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The impact of a diabetes self-management program on adult Hispanics in Eastern Coachella Valley

Brijesh Naranbhai Patel

THE IMPACT OF A DIABETES SELF-MANAGEMENT PROGRAM ON ADULT HISPANICS IN EASTERN COACHELLA VALLEY

A Project

Presented to the

Faculty of

California State University,

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In Partial Fulfillment

of the Requirements for the Degree

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by

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ABSTRACT

The primary aim of this clinical research project is to evaluate the effectiveness of a self-management diabetes program for the underserved Hispanic population in Eastern Coachella Valley, California. The project was conducted as part of a clinical assignment in the graduate nursing program at California State University San Bernardino. Thirty-eight participants (38) were recruited from Indio Family Care Center. In a face-to-face meeting with a diabetic educator, individual participants completed a self-care activity survey, received diabetes related education. In addition, their glycemic control blood levels, measured as glycosylated Hemoglobin (Hb A1c) were obtained from the patient's medical records. The diabetic educator followed up with participants in phone interviews at periodic intervals, over the course of three months. At the end of the designated three month education period, patients completed the same self-care activity survey. Blood levels for Hb A1c were compared to initial patient results. The diabetes education program guided by the diabetes educator had significant effects on all self-care activities and glycemic control among the Hispanic participants. Total self-care activities improved by 23%

(p <.001) and Hb A1c results decreased from a mean of 9.23 to 7.96 (p < .001). Future research is needed with more than one diabetic educator and a larger more diverse sample with a control group.

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Many people have played a role in the completion of this project. There is no way I would have been able to do it alone. Before I acknowledge the individuals who supported me in this project, I would like to thank God and my spiritual guru for giving me strength and the intellect to be able to further my education.

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CHAPTER ONE

INTRODUCTION

Background and Significance

Diabetes is a serious public health challenge for the United States (American Diabetes Association [ADA], 2007). According to the Centers for Disease Control (CDC), diabetes affects more than 25.8 million people or 8.3% of the United States population; 11.8% of all men and 10.8 % of all women age 20 or older have type2 diabetes (CDC, 2011). Approximately 24% of Mexican Americans, the largest Hispanic/ Latino subgroup, between the ages of 45 to 74 have diabetes (ADA, 2007).

In 2010, the CDC estimated 79 million people or 35% of adults ages 20 years or older in U.S. had prediabetes, a condition that puts people at an increased risk for diabetes (CDC, 2011). Diabetes is a complex disease for which control is affected by a number of factors. Uncontrolled blood glucose levels lead to acute and chronic complications and poor quality of life (National Institute of Digestive and Kidney Diseases [NIDDK], 2006). Individuals with diabetes are at increased risk for complications including blindness, cardiovascular disease,

stroke, neuropathy, renal failure, and amputation (NIDDK, 2008).

Burden of Diabetes

In 2007, the estimated cost for treatment of diabetes in the United States was $218 billion, equivalent to 10% of all healthcare dollars (CDC, 2007). Many of these complications are more common among minority groups, those without health insurance and those with limited access to medical care (Philis-Tsimikas & Walker, 2001). The American Diabetes Association (2007) indicated that risk of developing diabetes related complications can be four-time higher for those people who did not receive formal education regarding self-care practices. The Hispanic population is the fastest growing minority in the United States and Hispanics have a higher lifetime risk of diabetes than do non-Hispanic Whites (Narayan, Boyle, Thompson, Sorensen & Williamson, 2003). Hispanic patients with diabetes have nearly two times the prevalence of type 2 diabetes compared to non-Hispanic whites (CDC, 2007).

Hispanic groups are at a higher risk of diabetes related complications due to their low literacy level and lack of knowledge about diabetes and its management in

some members of the population. Education is also essential for focusing on behavior changes necessary for managing diabetes (Tucker, Bermudez & Castaneda, 2000). The incidence of depression among Hispanic patients with diabetes is twice the incidence of depression, when compared with the general population of the United States (Anderson, Freedland, Clouse & Lustman, 2001). Patients with both depression and diabetes have an increase risk of negative outcome; decrease compliance with regard to treatment regimens and self-care guidelines; and resultant increases in utilization of health care services (Katon, Von Korff, Ciechanowski, Russo, Lin, Simon, Ludman, Walker, Bush & Young, 2004).

The diabetic educator intervention targeted the Hispanic population in Eastern Coachella Valley. Minorities face many obstacles acquiring health care services and many ethnic populations receive suboptimal care in the U.S. (Caballero & Tenzer, 2007). It is important to note that lack of health insurance, low income, limited access to health care, education, illiteracy, health beliefs and practices all impact the health status among Hispanic patients with diabetes (Gulliford et al, 2004).

Long term, culturally competent diabetes self-management education programs that address the needs of the Hispanic population are important to reduce health disparities in Eastern Coachella Valley. Furthermore, nurses must be knowledgeable about culturally appropriate diet, activities, physical appearance, knowledge of the disease, acceptance of the disease, and the nurses' spiritual role in disease management. Such knowledge will guide health professionals to tailor their interventions for the specific needs of the patients.

This study evaluates the effectiveness of diabetes self-management education program in adult Hispanics in Easter Coachella Valley. Adult Hispanics with type 2 diabetes were selected as the target population for the program.

Problem Statement

A 2010 community health needs assessment by the Health Assessment Resource Center (HARC) revealed diabetes as the top priority health problem for adults in the Eastern Riverside County (HARC, 2010). Limited access to diabetes educational services in the Eastern Coachella Valley for the uninsured/low-income Hispanic population

indicates a need for a community-based educational program with long term follow up, to improve the quality of diabetes care and health outcomes.

Patient's success in diabetes management is based on glycemic control. This study attempts to provide necessary self-management skills to individuals with diabetes, in order to achieve glycemic control, empower affected patient, and reduce complication related to diabetes.

Purpose of the Study

The purpose of this clinical project was to evaluate the effectiveness of a self-management diabetes education program, designed for the underserved Hispanic population in the Eastern Coachella Valley, California. The diabetes self-management program was administered by a diabetes educator to improve diabetes management, measured as improved self-care activities and glycosylated hemoglobin (Hb A1c) levels. The program provided access to long-term diabetes care to lessen the burden of acute and chronic complications related to diabetes. This study looked at two hypotheses: 1) Participants in a diabetes self-care management program will significantly improve their self-

care activities of nutrition, exercise, medication, and glucose monitoring; and 2) Among participants in a diabetes self-management program, improved diabetes self-care management will significantly improve the long-term glycemic control.

Theoretical Framework

The diabetic educator intervention tested in this study was based on Watson's Theory of Human Caring which offers a framework that embraces and interests with art, science, humanities, spirituality, and dimensions of mind-body-spirit (Watson, 2005). Watson's principles are universal and can be applied to vulnerable populations. In Watson's model, the diabetes educators' aim is to sustain helping, trusting, caring relationship to problem solve and teach patient and family of proper care (De Chesnay & Anderson, 2008). The model helps the health care professional to tailor each individual's needs and adapt as necessary for individual characteristics such as age, type of diabetes, cultural influences, and health literacy, etc... The major elements of Watson's Human Caring theory are the carative factors, the transpersonal caring, and the caring occasion/caring moment (Watson,

2005). Care based on the theory allows the educator to provide compassionate caring to ease patient and family suffering, and to promote their healing and dignity. The model can also help nurse's own actualization (De Chesnay & Anderson, 2008).

Summary

Diabetes is a complex disease that can lead to multiple complications if appropriate care is not taken. Hispanics are at a higher risk of diabetes related complications due to their numerous risk factors (U.S. Department of Health and Human Services, 2001). Studies suggest that long-term culturally appropriate diabetes self-management education programs that address specific needs of the underserved Hispanic population have demonstrated improved health outcomes (Philis- Tsimikas et al. 2004). This current clinical project not only addressed the individual needs of the Hispanic population but also provided follow-up care, which has been the corner-stone of diabetes management (Spellman, 2009).

The following chapter provides a summary and review of published studies conducted in various clinical

settings demonstrating the impact of self-management diabetes program and positive outcomes.

CHAPTER TWO

LITERATURE REVIEW

Operational Definitions

Type 2 Diabetes

Type 2 diabetes was previously called non-insulin-dependent diabetes mellitus (NIDDM), or adult-onset diabetes. Type 2 diabetes is a condition characterized by high blood glucose levels caused by either a lack of insulin or the body's inability to use insulin effectively (National Institute for Digestive and Kidney Diseases, 2006).

