blood glucose levels lower and towards or within targeted ranges than before the intervention. Necessary changes to treatment, plan diagnostic testing, and appropriate referrals were carried out as necessary after review with the primary care physician. Teach-back and return demonstrations were also implemented as part of the coaching process when appropriate, to ensure understanding of the diabetes education provided as well as to evaluate that the teaching method used was effective.

The biweekly phone calls served as a rich source of qualitative information about barriers to effective patient care management in this patient population. Documentation was housed in the electronic health record (EHR) as a checklist template, and with

narrative notes for each encounter. All data were downloaded from the EHR, de-identified, placed in an excel file, and provided to me for secondary analysis in the DNP project. The qualitative component was included in the DNP QI evaluation that highlighted factors leading to success or failure with improved HbA1c and SBGM fasting levels.

Significance

Evidence-based interventions have been beneficial and have worked in enhancing glycemic control in Type 2 diabetic adults in various populations and settings. For example, Lee, Greenfield, and Pappas (2018) discussed the use and effect of telehealth remote patient monitoring on glycemic control in Type 2 diabetics. Manders et al. (2016) explored the effect of a Type 2 diabetes in-hospital treatment protocol which was managed by a nurse while Shen et al. (2018) analyzed the efficacy of internet-based interventions on glycemic control in Type 2 diabetic patients. Furthermore, Zhou et al. (2014) demonstrated that telemedicine systems can influence glycemic control positively in the treatment of Type 2 diabetes, especially in cases where there are lack of transportation and barriers to access outpatient clinics.

This project intervention and evaluation plan align with clinical practice guidelines because the ADA (2014) reported a higher prevalence of total diabetes (both diagnosed and undiagnosed) among all Hispanic/Latino groups (approximately 17 %) when compared to non-Hispanic whites (10%). Furthermore, in the effort to promote health and reduce disparities in populations, the ADA (2017) mentioned that there are various factors that impact glycemic control in diabetes like food insecurities, cultural

and ethnic differences, lack of support, language barriers, and knowledge deficit. There was a plan to address all these during the project period in order to reduce or eliminate the barriers to Type 2 diabetes management, reduce comorbidities, and mortality rates. This, in turn, led to a positive influence in nursing practice by enhancing the quality of care and health outcomes for these patients. The chronic care model serves as a guide when initiating diabetes treatment plans in order to achieve productive health outcomes and interactions between the health care team and the patients (ADA, 2017).

In the improvement of glycemic control in Hispanic adults with Type 2 diabetes, various stakeholders ought to be involved as this is a public health problem. The CDC, Agency for Healthcare Research and Quality (AHRQ), and the National Institute of Diabetes and Digestive and Kidney Diseases are federal agencies that provide appropriate guidance and health information on various chronic diseases including Type 2 diabetes. These agencies are significant stakeholders where diabetes is concerned. Also, it is essential that membership and advocacy organizations such as the American Association of Diabetes AADE and ADA, as well as public health officials, health care providers, the hospital/ health system leadership, and the target communities, patients and their families are all involved in T2DM management in order to improve health outcomes. On the local level, stakeholders such as diabetes educators, dieticians, endocrinologists, social workers, clinicians, and patients and their family members who were likely to be impacted by addressing the problem were all involved.

Community stakeholders are important in helping to address concerns among Hispanics, these are known people who work for community establishments or agencies

that provide care, services or outreach to Hispanic individuals with diabetes (CDC, 2015; Schmittdiel et al., 2015). These stakeholders can use various establishments and companies as channels of intervention, promote cultural competence and awareness among health care professionals and volunteers, distribute appropriate information as well as organize activities to promote awareness of diabetes prevention and disease-management strategies (Schmittdiel et al., 2015). Therefore, there is a great potential transferability of the findings of this doctoral project to other practice areas such as inpatient and public health settings, in the effort to improve health outcomes and quality of lives.

Clark and Utz (2014) reported that a goal for diabetes, according to Healthy People 2020, is to lessen the disease and economic liability of the disease and enhance the quality of life for everyone who has or is susceptible to the disease. By improving the quality of life and health outcomes of those with Type 2 diabetes in various communities and the society, positive social change is achieved. These patients will have a better chance at life, live longer and healthier, have decreased rates of comorbidities, and contribute to the society positively.

Summary

This evidence-based intervention enabled patient coaching for improved blood glucose and self-care by removing any deficits in knowledge. The CDC (2017b) reported that multiple care delivery issues such as health disparities, cultural sensitivity, access to care, socioeconomic factors, and inequity are some of the barriers the Hispanic population face when it comes to chronic disease management. This project has

contributed to positive social change because it addressed the above social issues facing

this population which in turn aided in the improvement of their glycemic control.

Furthermore, it is a significance to nursing practice because good glycemic control

increases the quality of life of the patient, reduce morbidity and mortality rates, and

decrease health care costs (Manders et al., 2016).

Section 2: Background and Context

Introduction

The practice problem discussed in this doctoral project was poor glycemic control among Hispanic adults with Type 2 diabetes and the implementation of an evidence-based intervention to address the issue. The expected results included improved glycemic control, enhanced quality of life, and other related health outcomes as reported by Hua et al. (2017). These researchers conducted a systematic review by researching cost-effectiveness studies that used Type 2 diabetes imitation models to evaluate health outcomes of blood glucose-related interventions with regard to quality-adjusted life-years (QALYs) or life expectancy (LE) (Hua et al., 2017). Thus, a consistent relationship between HbA1c and QALYs or LE was found (Hua et al., 2017).

The practice focused question was Will the implementation of an evidence-based intervention, such as bi-weekly telephone calls by the advanced practice nurse, in addition to their standard treatment regimens, yield better glycemic control among adult Hispanics with Type 2 diabetes? A vital health outcome achieved from this project was that these Hispanic adult patients were able to better engage in self-care activities such as healthy eating, increase in physical activity, blood sugar monitoring, medication adherence, and reduction or elimination of risky behaviors. This was possible through ongoing education, intervention, and empowerment from their health care team (Shrivastava, Shrivastava, & Ramasamy, 2013).

Concepts, Models, and Theories

Self-Care Management in Diabetes

The concept of self-care is very significant in Type 2 diabetes management. It emphasizes the importance of assuming responsibility for oneself as it is a daily, gradual, and individualized task (Shrivastava, Shrivastava, & Ramasamy, 2013). It also involves a great deal of autonomy in behavior and decision making. The association between diabetes self-care and glycemic control has been studied in the literature extensively and a good number of these articles focus on the routine health behaviors of patients (ADA, 2017). For example, the AADE (2014a) reported that self-care behaviors consist of a healthy diet, being fit and active, checking blood sugar levels, taking medications as prescribed, problem solving, reducing risks, and coping well, both physically and emotionally. It is essential that the patients have the competence for problem solving, as needed, so that they can prepare for the unexpected and plan to deal with similar issues in the future. Adhering to the above behaviors will aid in the reduction of health complications and increase life span of the diabetic patients.

Likewise, Schnell, Klausmann, Gutschek, Garcia-Verdugo, and Hummel (2017) demonstrated in a study that self-monitoring of blood glucose (SMBG) leads to an improvement in metabolic control and diabetes management. The above observational study involved the analysis of diabetes self-management (DSM) and glycemic outcomes before and during a blood glucose meter system implementation in diabetic patients. The study comprised of 193 enrolled patients in which after 6 months, the patient's attitudes on self-care (Q16, $p = .0046$) and nutrition ($p=.004$) showed major improvements. Also,

the implementation of the blood glucose meter led to better glycemic control, as demonstrated by mean HbA1c levels, which decreased from 8.68 at baseline to 8.13 after 3 months and to 7.9 at 6 months (Schnell et al., 2017).

Similarly, Nicoll et al. (2014) reported positive findings showing that there was a remarkable reduction in HbA1c, the standard barometer for measuring glycemic control, for all patients who completed diabetes self-management education (DSME) and received regular medical follow-up. From the 43 patients that were included in the evaluation, the mean HbA1c before DSME was 10.2 and after DSME was 7.8, which shows a 23.5% reduction. The duration of diabetes also played a significant factor in the study because patients with length of diabetes of less than 1 year had a considerably decrease in mean HbA1c (28.7%) than those with a duration of diabetes greater than 1 year (20.2%).

The effect of telephone intervention on glycemic control in patients with diabetes has also been evaluated. Suksomboon, Poolsup, and Nge (2014) reported that telephone intervention has potential benefit of improving glycemic control in diabetes, especially in less privileged societies. Similarly, Chamany et al. (2015) concluded in their research that telephone intervention carried out by health professionals is clinically efficient in improving glycemic control in diverse minority populations with diabetes. A randomized controlled trial study by Shahid, Mahar, Shaikh, and Shaikh (2015) also showed that the use of phone technology in rural areas was beneficial in reducing HbA1c levels through direct communication with the patients with diabetes. The above evidence has helped in supporting that the implementation of biweekly telephone calls at the study site led to the improvement of glycemic control in Hispanic adults with Type 2 diabetes.

