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The Effects of a Diabetes Education Program among African American Adults with Type 2 Diabetes

Immaculata Okere

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Georgia States University

Abstract

Title: The Effects of a Diabetes Education Program among African American (AA) adults to Improve Medication Adherence and Decrease Hemoglobin A1c (HbA1c).

Purpose: To evaluate the effects of a diabetes education program to decrease HbA1c and improve medication adherence in AA with diabetes in a Primary Care setting.

Method: This a quality improvement study and a descriptive quantitative design with a convenience sampling of 21 participants. Eligibility includes AA, ages 18 to 65, diagnosed with type 2 diabetes, and who attended routine care at project site. The results of pretest and posttest, and pre and post HbA1c were analyzed using Descriptive Statistics and Paired Sample T-test. The HbA1c was analyzed at baseline and three months after intervention. Five research engines were used to locate articles dated 2007-2017, with key articles obtained from CINAHL, PsycINFO, Nursing & Allied Health, Medline, and PubMed Clinical Queries.

Results: A total of 21 participants enrolled in the study. Out of 21 participants, 11 returned for post HbA1c recheck. The analysis revealed statistical significant difference between the pre and post test scores, ($M = 66.43$, $SD = 11.634$) from the post test score ($M = 93.81$, $SD = 9.862$), $t(21) = -9.580$, $p < .0005$ (two tailed). The mean increase in post test scores was -27.136 with 95% confidence interval ranging from -33.343 to -21.419. Whereas the difference between the pre-HbA1c and post HbA1c mean was statistically insignificant, there was an observable clinical significance in patients' outcome.

Conclusion: The findings revealed significant improvement in diabetes knowledge and no statistical significance in the HbA1c results. Future research is needed with a large sample size over a longer period before a strong conclusion is reached.

Table of Contents

Effects of a Diabetes Education Program on African American Adults with Type 2 Diabetes

Type 2 diabetes is a major health issue in the United States (American Diabetes Association [ADA], 2014). According to American Diabetes Association (2014) report, African Americans are disproportionately affected by diabetes when compared to other ethnic groups (ADA, 2014). Individuals with type 2 diabetes are at higher risk of developing other health problems such as blindness, kidney disease and amputation (ADA, 2014). The student investigator (SI) has the privilege of working with the underserved population in an Urgent Care Clinic at a Level 1 trauma center in the southeastern United States. The SI sees chronic illnesses such as diabetes, hypertension, and chronic kidney diseases. The majority of the patients are African American adults, who do not adhere to diabetes medications and treatment plans. An estimated medication nonadherence rate of 28%-42% is common among AA adults with chronic conditions including diabetes (Bockwoldt et al., 2017). Some of these patients run out of diabetes medications for days or weeks before they come in for the prescription refill. The most common reason provided by the patients for delays in refilling their prescriptions is an inability to afford prescribed medications.

Studies about oral diabetes medications adherence have focused on practical issues such as access to medication, costs, and regimen complexity (Bockwoldt et al., 2017). The goal of diabetes education is to enhance and assist positive self-management behaviors that can improve quality of life, regulate metabolism, and prevent acute and chronic complications, and decrease mortality and morbidity (Odgers-Jewell, Isenring, Thomas & Reidlinger, 2017).

A key measure of adherence to diabetes medication and lifestyle choices is the HbA1c. HbA1c is a 3-month measure of average plasma glucose concentration (Merriam-Webster, 2017). This paper reports the development, implementation, and evaluation of a Doctor of

Nursing Practice (DNP) scholarly project. The aim of the DNP project was to decrease HbA1c in the underserved population of AA adults with type 2 diabetes. This paper includes the identification and review of literature, conceptual framework, project timeline, project evaluation, and data analysis for the DNP project.

Background and Significance

According to the Center for Disease Control (CDC) diabetes is a chronic disease that affects 30.3 million people in the United States, and the incidence rate for non-Hispanic black adults is 9.0 per 1000 compared to 5.7 per 1000 in non-Hispanic whites (CDC, 2017). The risk factors for complications include smoking, overweight, obesity, physical inactivity, high blood pressure, high cholesterol, and hyperglycemia (CDC, 2017). Patients' centered interventions in type 2 diabetes, have been effective in improving blood glucose levels, patient knowledge, weight, medication use, and enhance self-management behaviors (Odgers-Jewell et al., 2017).

HbA1c is a standardized test that is used to measure the average blood glucose of participants over three months of pre and post diabetes education program. HbA1c is considered a gold standard to screen for, diagnose, and assess glucose control in diabetes patients (Sacks, 2011; Wright & Hirsch, 2017). HbA1c in the United States are expressed in percentage, the 5.7% level and below is considered normal, 5.7%- 6.4% is prediabetes, and 6.4% or higher is considered diabetes. Lifestyle modification is recommended to maintain HbA1c level below 7.0% as complications are directly related to increase in level (Sherwani, Khan, Ekhazaimy, Masood, & Sakharkar, 2016). The impact of consistently high levels of glucose in the blood can lead to the risk of developing life threatening complications. The prevalence rate of diabetes in African Americans (AAs) nearly double (18.7%) when compare to whites (10.2%), with a higher risk of developing complications such as kidney failure, blindness, lower limb amputation, and

amputation-related mortalities than non-Hispanic Whites (Bhattacharya, 2012; Purcell & Cutchen, 2012).

The essentials to diabetes medication adherence are perceptions and health beliefs about the disease and treatment (Bockwoldt et al., 2017). Perceptions are often formed by experiences with family members with the disease (Bockwoldt et al., 2017). AAs diagnosed with type 2 diabetes need prescription medications, insulin, oral, or both, and medication adherence to have better glycemic control, fewer diabetes-related complications, minimize hospitalization and healthcare cost, and decrease mortality (Bockwoldt et al., 2017; Williams, Walker, Smalls, Campbell, & Egede, 2014). Providing culturally sensitive education programs is an effective strategy to improve knowledge and support for AA individuals living with type 2 diabetes (Williams et al., 2014).

Medication adherence and effective management is vital because poorly managed diabetes contributes to serious health issues such as dementia, pneumonia, and several types of cancer. Individuals with diabetes often have multiple chronic diseases and have complex medication regimens. Depression rates are doubled among patients with diabetes, therefore complicating health care (Williams et al., 2014). An estimated total cost of $245 billion was spent on diabetes care in the United States in 2012, a 41 % increase from 2007 at $174 billion (ADA, 2013). The total care expenditure is higher among AA at $13,700 per individual per year, when compared to other ethnic groups, and are 2.3 times higher than in the absence of the disease (CDC, 2017).

Problem Statement

About 13% of AAs are recognized to have the diagnosis of type 2 diabetes and are known to suffer the worst complications when compared to other cultural groups. They have

difficulties with blood glucose, lipid and blood pressure control (Tang, Funnell, Sinco, Spencer, & Heisler, 2015). AAs are twice as likely to be diagnosed with diabetes than non-Hispanic counterparts (United States Department of Health and Human Services Office of Minority Health, 2015). Lack of knowledge and understanding of the disease and its complications is one of the major reasons for poor outcomes in AA adults with type 2 diabetes (Tang et al., 2015).

Type 2 diabetes is a challenging chronic disease that impact patient both physiologically and psychologically. Patients diagnosed with type 2 diabetes undergo extreme stress and worry about complications more often than those who do not have the disease (Steinhardt et al., 2015). AAs, who cope with racial discrimination along with a low socioeconomic status, are more likely to experience further stresses, restricting their understanding of the disease and hindering their ability to make healthy lifestyle choices (Steinhardt et al., 2015). There are several reasons for poor glycemic control among AAs that should be addressed, while exploring a culturally tailored diabetes education and treatment regimen. The goal of this scholarly project is to reduce HbA1c among AA adults, through implementation of a culturally sensitive diabetes education program to improve glycemic control. Findings from this project may help advanced practice providers understand the challenges with diabetes management among AAs and find effective ways to achieve and get better patient outcomes.

Purpose of the Project

The goal of this scholarly project is to evaluate the effect of a diabetes education program among AA adults between the ages of 18-65 years with type 2 diabetes in a primary care setting in a Level 1 trauma center in the southeastern United States. This study can help people in the community. The result from this study will be used to enhance patients' care, improve medication adherence, lower HbA1c, and decrease health care cost.