Glycosylated Hemoglobin (Hb A1c)

Hemoglobin A1c (Hb A1c), also known as glycosylated hemoglobin or glycohemoglobin, measures the percentage of hemoglobin A that has become glycosylated (coated with glucose) during the past two-three months (ADA, 2011). A normal reading for healthy individuals is about 4-6% Hb A1c. A person with diabetes whose disease is well controlled will have 7% or lower.

Quality of Life

Treatment for those individuals with diabetes can have significant impact on many aspects of quality of

life. Personal relationships, work, social, emotional and physical well-being can be considerably affected by diabetes (Jacobson, 1996). Patients with diabetes often feel angry, guilty, or frightened about the disease, and frequently are not motivated to manage their diabetes self-care activities. Studies indicate that diabetes is associated with decreased quality of life, measured in a variety of different ways (Schafer, 2000). Quality of life is associated to the degree of excellence a person considers their lives to contain. Performing daily activities, positive and negative feelings, energy and discomfort, interpersonal relations, personal control, personal and intellectual growth, and material possessions are some of the criteria people around the world look at to judge the excellence (Gill & Feinstein, 1994). Over the years, the concepts of quality of life have become ambiguous and there are numerous different instruments that assess the various aspect of quality of life. This thesis will not evaluate any aspects of quality of life.

Diabetes Self-Management

Diabetes self-management means the ongoing process of adjusting daily life-style to improve glycemic control. Diabetes self-management incorporates meal planning,

physical activity, blood glucose monitoring, proper medications, emotional/physical stress, understanding sick day rules, and adjusting appropriately to maintain optimal glucose control (Kulzer, Hermanns, Reinecker, & Frank, 2007).

Overview of Type 2 Diabetes

There are four known types of diabetes: type 1 diabetes, type 2 diabetes, gestational diabetes, and other specific types of diabetes due to other causes (ADA, 2008a, ADA 2008b). Major types of diabetes include Type II (non-insulin-dependent diabetes mellitus, NIDDM), which accounts for 90 to 95% of cases of diabetes, followed by Type I (insulin-dependent diabetes mellitus, IDDM), which accounts for 5-10% (CDC, 2007). For purpose of this thesis, type 2 diabetes will be discussed. Type 2 diabetes was previously called non-insulin-dependent diabetes mellitus (NIDDM), or adult-onset diabetes. Diabetes type 2 is a condition characterized by high blood glucose levels caused by either a lack of insulin or the body's inability to use insulin effectively (National Institute for Digestive and Kidney Diseases, 2006). Type 2 diabetes usually starts with insulin resistance, a

condition in which fat, muscle, and liver cells do not use insulin properly (Shaw & Chisholm, 2003).

Specific cause of type 2 diabetes is presently not known however genetic factors and environmental factors appears to be the most common cause of type 2 diabetes (Shaw & Chisholm, 2003). Risk factors for type 2 diabetes include obesity, family history of diabetes, older age, history of gestational diabetes, impaired glucose tolerance, physical inactivity, and race/ethnicity (National Diabetes Information Clearinghouse, 2007). Of these risk factors, obesity has been identified as a major risk factor in the increasing incidence of diabetes; over half (55%) of persons with type 2 diabetics are obese (Geiss, Pan, Cadwell, Gregg, Benjamin & Engelgau, 2006). Obesity leads to increased insulin resistance that can lead to development of diabetes (Eberhart, Ogden, Engelgau, Cadwell, Hedley & Saydah, 2004).

Despite the major role of body fat as a risk factor, there is also clear evidence that type 2 diabetes has a strong genetic link (CDC, 2007). According to family studies, 33% of offspring of one parent with diabetes is expected to develop this disease later in life and if both parents have diabetes, the risk is over 50%; and in

monozygotic twins, the risk for type 2 diabetes is close to 100% (Narayan, Boyle & Thompson, 2003)

Even though Type 2 diabetes more commonly occurs in adults, increasingly, children have been diagnosed with the disease (CDC, 2007). The rise in obesity, physical inactivity, and the consumption of excess calories seems to have lead to the epidemic of children with type 2 diabetes (Torpy, Lynm & Glass, 2009).

Incidence and Prevalence of Diabetes

The numbers of individuals with a diabetes diagnoses are rapidly growing. Since 1990, new cases of diabetes have gone up by 5% each year and cases of type 2 diabetes are up 90% from 4.8 per 1,000 in 1995-1997 to 9.1 in 2005-2007 (CDC, 2007). A total of 1.6 million new cases of diabetes were diagnosed in people ages 20 years or older in 2007 (CDC, 2007). For individuals born in U.S. in 2000, the lifetime risk of those diagnosed with diabetes is roughly 1 in 3 for males and 2 in 5 for females (Narayan, Boyle, Thompson, Sorensen, & Williamson, 2003). This rate is even higher for minority population, with Hispanic females having 50% risk at birth compare to 31.2% for non-Hispanic whites (Narayan et al. 2003).

Diabetes is the seventh leading cause of death in United States (ADA, 2007). In 2004, 68% of diabetics had heart disease and 75% had high blood pressure (CDC, 2007). Diabetes is a leading cause of blindness, lower-limb amputations, and kidney failure (CDC, 2007). 60% to 70% of diabetics have a mild to severe form of nervous system damage, and 33% have periodontal diseases (CDC, 2007). Overall, the risk for death is twice as much that of person without diabetes of same age (CDC, 2007).

Many factors contribute to the increase in diabetes, including higher prevalence of overweight and obesity, changes in diagnostic criteria, improved or enhanced detection, decreasing mortality, a growing elderly population, and growth in minority populations in which the prevalence and incidence of diabetes are increasing (ADA, 2007).

Diabetes in Hispanics

In the last two decades, the United States has experienced a dramatic increase in the Hispanic population (U.S. Census Bureau, 2010). Hispanics are the nation's largest and fastest growing minority group (CDC, 2006). The current population of Hispanics in U.S. is 50 million and is expected to double in 2050 (CDC, 2010). An

estimated 37% or 16 million Californians are Hispanics (U.S. Census of Bureau, 2011). After adjusting for population age differences, national survey data indicate that 11.8% of Hispanics over the age of 20 are diabetics (CDC, 2011). There is great deal of health care disparities among racial and ethnic minorities, especially among the Hispanics. There are many factors that influence the disparities. According to a 2007 U.S. Census Bureau report, poverty level of Hispanics was 21.5 percent in comparison to 8.2 percent of non-Hispanic Whites (U.S. Census Bureau, 2007). It is also important to know that Hispanics have the most uninsured rates of any racial or ethnic group in America (CDC, 2007). According to 2007 CDC report, 32.1 percent of the Hispanic population didn't have health insurance, as compared to 10.4 percent of the non-Hispanic White population. Literacy level among Hispanics is also lower compared to non-Hispanic Whites: 89 percent of non-Hispanic Whites have a high school diploma compared to 61 percent of Hispanics, and 30.5 percent of non-Hispanic Whites have a bachelor's degree in comparison to 12.5 percent of Hispanics (U.S. Census Bureau, 2007).

Diabetes management can be costly and complicated. Uncontrolled diabetes results in costly, life threatening and debilitating complications, loss of productivity at work, and premature death (Minnesota, 2005). Uninsured patients with diabetes are less likely to get healthcare services that would meet professional standards (Institute of Medicine, 2001). According to Health Economics Program (1999), for the uninsured diabetics, primary source of medical care is delivered through high-cost emergency departments rather than doctors' offices. Also, uninsured diabetics receive fewer foot exams, cholesterol tests and eye exams-services that help reduce the incidence of amputations, heart attacks, strokes and blindness (Institute of Medicine, 2001).

Diabetes in Eastern Coachella Valley

Hispanics in Eastern Coachella Valley (ECV) is estimated to be 85% of total population (HARC, 2010). For the purpose of this study, four major cities of ECV are incorporated including Indio, Coachella, Mecca, and Thermal. A 2010 community health monitor survey of more than three thousand households in Eastern Riverside County provides unbiased, statistically reliable data. The majority (90%) of Hispanic/Latino in the ECV are of

Mexican American origin (HARC, 2010). An estimated 10 percent of Hispanics have diabetes in California and in Riverside County (HARC, 2010).

According to the HARC (2010) access to health care in Eastern Coachella Valley is limited for minority populations, the underinsured, those with no insurance and undocumented workers. "Access to quality of care is important to eliminate health disparities and increase the quality and years of health life for all people" (p. 63). An estimated 20.5% of Eastern Coachella Valley's resident did not have any kind of health care coverage in 2010 (HARC, 2010). Hispanics/Latinos are three times more likely than Whites to be uninsured in ECV (37.7% vs. 13.8%) (HARC, 2010). The main reason for the lack of health care insurance coverage (43.1%) was that they couldn't afford to pay the premium (HARC, 2010). Furthermore, there is shortage of health care providers, namely primary care physician in the region (1 physician for 3,000 people) of Coachella, Thermal, and Mecca (Coachella Valley Health Initiatives [CVHI] 2010). The degree of poverty and lack of healthcare services makes the health care disparities even worse in ECV. In 2008 for example, several cities in the Coachella Valley had

significantly high poverty level with the highest being 45% in Mecca, and 29% in Coachella (CVHI, 2010).