Various evidence-based interventions have been successfully used in Type 2 diabetes management to yield better glycemic control. Such interventions include socioculturally appropriate ones, such as lifestyle behaviors and self-management diabetes education, and information technology-based interventions (Gucciardi, Wing-Sheung Chan, Manuel, and Sidani, 2013). For example, a literature search involving six health databases for randomized controlled trials and comparative studies conducted by Gucciardi et al. (2013) revealed success rates of intervention features based on efficiency in improving HbA1c, diet, or physical activity. From the 13 studies that were analyzed, 38 intervention features were identified in relation to their success with an outcome. There were four intervention features that had statistically major positive rate differences across outcomes: (a) hospital-based interventions, (b) group interventions, (c) use of situational problem-solving, and (d) incorporating dietitians as interventionists (Gucciardi et al., 2013). For example, using peer workers as interventionists and using the telephone as a medium of providing education had a positive rate difference of 50% for physical activity (Gucciardi et al., 2013). In addition, six intervention features had increased positive rate differences, greater than 50%, on specific outcomes (Gucciardi et al., 2013).

Likewise, Alharbi et al. (2016) aimed at evaluating the effect of information technology on changes in HbA1c levels and associating the interventions with the elements of the chronic care model (CCM) in a systematic review and meta-analysis of clinical trials study. The study featured 1,082 articles and 32 trials, which highlighted about 40,454 patients (Alharbi et al., 2016). The results showed that interventions that focused on information technology resulted in a considerable decrease in HbA1c levels

(mean difference -0.33%) while the studies aiming at electronic self-management systems revealed the biggest decrease in HbA1c (0.50%), followed by those with electronic medical records (0.17%), an electronic decision support system (0.15%), and a diabetes registry (0.05%) (Alharbi et al., 2016). Therefore, study findings revealed that interventions that are based on information technology and linked to CCM showed better HbA1c levels (Alharbi et al., 2016). The reduction in HbA1c levels consequently resulted in enhanced glycemic control in Type 2 diabetics (Alharbi et al., 2016). Therefore, Type 2 diabetes management requires a multifaceted approach to yield better health outcomes and this project implemented those strategies.

Glycemic Control in Hispanic Patients with Diabetes: Barriers and Solutions

According to Hu, Wallace, McCoy, and Amirehsani (2014) and Rotberg et al. (2016), the factors related to poor diabetes management and glycemic control include personal factors such as knowledge and attitude towards the disease, behavioral factors, such as self-efficacy and skills associated with diabetes management, and thirdly, environmental factors such as socioeconomic barriers. For example, Sami, Ansari, Butt, and Ab Hamid (2017) reported that the main factors responsible for the rapidly increasing incidence of diabetes are dietary habits and sedentary lifestyles. Thus, an improvement in elevated HbA1c levels can be attained through diet management and exercise activity in the effort to prevent diabetes complications. Making patients aware of the various diabetes complications through education and knowledge impaction of appropriate diets, attitudes, and practices will result in better control of the disease. Dietary intake intervention included making changes in food choices by decreasing fat intake and

increasing vegetable, fruit and grain consumption (Sami et al., 2017). Hemmingsen et al. (2017) reported some study results that were done regarding the impact of diet and exercise on Type 2 diabetes. They analyzed eleven studies that compared diet and physical activity to just standard diabetes treatment. The study findings demonstrated that diet with physical activity reduced the risk of developing Type 2 diabetes in 315 of 2,122 participants (15%) in the diet and physical activity group when compared with 614 of 2,389 participants (26%) in the standard treatment group (Hemmingsen et al., 2017).

Furthermore, it has been observed that there are cultural ways of understanding and interpreting the interaction between dietary habits and risk for Type 2 diabetes especially in immigrants. It is essential that cultural and sociocultural factors that can influence the designing of culturally appropriate interventions aimed at addressing the risks for Type 2 diabetes are considered (Tshiswaka, Ibe- Lamberts, Mulunda, & Iwelunmor, 2017). Similarly, cultural influences play a huge role in risks and rate of Type 2 diabetes as some cultures consume certain types of food and avoid others. It was also observed that body mass index (BMI) and weight gain are considerably higher among people with low socioeconomic statuses compared to those of middle and high socioeconomic statuses. The same goes for educational level, it has been noted that people with low education levels tend to be obese compared to their counterparts of high educational levels (U.S. Department of Health and Human Services [USDHHS], 2013). The above knowledge was beneficial to this project as the evidence-based intervention gave room for thorough analysis of the participants' situations and allowed them to voice their concerns.

In the effort to decrease the rate of Type 2 diabetes and provide a tight glycemic control in the adult Hispanic population, the home and neighborhood environments must also be taken into consideration. The availability of good food and its preparation, opportunities for physical activity, and most importantly family support are major influences on its reduction (Colberg et al., 2016). Also, an environment that has adequate safe parks would enhance physical activity, thereby decrease obesity (Colberg et al., 2016). There is a strong relationship between the above evidences and the purpose of this project because the collection and analysis of these evidences provided guidance on addressing the practice-focused question. The knowledge of the above evidences assisted the advance nurse practitioners who implemented the intervention in asking the project participants the right questions, proffer solutions, and provide meaningful patient education.

Models and Theories

The CCM by Wagner (1998) was used for the DNP project. The model was developed to care for patients who are chronically ill in primary care and is a multifaceted framework that focuses on population groups (Wagner, 1998). The model generates practical and evidence-based approaches to the management of chronic diseases (Wagner, 1998), which in this case is Type 2 diabetes. The CCM highlights the vital components of a health system that support efficient care of chronic diseases (Baptista et al., 2016). These components consist of the community, self- management support, the health system, delivery system design, decision support, and clinical information systems (Baptista et al., 2016). Baptista et al. (2016) assessed the impact of

the CCM on different clinical outcomes in a systematic review of 12 studies. Six of the 12 studies showed evidence of the usefulness of the CCM in the management of Type T2DM in primary care in addition to major enhancements in clinical outcomes. There were also suggestions that more benefits could be achieved when all six elements of CCM are combined and used. Likewise, Stellefson, Dipnarine, and Stopka (2013) conducted a literature review of 16 studies which included nine randomized controlled trials, in varied settings and demonstrated that CCM methods have been efficient in the management of diabetes in primary care settings in the United States. Using this model, the goal was to establish a culture and organization that encourage safe and high-quality care among these chronically ill patients which empowered them, and aided performance of self-care activities related to their diabetes (AADE, 2014a; Baptista et al., 2016; Stellefson et al., 2013). Therefore, in order to achieve a good glycemic control in the Type 2 diabetic patients using this model, there was a considerable amount of education, supportive communication, and collaboration between the patients and the health care team throughout the course of the project. The health care team comprised of a registered dietician/nutritionist, health care professionals, and specialists whose unique roles contributed to improved glycemic control and better health outcomes.

Relevance to Nursing Practice

My DNP project is very significant to nursing practice because Type 2 diabetes is a public health problem as it affects millions of people in the U.S. T2DM is a major chronic disease with high prevalence in various patient populations. Preventing the disease and managing it well in those already afflicted by it is essential. The development

and implementation of planned evidence-based approaches have been demonstrated to improve glycemic control and prevent complications in the affected patient population (Alharbi et al., 2016; Hu et al., 2014). With this type of evidence-based intervention in place, Type 2 diabetes Hispanic adult patients learnt to be accountable for their health, embraced healthy behaviors such as food choices and exercise, engaged in self-care activities like self-blood glucose monitoring, and started going to their clinic appointments as scheduled.

Nurse practitioners have a responsibility to assess for any barriers to care, so that both providers and patients can deliberate on feasible solutions that will enhance health outcomes. For example, according to Garcia et al. (2016), some patients have lower socioeconomic status than others, in terms of financial status and educational levels, which may impact daily glucose monitoring (that is, securing and learning how to use the glucometer). Some of them may not have means of transportation to go to their appointments and some may be shy to acknowledge to their providers that they could not understand education provided to them regarding their diseases. Cultural differences and financial status may also impact patients' ability to buy fresh food and may result in an over reliance on fast food, or other dietary patterns that are not conducive to lowered HbA1c levels (Hu, Amirehsani, Wallace, & Letvak, 2013). The above barriers were assessed and analyzed with the targeted patients at the project site, and solutions were proffered which included offering some of these patients' taxi vouchers or bus passes to get to their appointments and having a Spanish translator available during the coaching sessions and during their appointments, even though it appeared all the patient

participants understood English. All the above strategies were utilized in an effort to promote better quality of life and health outcomes, reduce health associated costs, and reduce mortality and morbidity rates (Nuti, et al., 2015). This project also contributed to positive social change because various social issues facing the Hispanic population such as SES, health care inequality, and so on were addressed, which then contributed to better disease management and glycemic control improvement (Manders et al, 2016).

<center>**Local Background and Context**</center>

The clinic chosen for this doctoral project is located in a prominent urban area in California. The geographical area where the clinic is located has a longstanding reputation for high unemployment, poverty and crime rates, but these have plummeted over the years. It is significant to mention the above because of the types of patients seen in the clinic. Most are poor and lack education. Also, an advantage to the community and clinic is that the physician-owner and majority of the staff are bilingual. This attribute draws in a high number of Hispanic patients who live in the surrounding area to the clinic for medical care.

With regards to the intervention, during the bi-weekly telephone calls, the coaching sessions assisted in guiding the patients to take accountability for their self-care and increase adherence to the treatment regimen. With the intervention in place, there was great expectation that the channel of communication and trust will be open for the patients to freely discuss areas of concern or interest with the advanced practice nurse. Reported fasting blood glucose (FBG) recorded with each telephone intervention and HbA1c results, when appropriate, were used as the outcome measures and so that trends

could be examined and medication modifications, diagnostic testing, and appropriate referrals could be carried out by the provider as needed. With regards to HbA1c results, they served as an efficient outcome measure for Type 2 diabetes, but because of the time frame of the project, it was not as beneficial as the FBG results. However, it was interesting to see if the measure of patient-report FBG varied with HbA1c as any time one relies on human participants for quantitative data, it is a potential problem and may lead to data collection limitations.