Clinical Questions

The clinical question that will guide this DNP Project is: Among AA adults with type 2 diabetes, what is the effectiveness of a diabetes education program on medication adherence and HbA1c in the primary care setting? For this DNP Project, the target population is AA men and women between the ages of 18-65 years who are diagnosed with type 2 diabetes. The intervention is a diabetes education program. The outcomes are medication adherence and decrease in HbA1c.

Search Strategy

The review of relevant literatures regarding diabetes in AAs was achieved by using biomedical and social science search strategies. Five research engines were used to locate articles dated 2007-2017, with key articles obtained from CINAHL, PsycINFO, Nursing & Allied Health, Medline, and PubMed Clinical Queries. Studies and publications included in the search are systematic review or meta-analysis, clinical practice guidelines, quantitative research studies, and qualitative research studies. The key terms used to identify potential articles include type 2 diabetes, AAs, diabetes education, diabetes complications, and HbA1c. Research articles were selected if it precisely talks about diabetes in the AA population, medication adherence, knowledge of diabetes, and diabetes self-management. Other inclusion criteria are articles published in English language and adults ages 18 to 65 years. The exclusion criteria include non-diabetes patient, kids, pregnant women, and type 1 diabetes.

Search Results

The literature search revealed 200 articles. Twenty-five studies were retained for comprehensive evaluation after initial screening titles and abstracts for relevance, while 175 studies were not relevant for the project and did not meet the inclusion criteria. Fifteen

additional studies were identified from the 25 selected studies reference lists. A total of 40 studies were examined in detail with the use of the selection criteria. And lastly, 13 studies were identified for critical appraisal after rigorous screening with inclusion and exclusion criteria. There were five well designed randomized control trials (Level 11), two well designed quasi-experiment (Level 111), one cross-sectional study (Level 1V), and five quantitative descriptive or qualitative studies (Level V1). Levels of evidence are assigned to studies according to the quality of design, validity, and applicability to patient care (see Appendix A). Literature appraisal of 13 articles were based on the Grading for Recommendations, Assessment, Development, and Evaluation (GRADE) criteria (GRADE Working Group, 2012). GRADE is an effective method of linking quality of evaluated evidence to clinical recommendations (GRADE Working Group, 2012). The grading provides an essential component in evidence-based medicine and helps in making clinical decisions (Burns, Rohrich, and Chung, 2012).

Review of Literature

Effectiveness of Culturally Tailored Interventions

Underserved members of AA population with type 2 diabetes in the primary care settings are classified as high risk for morbidity and mortality related to diabetes. Overall, the evidence supports diabetes self-management through educational intervention programs (Chlebowy, Hood, & Lajooie, 2015; Steinhardt et al., 2015; Williams et al., 2014; Fitzpatrick et al., 2016). Specifically, culturally specific educational programs in managing type 2 diabetes in AAs with focused outcomes of lowering HbA1c and improving diabetes medication adherence are most effective (Chlebowy et al., 2015; Williams, Walker, Smalls, Campbell and Egede, 2014).

Culturally tailored educational programs promote positive lifestyle changes and self – management through family and community support. A systematic review conducted by Carter, Barba and Kautz (2013) found that culturally tailored education can lead to significant improvements in self-care in AAs with type 2 diabetes. Carter and colleagues reviewed ten articles; six focused on AAs only, three were a combination of AAs and other ethnic groups, and one had a sample comprised of 18% of Caucasians. The researchers found that culturally specific educational interventions may reduce the cost of health care for AAs with type 2 diabetes. To avoid complications with type 2 diabetes, education is suggested as the best intervention in the AA population. Individualized patient education was found to be effective in promoting positive lifestyle changes. The benefits of culturally tailored education interventions are the absence of identifiable risks associated to self-management in patients with type 2 diabetes.

Similar findings were identified in a qualitative phenomenological study by Purcell and Cutchen (2013). Purcell and Cutchen aimed to assess AAs' experiences managing type 2 diabetes using culturally sensitive diabetes self-management education. The study examined sixteen (16) AAs diagnosed with diabetes, and found that intervention should be family focused, with an emphasis on spiritual values. In the AA community, both family and church community serve as key support systems to promote diabetes self-management.

In another study, researcher found significant improvement on several physiological and behavioral measures from baseline to a 3-months follow-up assessment among a sample of 25 participants. Providing culturally sensitive diabetes self-management education (DSME) programs has been shown to be an effective strategy to enhance knowledge, and support for individuals with type 2 diabetes (Williams et al., 2014).

Moreover, focusing on the following lifestyle modification factors can result in decreased HbA1c: healthy eating, physical activity, regular blood glucose checks, and taking prescribed medications, as preventive measures for individuals with type 2 diabetes (Bhattacharya, 2012). Other strategies include increasing coping skills, reducing stress, increasing self-efficacy, and motivation to perform self-care (Carter et al., 2013). Some evidence suggests that clinicians should use individualize approaches to care to accommodate issues which hinder diabetes management such as socioeconomic status, and complex diabetes treatment regimen; and encourage behavior change to motivate patient in enhancing coping skills and self-care strategies (Chlebowy et al., 2015; Carter et al., 2013). However, given the evidence, there is a need for the application of self-management educational intervention program for patients with type 2 diabetes in the writer's clinical practice.

Similarly, the motivational intervention and a resilience-based diabetes self-management education program promote lower HbA1c, self-care, and diabetes knowledge. A randomized control trial study was carried out by Chlebowy et al. (2015) to determine the effect of a motivational interviewing intervention on regimen adherence and diabetes markers among AAs with diabetes in the primary care setting. The study examined sixty-two participants and found that intervention group significantly increased the odds that participants improved the frequency of engaging in physical activity, improved adherence to diabetes self-care, and lowered HbA1c levels when compared to the control group, but not with medication taking and glucose monitoring. Likewise, a quasi-experimental design carried out by Steinhardt et al. (2015), to explore the feasibility and outcomes of a resilience-based diabetes self-management education (RB-DSME) program, to improve psychological and physiological health in AA adults with type 2 diabetes. The study examined sixty-five participants and found that the experimental group

showed significant improvement in relation to comparison group in diabetes knowledge, positive perception of the disease, HDL cholesterol level, and fasting blood glucose. The study also showed the potential feasibility and effectiveness of the RB-DSME intervention to improve health of AA adults with type 2 diabetes.

Barriers and Facilitators to Self-Management of Diabetes

In addition to exploring evidence for effective educational interventions, an understanding of barriers unique to AA men and women is important. Adherence and effective self-management was linked to patient perceptions of control over the disease process (Williams et al., 2014). In one study, facilitators were primarily identified as external factors and barriers were perceived as internal factors. External facilitators to type 2 diabetes adherence behaviors in AAs include: support from family, peers, and health care providers (Chlebowy et al., 2010). Internal barriers included: fears associated with glucose monitoring, lack of diet control, memory failure, and perceived lack of control over diabetes.

In recognizing negative emotion and poor metabolic control as barriers to diabetes medication adherence, a descriptive qualitative design employing semi-structured interview was conducted by Bockwoldt et al. (2017). The study describes the experiences of taking diabetes medications among midlife AA adults with type 2 diabetes. Findings suggest that negative emotions about type 2 diabetes was a barrier to medication adherence (Self-concept mode); difficulty integrating medication regimen into daily life (Role function mode); availability of support system improves medication adherence (interdependence mode); and physiologic adaptation to medication regimen is reflected by the HbA1c result, coupled with episodes of sensations of hypoglycemia and hyperglycemia.

Medication Adherence

Qualitative interviews and cross-sectional analyses done by Blackmon, Laham, Taylor and Kemppainen (2015**)** explored medication adherence experiences of rural AAs with type 2 diabetes in rural primary care clinics and in-patient care centers in Southeastern North Carolina. Findings showed poor metabolic control in males with HbA1c of 9.0, and females with moderate glycemic control of 7.2. Adherence was associated with having health insurance and working for pay. Participants underutilized medications frequency with no provider consult, and financial limitations were major obstacle for participants. The effective interventions to improve medication adherence in type 2 diabetes study conducted by Williams et al (2014) suggest that medication adherence alone is insufficient in managing diabetes and achieving glycemic control.