Health Care Access in Eastern Coachella Valley for Underserved/uninsured

There are different types of barriers which are encountered by those with diabetes related to their medical care. Study conducted by Zigibor and Simmons (2002) on 323 multiethnic diabetic patients who reported experiencing financial and access problems were a major barrier in performing self-glucose monitoring. Health beliefs, self-efficacy, and motivations are some other barriers which impacted the compliance (Zigibor and Simmons (2002). Unfortunately, health-care providers often times do not see these barriers which are experienced by the patients.

Riverside County regional Medical Center offers state-of-the-art emergency and other services. But for the patient living in ECV, the distance is 86 miles or approximately 1 hour, 20 minutes driving time by car. It's unlikely that patients from the ECV would travel that far due to the distance, cost, and travel time. The Indio Family Care Center, located in Indio, provides low-cost primary care, family planning, immunization, and several

other small services. According to Gloria Robinson, assistant nurse manager at the center, approximately 80% of persons arriving on a daily basis are Hispanic origin (Stewart, 2007).

The ECV has four low-cost health clinics. Martha's Village & Kitchen, located in Indio, provides housing to the homeless and on-site medical clinic to the residents of Martha's as well as non-residents who may be uninsured. 90% of the patients seen here are uninsured (Stewart, 2007). Clinicas De Salud Del Publo, Inc. operates in Mecca and Coachella. The clinic provides primary care, family planning, prenatal services, and laboratory, radiology and pharmacy services at very low-cost (Stewart, 2007). Santa Rosa de Valle Clinic in Coachella provides preventative and primary care services. An estimated 95% of patients seen are of Hispanic/Latino origin (Stewart, 2007). Twenty percent of the patients seen at the clinic are uninsured, and remainders are in program such as Medi-cal or Medically Indigent Services Program (MISP) (Stewart, 2007).

John F. Kennedy (JFK) Hospital in Indio provides emergency services to the city of Indio, Coachella, Mecca, and Thermal. They accept uninsured, unable-to-pay

patients presenting with a multitude of healthcare issues (Stewart, 2007). From July 2005 to June 2007, some $2,404,213 worth of services was provided to uninsured and unable to pay populations (Stewart, 2007). The main access to health care for many underserved population in ECV is JFK Hospital. Currently, there is a retired nurse who provides few hours of diabetic services each week to the patients who are admitted in the Hospital. Unfortunately, there is no follow-up or out-patient program available at the hospital at this time for diabetics. Many patients admitted with diabetes and related complications at JFK Hospital are sent home with very little or no diabetes education. Recent community health assessment revealed diabetes management as one of the top priorities in the Coachella Valley (HARC, 2010).

Diabetes Education

Achieving and maintaining metabolic control is not an easy task for every diabetic. To appropriately manage their diabetes, patients require a basic understanding of diabetes, dietary intake, physical activity, self-monitoring of blood glucose, medication management, and behavior changes. Long-term, culturally appropriate

diabetes self-management education programs that address specific needs of the underserved Hispanic population have had significant effects on health outcomes (Philis-Tsimikas, et al. 2004). Organized self-management education is as important as the medical treatment of diabetes (Gulliford, Mahabir & Rocke, 2004). The goals of diabetes education are to improve glycemic control, avoid acute and chronic complications, and reach an optimal quality of life. One of the Healthy People 2020 goals is to increase proportion of people with formal diabetes education from 56.8% to 66.8%. (U.S. Department of Health and Human Services, 2010).

In the past, diabetes education was mostly hospital-based; a nurse, dietitian, or diabetic educator would conduct one-on-one sessions at the bedside. Additional education or follow-up information was rare. With shorter hospital stays, inpatient diabetes teaching is even less effective in meeting complex self-management needs (Brown, Garcia, Kouzekanani & Hanis, 2002). Therefore, effective methods to deliver patient education and teach self-management skills that result in longer-term improvement to health are needed (Philis-Tsimikas et al., 2004).

Today, the trend is to provide outpatient education in community settings where educators can spend quality time reinforcing self-management skills and behavior changes (Deakin et al., 2006). Diabetes self-management education has gained significant importance as research has documented the benefits of such interventions in improving glucose control and reducing diabetes-related complications (Brown et al. 2002).

Diabetes Program Outcome Assessment Tools

Persons with diabetes must take an active role in managing their treatment self-care (Downer, 2001). Effective management of diabetes requires a multidisciplinary approach that may include primary care provider, endocrinologist, diabetes nurse, social worker, dietician, and the patient (Dunning, 2003). However, the person with the diabetes is the most important member in the team. Actually, diabetes is a self-managed disease where the patients themselves do a majority of diabetes management. This requires patients to make appropriate decisions about how they will live with the disease. This can happen only if people with diabetes are informed or knowledge about the disease and be able to put in action.

The goal of diabetes control is to remain free from the symptoms of diabetes, to keep blood sugar in target range, and to maintain quality of life.

Diabetes Self-Care Activity Assessment

Self-care activities and Hb A1c are two variables which were evaluated in this clinical research project. Self-care behaviors play an important role for the person with diabetes. To assess self-care behaviors, Toobert, Hampson & Glasgow (2000) developed the "Summary of Diabetes Self-Care Activities" (SDSCA) tool. This tool is based on self-report of diabetes management activities over the previous seven days. The following is one example of how the items are worded: 'On how many of the last seven days how often did follow your recommended calorie intake?' The SDSCA assesses five areas essential for diabetes care. The areas of regimen assessed in the tool includes blood glucose monitoring, diet (general and specific), medication, exercise and foot care. For this study, only four SDSCA areas were assessed: diet (5 questions; potential total Subscale score = 25), exercise (3 questions; potential total Subscale score = 21), glucose monitoring (2 questions; potential total Subscale score = 8), and medication use (2

questions; potential total Subscale score = 4). The total possible score on the SDSCA tool is 58. A high score represents positive self-care activities. See Appendix B. Each participant in the study completed the SDSCA survey at the beginning and at the end of the program.

Glycosylated Hemoglobin (Hb A1c) levels

Hb A1c is the most common lab test that is used to measure glycemic control. As a direct assessment of, metabolic control, the Hb A1c measures the percentage of hemoglobin A that has become glycosylated (coated with glucose) during previous two-three months (ADA, 2011). Normal Hb A1c for healthy individuals is about 4-6% (ADA, 2011). A reading of 8% or higher indicates the need for a change in treatment or better dietary compliance (Encyclopedia of Nursing & Allied Health, 2009). Even a 1% reduction in Hb A1c level from 8% to 7% will lower the individuals' risk for complications by 40% (CDC, 2005). American Association of Clinical Endocrinologist (AACE) and the American College of Endocrinology (ACE) recommend a level below 6.5% for person with diabetes (AACE/ACE, 2010). Even though the Hb A1c test is widely used for the treatment decisions for the management of diabetes, the test is subject to some limitations. Such conditions that

affect erythrocyte turnover (hemolysis, blood loss) can alter the results of hemoglobin A1c (Sacks, Bruns, Goldstein, Maclaren & McDonald, 2002). Hb A1c monitoring is currently the best way to assess glycemic control, manage and treat diabetes (AACE/ACE, 2010). For this study, Hb A1c results were retrieved from each project participant's chart at the beginning and at the end of the program for comparison. There is a strong relation between self-care activities and Hb A1c. Participants who adhere to self-care activities will reduce Hb A1c levels and reduce the risk of diabetes related complications.

Diabetes Self-Management Trials

There are many diabetes intervention reports that have shown improved metabolic control (Glasgow et al., 1992; Miller et al., 2002; Murlow et al., 1987; Norris et al., 2002; Ridgeway, 1999). A randomized clinical trial conducted in the UK by Davis and et al. (2007) evaluated the effectiveness of a self-management program for 824 people with newly diagnosed type 2 diabetes. The self-management project involved a six-hour structured group educational setting and the program evaluated Hb A1c, blood pressure, weight, blood lipid levels, smoking

status, physical activity, quality of life, and beliefs about illness before and after the education. After a 12 month period, the intervention group showed a reduction in Hb A1c blood levels, greater weight loss, greater understanding of diabetes, decreased smoking, greater personal responsibility, lower blood pressure, and lower rates of depression.