The goal was to see a downward trend of FBG post-intervention. The results were compared to pre-intervention data. Along with the phone call intervention, the participants received advanced coaching by the advanced practice nurse on the most recent ADA standards of care. The causes, needs, and strategies required to manage Type 2 diabetes and improve glycemic control in this patient population were examined. An institutional priority for Type 2 diabetes management is to provide high quality of care to these chronic disease patients in order to improve their health outcomes. According to the ADA (2016), there are certain interventions that improve quality of diabetes care in any health care setting, which leads to improved glycemic control, and they are: (a) utilizing evidence-based guidelines to guide care, (b) increasing the role of teams to establish more comprehensive disease management strategies, and (c) providing patient-centered care.

When addressing glycemic control in this patient population, locally used terms to address the issue were non-compliance, patient nonadherence to treatment, and health disparities. Health disparities in society have led to inequality and differences in quality of care received and health outcomes of lower-class patients when compared to higher

class patients (Arpey, Gaglioti, and Rosenbaum, 2017). In most communities where there are high Hispanic population rates, there are lack of resources or amenities for health living. As mentioned above, there is a high population of Hispanics in the particular community where the project site is located. Therefore, this project was a very beneficial one that made significant impact on the health outcomes and quality of lives of the patients.

Role of the DNP Student

As the DNP project manager, I utilized evidence-based research articles to gather information regarding the target population; social and economic factors, cultural habits and beliefs regarding this health issue. In this DNP project, which uses a Quality Improvement (QI) approach, I analyzed trends and gaps apparent in the health care literature and used specific strategies and interventions suitable to address this health issue. The solutions employed addressed the cultural expectations of the patient population, without bias or prejudice, in order to yield positive outcomes that have the potential for sustainability.

As project leader for the QI intervention, I oversaw the development of the documentation template, and guides for coaching sessions. The NPs at the site were primarily responsible for implementing this evidenced-based intervention at the private family practice clinic. My primary role in the project was to conduct secondary analyses of de-identified data in order to evaluate the effect of the QI intervention on patient outcomes, specifically SBGM fasting values and HbA1c levels which, taken together, represent glycemic control. The motivation for this doctoral project was that it will

contribute positively and impact the health outcomes of the patients seen in the clinic. As stated before, a significant amount of the patients seen in the clinic are Hispanics and this suits the project well. The potential bias I had in mind, which could have negatively affected this project, was observer bias due to the prior knowledge and subjective feelings that the NPs have about the targeted patient population. Also, for the participants, subject/participant bias could have been an issue, this is a tendency of the patients to act or answer questions a certain way in order to favor the project (Smith & Noble, 2014). I addressed observer bias by setting clear rules and procedures for the advanced practice nurse practitioners (APRN/NPs) involved in the project and cautioned them to avoid any prejudices. Subject or participant bias can affect the validity of a project. Therefore, I addressed this issue with the NPs by discussing how to gain the trust of the participants, encouraging them to let the patients know that there are no right or wrong answers, and that patients should feel free to disclose any information that is necessary to improve their health outcomes.

Role of the Project Team

Collaboration with other disciplines, professions, and the community may be beneficial to be successful and improve the population's health outcomes (CDC, 2017a). As previously stated, the project was an existing QI initiative at the site. Accordingly, the team comprised of a registered dietician provided medical nutrition therapy and nutrition guidance for the patients, a social worker who assisted the patients in solving and coping with problems in their everyday lives, the two APRN/NPs who carried out the project, clinic staff who assisted in coordinating medical records, and the physician and/or

specialist who were available for medical consultation and treatment plans as necessary. Other members of the team included a pharmacist, podiatrist, ophthalmologist, and nephrologist for needed referrals (CDC, 2016). As project manager, I led weekly project team meetings with the APRN/NPs who provided feedback on project progress and any technical obstacles related to appointments, documentation in the EHR, access to patients in between scheduled phone calls for blood draws, needed referrals to other members of the project team and other patient requests as needed.

Summary

There are multidimensional issues related to Type 2 diabetes which require multiple interventions to address effectively. Apart from implementing bi-weekly phone calls intervention in a clinic or outpatient setting, it is important that at the state and national levels, there are also interventions in place to curb obesity and diabetes in adults especially among the Hispanic adult population. According to Rotberg, Greene, Ferez-Pinzon, Mejia, and Umpierrez (2016), there should be more efficient outreach programs, nutrition education programs, and availability of funds to carry out specific projects which would be tailored to specific groups of people in the community. Adequate and safe parks in every community for recreation and physical activity purposes are beneficial in improving health outcomes. Also, adult education and health programs that are free or low cost are beneficial. Finally, funded higher education programs for health care professionals who work directly with these populations should be readily available to them in order to enhance their patient care skills and improve health outcomes (Rotberg et al., 2016). With analyses of data, this doctoral project hopefully brought to light the

above issues and the various solutions and interventions that will help in improving the

patient population's quality of life and health outcomes.

Section 3: Collection and Analysis of Evidence

Introduction

There is overwhelming support in the literature to emphasize the use of evidence-based interventions to improve glycemic control in the diabetic population. Complications from poor glycemic control tend to affect the whole body because major organs and systems are affected (Nuti et al., 2015). Also, several studies have shown that physical activity and dietary changes lower Type 2 diabetes risks and that a combination of both demonstrate better achievements than the implementation of one alone (Sami et al., 2017; Tshiswaka et al., 2017). The biweekly phone calls, as an evidence-based intervention, covered the above topics during the coaching provided by the advanced practice nurse. The benefits of this DNP project are numerous. First, it provided an insight into the lives, beliefs, and health habits of the Hispanic population. Secondly, it was used to determine what the needs of these patients are, in order to adequately assist them to improve glycemic control in their diabetes management.

Practice-Focused Question

Among adult Hispanics with Type 2 diabetes, will the implementation of an evidence-based QI intervention, such as biweekly telephone interventions/calls by the advanced practice nurse, in addition to their standard treatment regimens, yield better glycemic control? This question is necessary to ascertain the efficacy of evidence-based interventions in improving the glycemic control in Type 2 diabetic adults. An evidenced-based intervention such as biweekly telephone calls to this patient population along with their standard treatment plan further aided in the reduction of fasting blood sugar and

HbA1c levels, and on the long run, decrease comorbidities, hospital readmission rates, healthcare costs and improve patient's quality of lives and health outcomes (Chamany et al., 2015).

<p align="center">**Sources of Evidence**</p>

Published Outcomes and Research

The sources of evidence for this project were from electronic databases such as CINAHL Plus with Full Text, CINAHL & Medline Simultaneous search, PubMed, and ProQuest Nursing & Allied Health Source. Professional organizations like the ADA were also beneficial as well as diabetes handbooks. Studies from literature showed that numerous factors play a role in one's predisposition to a chronic disease, such as Type 2 diabetes. According to Hu et al. (2013), some of these factors include genetics, diet, lifestyle, culture, values or beliefs, educational, and income levels among many others. Lack of diabetes education and knowledge deficit also contributes to the poor management of Type 2 diabetes and poor glycemic control (Hu et al., 2013). Sami et al. (2017) also reported that Type 2 diabetic patients need support and continued reinforcement of diabetes education which comprises of dietary support by various stakeholders such as health care professionals and health facilities. This is important so that these patients will be able to understand the disease and its management better, feel supported in their self- care activities, which then enhance their health outcomes and quality of life. Proper diabetes education and dietary management will also reduce various health complications involving body organs such as the eyes, kidneys, and heart (Sami et al., 2017). Hu et al. (2013) then concluded that there are perceived hindrances to

diabetes self-management in the Hispanic population which need to be addressed. These barriers center on culture, support from family, and self-management skills education (Hu et al., 2013). Therefore, resources and interventions that address the above were addressed during the project, in order to yield better health outcomes in this patient population.

In addition to the various research studies discussed earlier that supported this project, a literature review was carried out in which other research study articles were compiled and analyzed using a matrix template (see Appendix A), and they are also used to support the use of evidence-based interventions to improve glycemic control in Type 2 diabetic patients in a variety of health care settings. These sources of evidence were retrieved from electronic databases such as CINAHL Plus with Full Text, CINAHL & Medline Simultaneous search, PubMed, and ProQuest Nursing & Allied Health Source. The key words and phrases that were searched for include *adult, Hispanic, evidence-based, interventions, adult Hispanics, evidence-based intervention, telephonic interventions Type 2 diabetes* and *phone call intervention.* Also, information from professional organizations such as the ADA and AADE was used.

Archival and Operational Data

All data, both qualitative and quantitative, were secured from the EHR, downloaded and de-identified for secondary analyses. This includes HbA1c results which were secured at the beginning of the 12-week period and again at the end. Daily blood sugar reports were also self-reported by the patients and the SBGM fasting results on the day of the biweekly phone call were recorded in the EHR, as patient reported. The

biweekly phone calls were also guided by a documentation template in the EHR and included both a checklist of needed items for discussion as well as narratives highlighting barriers and facilitators. These data were downloaded into an Excel file, and de-identified for secondary data analyses. Permission and consent to gain access to operational data, as needed, was received from my preceptor who is also the physician and owner of the family practice clinic. Patient charts/EHR were used as one of the major data sources due to their reputability as solid legal documents in health care (see Accordino, Kopple-Perry, Gligorov, & Krieger, 2014).