The study on the ability to positively enhance glycemic control through community interventions offer a promising approach to medication adherence among AA with type 2 diabetes. Small, Walker, Bonilha, Campbell and Egede (2015) conducted a systematic review of published community interventions and their ability to positively impact glycemic control in AAs with type 2 diabetes. The study showed that among five randomized control trials, three reported improved glycemic control in the intervention group when compared to the control group. Among the eight studies that do not have randomized control trial, six showed a statically significant change in HbA1c. Using a qualitative descriptive interview study that utilized the ground theoretical method, the underlying factors influencing the promotion of type 2 diabetes self-management among adult AA diagnosed with the disease were examined (Bhattacharya, 2012). The study shows that engaging AAs diagnosed with type 2 diabetes in community-based program offers a promising approach to management. Three broad implications were identified: a. analyzing type 2 diabetes as a chronic disease in health behavior framework; b. developing

practical and culturally relevant dietary and physical exercise guideline; c. situating medication adherence beliefs in social historical contexts.

Gap in Knowledge

In comparing the effectiveness of three delivery modalities of Decision-making Education for Choices in Diabetes Everyday (DECIDE), Fitzpatrick et al. (2016) studies on a randomized trial with 182 participants with suboptimal cardiovascular risk factor profiles, such as elevated blood pressure, lipid levels and HbA1c showed significant reduction in systolic blood pressure in Self-Study (b = -4.04), and Group Study (b = -3.59) at 6 months' post intervention. Self-Study and Enhanced Usual Care group noted significant decline in LDL, and Self-Study alone noted an increase in HDL (b = -1.76, $P < 0.05$). Self-Study and Individual Study noted higher increase in knowledge than Enhanced Usual Care ($P = < 0.05$), and all groups improved in problem-solving ($P = 0.01$).

Another study conducted at two adult primary care clinics in South Carolina showed that inadequate health literacy was significantly and moderately associated with diabetes knowledge, but weakly associated with self-efficacy and depressive symptoms. There were no associations between health literacy, HbA1c, blood pressure, body mass index, or control of any of the parameters (Sayah, Majumdar, Egede and Johnson, 2015).

Grading of the literature review using GRADE criteria shows a strong recommendation with high to moderate quality of evidence. Before a strong conclusion is reached on the effects of educational intervention on diabetes medication adherence, careful thought should be given to studies with larger sample sizes and explored over longer periods. Some of the literature articles reviewed on the impacts of educational intervention program to improve diabetes medication adherence, and decrease HbA1c showed the valuable effects in enhancing diabetes patient's

overall health outcomes. Moreover, while some offer no explanations on the flaws of the studies, others show variability in the technique for exploring, strategies to address adherence, stages of illness, and communicating the impacts of education may be a restraint to arrive at a conclusion.

Conceptual Framework

General Overview

A conceptual framework resembles a road map that can be used to link all the essential aspects of the DNP project (Moran, Burson, and Conrad, 2017). The conceptual framework serves as a guide, which the DNP students are expected to follow as an outline to direct the project. Sister Calista Roy's Adaptation Theory is a framework chosen for this project. The theory explains human responses to chronic illness, deals with nurse and patient interaction within the environment, and will be essential to address issues in this scholarly project. The paper is looking at the framework which will serve as a guide to the scholarly project, for which the focus is to decrease HbA1c in the underserved population of AA adults with type 2 diabetes.

Roy's adaptation model is viewed as a guide for nursing practice in a world with emerging needs (Roy, 2011). The model provides a design for knowledge development and several opportunities for investigators to combine knowledge of integrated health of people in the dynamic society worldwide (Roy, 2011). Clinicians must take the responsibility of improving medication adherence and not leave it to the patient alone (Williams et al., 2014).

Roy's four modes of adaptation include physiological needs, self-concept, role function, and interdependence (see Appendix B) (Seah & Tham, 2015). The physiological needs have five fundamental requirements which include oxygenation, diet, voiding, activities of daily living and security; and four systemic functions that consist of fluid, electrolyte and acid-base balance, neurologic and endocrine functioning. The self-concept guides the individual's thinking to

behave in a way that seems appropriate in his/her own context. The role function deals with how individuals interact with people in performing the assigned individual roles to their families or in societies. The interdependence mode focuses on how individuals nurture relationships with each other through acceptance and offering assistance (Seah and Tham, 2015).

Application to Project

Roy's adaptation model is pertinent to the project because the model sees individuals as an adaptive holistic system, who communicates with stressors in the environment. This model will guide the scholarly project in providing culturally sensitive educational programs to enhance health, attempts to prevent complications, and reduce HbA1c. The nursing action is aimed at enhancing system relationship by protecting, accepting, encouraging interdependence, and promoting personal and environmental change (Roy, 2011). Providers should understand the challenges with diabetes management among AAs, and find effective ways to address and obtain better patient outcomes. Roy refers to adaptation as a process and outcome where individuals or groups use awareness and choice to create an integration of human and its surrounding (Roy, 2008). The important goal of diabetes education is to enhance and assist with positive self-management behaviors that can regulate metabolism, improve glycemic control, prevent acute and chronic complications, improve quality of life, and ultimately decrease morbidity and mortality (Odgers-Jewell, Isenring, Thomas, and Reidlinger, 2017).

The worldview of this model represents reciprocal interactions which consider individuals as possessing interactive features. The interaction between people and their environment are mutual and changes may occur in either one (Roy, 2011). Using culturally specific educational intervention program in managing type 2 diabetes can lead to better HbA1c

and improve medication adherence, which is essential to the patient's overall health. Poor diabetes self-care is seen as one of the reasons for higher mortality rates and complications (Smalls, Walker, Bonilha, Campbell and Egede, 2015). Barriers to optimal patient outcomes identified are lack of knowledge, poor self-management skills, and poor motivation to lifestyle change (Small et al., 2015). Studies suggest that addressing barriers such as socioeconomic and environmental factors can decrease disparity among minorities with type 2 diabetes, and positively impact health outcomes (Smalls et al., 2015).

The integration processes are guide and coping strength of individual or group to handle stressors that can contribute to the enhancement of the person and society (Roy, 2008). Healthcare providers should strive to familiarize themselves with a patient's culture, to be able to motivate patient to enhance coping skills and self-care strategies. Purcell and Cutchen (2013) found that intervention should be family focused, with an emphasis on spiritual values, both family and church community can serve as support system to promote diabetes self-management.

The utilization of Roy's adaptation theory will be a beneficial framework in the execution and evaluation of the scholarly project. Roy's adaptation theory provides a holistic and comprehensive system based prospective for nursing practice. The theory provides a valued perspective on how to recognize essential issues for scholarly questions (Roy, 2011). The conceptual framework is a guide to the DNP project to effect change with educational intervention program, to improve diabetes medication adherence and decrease HbA1c. Roy adaptation as a theory is chosen to guide the scholarly project. Study findings indicate that diabetes self-management education is effective in lowering HbA1c, improving quality of life, and decreasing complications. Providers should strive to motivate patient through coping skills and strategies to achieve better outcomes. The Roy Adaptation theory addressed the integral

advance in understanding of the nursing practice. Study suggests that addressing socioeconomic and environmental factors can lead to better health outcomes (Smalls et al., 2017).

Implementation/Evaluation

Participants and Recruitment

The project is a practice improvement study and a descriptive study design. The project approval was granted by the Institution Review Board at Georgia State University and the Nursing Council and Research Overview at the project site before implementation. The sampling method is a convenience sampling with primary data collection. The target sampling size is 45 AA men and women between 18 to 65 years old who have a diagnosis of type 2 diabetes. Participants were recruited through flyers describing the program and the inclusion criteria placed in exam rooms and high-traffic areas of the clinics (see Appendix C). A telephone number was included in the flyer for those who are interested. The inclusion criteria were; AA adults, between 18 to 65 years with type 2 diabetes, and English speaking. While the exclusion criteria include; non-diabetes patient, children, pregnant women, patients with type 1 diabetes, and non-English speaking individuals. Participants were provided with a comprehensive description of the program, including the program purpose, participants' expectations, potential risks, and contact information if they have concerns or questions.