Culica, Walton and Prezio (2007) found similar results in their study of a low-cost self-management diabetes education programs targeted towards Mexican Americans. A total of 162 patients with type 2 diabetes enrolled in the program. The Hb A1c was measured at baseline and for 12 months. The mean Hb A1c was significantly reduced in patients who participated in the program for 12 months, from 8.22% at baseline to 7.0%. This study signifies that low-cost diabetes programs can make a significant difference in the outcome of underserved populations.

Another United Kingdom study by Deakin, Cade, Williams and Greenwood (2006) focused the education on empowering patients to develop diabetes self-management skills. Of the 314 participants, 157 were assigned to the education program and the other 157 were assigned the

control group. By 14 months, the education group compared with the control group had greater reduction in Hb A1c, cholesterol, body weight, and waist circumference. Also, the education group had a 16% reduction in diabetes medications, greater diabetes knowledge, and was much more satisfied with their treatment.

Another Connecticut study of 142 people with diabetes indicated a positive outcome regarding diabetes education based on self-management (Malijanian, Grey, Staff & Cruz-Marino-Aponte, 2002). Three months after enrollment in the self-management diabetes program, participants had a mean decrease in Hb A1c values from 9.31% to 7.21%. Short-term results showed that significant improvement in glycemic control can be achieved through a comprehensive program of patient education and self-management.

A study conducted by Project Dulce in Whittier, CA measured the effect of nurse-managed diabetes education and treatment program for a Hispanic community (Philis-Tsimikas & Walker, 2001). Three hundred people with diabetes at risk for complications (average blood sugar level above 250mg/dl) received 12 weeks of culturally appropriate education and training. After one year, the high risk group showed significant improvement in their Hb

Alc from 11.5% to 8.3%, reduction in total cholesterol, decrease in their blood pressure, and an increase in diabetes knowledge.

Rosal, Olendzki, Reed, Scavron, Gumieniak and Ockene (2005) conducted a pilot study at the University of Massachusetts. Their study focused on randomized clinical trial targeting low-income Spanish-speaking individuals with type 2 diabetes. Participants were randomly assigned to a control (n=10) and intervention (n=15) group. Ten group sessions were provided to the intervention group consisting of diabetes knowledge, attitudes, and self-management skills. Assessment was completed at baseline and at 3 and 6 months period. The study revealed that glycosylated hemoglobin decrease at 3 months interval for the intervention group was -0.8% and at 6 months, it was -0.85%. The decrease was significantly different from the controls. Also, there was an increase in physical activity and increase in glucose self-monitoring in the intervention group compared to the control group.

Summary

Numerous studies have demonstrated that diabetes education programs which focus on self-management of the

disease lead to a reduction in blood glucose levels, diabetes associated complications, medication costs, and fewer emergency room visits and hospitalization (Wagner, Sandu, Newton, Mc-Cullock, Ramsey, and Grothaus, 2001). Few of these studies have taken place in Community-based settings. Community based self-management diabetes programs and long-term patient participation will help reduce the burden of diabetes in the underserved Hispanic population.

The positive outcomes of self-management diabetes programs reported in the literature are consistent. As a result, diabetes self-management programs have been recognized as a valuable resource that enables patients to actively participate in managing their own care.

CHAPTER THREE

METHODOLOGY

The self-management diabetes program was developed as part of a clinical rotation in the Masters in nursing program at California State University of San Bernardino. The present study was conducted in a county clinic with a one diabetic educator and convenience sample of mostly adult Hispanics with diabetes. A 2010 community health needs assessment by the Health Assessment Resource Center (HARC) revealed diabetes as the top priority health problem for adults in the Eastern Riverside County (HARC, 2010). Limited access to diabetes educational services in the Eastern Coachella Valley for the uninsured/low-income Hispanic population indicates a need for a community-based educational program with long term follow up to improve the quality of diabetes care and health outcomes.

The primary aim of this clinical project evaluation was to determine the effectiveness of a self-management diabetes program designed for the underserved Hispanic population in the Eastern Coachella Valley, California. The diabetes self-management program is administered by a

diabetes educator to improve diabetes management, measured as improved self-care activities and Hb A1c levels.

One hypothesis guided this study: Participants in a diabetes self-care management program will significantly improve their self-care activities of nutrition, exercise, medication, and glucose monitoring and decrease in Hb A1c levels. This program uses American Diabetes Association (ADA) guidelines to address diabetes related education.

Target Population

Adult Hispanic clients with diabetes were recruited from the Indio Family Care Center. Eligibility criteria for participants included Hispanic individuals, age 18 or older, and diagnosed with type 2 diabetes. These criteria were adjusted to include patients from all ethnic backgrounds when the primary providers referred them to the diabetes program. Persons with gestational diabetes and type 1 diabetes were excluded from the project. Although the program mainly focused on adult Hispanics, services were not denied to other ethnic groups.

Setting

The current program was conducted at Riverside County's Family Care Center based in Indio, California in Eastern Coachella Valley (ECV). This location was excellent since the majority of clinic clients were member of the ECV underserved populations with low incomes and a large number of the Hispanic population from surrounding cities including Indio, Coachella, Mecca, and Thermal. This clinic is located between Indio and Coachella where the public bus transportation is readily available. The diabetes educator joined the clinic interdisciplinary team that included receptionists, primary care providers, financial coordinator, Spanish speaking translators, and clinic nurses. For the patient's privacy, a private office was allocated within the clinic for face-to-face meeting with the diabetes educator and follow-up phone calls.

Recruitment

Beginning in January 2010 adult patients with diabetes coming to the Indio Family Care Center to visit their primary care provider were invited to receive extra care from a diabetes nurse educator (DNE). Primary care providers and nurses working at the clinic refer patients

by scheduling an appointment with the DNE. For potential participants who could read English or Spanish, the DNE provided them with a copy of the program purpose, risks, benefits, duration, and procedures. For those patients who were unable to read, the information was explained by the DNE in English or a Spanish speaking interpreter.

Patients who were eligible to participate in the Diabetic Educator Program were informed about their rights to refuse to participate with no penalty or withdraw from the program at any time without any form of penalty or retaliation. Upon agreement to participate, individuals signed a language appropriate written informed consent for enrollment (See Appendix A). For those who only spoke Spanish, a Spanish version of the informed consent was provided and a Spanish speaking translator explained the contents before the individual signed the consent form.

The program evaluation involves secondary analysis of data collected on the program participants from January 2010 through March 2011. Of the 90 low-income Hispanic adults with diabetes who had been seen by the DNE, 38 completed follow-up visits.

Ethical Considerations

Prior to the clinical rotation, the DNE completed the course of Human Subject Ethics Training in the Protection of Human Participants required by the university. Two separate consents were required from the participants in the study. First consent was for the participants to join the self-management diabetes program and second consent was for allowing investigator to collect their data from the medical records.

During the initial patient visit, the DNE explained the purpose of the diabetes program at the Indio Family Clinic and the importance of evaluation of their participation. Patients were informed about completing a survey at the beginning and at the end of program, follow-up weekly phone support, and routine Hb A1c lab tests to assess blood sugar control after three months.

A written copy of the purpose and participation in the program was given to the patients who could read English or Spanish. For those patients who were unable to read, the form was explained by the DNE in English or a Spanish speaking interpreter explained the program verbally. All patients were assured there was no penalty for not participating in the program.

A written copy of the purpose and participation in the program was given to the patients who could read English or Spanish. For those who only spoke Spanish, a Spanish version of the informed consent was provided and a Spanish speaking translator. Participants were informed about their rights to refuse to participate with no penalty or withdraw from the program at anytime without any form of penalty or retaliation. Participants were provided with the purpose, risks, benefits, duration, and procedures prior to entering the program.

Before seeking IRB approval for the study, the DNE/investigator sought written approval to access all the charts and the DNE records at the Indio Family Care Center. The Director supplied a letter of agreement (see Appendix D). The DNE/investigator saw each diabetes program participant to explain the study and ask those who wanted their records as part of the study to sign the consent form (See Appendix D).

Secondary analysis of the confidential data set did not pose any risks to the participants in the DNE program. Patient confidentiality was maintained at all times. Each participant was assigned a study ID which was used to identify all data collected from baseline and through

outcomes the program. No personal identifiers were included in the evaluation data file. During data analysis, the medical record copies were kept in a locked drawer in the investigator's office. Upon completion of the thesis, all copies of medical records were returned to the clinic.