Evidence Generated for the Doctoral Project

      Participants. The ideal participants for the quality improvement intervention included those who had a basic understanding of English, could read and write, those who were able to perform self-blood glucose monitoring on a daily basis as instructed, as well as those agreeable to engage in telephonic calls with the APRN/NPs on a biweekly basis. Language translators were used for those who needed the service in the effort to generate accurate data. Patients with mental health disorders or cognitive impairment, acutely ill or with limited life expectancy, without glucometers, and those pregnant were excluded from the project. Also, new patients were not chosen for this DNP project. The intervention was carried out over a 12-week period on a convenience, random sampling of patients (n=50), ages 18-65.

      Procedures. To start the project, there were initial face-to-face meetings with the patients in the family practice clinic, then biweekly follow-up telephone calls carried out at mutually determined times. Data were collected through chart reviews, personal

telephone interviews, and use of questionnaires. These questionnaires were comprised of questions that were used before, during and after the coaching sessions. There were 10 questions geared toward the knowledge of self-care management and 10 other questions geared toward daily practices, both related to Type 2 diabetes (see Appendix B). The coaching sessions were done every 2 weeks, during the biweekly calls, for the duration of the project and focused on diet education, exercise education, and lifestyle changes. The telephone calls and questionnaires covered self-care actions like blood glucose self-monitoring to determine FBG results, medication compliance, education on diet, exercise, weight control and other factors serving as hindrances to better glycemic control. During the initial meetings, the patients were provided the food and blood glucose logs (see Appendix C) to document their daily dietary intake with specific measurements e.g. 1 cup of pasta, 2 medium sized flour tortilla etc., the amount of daily exercise in minutes, and their blood glucose results. These logs were then reviewed on the phone and each time they came to the clinic for their follow up appointments. Their glucometers were also checked during their clinic appointments to verify accuracy of data collected on the phone.

Protections. The protection of human subjects was necessary due to the nature of this project as it involves human participants. It was necessary to gain approval from Walden University IRB to be able to proceed with the project. Accordingly, the Walden IRB blanket manual for an existing quality improvement (QI) project, was followed diligently. As a DNP student who utilized the project site for practicum as well, coaching and documentation were routinely part of the activities being carried out during

practicum hours. I was responsible for securing de-identified data and performing

secondary analyses on these de-identified data to evaluate the project. Also, as the site is

a standalone small private clinic, not affiliated with any health system or hospital,

permission was obtained directly from the provider who owns the practice. Furthermore,

as the DNP student, who is also an advanced practice nurse, I led the project by abiding

by the set protocols and guidelines for practice when interacting and dealing with other

staff at the site who cared for the patients. I worked directly alongside the APRN/NPs

who gathered the necessary data for the project and consulted with the physician/my

preceptor when needed. I provided guidance and supervised the APRN/NPs regularly to

make sure they were following the plan and meeting the objectives of the project. To

further maintain confidentiality and protect the rights of the participants, unique pseudo

initials were utilized during the project to identify the participants and all data collected

were kept safe in a secured electronic database, accessible only by authorized staff at the

site. Informed consent was received from the participants easily. The informed consent

forms were handed out during the participants' selection and briefing process, at the

beginning of the 12-week project period.

I sought approval from the Institutional Review Board at Walden to perform

secondary data analysis from a de-identified dataset provided to me from the clinics'

EHR following the Walden IRB Quality Improvement manual. According to Polit and

Beck (2012), the IRB carries out an external review of the ethical aspects of a study.

Voluntary participation and the right to withdraw at any time, without any consequence,

was stressed to the participants. During the face to face meetings during the project

period, the participants were made comfortable and relaxed in a private room in the clinic. Although, the use of a natural setting, such as a patient's home, is preferable to do the initial face to face interviews so that the participants are relaxed and at ease, this posed some ethical issues as there were concerns of invasion of privacy (Hämäläinen & Rautio, 2013). There were further concerns that the participants may not have provided accurate answers to the APRN/NPs' questions for fear of being labeled or the plain fact that they were uncomfortable with the project or felt the need to want to please the APRN/NP. The above may lead to inaccurate analysis of data, which will serve as a limitation of the project.

Analysis and Synthesis

The project served the purpose of demonstrating that an evidence-based intervention which consists of bi-weekly phone calls and coaching to Hispanic adult patients with Type 2 diabetes will yield improved glycemic control. It was expected that at the end of the project, there will be reduced fasting blood sugars levels as well as HbA1c levels when compared to pre-intervention data that will be statistically significantly reduced using inferential statistics, to be determined after a review of the data for final sample size and normality. Also, the project team assisted in promoting healthier eating habits and exercise activities with the hope of prolonging the participant's life spans and improving their health outcomes. The interviews and telephone calls focused on self –care activities like self-monitoring of blood glucose, medication compliance, education on diet and physical activity, and factors that serve as barriers and facilitators to achieving better glycemic control. Narrative data from the

EHR were downloaded, and de-identified, and qualitative methods were utilized to extract themes from this documentation. These above methods helped provide in-depth answers to the practice- focused question and also revealed how Hispanics feel about their health and health promoting behaviors. The various limitations and barriers that predispose them to the disease were addressed as well.

Summary

According to the above evidences and the project outcome, improved glycemic control in Type 2 diabetic Hispanic adults is important as it will allow these patients lead functional lives in the society and promote positive change without the added burden of disease (USDHHS, 2013). Similarly, solving this issue will enable the public health sector to direct interventions and resources to the right places so that the Hispanics can live equally good and healthy lives along with other ethnicities. Finally, one social impact of the project will be the development of certain health policies that will enable minorities have better and easier access to health care services. This will allow them to seek preventive and treatment services on time, and reduce the risks for developing chronic diseases and various comorbidities.

Section 4: Findings and Recommendations

Introduction

The local nursing practice problem which was the main emphasis of this doctoral project was poor glycemic control in Type 2 diabetes. This practice problem is significant to nursing and health care and to the health of individuals, families, and communities. The purpose of the QI project was to improve glycemic control in Hispanic adults with Type 2 diabetes in a family practice clinic through the implementation of biweekly phone calls to the patients in addition to their standard treatment. The gap in practice at this private clinic was that there was lack of attention to the detail of patient care management because when patients missed their clinic appointments, there was little or no follow up which led to high blood sugar and HbA1C levels, as well as poor or nonexistent self-care activities and lifestyle modifications. According to Gray, Grove, and Sutherland (2017), the focused statement or question in a project is important when considering the significance and relevance of a study's problem and purpose. Thus, the guiding practice focused question for this project was: Will the implementation of an evidence-based QI intervention, such as biweekly telephone calls by the advanced practice nurse, in addition to their standard treatment regimens, yield better glycemic control among adult Hispanics with Type 2 diabetes? The purpose of this project was to evaluate the effect of an evidence-based intervention, such as the implementation of biweekly phone calls, on glycemic control in Type 2 diabetic Hispanic adult patients.

I used the literature as a key source of evidence for this scholarly project. The literature review included peer-reviewed scholarly journal articles that were published in

English language only, were in full text, and published in the last 5 years. These articles were AACN level of Evidence B because they are well designed controlled studies with results that consistently supported the various evidence-based interventions utilized to achieve improved glycemic control (Armola et al., 2009).

The biweekly phone calls composed of coaching sessions on self-care activities, medication compliance, and diabetes education including lifestyle changes, diet, and exercise. Diabetes knowledge was evaluated based on years of Type 2 diabetes diagnosis. The evaluation of the self-care management, diabetes knowledge, and daily practices related to the disease, before and after receiving the intervention, was conducted using a set of questions before, during, and throughout the 12-week project. I used the most recent ADA standards of diabetes care to design the coaching sessions, and the APRN/NPs used teach back method (Ha Dinh, Bonner, Clark, Ramsbotham, & Hines, 2016) in assessing adequate understanding of the education provided. The SBGM results were documented on food and blood glucose logs provided to the patient participants at the beginning of the project and these were reviewed during the biweekly telephone calls including daily dietary intake with precise measurements and the amount of daily exercise in minutes. I then conducted secondary analyses of de-identified data in order to assess the effect of the QI intervention on SBGM fasting values and HbA1c levels with narrative data from the EHR downloaded into a secure Excel file, de-identified, and qualitative methods used to extract themes from this documentation. The combination of the above methods and approaches were very effective in the success of this project.

Findings and Implications

The expectation at the end of the 12-week project was to see reduced SBGM fasting levels as well as HbA1c levels when compared to baseline data and secondly, to also see increased diabetes knowledge, self- care activities, healthier eating habits, and exercise activities as evidenced by effective return demonstrations and teach-back, higher scores on the posttest questionnaires, and accurate documentation in food and blood glucose logs.

The project participants had an average age of 43.7 years, education of 8 years, BMI of 30.3, and were primarily female, 69%. It was important to know the duration of diabetes diagnosis for these patients. Of the participants, there were six who were diagnosed more than 10 years ago and demonstrated being quite skillful in self-care activities like SBGM and with having more than adequate knowledge of diabetes. However, they admitted that they could benefit from a refresher coaching session and that they stopped performing SBGM as regularly as they should. There were 27 participants who were diagnosed with T2DM less than 5 years ago and reported they were still struggling with accepting the diagnosis and trying to live healthier lives, while 17 were diagnosed between 5 and 10 years.