Setting

The project site is a neighborhood primary care clinic located in the southeastern United States. The clinic opens Monday through Friday, 7 am to 5 pm. The clinic is a part of a level 1 trauma center that has 953 hospital beds, including six neighborhood clinics to support the health needs of the community. The patient population is about 7500 visits per year that include 45%

Hispanics, 45% Non-Hispanics, and 10% others. The center has twelve examination rooms and is staffed by: six medical assistants, one licensed practical nurse, one registered nurse, one full-time provider, and six part-time providers. The project site provides comprehensive health care for the underserved population of surrounding counties, and metropolitan area. The facility provides comprehensive healthcare in a compassionate, culturally competent, and ethical manner. The center offers lab services, a pharmacy, women's health care, pediatric care, other non-emergent health services, and reduces expensive visit to the main hospital Emergency Room (Reporters Newspapers, 2011). The site was chosen because it lacks a Diabetes Educator whereas the other primary care settings have Diabetic Educators. The other reason is that there is no opportunity for any other diabetes education program to influence the project result.

Instrument/Tools

The project utilized a pre and posttest design for the evaluation of a diabetes education program, using the Road to Health Diabetes Education toolkit and Four-Steps to Manage your Diabetes for Life (National Diabetes Education Program [NDEP], 2016). The medication adherence was evaluated by the Four-Item Morisky Green Levine Medication Adherence Scale (MGLS) (Beyhaghi, Reeve, Rodgers, & Stearns, 2016).

Road to Health Education Toolkit.

The Road to Diabetes Education toolkit is a program developed by the National Diabetes Education Program in collaboration with the National Institutes of Health and the Centers for Disease Control and Prevention. The program comprised of two sections: making healthy food choices and physical activity (NDEP, 2016). The pretest and posttest comprise of 20 close-ended survey format questions, selected from the Road to Diabetes toolkits (see Appendix D). Diabetes

knowledge was measured with a questionnaire developed for use in this project. It contains 20 questions; the scoring and responses are graded 5 points per question on the pretest and posttest up to 100 points. There are eight true or false questions and fourteen multiple choice questions. The reliability was evaluated with Cronbach's alpha. The reliability analysis for pretest was .357 and posttest was .733.

Four Steps to Manage Your Diabetes for Life.

The 4 Steps to Manage Diabetes for Life has four steps which include learning about diabetes, know your diabetes ABCs (HbA1c, Blood pressure, and Cholesterol), learn how to live with diabetes, and get routine care to stay healthy (NDEP, 2016). The program was specifically designed to prevent the development of complications associated with diabetes in AA and Latinos. The pre and posttest questions described above is a combination of information from the Road to Diabetes toolkit and Four Steps to Manage Your Diabetes for Life.

Morisky Green Levine Medication Adherence Scale (MGLS).

The medication adherence measurement toolkit selected is the Four-Item Morisky Green Levine Medication Adherence Scale (Beyhaghi, Reeve, et al, 2016). The tool validates self-report of medication adherence. The tool mentioned issues concerning patient's behavior with regards to medication usage, such as forgetting to take medication, careless about taking medication, discontinuing medication use due to the feeling that their health is under control, and stop taking medication due to feeling worse (Beyhaghi et al., 2016). The medication adherence questionnaires with four closed-ended questions are from the Four-Item Morisky Green Levine Medication Adherence Scale. These questions were asked to the participant if they ever forget to take medication; ever careless about taking medication; stop taking medicines when feeling

better, and stop taking medicines if they feel worse. The question is a yes or no answer, with yes =1, and no = 0. Scores > 2 is low adherence, scores 1 or 2 is medium adherence, and score 0 is high adherence. The reliability of this tool was evaluated with Cronbach's alpha. The reliability analysis was .632.

Demographic Questionnaire.

The participants' demographics include name, sex, date of birth, telephone number, and HbA1c. This information was collected from the participants during the implementation process.

Hemoglobin A1c.

Hemoglobin A1c is a standardized test used to measure the average level of participant's blood glucose over three-month post educational intervention. HbA1c is considered a gold standard to screen for, diagnose, and assess glucose control in diabetes patients (Sacks, 2011; Wright & Hirsch, 2017). HbA1c values for diagnosing diabetes include: normal which is below 5.7 percent, prediabetes is 5.7 to 6.4 percent, and diabetes is 6.5 percent and above.

Intervention & Data Collection

The SI approached potential project participants after their primary care provider visit and presented the flyers to them. Flyers describing the program and the inclusion criteria were placed in exam rooms and high-traffic areas of the primary care clinics. A telephone number was included in the flyer for those who were interested. Individuals who meet the inclusion criteria were asked to meet with the SI. Potential participants were provided with a copy of the consent form. The SI provided the participants with a few minutes to review the consent form. The SI asked the participant if he/she had any questions about the study? When the participant said yes,

the SI answered them. When the participant said no, the form was signed in blue or black ink pen. A copy of the signed consent form was provided to each participant, and the original copies kept by the SI in a locked cabinet (see Appendix E).

A detailed and brief explanation about what is required in each session was provided to each participant. The consent form was written at an 8th grade level. The consent was obtained on the day the participant came in for the study. The SI provided a comprehensive description of the program, including the program purpose, participants' expectations, potential risks, and contact information should they have concerns or questions. The SI gave the participant the pretest and the medication adherence questionnaire to complete. The teaching session was conducted with diabetes education tools. A posttest and program evaluation form were administered afterward (see Appendix F). Total length of participation was approximately one to two hours in each session. The recruitment period lasted from October 17, 2018, to November 14, 2018. The total days spent on data collection from participants was twelve days, and hours vary from five to twelve hours on those days.

Participant Protection

A special identification number was used to link participant identifying information and the data, and this information is kept separate from the data. The password information is stored on a secure computer file on a password protected computer. The hard copy is stored in a locked cabinet. Consent forms are stored separately from the data in a locked cabinet. Data stored on a flash drive are encrypted. The people that have access to the data include DNP project team leader, team members, and mentors.

Components of Analysis

Data was transferred from paper format to Microsoft Excel and analyzed in IBM Statistical Package for the Social Science (SPSS) version 25. Data extracted from pre and posttest were coded and entered in an Excel spreadsheet. In SPSS, data was analyzed via descriptive statistic and group comparison analyses. The alpha is set at 0.05 to determine whether the outcome is statistically significant. Cronbach's alpha coefficient is used to examine the internal reliability of medication adherence test, pretest, and posttest questionnaire. A null hypothesis (Ho) is set to show that among AA adults with type 2 diabetes, there is no difference in the mean pretest and posttest, and in the mean pre and post HbA1c score. An alternative hypothesis (Ha) is set to show that among AA adults with diabetes, there is a difference in mean of pretest and posttest, and in the mean of pre and post-HbA1c. The SI set a goal that each participant will have a 1-point decrease in HbA1c by three months' post intervention, and a 20 % increase in diabetes knowledge after comparing the pretest to posttest scores. A Paired t-test was used to compare the pre and post HbA1c. A code book was generated in SPSS. The frequency table was used to determine the valid percent of the sex of participants. Descriptive statistic was used to determine the minimum, maximum, mean, and standard deviation of HbA1c, pretest, and posttest; and sex of the study particpants.

Timeline

The timeline for this scholarly quality improvement project spanned from project identification and review of literature in October 2017 to defense in March 2019:

- Project identification and review of literature
- Clinical site and IRB processes and approvals

- Data collection and analysis
- Review and project defense

Results

The target sample size was 45 participants. A total of 21 participants enrolled in the study. Of the 21 participants, 11 returned for the post HbA1c test. The attrition rate was 52%. Descriptive analysis data variables were performed, according to the output, no error was observed in age, HbA1c, pretest and posttest data.

Participants Characteristics

The sample was comprised of 19% of males and 81% of females. The mean value for age is 53.24, SD 10.492, minimum 27, and maximum 65.

Hemoglobin A1c

Among the total sample, before the intervention HbA1c values ranged from 5.90 to 15.0 with the mean HbA1c of 8.23 (SD = 2.77). After the intervention, HbA1c values ranged from 6.30 to 11.90 with the mean HbA1c of 8.73 (SD = 1.90) (see Table 1).

Table 1.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Post A1C	11	6.300000000	11.90000000	8.736363636	1.903823903
A1C	21	5.900000000	15.00000000	8.233333333	2.739221301
Valid N (listwise)	11				

Pretest and Posttest

Pretest. A total of 21 participants completed the pretest. Pretest scores ranged from 40 to 90. The reliability analysis of pretest with Cronbach's alpha is .357 with 20 items.