Validity and Reliability

Data were collected using a *Summary of diabetes self-care activities (SDSCA)* questionnaire and Hb A1c test results. SDSCA tool has been used in various studies, nationally and internationally (Weinger, Butler, Welch & Greca, 2005). This tool assesses the history of self-care activities of people with diabetes. This instrument was adopted in the Project Dulce: The Whittier Institute of Diabetes, and was used recently at the Programa Dulce del Valle in Riverside County clinics in Indio. SDSCA has demonstrated acceptable reliability and validity (Toobert et al. 2000). The tool has demonstrated internal stability exceeding .50 and test-retest reliability range from .55 to .64 and validity reports were also high (Toobert et al. 2000).

The Hb A1c blood test, which measures average blood glucose for previous two-three months, is becoming the standardized test for glycemic control and diagnosing diabetes along with fasting blood glucose (ADA, 2010 & AACE/ACE, 2010). For adults, Hb A1c testing has strong predictive value for diabetes complications (Knowler, Barrett-Connor, Fowler, Hamman & Lachin, 2002).

Procedure

Demographics and medical history data were collected at baseline. Physiological assessments included measures of Hb A1c, blood pressure, height, and weight. Medications were recorded and reviewed during the face-to-face meeting. Behavioral assessment included 24 hr dietary recall, asking individuals whether they had checked their blood sugar level in the previous 24 hr, and their activity level. Pre and post program questionnaires measured changes in diabetes self-care activities. At the 3-month follow-up, individuals enrolled in the program were evaluated to show changes in Hb A1c levels.

The diabetes self-management education program is an interactive, collaborative process which provides adults with basic knowledge to manage their type 2 diabetes,

focusing on their self-identified problems and goals. Primary data collection methods included questionnaires (see Appendix B) and reviews of patient's medical records for Hb Alc levels.

Self-Care Activities Questionnaire

Each participant completed the questionnaire about diabetes self-care activities, at the onset of the self-management diabetes program and at the end of the program, independently, unless assistance was required. The 12-item questionnaire focused on four self-care activities for the previous seven days: nutrition, exercise, glucose monitoring, and diabetes medication. Diabetes self-care activities questionnaire allowed the DNE to assess patient's compliance with physician orders and helped identify focus area for patient education. Along with the questionnaire, the DNE interviewed the patient so assess their knowledge about the disease and its management. Specific interview questions included 24 hr food recall, recent blood sugar values, activity level, barriers to self-management (e.g. health insurance, transportation, responsibilities at home, financial issues, psychosocial issues, etc…).

Diabetes Education

Once specific educational and self-management needs of the patient were identified through the questionnaire and the interview, the DNE was able to focus on the area with the greatest self-management deficit. The education included an overview of diabetes, patient's current glycemic control, blood glucose monitoring, current medications, acute and chronic complications, sign/symptoms of hypo/hyperglycemia, meal planning, stress management, and foot care. Diabetes handbook, available from Riverside County Health Department, was given to every individual in appropriate language. The handbook covered all the topics which are mentioned above. Additional single page educational pamphlets were available from several diabetes suppliers on diet, meal planning, exercise, overview of diabetes, complications, and sign/symptoms.

Towards the end of the initial face-to-face meeting, a mutual short term goals were established by the patient and the DNE. The initial visit with the DNE lasted approximately 60-90 minutes. Patients were also reminded to come back to the clinic for additional face-to-face meeting if they needed further help. The

educational approach was culturally sensitive in terms of diet, language, cultural health beliefs, family involvement, and social emphasis.

Blood Sugar Log Sheets

Along with education handouts, the DNE provided each patient with daily blood sugar log sheets (See Appendix C). The DNE instructed patients on how to complete the log sheet. Also, the DNE reminded patients to take the log sheet to all of their appointment with the primary care provider.

Follow-up Phone Calls

During the first visit, the program participants provided the DNE with working phone numbers for weekly follow-up calls. The participants were asked to provide appropriate time and day to call to prevent scheduling conflict. The follow-up calls included discussion about blood sugar levels, activity, diet, medication regimen, concerns and questions. Twelve weeks of follow-up phone calls were provided to the patients. During each call, the DNE documented the discussion along with the focus of the next call. With each follow-up phone call, the diabetes educator provided positive reinforcement, positive feedback, motivation, and reminded each

participant of the individual goals. Follow-up phone calls helped the DNE to assess current progress of patient's diabetes self-management. Spanish speaking translators were used on as needed bases for the face-to-face visit and follow-up phone calls.

Follow-up Visit after Three Month

After three months of phone follow-up, each participant was requested to come to the clinic to complete the self-care activities questionnaire. This was the same survey the patients completed at the first visit. Patients were allowed additional time to discuss any concerns or questions at this meeting. Survey results, notes of previous telephone calls, office visit discussions, and the results of the Hb A1c test were reviewed to assess the effectiveness of the diabetes self-management program. The initial and three-month self-care activities questionnaire results were compared and Hb A1c results from the baseline and after three-month follow-up were reviewed from the patient's chart to assess overall glycemic control during the program. Patients were encouraged to come for additional education if needed.

Data Analysis Plan

Data were entered using the Excel format and converted to Version 16 of the Statistical Package for Social Sciences (SPSS; IBM 2008) for analysis. At the visit, the diabetic educator asked about self-care activities and answers were recorded. Higher numbers represented more positive self-care.

Descriptive statistics were computed to describe the sample, their self-care survey results and Hb A1c levels. Cross-tabulation of individual self-care pretest and post-test items were analyzed using Kendalls tau b, appropriate for ordinal data. Paired student t-tests were calculated to compare the difference in pre-test and post-test mean Hb A1c levels, and self-care nutrition, exercise, and glucose monitoring subscales. Pearson correlations were used to identify relationships between self-care activities and Hb A1c scores following the interventions. The criterion for statistical significance was $p < .05$.

Limitations

The present study was conducted in a county clinic with a one diabetic educator and convenience sample of mostly adult Hispanics with diabetes. A major limitation

of the evaluation is the lack of a control group or randomized sample and small sample size (N=38). One diabetes educator limited the number of participants to thirty-eight. Since all the patients were from one local clinic, the sample of underserved Hispanics with type 2 diabetes may not be representative of the larger population.

One of the problems encountered by the diabetic educator was reaching participants weekly for follow-up phone calls. Due to work schedule, personal commitment, and other responsibilities, some of the patients were not available for the follow-up phone calls. Thus, not every patient benefited from the follow-up phone calls. Also, socioeconomic and psychosocial barriers that might influence the outcome were not assessed in this study. Due to the limited numbers of volunteer hours by the diabetic educator, follow-up with every patient each week was not possible.

Although the self-care surveys were written in an appropriate language, self completion and varying literacy levels may have influenced individual participant's understanding of the survey questions. With a limited numbers of visits and time for one-on-one sessions,

patients may not have received enough support to carry out their diabetes self-management plan.

Without a comparison group and only one diabetic educator, one is not sure the outcome was due to participants' enthusiastic efforts to please the diabetic educator. In addition, their self-reports might have been inflated. It is also important to note that patients who are being evaluated automatically improved attention they receive.

A three-month follow-up may be too early to evaluate long-term improvement in diabetes self-care activities. Also, the self-care activities tool only asked about the last seven days activity. Thus, it is hard to know how long the participant has performed the activities.

In addition, the reduction in patient's Hb Alc levels may be due to a variable extraneous to program participation itself; one example might be increased aggressive diabetes treatment by the primary care providers. The Hb Alc results indicate the individual's average blood sugar for the previous two to three months. Due to inconsistencies in participant follow-up with the primary care provider, some of the Hb Alc results were not collected right at three months.

Summary

This retrospective study evaluated self-management diabetes program among adult Hispanics in the Eastern Coachella Valley. The 12-week program included face-to-face meetings with a diabetic nurse educator (DNE) and follow-up phone calls. The DNE compared the baseline and three month self-care activities of nutrition, exercise, medication, and glucose-monitoring self-care activities and glycemic control (Hb A1c blood levels).

The main purpose of the diabetes education program was to provide self-management skills to manage their own disease so they can prevent long-term complications associated with un-controlled diabetes.

CHAPTER FOUR

RESULTS AND DISCUSSION

This study evaluated Diabetic Self-Management Program participants' self-care activities and Hb Alc results. A diabetic educator provided face-to-face education and three months of follow-up over the phone. The results presented here include description of the sample, pre-test and post-test self-care activities results, subscale self-care activities results and Hb Alc lab results.

Demographics

The mean age of the 38 participants was 50 years (median = 52; sd = 12.4, range = 24-70); 95% (n=36) were Hispanic and 5% (n=2) were Caucasian. The majority of participants were female (n=22).