Results were documented based on baseline data, midpoint (6 weeks) data, and endpoint (12 weeks) data for SBGM fasting levels, baseline data and endpoint data (12 weeks) for HbA1c, journaling/diet, exercise activities and amounts done weekly, number of successful calls that were made to the participants, and number of documented SBGM fasting results during the project period. Baseline HbA1c data was based on the

participants most recent test results and ranged from 6.4% to 13.4%; 36% had an HbA1c

level between 7% and 8% (moderate glucose control); and 46% had HbA1c > 8% (poor

glucose control), while the rest had levels < 7% (good glucose control).

Most of the patients were compliant with the program. The number of calls

varied, but most participants completed five to six calls. For journaling and exercise,

most participants completed three to four times a week, and majority of the participants

completed and documented over 60 out of 84 of the requested SBGM fasting values. This

implies that the coaching sessions were beneficial in improving DSM, see Table 1.

Table 1

Descriptive Statistics on Compliance with the Coaching Program

Number of patients 1-50 in parenthesis	# of SBGM fasting levels 0-84	# of Successful Calls 0-6	Journaling 1-7 times a week	Exercise 1-7 times a week
	(0) 0-20	(0) 0-2	(12) 0-2	(14) 0-2
	(0) 21-40	(24) 3-4	(27) 3-4	(24) 3-4
	(12) 41-60	(26) 5-6	(11) 5-7	(12) 5-7
	(38) 61-84			

In terms of SBGM fasting values, there was more drastic change in the values

between the baseline, midpoint, and endpoint as opposed to the A1C which had minor but

statistically significant change from the baseline to the endpoint. At baseline, the

minimum self-reported fasting blood glucose level for all 50 participants was 108, while

the maximum was 303; at midpoint, the minimum decreased to 94 and maximum to 264;

and at endpoint, the minimum decreased to 89, while the maximum decreased to 200.

Thus, the project was successful because the endpoint SBGM fasting values of all the

participants were much closer to the expected normal values when compared to the

baseline values. Using the 95% confidence interval for mean, the value of the upper

bound baseline SBGM fasting value at 167.89 and the upper bound endpoint SBGM

fasting value at 148.16, the total difference is 19.73 which is a significant amount of

change in 12 weeks. Likewise, looking at the mean in SBGM fasting values from

baseline, midpoint, to endpoint, there were significant decreases from 159.78 to 152.00 to

142.26. The endpoint SBGM fasting values distribution was checked for normality and

once again, the assumption for use of a parametric test was violated (Shapiro-Wilk .95, df

$=47$, $p=.042$). The non-parametric Friedman test was used to test the differences in means

using a repeated measures approach ($x^2=87.239$, $df=2$, $p=.000$). The difference in SBGM

fasting values across the three timeframes is larger than that of A1C even though there

were positive results for both aspects. There are some considerations. Although the

HbA1c tests were performed in a laboratory setting, the SBGM results were self-reported

by patients based on home testing. So, there could be some inaccuracies, and this is a

limitation of the project. Also, the HbA1c test measured glycated hemoglobin which

reflects an individual's blood sugar over time, so the full results of the impact of the

patient testing may not be yet realized.

Of the 50 patients who participated in the project, three did not complete an

HbA1c at 12 weeks due to work and travel related reasons and were removed from the

results. All three of these patients had elevated levels at baseline at 7.8, 9.1, and 11.2.

Coincidentally, the 7.8 and 11.2 results were documented in two 31-year olds, which are

considered abnormally high HbA1c levels. Of the remaining 47 patients in the sample,

four had the same HbA1c score at baseline and 12 weeks later. Three patients had a slight

elevation in HbA1c from 7.20 to 7.50, 7.80 to 7.90, and 9.40 to 9.60, respectively. In

total, there were 40 patients whose HbA1c improved over the 12-week period. The

average HbA1c score at baseline of these 47 patients was 8.524 with a standard deviation

of 1.635. The mean score at endpoint was 8.208 with a standard deviation of 1.52. Since

the distribution of HbA1c values at the end of the 12-week program was not normally

distributed (Shapiro-Wilk= .911, *df*= 47 and *p*=.002), nonparametric tests were used to

determine significance in the change from baseline to the endpoint. A Wilcoxon Signed

Ranks test showed significance, indicating that the change in average score from baseline

to endpoint is not related to chance, and would likely occur with another sample (*z*= -

5.170, *p*=.000). Although the value is still not as low as desirable (less than 7% for

patients under 65, less than 8% for patients 65 and older), it is going in the correct

direction. As HbA1c is a composite measure of blood sugar levels over a three to 6-

month period (ADA, 2018a), and while these values are still in the abnormal range, the

full impact of the 12-week coaching period may not be evidenced as yet in the baseline to

endpoint comparison.

Since most patients did not actually move from poor control to moderate or good

control, but 40 patients' HbA1c moved in the correct direction, these slight improvements

in values, as indicated above, shows patients' progress towards better DSM, see Table 2.

Control is defined in three categories: poor control is evidenced by an HbA1c level

greater than 8%, moderate control is deemed as an HbA1c level of between 7 and 8%

while good control is defined as an HbA1c level of less than 7%.

Table 2

Diabetic Patients' HbA1c Control from Baseline to Endpoint

Number of Patients	Baseline A1c	Endpoint A1c
7	Good Control	Good Control
15	Moderate Control	Moderate Control
18	Poor Control	Poor Control
40 Total		

In addition, some questions were asked of the participants before and after receiving T2DM education and coaching on diet, exercise, and self-care activities. Evaluation was done based on questions related to self-care management and daily practices. Therefore, while analyzing the diet logs of the participants as well as during the interactions with the participants, it was noted that of the 20 combined self-care management and daily practice behaviors/knowledge evaluated, there was significant improvement in areas such as food options and self-care activities while there was a trend for improvement in medication adherence, follow-up with appointments, and exercise. The behaviors that improved in patients' qualitative self-report included following a healthy/diabetic diet, eating five or more servings of fruits and vegetables, reducing carbohydrates, and performing self-blood glucose monitoring. The participants that showed motivation to change, but were still struggling with their diet, were referred to a nutritionist for additional follow-up. The most common responses of participants that had issues with self-care activities included the following "I work long hours every day"; "I can only afford one full meal a day", "I do not have time to cook every day"; "I don't

have money to buy food, fresh fruits and vegetables every time"; "I don't have transportation to go to my appointments"; "I have to buy food outside due to my work schedule" (See Appendix D).

To address the above issues, these participants were linked with/referred to Cal Fresh and also the free transportation service for Medicare patients. In addition, the front desk staff were advised to make follow-up appointments for the patients on their way out of the clinic in order to decrease the chances of them not calling back to schedule their follow-up appointments. Also, they were advised to always verify the correct phone numbers of the patients and call them at least 3 days prior to their appointment date to remind them and address any potential issue that might cause problems in keeping their appointment. The primary care provider was also able to get some bus passes and taxi vouchers from a hospital where he consults. This was a great benefit to the project because it improved the follow- up compliance rates.

Surprisingly, most of the participants who were initially non-compliant with their treatment plans and follow-ups have a specific health insurance plan. During the implementation of the project, two physician representatives of the plan came to discuss a project they were working on with the primary care physician at the project site to improve patient compliance rates. They had the demographics and medical records such as HbA1c results of 8 out of the 50 patients in our pilot and plan to follow up with them individually or as a group to discuss barriers to care and plan interventions beyond the 12-week DNP project. They offered some gift cards as incentives for the patients to come

in for their clinic appointments and blood work, which also served as motivation for some of the participants.

Multiple phone call attempts were made to many of the participants for coaching purposes. The persistence on the part of the two APRN/RNs made it possible for the project to be successful. Overall, the coaching sessions enhanced numerous aspects of the diabetes self-management activities as well as increased diabetes knowledge, which led to improved HbA1c levels in majority of the participants. More than half of the participants admitted that the intervention and coaching have made them more aware and knowledgeable about SBGM and HbA1c testing and their importance in DSM. Consequently, the above outcomes have been beneficial in the achievement of positive social change in this patient population.

Recommendations

The results of this quality improvement DNP scholarly project demonstrated that implementing an evidence-based telephonic intervention that focuses on diet, exercise, self-care activities coaching, and assessment of barriers to care improves glycemic control (SBGM, especially fasting levels and HbA1c) in the Hispanic adult patients with Type 2 diabetes. This project also identified and addressed the gaps in practice related to T2DM. In terms of non-compliance with clinic appointments, It was recommended that non-compliant diabetes patients that need to be seen monthly or every 3 months in the clinic, based on their clinical situation and treatment plan, should not be allowed to call for their medication refills on the phone unless they show up for their follow-up appointments. Also, since there are other factors that may contribute to medication refill

rates, many of these patients will have to come to the clinic by all means possible to get their refills as well as see the provider for their diabetes follow-up appointments. In addition, I recommended that the front desk staff should endeavor to make follow-up appointments for the patients on their way out of the clinic instead of relying on them to call back to make their appointments. Also, they should always verify the correct phone numbers of the patients and call them at least 3 days prior to their appointment date to remind them and address any potential issue that might not let them show up. Nuti et al. (2015) report that a simple phone call and/or letter reminder of appointment date and time or for scheduling can have a positive impact on the clinical and behavioral outcomes of diabetic patients. Likewise, it is noted that multifaceted interventions aimed at appointment management and preparation during various stages of the medical outpatient care process enhances DSM (Nuti et al., 2015). Finally, the CDC (2018) stated that the use of alcohol and tobacco can make diabetes and its complications worse, which lead to poor health outcomes. Therefore, I recommended that at every clinic visit, lifestyle behaviors such as smoking and alcohol use need to be addressed with the patients with the intention to provide cessation education and appropriate referrals.