Posttest. A total of 21 participants completed the posttest. Posttest scores ranged from 75 to 100. There is a significant difference from the reliability analysis of the posttest which is .733 (see Table 2).

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Age	21	27	65	53.24	10.492
A1C	21	5.90	15.00	8.2333	2.73922
Pre-test	21	40	90	66.43	11.634
Post-test	21	75	100	93.81	9.862
Valid N (listwise)	21				

Difference Between Pretest and Posttest.

A paired sample t-test was conducted to evaluate the effects of a diabetes education program among AA adults with type 2 diabetes with scores on pre and posttest. The difference between the pre-test mean and posttest mean was statistically significant. The pretest score (M =66.43, SD = 11.634) and the post-test score (M = 93.81, SD = 9.862), t (21) = -9.580, p < .0005 (two-tailed). The mean increase in post-test score was -27.136 with 95% confidence interval ranging from -33.343 to -21.419 (see Table 3).

Table 3.

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
Pair 1	Pre-test - Post-test	-27.381	13.098	2.858	-33.343	-21.419	-9.580	20	.000

Difference Between Pre HbA1c and Post HbA1c.

A paired sample t-test was performed to evaluate the effects of a diabetes education program among AA adults with type 2 diabetes with scores on pre and post HbA1c. The difference between the pre-HbA1c and post HbA1c mean was statistically insignificant. The normal HbA1c level is below 7.0%. Some participants saw 0.1%, 0.3%, 0.5%, 1.7%, 2.5%, and 4.2 % reduction from pre to post HbA1c results. The pre HbA1c score (M = 8.23, SD = 2.73) and post HbA1c score (M = 8.74, SD = 1.90), t (11) = 1.084, P >.0005 (two tailed). The mean decrease in post HbA1c score was 0.554 with 95% confidence interval ranging from -.5853 to 1.694 (see Table 4).

Table 4

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	A1C - Post A1C	.5545454545	1.696681253	.5115686458	-.585300521	1.694391430	1.084	10	.304

Medication Adherence

Among this sample, the reliability analysis of medication adherence test (MAT), the Cronbach's alpha was .632 with four items. The medication adherence scores are as follows: 7 participants scored > 2 which is low adherence at 33%, 11 participants scored 1 or 2, which is medium adherence at 52.4%, and 3 participants scored 0, which is high adherence at 14.2%. However, since there is statistical significance in the difference in mean scores of the pretest and posttest, it is likely that there is clinical significance in this difference. Even though, there is no

statistical significance in post HbA1c, there is observable clinical significant difference in patients' outcome. Moreover, the sample size is 21, which is not enough representation of the total population because it is below the central limit theorem of 30. The SI will accept the null hypothesis but need caution in making any assumptions for application in the nursing practice with no additional analysis. The valid percent for the pretest and posttest test score is displayed below (see Table 5).

Table 5

Pretest and Posttest Valid Percent

Items	Pretest	Posttest
	Percentage Correct	Percentage Correct
1. Eating sugar does not cause diabetes	28.6	90.5
2. Eating too many calories per day can lead to overweight and obesity	95.2	100
3. In which body organ is insulin made?	71.4	95.2
4. What is are the risk factors of developing diabetes?	61.9	71.4
5. Which of these are signs of diabetes?	95.2	95.2

6. AAs have the highest rate of diabetes among other ethnic groups?	90.5	100
7. Diabetes can lead to kidney disease, the number cause of death or disability	90.5	100
8. How often does a diabetes patient supposed to go for eye checkup?	66.7	100
9.What is the normal BP level for a diabetes patient?	19.0	95.2
10.What percentage of diabetes patients die from heart disease?	33.3	90.5
11.Regular physical activity reduces the risk of getting diabetes	81.0	100
12. Before starting an exercise plan, what is the first thing you should do?	51.7	90.5
13. What are the benefits of exercising?	95.2	95.2

14. Fat free foods sometimes have as many calories as full fat version	7.4	95.2
15. How much exercise are your required per week?	66.7	100
16. A serving of carbohydrate is 15 grams of carbohydrate	38.1	95.2
17. Healthy fats include all except	71.4	90.5
18. Starchy vegetables include all except	57.1	85.7
19. The daily recommended glasses of water are	47.6	90.5
20. The American Diabetes Association recommended goal for HbA1C is less than 7% or the goal set by your provider	95.2	100

Discussion

The overall goal of this study was to find the effects of a diabetes education program among AA adults with type 2 diabetes in a primary care setting. The finding shows a significant improvement in the pre-test when compared to the posttest knowledge. The finding on HbA1c

shows no statistical significant improvement 3 months' post intervention. The barriers identified are lack of knowledge, poor self-management skills, and poor motivation to lifestyle change. A study suggests that addressing barriers such as socioeconomic and environmental factors can decrease disparity among minority with type 2 diabetes, and positively impact health outcomes (Small et al., 2015). The program talks about lifestyle modification such as physical activities, healthy diet, and medication compliance. Some participants found behavior modification hard to make due to a lack of family support, and the inability to afford medication and healthy food. Poor diabetes self-care is seen as one of the reasons for higher complications and mortality rates (Small et al., 2015). The self-management of diabetes requires frequent blood glucose check, some participants found it difficult to establish a routine to perform this task and take diabetes medications as recommended. Others report forgetfulness, busy lifestyle, and demanding daily life activities getting in the way. Study conducted by Williams et al (2014) suggests that medication adherence alone is insufficient in managing diabetes and achieving glycemic control.

Some participants are unaware of the need to exercise more, avoid poor food choices, and adhere to diabetes medications even when they feel good or not so good. Providing culturally sensitive diabetes self-management education programs, has shown to be an effective strategy to enhance knowledge, and support for individuals with type 2 diabetes (Williams et al., 2014). The study was originally planned to be a group session, but due to participants' different appointment times, the sessions were conducted individually. The participants enjoyed the one on one attention. Some suggest that diabetes education and caring relationship from their health care provider would facilitate medication adherence and lifestyle changes for them. To avoid complications with type 2 diabetes, education is suggested as the best intervention in the AA population (Carter et al., 2013). Carter et al. (2013) study shows that individualized patient

education was found to be effective in promoting positive lifestyle changes. Many of the participants were appreciative of the study and report that it was very informative.

The unexpected findings were that some Hispanics and older AA adults who did not meet the inclusion criteria were very eager to participant in the study. Recruitment difficulty was unanticipated. In most days, the SI could only recruit one participant per day, other days, two or three participants for a total of twelve sessions. The participants pre HbA1c range from 5.90 to 15.0, which indicates that the majority of the participants had uncontrolled diabetes and benefitted from this study. The minimum pretest score was 40%; however, the minimum posttest score was 75%. There is an increase of 35% in the posttest score, which exceeded the education goal of 20% for participants. In as much as the post HbA1c result showed no statistical significance, there was observable clinical significant difference in patients' outcome. The result shows that a diabetes education program was effective in improving medication adherence and decreasing HbA1c in AA adults with type 2 diabetes. Some studies support culturally specific educational programs in managing type 2 diabetes in AAs with focused attention on decreasing HbA1c and enhancing diabetes medication adherence to be most effectual (Chlebowy et al., 2015; Williams et al., 2014). Lifestyle modification factors such as: healthy eating, physical activity, regular glucose checks, and diabetes medication adherence can decrease HbA1c in individuals with type 2 diabetes (Bhattacharya, 2012). Clinicians focus on individualize approach to care has shown to encourage change which motivates and enhances coping skills and self-care strategies (Chlebowy et al., 2015; Carter et al., 2013). Yet another study shows a resilience-based diabetes self-management education program as effective in enhancing physiological and psychological health in AAs with type 2 diabetes (Steinhardt et al., 2015). Understanding the barriers unique to AA men and women is essential for effective educational

intervention. Financial limitation was identified as a major barrier for participants; medication adherence alone is found to be insufficient in achieving glycemic control in AAs with type 2 diabetes (Blackmon et al., 2015; Williams et al., 2014).