Sixteen percent (16%, n=6) of participants had a new diagnosis of diabetes. The average years with a diabetes diagnosis was 6.5 years (median = 4 years, sd = 6). The majority of the participants (68%, n=26) were on hypoglycemic medications; 26% (n=10) were on combinations of hypoglycemic medications and insulin, and 5% (n=2) were not on any medications.

Data Analysis

Once the chart data were entered into the spread sheet in Excel, 10% of the sample data was checked against the original chart for accuracy if data entry. The results are presented in order of the self-care items on the survey, followed by the Hb A1c blood levels. Finally, the relationships of Hb A1c to self-care activity scores and sub-scores (nutrition, exercise, glucose monitoring, and oral medication compliance) were analyzed.

Before the responses to the self-care items could be analyzed, question numbers four and five needed to be reverse coded so a high score indicated a positive self-care (See Appendix B).

Initial and Post-test Self-Care Activities

The Self-care activities questionnaire is a self-reporting tool that measures activities over the past seven days. Four areas were assessed: diet (5 questions; potential total Subscale score = 25), exercise (3 questions; potential total Subscale score = 21), glucose monitoring (2 questions; potential total Subscale score = 8), and medication use (2 questions; potential total Subscale score = 4). From the 12 questions, the total possible score on the SDSCA tool is 58. A high score

represents positive self-care activities. Initial and three-month self-care activities questionnaire results were compared for each question.

Nutrition

1. How often did you follow your recommended food plan over the last seven days?

   After the intervention, there was a three-fold increase in participants who responded that they 'always' or 'usually' (from 18.4% to 73.7%) follow their food plan. There was also a marked decrease (from 31.6% to 0%) in those who responded they did not have a recommended food plan. Although these decreases are clinically significant, statistically they were not (Kendalls tau b = .13, p = .42) See Appendix E Table 1.

2. How often did you successfully limit your calories if recommended?

   Following the intervention, there was a decrease in participants who reported being 'not sure what's recommended calories' (from 13.2% to 0%). There was more than two fold increase in participants who responded that they 'always' or 'usually' (from 21% to 68.5%) limit their calories. These decreases are both

clinically and statistically significant (Kendalls tau b = .393 p = .007). See Appendix E Table 2.

3. During the past week, how often did your meals include high fibers, such as fresh fruits, fresh vegetables, whole grain breads, dried beans and peas, and bran?

   The number of participants who reported 'always' consuming meals high in fiber more than doubled after the intervention (21.1% to 73.7%). Although these increases are clinically significant, statistically they were not (Kendalls tau b = .13, p = .31). See Appendix E Table 3.

4. During the past week how often did your foods include high fat foods, such as butter, ice cream, oil, mayonnaise, salad dressing, bacon, and other meat with fat or skin?

   Over 100% of the participants responded 'rarely' after the intervention when asked 'how often did you consume high fat foods' (from 23.7% to 52.6%). There was slight decrease in responses from participants who stated 'never' (from 13.2% to 10.5%) include high fat foods in their diet. Although these changes are clinically significant, statistically they were not (Kendalls tau b = -.10, p= .50). See Appendix E Table 4.

5. During the past week, how often did your foods include sweets and desserts such as pie, cake, jelly, soft drinks (with sugar), or cookies?

Following the intervention, there was almost a two-fold increase in participants who responded 'rarely' or 'never' (from 26.3% to 76.3%) includes sweets and desserts in their diet. There was a 94% decrease in response from participants who stated 'usually' consumes foods including sweets and desserts after intervention (from 44.7% to 2.6%). Although these changes are clinically significant, statistically they were not (Kendalls tau b = -.14, p = .29). See Appendix E Table 5.

Exercise

6. Of the last seven days, how many days did you participate in 20 minutes or more of physical exercise?

After the intervention, the mean numbers of days was 4.16 compared to 2.34 at the time of the pre-test. These changes were both clinically and statistically significant. ($t = 3.372$, $p < .002$). See Appendix E Table 6.

7. Of the last seven days, how often did you exercise the amount suggested by your doctor or health care provider?

The respondents reported almost twice as many days of exercise suggested by a health care provider (from 2.23 days to 4.16) after the intervention compared to baseline. These changes were both clinically significant and statistically significant (t-test = 3.37, p =.002). See Appendix E Table 7.

8. Of the last seven days, how often did you participate in a specific exercise session other than what you do around the house or as part of work?

   Following the intervention, there was two times increase in numbers of respondents who participated in a specific exercise session other than what they do around the house or as part of work of the last seven days. These changes are clinically and statistically significant (t-test = 3.901, p =.001). See Appendix E Table 8.

Glucose Monitoring

9. On how many of the last seven days did you check your blood glucose level at least once?

   Post intervention, there was almost a 93% increase (from 36.8% to 71.1%) in those who reported checking their blood glucose 'every day' when compared to baseline. There was also a 63% decrease (from 23.7% to 7.9%) in those who reported 'never' checking their blood glucose.

Although these decreases are clinically significant, statistically they were not (Kendalls tau b = .19, p = .19). See Appendix E Table 9.

10. Over the last seven days, how often did you perform all the glucose monitoring recommended by your doctor or health care provider?

There was a 125% increase (from 31.6% to 71.1%) in those who reported performing all glucose monitoring recommendations 'every day'. Although these decreases are clinically significant, statistically they were not (kendalls tau b = .17, p = .23). See Appendix E table 10.

Diabetes Medication

11. How many of your planned insulin injections did you take over the last seven days?

The analysis of pretest post-test changes was conducted for the 11 (32.3%) participants who took insulin. There was not a significant difference between pre and post measurements (kendalls tau b = .49, p = .23). See Appendix E Table 11.

12. How many of your recommended number of pills to control your diabetes did you take in the past seven days?

The analysis of pretest post-test changes was conducted for the 34 (89.5%) participants who took oral hypoglycemic medications. There was a 30% increase (from 71.1% to 92.1%) in the proportion of participants reporting they took 'all' of the prescribed number of pills to control their diabetes during the past seven days. These changes were both clinically and statistically significant (t-test = 2.54, p = .02). See Appendix E Table 12.

Average score for all participants improved after the intervention. When the individual pre-test and post-test item responses were cross-tabulated, Kendall's tau analysis indicated four out of twelve items to be statically significant among the responses; successfully limiting calories as recommended (question 2, p = .007), participate in 20 minutes or more of physical exercise (question 6, p = <.002), exercise the amount suggested by the doctor (question 7,p = .002), participate in exercise session other than around the house or as part of work (question 8,p = .001), and recommended numbers of pills (question 12, p = .02).

Pre and Post-Test Self-Care Activities Sub-Score

Satisfaction results were not seen with individual questions of self-care activities. An attempt was made to see if grouping of similar items produced better results.

The pre-test and post-test sub-score means were compared using student t-tests. This test is appropriate for comparing the scores as interval level data. Even though many individual items didn't show statistical significance, the changes in sub-scores was a statistical and clinical significant. See Table 1.

On the pre-test, the nutrition subscale score was 14.76 (five items) out of a possible score of 25. This score increased to 19.97 after intervention (t-test = 6.533, $p < .001$). The mean pre-test exercise subscale score was 6.54 (three items) out of a possible score of 21. Self-reported exercise score increased to 12.28 after the intervention (t-test = 3.294, $p < .002$). On the pre-test, the glucose monitoring subscale score was 5.28 (two items) out of a possible score of 8. The glucose monitoring score increased to 6.89 after the intervention (t-test = 3.768, $p < .001$).

Survey sub-score on medication compliance could not be calculated for the entire sample, because the patients

were prescribed varying medication regimens: insulin, an oral hypoglycemic agent, or both. The analysis focused on numbers of patients who were on oral hypoglycemic agents. On the pre-test, the mean score for oral medication compliance was 3.64 (91%) and post-test score was 4.0 (100%) after the intervention.

Glycemic Control

Pretest and post-test Hb A1c analysis indicated significant changes. The mean pre-test score was 9.23 compared to mean post-test score of 7.96 (t-test = 4.06, $p < .001$). Blood test collection intervals between the pretest and post-test Hb A1c ranged from a low of 30 days (1 month) to a high of 270 days (9 months). To determine if this variance influenced the findings, Hb A1c level changes were calculated and correlated with the number of days between readings. The relationship was not significant ($r = .052$, $p = .38$).

Table 1. Pre-Test and Post-Test Sub-Score

	Nutrition	Exercise	Glucose Monitoring
Possible score	25	21	8
Pre-test score	14.76	6.54	5.28
Post-test score	19.97	12.28	6.89
Paired t-test	6.533	3.294	3.768
P Value	<.001	<.002	<.001

Self-Care Activities and Glycosylated Hemoglobin (Hb A1c)

The post-test total self-care mean scores were significantly higher than the pretest total self-care mean scores (43.7 from 30.0), out of a potential score of 58 (paired t-test = 4.06, $p < .001$). The mean post-test Hb Alc score was 7.96 compared to mean pre-test score of 9.23. See Table 2.