Contribution of the Doctoral Project Team

The team members participating in this doctoral project were phenomenal. They all went above and beyond expectation because they have been working hard in addressing poor glycemic control in Type 2 diabetics in the clinic over the last few years. They provided enormous support whenever needed to make sure data collection and getting in touch with the participants were easier for the APRN/NPs. A registered

dietician was consulted when there was need for medical nutrition therapy and nutrition guidance for some of the patients. There were also referrals to a social worker who assisted the patients in solving and coping with problems in their everyday lives. In addition, the clinic staff were available and eager to assist in coordinating medical records, while the primary care physician was available for medical consultation and treatment plans as needed. Other referrals to specialists' like endocrinologist, nephrologist, ophthalmologist, podiatrist, and cardiologist were done based on each participant's health need and clinical picture. The team as a whole were all very unique and significant to the success of this project. According to McGill et al. (2016), an interdisciplinary team in diabetes care contributes to improvements in treatment outcomes for patients; therefore, it is essential to ensure access to such team, when necessary.

There are plans to extend this project beyond the DNP doctoral project because it is very significant to nursing practice and patient outcomes. Most, if not all, practices experience the issue of poor glycemic control in Type 2 diabetes and it would be a great benefit to share this intervention with other primary care clinics and other settings to improve health outcomes and quality of life for these patients.

Strength and Limitation of the Project

The strengths of this QI project are several. As stated earlier, the project team made a huge impact in the success of the project. Another strength of the project was that I, the DNP student and project leader, as well as the APRN/NPs developed a good relationship with the long-term patients at the clinic. I believe this helped in the higher

than expected compliance rates. Another strength of the project was that it lasted for 12

weeks which allowed for adequate SBGM and HbA1c testing. HbA1c is referred to the

gold standard test in diabetes care or the primary test used for diabetes management as it

provides information about a person's average levels of blood glucose over the past 3

months (ADA, 2018a).

     A limitation of the project was the self-reported blood glucose data and inability

to limit extraneous variables such as glucometer malfunction. Even though the project

team tried to correlate the self-reported data with the actual glucometer readings when the

participants came to clinic, we could not guarantee that the results were actually accurate

because the times of record were different for everyone and also because the testing was

done in the comfort of the participants' homes in the absence of the project team.

Although the participants were provided with instruction on what indicated fasting blood

glucose levels and instructed to not eat or drink anything but water for eight hours before

the test, we could not control this. Despite these limitations, the results of the project

were clinically significant. Another important point to note was that a confounding

variable may be the 8 patients that were included in the project of the specific health plan

that the provider representatives were doing due to the incentives that were provided that

served as extra motivation.

     As diabetes is well known as a cardiovascular risk factor and majority of patients

do have comorbidities, the recommendations for future projects addressing similar topics

and using similar methods include concurrent screenings and monitoring of blood

pressure to identify or manage patients with hypertension by offering treatment involving

medications especially the use of an angiotensin II receptor blocker (ARBS)/ angiotensin-converting-enzyme inhibitor (ACEI) to protect the kidneys; as well as dyslipidemia screening and monitoring of lipid levels in order to achieve target goals with possible treatment with statins; and thirdly, the use of aspirin therapy as recommended for primary and secondary prevention for patients with increased risk of or history of cardiovascular disease (ADA, 2018b). Even though intensive biweekly coaching is in place for some patients at the clinic, it is not consistently done across all chronic illness types which represents another gap in practice. Therefore, it is essential to make sure that when treating a chronic disease, such as Type 2 diabetes, the coaching plan is in place for the patients.

Summary

Although this was a short-term project, there were some improvement observed in glycemic control and diabetes self-management after the intervention. The project did demonstrate that an evidence-based intervention which comprised of bi-weekly phone calls and coaching sessions by APRN/NPs to T2DM Hispanic patients improved their SBGM fasting and HbA1c values as well as their knowledge of diabetes, DSM, and expected daily practices. The midpoint and endpoint SBGM fasting values showed better improvement compared to baseline values than the baseline and endpoint HbA1c values. Most certainly, if the project had been carried out for several months, there would have been significant improvements observed in all aspects. Despite this, this was a dynamic project that is worth implementing in other primary care and outpatient settings as part of the TDM treatment plan.

Section 5: Dissemination Plan

I plan to discuss the overall results of this QI project with the primary care physician (PCP) who is the owner of the clinic, the office manager, other providers, and staff at the site. Also, in order to bridge the gaps in practice, a review of the recommendations is valuable. The clinic providers need to be made aware of the impact of the project intervention and results which have shown to improve health outcomes. This will motivate them to continue this intervention or something similar with all their chronic disease patients.

Based on the nature of this project, it will be beneficial to disseminate the project findings to other primary care clinics in the area and other sites where the PCP has privileges to practice. The PCP meets on a regular basis with other PCPs in the environs for meetings and conferences, so this would be an avenue to share the results of this QI project in the effort to improve health outcomes of chronic disease patients in similar settings. Unfortunately, the project site is not directly affiliated with any health system that could benefit from this doctoral project; however, it will be suitable to share the results of this doctoral project results with a local specialty clinic to improve glycemic control in gestational diabetes. I would be able to provide needed education to this clinic or any others on as needed basis.

Furthermore, as a member of both the American Nurses Association (ANA) and California Association for Nurse Practitioners (CANP), this is a great opportunity for me to showcase my work to these professional organizations, in the effort to improve health outcomes. I have been seeking information about the process of submitting this project to

these organizations for a poster or podium presentation, as well as to an APN/NP journal. I am also very excited because I recently found out through my current work manager that I may have an opportunity to share my project more broadly in the company as the main focus is health promotion and chronic disease prevention in the adult population. Also, there has always been a great push and support given to nurse practitioners to advance their degrees to the doctoral level.

Analysis of Self

This QI doctoral project has been a momentous experience for me. Due to the high level of expertise I possess as a doctoral student and the fact that a holistic approach to care is a huge part of our nursing training, the interventions and methods used in the project were based on greater depth and breadth of knowledge with the capability to synthesize physiological, psychological, social, and environmental data. This project has enabled me to focus on the whole being when providing care to patients because it is easy to just focus the medical needs of patients due to busy schedules and forget about the socioeconomic and psychological aspects which could serve as huge barriers to care. I have been able to use this holistic approach for patients for during their visits by asking them variety of questions to be able to offer them appropriate care with treatment options. In addition, with the success of this project, I can continue to assess gaps in care and practice and offer appropriate evidence-based strategies to chronic health conditions for patients in the effort to improve their health outcomes.

Even with the conclusion of this doctoral project, I will continue to review the literature for updated treatment guidelines and interventions for various diseases and I

will be able to incorporate in patient care. I will also serve as a good source of education to staff in various settings regarding to how to efficiently care for chronic disease patients. Furthermore, an opportunity to continue this work and improve quality of life and health outcomes is my daily work, which is the care of geriatrics with various comorbidities and chronic diseases. Apart from the obvious project results, the project implementation period taught me a lot about time management, persistence, adequate planning, organization, and team work as a nurse leader. I also learned that it takes great collaboration between patients and the health care team to achieve improved health outcomes and this is essential in any practice setting.

My communication, leadership, and critical thinking skills were heightened with this project. I had to use these skills during my numerous interactions with all the clinic staff and the patient participants to ensure that the project was successfully carried out and appropriate results were achieved. My knowledge of and confidence in DM has also improved greatly, which is evident in how the patients responded to all my coaching tactics. My use of EHRs as well as different software to analyze data has also been greatly enhanced with this project. This proficiency has aided in better coordination of care between other health professionals and I in the effort to achieve desired health outcomes. In addition, this project has enhanced my scholar skills with literature to determine evidence-based strategies, applying research techniques to various projects, such as this, and the ability to develop a scholarly voice in various professional environments.

Summary

Improved glycemic control can lead to better health outcomes, improved quality of life, and enhanced care coordination between health care professionals and Type 2 diabetic patients. Efficient T2DM management necessitates enhanced patient knowledge and self-confidence which enable these patients to take lead and participate in daily self-care activities related to their diabetes. Implementing an evidence-based intervention of biweekly phone calls to Type 2 diabetic Hispanic adult patients has been demonstrated through this doctoral project to lead to improved glycemic control and patient engagement in self-management and daily practices associated with their diabetes. The intervention composed of coaching sessions focused on dietary and lifestyle changes, medication adherence, adherence to clinic appointments, discussion of barriers and challenges, as well as enablers to DM, among many other related issues. It was evident that effective communication and continuous collaboration between the patients and the health care team go a long way in achieving better health outcomes such as reduced hospital readmission rates, lower rates of mortality and morbidity, improved quality of life, and decreased health care costs.