Practice Implications

Effective diabetes education program is essential to improve medication adherence and reduce HbA1c to improve overall health outcomes and lower healthcare expenditures. The findings show that improve communication through diabetes education, can advance diabetes knowledge, decrease HbA1c, enhance health, and decrease diabetes complications. The result of this project can be used as a basis to strengthen the benefits of a diabetes education program in AA population with type 2 diabetes. Continuing a diabetes education program and maintaining regular follow-up will increase the likelihood of maintaining a lifestyle change.

Developing personalized individual patient care plan is an essential factor to improve disease management, glycemic control, and quality of life (Williams et al., 2014). Clinicians should find effective ways to address and obtain better patients outcomes, by understanding the challenges of diabetes management among AAs. Even though the number of participants were small, this DNP scholarly project shows that increase knowledge of AAs with type 2 diabetes can decrease HbA1c and improve overall health outcomes. Providing education alone has not been shown to be successful in reducing diabetes rates and complications. Future research should give careful thoughts to studies with larger sample sizes, explored over longer periods before a strong conclusion is reached.

Limitations

The study limitations include limited time, low number of participants, convenience sampling, and study limited to one institution. Conducting the study over a longer period with a larger sample size would provide data needed to implement significant change in practice. The project is limited to AA adults with type 2 diabetes only. The convenience sampling is considered as biased because individuals did not have equal chance of being selected. Participants' inclusion criteria were limited to AAs adults between the ages of 18-65 years. Other challenges in this project include socioeconomic status of the patient population, time commitment in having more participant, and lack of follow-up checks. In spite of these limitations, the project has significant clinical results that should motivate healthcare organizations in general, and particularly the nursing profession, to explore the benefits of this project and utilize it to better patient health outcomes.

Conclusion

Diabetes is a serious health problem in the United States, which affect individuals of different economic classes and ethnic groups (ADA, 2014). A diabetes education program has a potential to significantly improve the level of HbA1c in AAs diagnosed with type 2 diabetes. Health care providers are encouraged to communicate the benefit of a diabetes education program to patients and their families during their routine clinic office visits. Lack of knowledge and understanding of the disease and its complications is one of the major reasons for poor outcomes in AA adults with type 2 diabetes (Tang et al., 2015). Roy's adaptation model was a guide to the scholarly project in providing culturally sensitive educational programs to enhance health, prevent complications, and reduce HbA1c. Evidences show that more research is needed

to identify effective interventions to improve medication adherence in type 2 diabetes (Williams et al., 2014). Also, larger studies with multiple diabetes clinics with similar patient population characteristics, and longer study durations are needed to further understand this issue related to diabetes health outcomes in the primary care settings.

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Appendix A -Evidence Table

Bogner, H. R., Morales, K. H., De Vires, H.F., & Cappola, A. R. (2012). Integrated management of type 2 diabetes mellitus and depression treatment to improve medication adherence: A randomized control trial. *Annals of Family Medicine, 10(1).*				**Grade level of Evidence:** Strong recommendation; high quality evidence (1)
Hypothesis/Question	**Design**	**Sample**	**Measurement**	**Results/Implication**
To examine whether a simple, brief integrated approach to depression and type 2 diabetes treatment improve adherence to oral hypoglycemic agents and antidepressant medications, glycemic control, and depression among primary care patients.	A randomized control trial	180 participants, ages 30 years and older, with diagnosis of diabetes on oral hypoglycemic agent, and current prescription for antidepressant, were recruited from 3 primary care practices in Pennysylvania	Participants	Brief integrated intervention of type 2 diabetes and depression show successful improvement. Patients who received the intervention were more likely to attain HbA1c of less than 7%, when compared to usual care

Carter, B. M., Barba, B., & Kautz, D.D. (2013). Culturally tailored education for African Americans with type 2 diabetes. *Medsurg Nursing, 22(2).*				**Grade level of Evidence:** Strong recommendation; Good quality evidence (V)
Hypothesis/Question	**Design**	**Sample**	**Measurement**	**Results/Implication**
Does culturally tailored education lead to significant improvements in self-care in African Americans with type 2 diabetes?	Systematic review of RCTs	10 articles, six focused on African Americans only, three is combination of African Americans and other ethnic groups, and one included 18% of Caucasians.	10 articles critically summarized and appraised	To avoid complications with type 2 diabetes, education is suggested as the best intervention in African American. Culturally specific educational interventions may reduce the cost of health care for African Americans with type 2 diabetes. Individualized education is effective in promoting positive lifestyle changes. Patient quality of life is improved with better glycemic control, but this may be at a great cost due to functional restrictions in the patient's daily activities and use of health care services. Future studies needed to include younger African Americans and individuals predisposed to type 2 diabetes.
Chlebowy, D. O., El-Mallakh, P., Myers, J., Kubiak, N., Cloud, R., & Wall, M, P. (2015). Motivational interviewing to improve diabetes outcomes in African Americans adults with diabetes. *Western Journal of Nursing Research, 37(5)* 566-580. doi:10.1177/0193945914530522				**Grade Level of Evidence:** Strong recommendation; good-quality evidence (11).

Hypothesis/Questions	Design	Sample	Measurement	Results/Implications
a. Does African Americans adult with type 2 diabetes receiving the motivational interviewing intervention (MII), exhibit greater adherence to prescribed treatment regimens (medication usage, glucose monitoring, and physical activity), when compared with those receiving usual care (UC)? b. Does African American adults with T2DM receiving the MII exhibit greater improvement from baseline to 3-month follow-up in diabetes markers (HbA1c, random serum glucose, and BMI) when compared with those receiving UC?	Randomized controlled trial	Convenience sample of 62 voluntary participants recruited at the time of clinic visits and assigned to UC group (n=36), or the MII group (n=26)	Demographic and health history data were collected using a 10-item survey. Chart reviews were conducted at baseline and at 3-month follow-up to obtain random glucose, HbA1c, and BMI. Medication usage data collected using self-report measures at 3-month follow-up. Data was collected from physical activity monitors and blood glucose monitors at 3-month follow-up.	Intervention group significantly increased the odds that participants improved the frequency of engaging in physical activity, but not medication -taking and glucose monitoring. Participants demonstrate decrease blood glucose levels and reduced BMI. MII group had significantly lower HbA1c levels and improved adherence to diabetes self-care compared with UC group. Participants in MII groups lost significant weight compared with those in the UC group. Limitations: Convenience sample, which limits generalizability. Attrition for both the MII and UC groups was about 50 % and resulted in low participant included in the final data analysis. Further research is recommended to determine optimal MII strategies to address adherence to a variety of self-care activities in this population using a larger sample over a longer period.