Table 2. Total Self-Care Activities and Glycosylated Hemoglobin (Hb A1c)

	Self-Care Activities	Hb A1c
Potential Score	58	A1c Goal < 7%
Pre-test score	30.0	9.23 (SD=2.40)
Post-test score	43.7	7.96 (SD=1.65)
Paired t-test	5.4	4.06
P Value	<.001	<.001

Correlations of Self-Care Activities to Glycosylated Hemoglobin (Hb A1c)

Pearson correlations were used to determine the significance of the relationship between self-care activities scores and Hb A1c. The correlation of pre-test self care activities scores and pre-test Hb A1C levels was not significant ($r = -.15$, $p = .21$). The correlation of post-test self care activities scores and post-test Hb A1C levels was significant ($r = -.457$, $p = .003$). The

negative Pearson r was expected; individuals with higher self-care activities scores had lower Hb A1c levels.

Discussion

The diabetes self-management education program had a significant impact on several self-care activities and Hb A1c. Total self-care activities improved by 23% ($t = 5.4$, $p < .001$). Hb A1c results significantly decreased from a mean of 9.23 to 7.96 (t-test = 4.06, $p < .001$). With improved post-test self-care activity following the intervention, scores were significantly correlated with post-test Hb A1c levels ($r = -.457$, $p = .003$).

The mean nutrition subscale score increased from 16 (64%) to 20 (80%) out of possible score of 25 after the intervention. The mean exercise subscale score increased from 6.54 (31%) to 12.28 (58%) out of possible score of 21. The mean glucose subscale score increased from 5.28 (66%) to 6.89 (86%) out of possible score of 8 after intervention. The mean oral medication compliance subscale score increased from 3.64 (91%) to 4.0 (100%) out of possible score of 4 after intervention.

Even though the mean Hb A1c levels after three-months did not achieve the target goal of Hb A1c < 7%

(ADA, 2007), the final Hb A1c levels were very close to the target.

Summary

The study had several major findings. Adult Hispanics participated in the diabetes self-management program were able to make major improvement in diabetes self-care activities of nutrition, exercise, medication, and glucose monitoring. Total self-care activities improved by 23% ($p < .001$). In addition, improvement in self-care activities correlated with a decrease in Hb A1c ($p = .003$). All the outcomes support the study hypothesis that participants in a diabetes self-care management program will significantly improve their self-care activities of nutrition, exercise, medication, and glucose monitoring and improve their glycemic control.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

According to the CDC (2007), the proportion of Hispanics who report that they have no usual place to receive health care is more than double that of non-Hispanic whites and non-Hispanic blacks. In Eastern Riverside County in 2009, an estimated 14.8% of adults age 18 and older did not have any kind of health care coverage and Hispanics are nearly five times more likely than Whites to be uninsured (HARC, 2010). Lack of affordable health insurance, lack of affordable medical services, language barrier, cultural barrier, lack of transportation, lack of awareness of available services, hours of operation, and long waits all impact access to health care.

It is important to have access to quality care to eliminate health-care disparities and increase the quality and years of healthy life. This is especially true for persons with diabetes mellitus. Uncontrolled diabetes can lead to severe complications and early death (Copeland et al, 2005). People with diabetes must control of their blood sugar with combination of nutrition, exercise, and

medication management. These steps will lower their risk of complications.

Program Summary

The self-management diabetes program was established at Indio Family Care Center as part of a masters' in nursing clinical rotation. The aim of the program was to improve participants' knowledge and skills required for self-management and also to improve glycemic control of diabetes among Hispanics in the Eastern Coachella Valley. The program involved face-to-face meetings and follow-up telephone calls to clinic patients with diabetes. The RN masters student served as a diabetes educator. During the meetings, the educator stressed the importance of healthy food choices, physical activity, self-monitoring of blood glucose, medication management and other necessary behavioral changes. The follow-up calls served as additional support and to track changes.

The study involved secondary analysis of data collected in a clinic serving low-income Hispanic adults with diabetes. The program results support the hypothesis that self-management skills learned during the

intervention would significantly improve self-care activates and glycemic control.

Conclusion

The findings validate the beneficial effects of the diabetes self-management program designed for Hispanics. The face-to-face meeting(s) along with follow-up phone calls had a significant effect on the participants' nutrition, glucose monitoring, activity level, and medication regimen. These findings are similar to published results of several research trials indicating that persons with diabetes who attend diabetes self-management programs have better glycemic control compared to those who do not attend such programs (Glasgow et al., 1992; Miller et al., 2002; Murlow et al., 1987; Norris et al., 2002; Ridgeway, 1999).

Even though this study didn't formally collect qualitative data, participants commented that they appreciated the personal attention and follow-up care. Although the program did not attract large numbers of participants, the friendly environment enhanced learning so the patients felt comfortable discussing their issues and concerns with the DNE. The key to sustaining self-

management of diabetes is routine contacts with patients by a diabetes educator in whom they have confidence and trust. The study has implications for practice, research as well as education.

Recommendations

Access to quality care is important to eliminate health disparities and increase the quality and years of healthy life for all persons. Thus, nurses must take more active role in eliminating such disparities, especially for Hispanic population. Access to care is particularly important for persons with diabetes. Nurses can work on policy changes to improve the care of uninsured or low-income Hispanics. As nurses work on policies, it's important to include community participation in the process.

Diabetes self-management programs should be promoted in the multiple settings such as hospital settings, church-based, senior centers, clinics, primary-care settings, community center. Diabetes education might be offered in the setting if initial surveys of need indicate a large numbers of clients with diabetes.

Nursing staff in any setting can play a key role in promoting and educating patients with diabetes. A course should be developed in diabetes self-management for the nurses who frequently encounter diabetic patients. Retired nurses also could offer their skills and expertise in the management of diabetes by offering volunteer hours in their local community. Implementing self-management programs in an existing clinic require limited resources. Identifying nurses from the community who are willing to volunteer few hours a week can be tremendous help in establishing and continuing diabetes education programs.

Community health workers (CHWs), also called Promotora, are also another source of help reaching underserved population. They are trained by health care professionals to work within the community to provide additional support. Therefore, identifying and training individuals who can provide diabetes education to the community adds additional help. Their contributions to diabetes care would be beneficial to the underserved population with diabetes.

In spite of the limitations of this project, the positive outcomes strengthen the importance of self-management of diabetes among Hispanic population.

However, the limitations of this study can be addressed in future studies. First, future research can look at weekly follow-up face-to-face meetings compared to weekly follow-up phone calls and see the outcome. Many underserved Hispanic adults often face psychosocial and socioeconomic issues. Future research should identify psychosocial and socioeconomic issues affecting patients with diabetes and address these issues. Future research should identify these issues and address them in new interventions for self-management of diabetes. Future research should also be conducted with a larger sample and a more diverse group that is more representative of the population of Hispanics with diabetes.

With the increasing prevalence of diabetes, maintaining glycemic control is very important in preventing serious complications. Such complications would decrease the individual's functional level and impair quality of life. Participation of adult Hispanics with diabetes in self-management activities and regular follow-ups will improve clinical outcomes, reduce or prevent diabetes related complications, reduce healthcare costs, and ultimately improve quality of life.

APPENDIX A

CONSENT FORM (ENGLISH VERSION)

CONSENT FORM (ENGLISH VERSION)

Self-management Diabetes Program in the

Eastern Coachella Valley

Patient Participation Agreement

A. As a participant in this program, I will be provided with the following diabetes care and education:

1) Clinical visits with a diabetes nurse educator
2) Nutrition counseling
3) Laboratory tests for managing diabetes
4) Opportunity to attend a small group diabetes education class
5) Foot exam and daily foot care skills
6) Personal sick day management plan
7) Yearly diabetes retinal scan
8) The opportunity to participate in development of an individualized self-care plan which affects my diabetes care

B. As a program participant, I agree to maintain the following patient responsibilities:

1) Keep my schedule appointments. If I have to cancel an appointment, I agree to call in advance and reschedule the appointment for a different time
2) Check and record my blood sugars as agreed upon
3) Maintain a written record of my blood sugar as agreed upon
4) Work with the program team to make diet and physical changes that will help me to better manage my diabetes
5) Participate in program evaluation by completing questionnaires regarding my diabetes care
6) Notify of any changes in home address, phone number, or insurance status
7) Report any Emergency room visits to the educator
8) Schedule appointments with the diabetic educator to review my progress
9) Allow program staff to assess and review my clinic medical records for evaluation purposes
10) Follow recommended treatment/medication plan

C. As a program participant, I may be dismissed from this program for the following reasons:

1) Inappropriate conduct or misbehavior to any staff member or patient
2) Repeated failure to accompany with recommended treatment regimens
3) Under the influence of alcohol or illegal drugs during scheduled appointment

D. I have read and understood the above information. I volunteer to accept the responsibility of participating in this program.