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Appendix A: Literature Review Matrix Template

Citation	Conceptual and/or Theoretical Framework (specify)	Main Finding(s)	Research Method (including what, exactly, was done)	Strengths of Study	Weaknesses (include any weaknesses of the study, remaining gaps in the literature, and recommendations for future studies specifically mentioned by the author(s) of the article)	Level of Evidence
Manders,I. G., Stoecklein, K., Lubach, C.H., Bijl-Olderich,J., Nanayakkara, P.W., Rauwerda, J.A., Kramer, M.H.,& Eehoff, E.M. (2016). Shift in responsibilities in diabetes care: The nurse-driven diabetes in-hospital treatment protocol (N-DIABIT).	The authors reported that there is poor glycemic control during admissions, i.e. hypoglycemia, hyperglycemia, and excessive glucose variability and that implementation of a Nurse-Driven Diabetes In-Hospital Treatment protocol (N-DIABIT) improved it. Nurse Driven protocol	The researchers tried to investigate the feasibility, safety and efficacy of a Nurse-Driven Diabetes In-Hospital Treatment protocol (N-DIABIT), which consists of nurse-driven correctional therapy. Per-protocol analyses showed significant reductions in mean blood glucose levels and consecutive hypoglycemia and hyperglycemia in the	Retrospective study Data collected on 210 adult patients with diabetes consecutively admitted in the 5-month period following the implementation of N-DIABIT (intervention group) were compared with the retrospectively collected data on 200 consecutive patients with diabetes admitted in the 5-month period before N-DIABIT was implemented (control group).	Variety of hospital wards participated in the study Large sample size and long observation period No major significant difference in gender and age distribution between the two groups Special training for the	BMI data were not available for all patients. Transfer of patients to different wards and different protocol implementation times could have negatively influenced the results. The authors recommend that future studies should address the long-term maintenance	AACN Levels of Evidence Level B. Study supports intervention (Armola, Bourgault, Halm, Board, Bucher, Harrington, Heafey, Lee, Shellner, & Medina, 2009).

Diabet. Med, 33, 761–767. doi: 10.1111/dme.12899	adherence Nurse Driven therapeutic actions Improving efficiency in patient care Univariate and multivariate linear regression analyses	intervention compared to the control group. This demonstrated that implementation of N-DIABIT by trained ward nurses in non-intensive care unit diabetes care is feasible and effective in improving glycemic control. High protocol adherence was also associated with improved glycemic control.	Additional per-protocol analyses were performed in patients in whom mean patient-based protocol adherence was ≥70%. (intervention Subgroup of 173 vs. control subgroup of 196 participants). Randomized prospective study	nurses Standardized BG measurements and target levels as recommended by current guidelines Faster detection and correction of abnormal BG values was noted when the N-DIABIT protocol was followed. There was a control group.	of protocol adherence, meaningful reductions in admission length, and cost-effectiveness.	
Schroeder, J.E., Liebergall, M., Raz, I., Egleston,	Authors stated that glycemic control during	The researchers tried to assess the benefits of implementing an intensive	Type 2 diabetic adult patients admitted to the Orthopedic Surgery	Randomization There was a control	Small sample size	AACN Levels of Evidence Level B

| R., Ben Sussan, B., Peyser, A., & Eldor, R. (2012). Benefits of a simple glycemic protocol in an orthopaedic surgery ward: A randomized prospective study. *Diabetes Metab. Res. Rev.,* 28, 71–75. doi:10.1002 /dmrr.1217 | hospital admissions is often below standard quality and demonstrated that the utilization of a glycemic protocol improved it.

Improving health outcomes

Achieving target goals | subcutaneous insulin protocol in an orthopedic department.

Mean blood glucose levels during the hospital stay were lower in the intervention group compared to the control group. Length of stay was also shorter by 2 days in the intervention group.

The number of severe hyperglycemic events (blood glucose level above 400) was significantly lower in the intervention group. There was no significant difference in the number of hypoglycemic events.
The result demonstrated that the four-step intervention protocol improved glycemic control of hospitalized patients in the orthopedic department and made the treatment of these patients easier. | department were prospectively randomized during a 6-month period. One group of 30 patients received standard care with sliding scale insulin and the other group of 35 received the intervention protocol. The staff was educated on the importance of glucose monitoring and control during this time. An intensive multiple-injection protocol comprising of four daily regular/neutral protamine hagedorn (NPH) insulin injections was implemented in the intervention group. | group

The program was followed up by a consulting diabetolog ist. | Study limited to one department only which may have compromise d the study results | Well-defined randomize d study that supports the interventi on (Armola et al., 2009). |

| Coto, J.A., Yehle, K.S., & Foli, K.J. (2016). Relationship between standardized glycemic protocols and healthcare cost. *Clinical Nursing Research,* 25(1), 67-78. doi: 10.1177/10 547738145 39003 | General Linear Regression Model

Patient safety

Cost-effectiveness

Authors report that study is of relevance because hyperglycemia is a risk factor for less than desired clinical outcomes within the inpatient setting and implementation of a diabetic protocol leads to improved glycemic control and optimal health outcomes. | A retrospective cohort analysis was conducted on Type 2 diabetic adults. Pre-diabetic protocol (January 2011-December 2011) and post-diabetic protocol (August 2012-October 2012). The sample comprised of inpatients who were 18 years and older admitted w/o complication and /or with abnormal fasting blood glucose. Pre-protocol sample consisted of 346 patients and post-protocol sample consisted of 149 patients. Patients who received the diabetic protocol in 2012 experienced a decrease in the blood glucose and decrease in admission days. This study demonstrated that the development and implemen - tation of a protocol-based care for type 2 DM adult patients is | Retrospective cohort study | Large sample size and good timeframes

Pre-diabetic protocol vs post-diabetic protocol groups | No real-time observation

There were no control for variables such as co-morbidity, mortality, patient acuity, and socioeconomic status.

Room assignment was predictable

Authors concluded that sliding scale insulin (SSI) dosing does not support proper glycemic control of Type 2 diabetes but the use of structured protocols which incorporate combined interventions, long acting basal insulin as well as intermediate and fast acting insulin for correctional dosing, and multidisciplinary approaches does. | AACN Levels of Evidence Level B

Well-defined study that supports intervention (Armola et al., 2009). |

		related to improved glycemic control during admission and at the time of discharge, while decreasing the LOS and excess admission days.				
Marelli,G., Avanzini,F., Iacuitti,G., Planca,E., Frigerio,I., Busi,G., Carlino,L., Cortesi,L., Roncaglioni,M.C.,& Riva, E. (2015). Effectiveness of a nurse-managed protocol to prevent hypoglycemia in hospitalized patients with diabetes. *Journal of Diabetes Research,* [173956]. doi: 10.1155/2015/173956	Wilcoxon test for median analyses Poisson regression Multivariable logistic models Increasing nurse satisfaction Improving patient outcomes	In 350 consecutive Type 2 diabetic in-patient adults, hypoglycemic incidences(blood glucose < 70 mg/dL) during SC insulin treatment was assessed before (phase A) and after (phase B) the protocol was implemented following specific criteria. 84 patients in phase A and 266 in phase B received SC insulin for median periods of, respectively, 7 (Q1–Q3 6–12) and 6 days (Q1–Q3 4–9). Hypoglycemic incidences reduced significantly from 0.34 ± 0.33 per day in phase A to 0.19 ± 0.30 in phase	Prospective pre-post-intervention study Authors wanted to test the efficacy and safety of the Desio Diabetes Diagram (DDD) protocol to prevent hypoglycemia during subcutaneous (SC) insulin treatment, which leads to better glycemic control in Type 2 diabetic adults.	Characteristics of both groups were well matched except for BMI Long duration of study (3 years) Novel approach: Focus on prevention than treatment Well accepted and utilized by nurses Use of a control group Characteristics of protocol make it usable in other	Study was carried out in a single center Causal relationship between strategies used and findings could not be established due to type of study method Despite limitations, authors conclude that the protocol implementation as well as education/training of both nurses and patients played a great part in reducing hypoglycemic episodes.	AACN Levels of Evidence Level B Well-defined prospective study that supports intervention (Armola et al., 2009). Improved glycemic control was demonstrated in the study (hypoglycemia episodes decreased when protocol was used)

		B.		clinical contexts		
Renthal, N., Roe, E.D., Adams-Huet, B., & Raskin, P. (2013). A novel glucose-insulin infusion maintains perioperative glycemic control through multiple transitions of care. *Journal of Perioperative Practice,* 23(10), 222-227	Improving patient outcomes Patient safety	Authors tried to determine the efficacy of the Glucose-insulin infusion-Parkland Protocol (GIPPr) on blood glucose readings and to measure rates of euglycemia in Type 2 diabetic adults admitted in a hospital for surgery. They compared the results to those patients treated with standard subcutaneous insulin. A total of 125 patients were involved in the retrospective study, 93 were treated with GIPPr and 32 were treated with SC insulin. The rate of hypoglycemia in the GIPPR group was 0.69% while that of the SC group was 4.52%. Also, the GIPPr showed a higher proportion of BG readings between 3.89-10mmol/L when compared to the SC insulin (85.4% vs 50.68%). Study demonstrates	Retrospective study	Randomized sample There was a control group Type of surgery did not influence outcomes Characteristics (age, sex, surgical procedure type, basic metabolic profiles) of both groups were similar Good exclusion criteria that might alter results: pregnancy, DKA, ACS, acute CVA, hyperosmolar nonketotic syndrome	Small sample size Observational nature Comparison of protocols with other institutions not possible because this was a county sponsored teaching hospital. Patient's lack of health insurance and/or reliable access to preventive diabetes care are barriers. Despite the limitations, the authors believe that distribution of the GIPPr to other hospitals with less resources would be beneficial and that the protocol is efficacious than standard treatment in improving glycemic control	AACN Levels of Evidence Level B Well-defined study that supports intervention (Armola et al., 2009).