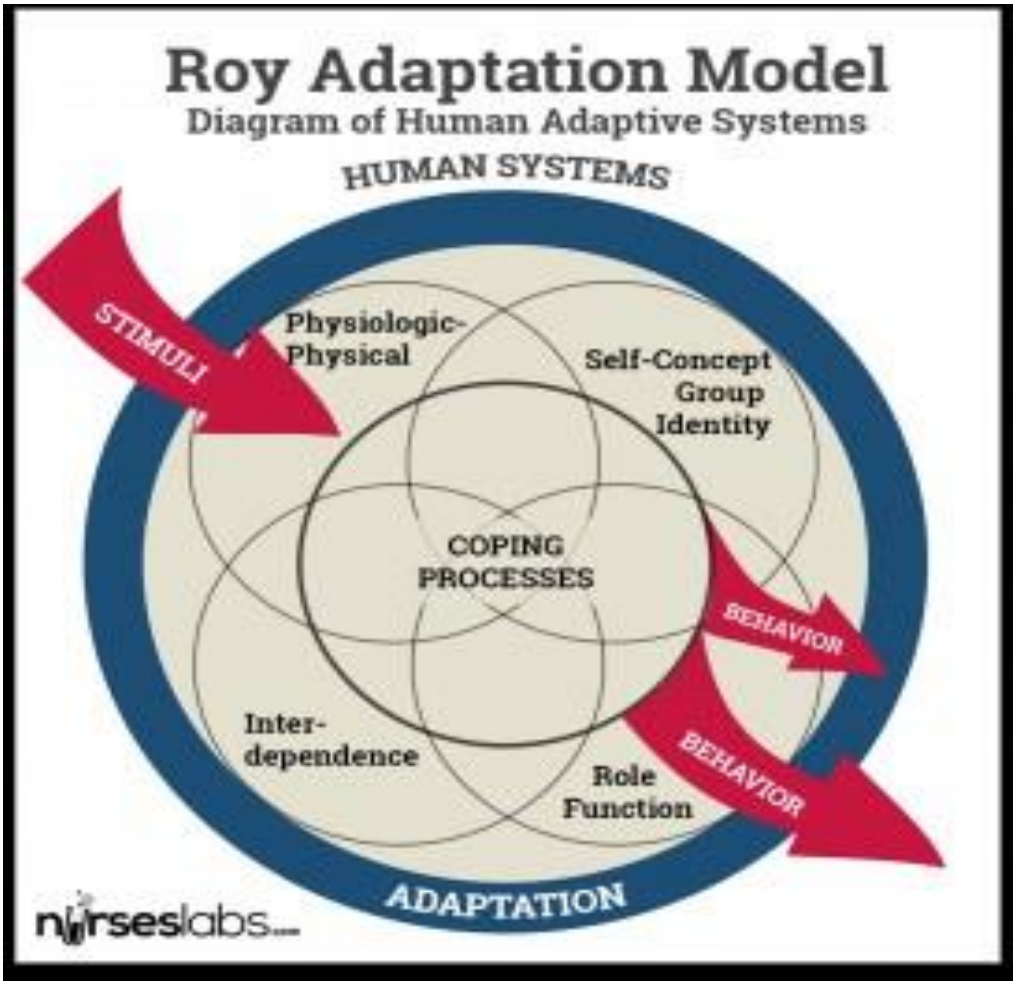
Fitzpatrick, S. L., Golden, S. H., Stewart, K., Sutherland, J., DeGross, S., Brown, T., …Hill-Briggs, F. (2016). Effect of DECIDE (Decision-making Education for Choices in Diabetes Everyday) program delivery modalities on clinical and behavioral outcomes in urban African Americans with type 2 diabetes: A randomized trial. *Diabetes Care 39*: 2149-2157. doi:10.2337/dc16-0941				**Grade Level of Evidence:** Strong recommendation; high-quality evidence (1)
Hypothesis/Questions	**Design**	**Sample**	**Measurement**	**Results/Implications**
To compare the effectiveness of three delivery modalities of Decision-making Education for Choices in Diabetes Everyday (DECIDE), a nine-module, literacy-adapted diabetes and cardiovascular disease (CVD) education and problem-solving training, compared with an enhanced usual care (UC), on clinical and behavioral outcomes among urban African Americans with type 2 diabetes.	Randomized control trial. Group 1: DECIDE Self-Study (n = 46). Group 2: DECIDE Individual (n = 45). Group 3: DECIDE Group (n = 46), or enhanced UC (n = 45)	Eligible participants (N=182) had suboptimal CVD risk factor profile (A1C, blood pressure, and/or lipids)	Eligible participants were randomized to one of the four study group: 1. DECIDE Self-Study 2. DECIDE Individual 3. DECIDE Group 4. Enhanced UC. Intervention duration was 18-20 weeks. Interventionists had bachelor's or master's degrees in health education, psychology, social work, and completed training in the DECIDE program and module content.	No significant difference in outcomes noted at 6 months on DECIDE modalities and Enhanced UC. Participants with A1C $\geq$ 7.5% at baseline, A1C reduced in each DECIDE modality at 1-week post intervention ($P < 0.05$) and only in Self-Study at 6 months' post intervention ($b = -0.24$, $P < 0.05$). Significant reduction was noted in systolic blood pressure in Self-Study ($b = -4.04$) and Group ($b = -3.59$) at 6 months' post intervention. Self-Study, Individual, and Enhanced UC noted significant declines in LDL and Self-Study noted an increase in HDL ($b = 1.76$, $P < 0.05$) at 6 months' post intervention.

			Individual and group sessions were audiotaped. Taped were randomly selected and reviewed by the DECIDE intervention supervisor.	Self-Study and Individual noted a higher increase in knowledge than Enhanced UC ($P < 0.05$), and all groups improved in problem-solving ($P < 0.01$) at 6 months' post intervention. Limitation: Even though, sample size of 182 provided adequate power for the primary outcome, a larger size would have provided greater power for the secondary outcomes.
Smalls, B. L., Walker, R. J., Bonilha, H. S., Campbell, J. A., & Egede, L. E. (2015). Community interventions to improve glycemic control in African Americans with type 2 diabetes: A systemic review. *Global Journal of Health Science, 7(5).* doi:10.5539/gjhs. v7n5p171				**Grade Level of Evidence:** Strong recommendation; high-quality evidence (1)
Hypothesis/Questions	**Design**	**Sample**	**Measurement**	**Results/Implications**
To conduct a systematic review of published community interventions to evaluate different components of community interventions, and their ability to positively impact glycemic control in African Americans with type 2 diabetes (T2DM)	Systematic review of RCTs	Thirteen studies identified that met the predetermined inclusion criteria	Medline, PsychInfo and CINAHL were searched for potential eligible studies published between January 2000 through January 2012. Inclusion criteria include: 1. Describe a community intervention, not prevention; 2. Indicate specifically in data analysis and results, the impact of the	Among 5 randomized control trials, 3 reported improved glycemic control in the intervention group when compared to the control group. Among 8 studies that do not have randomized control trial, 6 showed a statically significant change in HbA1C. The assessed community interventions led to significant reductions in HbA1C in African Americans with type 2 diabetes.
			American adults 18 years and older; 3. Measure glycemic control (HbA1C) as an outcome measure; 4. Involve patients in a community setting, excluding hospitals and hospital clinics.	utilization of multiple delivery methods, consideration of mobile device software, nutritionist educators, and curriculum-based approaches. Limitations: The review was limited to studies published in English language from 2000 and 2012; limits to articles that had glycemic control as an outcome measures; possible publication bias and selective outcome reporting could have biased the conclusion; and limitations obtained from the 8 studies that were not RCTs such as increase inability to identify confounder, social desirability, and inappropriate number of participant.
Steinhardt, M. A., Brown, S. A., Dubois, S. K., Harrison, L., Lehrer, H. M., & Jaggars, S.S. (2015). A resilience intervention in African-American adults with type 2 diabetes. *Am J Health Behavior, 39(4),* 507-518. doi: http://dx.doi.org/10.5993/AJHB.39.4.7				**Grade Level of Evidence:** Strong recommendation; good-quality evidence (11)
Hypothesis/Questions	**Design**	**Sample**	**Measurement**	**Results/Implications**
To explore the feasibility and outcomes of a resilience-based diabetes self-management education (RB-DSME) program to	Quasi-experimental design	Sixty-five (65) African American aged 30-85 years diagnosed with T2D recruited	Psychological and physiological measures were taken at baseline and 6 months. ANCOVAs assessed	The experimental group shows significant improvement in relation to comparison group for diabetes knowledge, positive

improve psychological and physiological health in African-American adults with type 2 diabetes (T2D).	Experimental group (N =32) received RB-DSME Comparison group (N =33) received standard DSME	through church announcements, radio, flyers posted in community, and fasting blood glucose screenings held at 2 participating churches on Sunday mornings.	whether the experimental group improved its overall outcome relative to comparison group, while controlling for baseline scores.	meaning, HDL cholesterol, and fasting blood glucose. The study showed the potential feasibility and effectiveness of the RB-DSME intervention to improve the health of African-American adults with T2D. Limitations: Participants were not randomly selected from the population. The sample may not be a representative of the population, and therefore, may have implications for generalization of the results. The use of self-reporting has inherent limitations due to potential for untruthful or inaccurate response.
Williams, I. C., Utz, S. W., Hinton, I., Yan, G., Jones, R., & Reid, K. (2014). Enhancing diabetes self-care among rural African Americans with diabetes: Results of a two-year culturally tailored intervention. *The Diabetes Educator, 40(2).* doi: 10.1177/0145721713520570				**Grade Level of Evidence:** Strong recommendation; good-quality evidence (11).
Hypothesis/Questions	**Design**	**Sample**	**Measurement**	**Results/Implications**
To test the feasibility of conducting community-based randomized controlled trial evaluating a culturally tailored community-based group diabetes self-management education (DSME) program among rural African Americans.	A quasi-experimental design	Twenty-five African American adults aged 18 years or older, diagnosed with type 2 diabetes, who are willing to attend 8 educational sessions; recruited from rural community using flyers, newspaper, and radio ads	Thirty-two (32) African American adults were recruited and 25 adults were retained and participated in an interventional study to test the effectiveness of the "Taking Care of Sugar" DSME program for the 2-year follow-up. Demographic variables; Health status, and management questions; and other measures included assessing a participant's knowledge about diabetes self-management by using the Spoken Knowledge in Low Literacy patients with Diabetes (SKILLED) questionnaire, a 10-item instrument.	Participants showed significant improvement on several physiological and behavioral measures from baseline to 3-months follow-up assessment. Participants reported improved knowledge about diabetes self-management and personal care skills that continued over time. Providing culturally sensitive DSME programs has clearly shown to be an effective strategy to enhance education and support for individuals with type 2 diabetes. Future studies and understanding of how nurses and case managers can be utilized to discuss the needs of rural residents, which may expand the positive effect of the DSME on blood glucose over time. Limitations: No control group and small sample size

Appendix B

Roy Adaptation Model



Appendix C

Diabetes Education Flyer

Diabetes Fun Day:

Free Diabetes education class

The purpose of the study is to see the effects of a diabetes education program on medication taking habit and decrease in hemoglobin A1c

Benefits include:

-Taking better care of oneself and decrease hemoglobin A1c

-Improve medication taking habit

The number of participants is about 45

The study will last about 3 hours

Compensation: Healthy kit that include -bandages, hand sanitizer, antibacterial wipes, packet tissues, and hypoallergenic lotion

Location

Grady Health System North Fulton Health Center
7741 Roswell Rd
Sandy Springs, GA 30350

When: TBD

Time: TBD

Study Criteria:

African American

Ages 18-65 years

Type 2 Diabetes

English speaking only

Contact information: Imma Okere, doctor of nurse practice (DNP) student at Georgia State University, 678 -481-0199

Appendix D

Road to Health Pretest/Posttest and MGLS Questionnaire

1. Eating sugar does not cause diabetes.
   a. True
   b. False
2. Eating too many calories per day can lead to overweight and obesity.
   a. True
   b. False
3. In which body organ is insulin made?
   a. Liver
   b. Kidney
   c. Pancreas
   d. Stomach
4. What are the risk factors of developing diabetes?
   a. Family history
   b. Eating starch, fat or sugar
   c. Overweight/obesity
   d. A & B
   e. A & C
5. Which of these are signs of diabetes?
   a. Frequent urination
   b. Increase thirst
   c. Persistent cough
   d. A & B
   e. B & C
6. African American have the highest rate of diabetes among other ethnic groups?
   a. True
   b. False
7. Diabetes can lead to kidney disease, the number one cause of death or disability.
   a. True
   b. False
8. How often does a diabetes patient supposed to go for eye checkup?
   a. Once a year
   b. Every 6 months.
   c. Every 3 years
   d. Every 5 years
9. What is the normal BP level for a diabetes patient?
   a. 130/80
   b. 160/95

c. 140/90
d. 100/80

10. What percentage of diabetes patients die from heart disease?
    a. 30%
    b. 68%
    c. 50%
    d. 80%
11. Regular physical activity reduces the risk of getting diabetes.
    a. True
    b. False
12. Before starting an exercise plan, what is the first thing you should do?
    a. Find an exercise activity you like
    b. Discuss with your healthcare provider
    c. Start slowly
    d. Get an exercise buddy
13. What are the benefits of exercising?
    a. It helps to lower blood glucose level
    b. It helps you lose weight
    c. It helps to lower blood pressure
    d. It helps with your overall health
    e. All of the above
14. Fat free foods sometimes have as many calories as the full-fat version
    a. True
    b. False
15. How much exercise are required per week?
    a. One hour every day
    b. 30 minutes daily for at least 5 days a week
    c. 20 minutes most days of the week
    d. 45 minutes most days of the week
16. A serving of carbohydrate is 15 grams of carbohydrate
    a. True
    b. 2. False
17. Healthy fats include all except
    a. Olive oil
    b. Canola oil
    c. Nuts
    d. Butter
18. Starchy vegetables include all except
    a. Potatoes
    b. Corn

c. Peas
d. Tomatoes

19. The daily recommended glasses of water are
    a. 8-10
    b. 6-8
    c. 8-12
    d. 4-6
20. The American Diabetes Association recommended goal for HbA1c is less than 7% or the goal set by your provider.
    a. True
    b. B. False

Four-Item Morisky Green Levine Medication Adherence Scale with yes/no response (circle yes or no)

1. Ever forget to take medicines Yes No
2. Ever careless about taking medicine Yes No
3. Stop taking medicines when feeling better Yes No
4. Stop taking medicines if you feel worse Yes No

Appendix E

Informed Consent

Title: The Effect of a Diabetes Education Program among African American Adults to Improve Medicine Taking Habit and Lower Hemoglobin A1c (HbA1c) in the Primary Care.

Principal Investigator: Sarah Killian, DNP, RN, NEA-BC

Student Principal Investigator: Immaculata Okere, MSN, FNP-C, RN, CCRN

Why are we doing the study?

We are doing a study to find out if a diabetes education will improve drug taking habit and lower HbA1c. You are being asked to take part in this study because you are a patient in this clinic. A total of 45 people will be asked to take part in this study.

What will happen during the study?

If you decide to take part, you will be asked some questions about yourself. You will complete a pretest before the diabetes teaching. You will also fill out a diabetes drug taking questionnaire. Each of the task will take about 30 minutes. Then you will be taught how to improve your diabetes, your drug taking habit, and how to lower your HbA1c. At the end of the study, you will take a posttest. You will also be asked to evaluate the program. The study time will take about 3 hours and will be in one session. Your medical record will be looked at, to find your most recent HbA1c before and after the study, to see if there is any improvement. You will only talk to the student study doctor. The research will take place at Grady Health System around September and October 2018.

Future Research

Researcher will remove information that may identify you in the study. We may use your data for future research study. If we do this, we will not ask for any additional consent from you.

Risks

In this study, you will not have any more risks than you would in a normal day of life.

Benefits

This research study can help people in the community. We will use the results from this study to help our patients take better care of themselves, lower their HbA1c, and lower health care cost.

Alternative

The alternative to take in this study is to not take part in the study

Compensation

You will receive a Healthy Living Kit (including bandages, hand sanitizers, anti-bacterial wipes, packet tissues, and hypoallergenic lotion) for participating in this study.

Do I have to be part of the study?

You do not have to be in this research study. If you decide to be in the study and change your mind, you have the right to drop out at any time. You may skip questions or stop been part of the study at any time. You may refuse to take part in the study or stop at any time. This will not cause you to lose any benefits.

Who will know about my answers or my health information?

We will keep your records private to the extent allowed by law. The people and institution that will look at your personal information are: Dr. Sarah Killian at Georgia States University, Dr. Linda Toomer, and Dr. Esther Iwotor at Grady Health System. Georgia States University Institutional Review Board, and Office for Human Research Protection. You will receive a special identification number. And all the forms that you get will have this number on it. The information you provide will be stored in a locked cabinet. And on a secure computer file on a password protected computer. Your name and other personal information will not show when we present or publish this study results. This personal information will be destroyed after we finish our study in May 2019.

Who do you call if you have questions?

You may call Dr. Sarah Killian at 404-413-1208 or email at skillian@gsu.edu. You can also call Immaculata Okere at 678-481-0199 or email at iokere1@student.gsu.edu. If you have questions about the study or your part in it. And, if you have questions, concerns, or complaint about the study.

You can call the GSU Office of Human Research Protections at 404-413-3500 or irb@gsu.edu. If you have questions about your rights as a study participant. And, if you have questions, concerns, or complaint about the study.

Consent

We will give you a copy of this consent form to keep.

If you are willing to be part of this research, please sign below

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Printed Name of Participant

---------- ----------

Signature of Participant Date

_____ ----------

Principal Investigator or Researcher Obtaining Consent Date

Appendix F

Diabetes Education Evaluation Form

1. What do you like about the class today?

2. What did you not like about the class today?

3. What are some things that you would like to have seen?

4. Did you learn anything new today?

5. Do you have any topics you would like to discuss in the future?

Additional comments ----------