		the use of GIPPr improved glycemic control in Type 2 diabetic adult inpatients.				
Caimari, F., Gonzalez, C., Ramos, A., Chico, A., Cubero, J. M., & Pe´rez, A. (2014). Efficacy of a hyperglycemia treatment program in a vascular surgery department supervised by endocrinology. *Cir Esp*,94, 392–398	Patient adherence Protocol Efficacy Patient Safety	This study aimed at evaluating the efficacy of a hyperglycemia treatment protocol (HTP) in improving glycemic control. All patients with Type 2 diabetes hospitalized at a vascular surgery unit over 1 year period were retrospectively reviewed. A total of 140 hospitalizations of 123 patients were included. The protocol to was applied in 96.4% of patients (22.8% correction dose, 23.6% basal correction dose, and 50% basal-bolus-correction dose [BBC]). Patients with BBC had increased HbA1c and mean glycaemia on the first day of admission. Mean blood glucose was	Retrospective observational study	Long study duration (12 months) to monitor protocol efficacy Involvement of the Endocrinology department to oversee the study Variables and patient characteristics were extensive	Focus on only patients from vascular surgery unit which means the participants of the study had high risk factors for chronic complications and cardiovascular events. No real-time study Despite the limitations, authors stated that the patient characteristics was a good bonus to the study. Thus, the information obtained is appropriate to the majority of hospitalized patients, specifically surgical patients.	AACN Levels of Evidence Level B Well-defined study that supports intervention (Armola et al., 2009).

		lower in the middle and in the last 24 h of hospitalization in patients with BBC, but was unchanged in the remaining patients. In general, the mean glycaemia at the middle of hospitalization and the last day of hospital stay were considerably reduced compared to those from the first day of hospitalization, with a low rate of severe hypoglycemia. The HTP demonstrated improvement of glycemic control in diabetes Type 2 patients during hospitalization.				
Buchko, B.L., Artz, B., Dayhoff, S., & March, K.S. (2012). Improving care of patients with insulin pumps during hospitalization: Translating the evidence. *J Nurs Care*	John Hopkins Nursing Evidence-Based Practice (JHNEBP) Model and Guidelines Improving Staff competence Patient safety	This study was done to assess whether the implementation of an evidence-based standardized protocol would improve blood glucose levels in Type 2 diabetic adults during hospitalization. A continuous subcutaneous insulin infusion (CSII) protocol was used. There were 3 phases,	Retrospective chart reviews Pilot study The early implementation phase demonstrated better glycemic control than the pre-implementation phase while the later implementation phase showed the best results of glycemic	Comparative design Long duration of study(2 years) No adverse effects noted	Not all patients in the hospital with CSII were evaluated Small sample sizes Authors stated that protocol is not being applied consistently and maintaining staff competence	AACN Levels of Evidence Level B Well-defined study that supports intervention (Armola et al., 2009).

Qual, 27(4), 333-340. doi:10.1097 /NCQ.0b01 3e3182595 881.		preimplantation phase which had 6 patients with 141 BG readings with substantial amount of hyperglycemia, early implementation comprising of 16 patients with 386 BG readings with half being hyperglycemic, then the later implementation phase with 17 patients with 213 BG readings with majority showing normoglycemia.	control.		is also a problem especially with the low patient population. Education of staff is important because there is more room for improvemen t.	
Adorable-Wagan, P., Paz-Pacheco,E., & Aligui,G. (2014). Efficacy and safety of insulin protocol among medical and surgical patients admitted in the Medical City Hospital. *Journal of the ASEAN Federation of Endocrine Societies,* 29(2), doi:10.1560 5/jafes.029. 02.12	Efficacy and safety outcomes	Study was to assess improvement in glycemic control of Type 2 diabetics in intensive care over a 10 year period using Markovitz insulin infusion protocol (MIP). 101 patients met the criteria, Mean time to achieve target blood sugar was 24hrs for MIP compared to standard treatment (physician directed insulin infusion (PDI)). Blood glucose levels reduced in MIP compared to	Non - randomized retrospective study	Extensive admission characteri stics and clinical variables Good inclusion and exclusion criteria Extended study duration (10 years)	Unrelated deaths of 6 patients occurred during implementat ion of protocol Small sample size Authors suggest that future studies should assess the efficacy of this Markovitz insulin protocol in improving glycemic control and patient outcomes in	AACN Levels of Evidence Level B Well-defined non randomize d controlled study that supports interventi on (Armola et al., 2009).

		PDI. Also, MIP led to a higher rate of targeted blood sugar, reduced stay in ICU, and lower hypoglycemia rates compared to PDI. Incidence of hypoglycemia was high (5.1%) in PDI while that of Markovitz protocol was low (1.4%).			ICU patients.	
Dodson, C.H., Simpson, J., & Feinstein, D. (2014). Glycemic control in a medical intensive care setting: Revision of an intensive care unit nurse-driven hyperglycemia protocol. *Crit Care Nurs*, 37(2), 170-181. doi: 10.1097/CNQ.0000000000000016	NICE-Sugar (Normoglycemia in intensive care evaluation-Survival using Glucose Algorithm Regulation) trial Patient safety	Study was to assess glycemic control in the ICU setting after implementation of a revised nurse-driven ICU hyperglycemia protocol. 42 adults were utilized (25 diabetics and 17 non-diabetics) with 1650 blood glucose (BG) measurements over a 2 month period. Results after protocol implementation showed 73% of BG were within targeted range and only 26% were >180. Mean BG in the diabetics was 177 while that of non-diabetic was 144. Authors conclude the protocol improved	Quasi-experimental posttest design Pilot study	All patients in unit that was ordered the protocol by the physician were included in study Exclusion criteria fit the type of study: type 1 diabetes No adverse events reported Education was provided to the ICU nurses by the inpatient glycemic control team	Short study duration (2 months) Small sample size Several limitations not used in study: LOS, comorbidities, APACHE score, which may have negatively impacted study outcomes Authors recommended that future research should perform further evaluation of the ICU hyperglycemia protocol to determine its applicability to different health	AACN Levels of Evidence Level B Well-defined study that supports intervention (Armola et al., 2009

		glycemic control in ICU patients and lowered the rate of hypoglycemia.			systems.	

Appendix B: Coaching Questionnaire

Knowledge of self-care management:
Choose which food/drink that will likely increase your blood sugar and should be avoided. Choose all that apply.
 (a). Soda   (b). Spinach (c). Wheat bread (d). Fast food   (e). Tortilla
When and how should you check your blood sugar?
When should you record your blood sugar levels and/or analyze the value chart with your blood glucose meter?
How many minutes of exercise is recommended for you daily?
Should you skip your diabetes medications if you don't feel like taking them?
What time of day should you do your fasting blood glucose test?
Which is better? Fast foods or home cooked meals? Why?
Choose a better food option: baked foods or fried foods?
What should your ideal fasting blood glucose result be?
What are symptoms of low and high blood sugars and what should you do?

Daily Practice:

When was your last hemoglobin A1C done and what was the number? What is considered a good number?
How many times did you check your blood sugar last week?
Can you do a 24 hour diet recall for breakfast, lunch, dinner?
What were your lowest and highest blood glucose levels in the past week?
What time do you eat dinner every night?
How many full meals do you eat in a day?
How many servings of fruits and vegetables have you had daily, this week?
What type of exercise do you do and for how many minutes a day?
Approximately how many times did you cook at home this month?
 Do you follow up with your doctor regularly or are there barriers you face in going to your appointments?

Appendix C: Documentation Template

Blood Glucose and Food Log   Name: _____

		Breakfast		Snack	Lunch		Snack	Dinner	
Date:	Food & Drinks (Include size of servings)								
		Total carbs: ____ g		Carbs: ___ g	Total carbs: ____ g		Carbs: ___ g	Total carbs: ____ g	
	Glucose	Before:	2 hrs after:		Before:	2 hrs after:		Before:	2 hrs after:
Date:	Food & Drinks (Include size of servings)								
		Total carbs: ____ g		Carbs: ___ g	Total carbs: ____ g		Carbs: ___ g	Total carbs: ____ g	
	Glucose	Before:	2 hrs after:		Before:	2 hrs after:		Before	2 hrs after:
Date:	Food & Drinks (Include size of serv-ings)								
		Total carbs: ____ g		Carbs: ___ g	Total carbs: ____ g		Carbs: ___ g	Total carbs: ____ g	
	Glucose	Before:	2 hrs after:		Before:	2 hrs after:		Before:	2 hrs after:

Appendix D: Qualitative Results

Number of Responses	Questions	Qualitative data/Responses
18	How many servings of fruits and vegetables have you had daily, this week?	"Maybe one, I don't have money to buy food, fresh fruits and vegetables every time"
21	How many full meals do you eat in a day?	"I can only afford one full meal a day" "I have to buy food outside due to my work schedule"
28	Do you follow up with your doctor regularly or are there barriers you face in going to your appointments?	" I don't have transportation to go to my appointment" "I have to go to work" "Sometimes, I forget to go"
23	How many times did you check your blood sugar last week?	About twice only, because I don't have time due to working long hours" "I forget sometimes" "I need a new glucometer and testing strips…"
30	What type of exercise do you	"I do a lot of walking and

	do and for how many minutes a day?	lifting at work and by the time I get home, I am tired…"