Participant	**Team Member**
Name_____	Name_____
Signature_____	Signature_____
Date_____	Date_____

Note: This consent form was adopted from the Programa Dulce del Valle at Riverside County Clinic in Indio, CA.

APPENDIX B

SUMMARY OF DIABETES SELF-CARE ACTIVITIES

SUMMARY OF DIABETES SELF-CARE ACTIVITIES

Instructions: Thank you for taking the time to complete this! These questions below ask you about your diabetes self-care activities during the past 7 days. If you were sick during the past 7 days, please think back to the last 7 days that you were well. Please answer the questions honestly and accurately, select one answer per question and fill in the appropriate circle.

NUTRITION

1. How often did you follow your recommended food plan over the last 7 days?

O Always O Usually O Sometimes O Rarely O Never O I don't have a food plan diet

2. How often did you successfully limit your calories if recommended?

O Always O Usually O Sometimes O Rarely O Never

O I'm not sure what is recommended as healthy eating for diabetes control

3. During the past week, how often did your meals include high fiber foods, such as fresh fruits, fresh vegetables, whole grain breads, dried beans and peas, and bran?

O Always O Usually O Sometimes O Rarely O Never

4. During the past week, how often did your meals include high fat foods such as butter, ice cream, oil, mayonnaise, salad dressing, bacon, other meat with fat or skin?

O Always O Usually O Sometimes O Rarely O Never

5. During the past week, how often did your meals include sweets and desserts such as pie, cake, jelly, soft drinks (with sugar), cookies?

O Always O Usually O Sometimes O Rarely O Never

EXERCISE

6. Of the last 7 days, how many days did you participate in 20 minutes or more of physical exercise?

O None O 1 O 2 O 3 O 4 O 5 O 6 O 7

7. Of the last 7 days, how often did you exercise the amount suggested by your

doctor or health care provider?

O None O 1 O 2 O 3 O 4 O 5 O 6 O 7

O My health care provider has not suggested an exercise program

8. Of the last 7 days, how often did you participate in a specific exercise session other than what you do around the house or as a part of work?

O None O 1 O 2 O 3 O 4 O 5 O 6 O 7

GLUCOSE MONITORING

9. On how many of the last 7 days did you check your blood glucose level at least once?

O Every day O Most days O Some days O Never

10. Over the last 7 days how often did you perform all the glucose monitoring recommended by your doctor or health care provider?

O Every day O Most days O Some days O Never

O My health care provider has not recommended I monitor my glucose

DIABETES MEDICATION

11. How many of your planned insulin injections did you take in the past 7 days?

O All of them O Most of them O Some of them O None of them

O I do not take insulin

12. How many of your recommended number of pills to control diabetes did you take in the past 7 days?

O All of them O Most of them O Some of them O None of them

O I do not take pills to control my diabetes

Note: Self-care activities survey questions were used in the Diabetes Dulce Programma by the Riverside County Clinic in 2007.

Toobert, D.J., Hampson, S.E., Glasgow, R. E. (2000). The summary of diabetes self care activities measure. *Diabetes Care*, 23 (7), 943-950.

APPENDIX C

BLOOD SUGAR LOG SHEET

BLOOD SUGAR LOG SHEET

Date	Before Breakfast	2 hours after Breakfast	Before Lunch	2 hours after Lunch	Before Dinner	2 hours after dinner	At Bedtime	Before Exercising

Note: This form was adopted from the Programa Dulce del Valle at Riverside County Clinic in Indio, CA.

APPENDIX D

APPROVAL LETTERS

Department of Public Health
Riverside County Health Services Agency

Date: 10-01-2010

To: whom it may concern

School: California State University of San Bernardino

Regarding: Diabetes Research Project by Brijesh Patel at the Indio Family Care Center

My name is Gloria Robinson and I am the clinic manager at the Indio Family Care Center with Riverside County. I have known Brijesh Patel since 2007 when he first began doing his clinical experience at the clinic. His recent clinical experience providing diabetes education to the clinic's patients has added additional services which we did not have due to the budget crisis. Many of our patients who come to the clinic don't have access to diabetes education. I know that Brijesh wants to make his clinical experience into research project for the complication of his Masters degree in nursing. I give him the permission to conduct the project at the Indio Family Care Center and wish him good luck. I know that his project involves face-to-face discussion(s) with the patients, reviewing patient's charts, and following patients over the phone for several months. I also have reviewed patient's risks and benefits of his project. He has informed the clinic well in advanced regarding his project; therefore, I even have provided office space for patient's privacy. His role in the clinic is important. I appreciate his hard work and I respect his dedication. If you have any questions, you can contact me at 760-863-8924.

Sincerely

Gloria Robinson
Indio Family Care Center
47-923 Oasis Street
Indio, CA 92201
Tel: 760-863-8924
Fax: 760-863-8366
Email: grobinson@rivcoha.org

CALIFORNIA STATE UNIVERSITY
SAN BERNARDINO

Academic Affairs
Office of Academic Research • Institutional Review Board

April 18, 2011

CSUSB INSTITUTIONAL REVIEW BOARD
Expedited Review
IRB# 10064
Status
APPROVED

Mr. Brijesh Patel
c/o: Prof. Teresa Dodd-Butera
and Prof. Margaret Beaman
Department of Nursing
California State University
5500 University Parkway
San Bernardino, California 92407

Dear Mr. Patel:

Your application to use human subjects, titled "The Impact of a Diabetes Educator on Diabetes Self-Care Management" has been reviewed and approved by the Institutional Review Board (IRB). The attached informed consent document has been stamped and signed by the IRB chairperson. All subsequent copies used must be this officially approved version. A change in your informed consent (no matter how minor the change) requires resubmission of your protocol as amended. Your application is approved for one year from April 18, 2011 through April 17, 2012. One month prior to the approval end date you need to file for a renewal if you have not completed your research. See additional requirements (Items 1 – 4) of your approval below.

Your responsibilities as the researcher/investigator reporting to the IRB Committee include the following 4 requirements as mandated by the Code of Federal Regulations 45 CFR 46 listed below. Please note that the protocol change form and renewal form are located on the IRB website under the forms menu. Failure to notify the IRB of the above may result in disciplinary action. You are required to keep copies of the informed consent forms and data for at least three years.

1) Submit a protocol change form if any changes (no matter how minor) are made in your research prospectus/protocol for review and approval of the IRB before implemented in your research.
2) If any unanticipated adverse events are experienced by subjects during your research.
3) To renew your protocol one month prior to the protocols end date.
4) When your project has ended by emailing the IRB Coordinator/Compliance Analyst.

The CSUSB IRB has not evaluated your proposal for scientific merit, except to weigh the risk to the human participants and the aspects of the proposal related to potential risk and benefit. This approval notice does not replace any departmental or additional approvals which may be required.

If you have any questions regarding the IRB decision, please contact Michael Gillespie, IRB Compliance Coordinator. Mr. Michael Gillespie can be reached by phone at (909) 537-7588, by fax at (909) 537-7028, or by email at mgillesp@csusb.edu. Please include your application approval identification number (listed at the top) in all correspondence.

Best of luck with your research.

Sincerely,

Sharon L Ward, Ph.D.

Sharon Ward, Ph.D., Chair
Institutional Review Board

SW/mg

cc: Prof. Teresa Dodd-Butera and Prof. Margaret Beaman, Department of Nursing

PALM DESERT CAMPUS

CALIFORNIA STATE UNIVERSITY, SAN BERNARDINO
INSTITUTIONAL REVIEW BOARD COMMITTEE
APPROVED 04/18/11 VOID AFTER 04/17/12
IRB# 10004

Evaluation Research of Diabetes Educator Appointments
Patient Informed Consent

My name is Brijesh Patel, a graduate nursing student from California State University of San Bernardino. I am the diabetes educator who has been meeting with you at the Indio Family Center in Indio, CA and calling you to help you manage your diabetes over the last several months. As part of my graduate studies, I am conducting an evaluation research study on the importance of this form of diabetes education and regular follow-up over the phone to improve diabetes self-care activities and blood sugar levels.

With your permission, the clinic will give me a copy of the information I recorded on your chart during each visit with me at the clinic and during the follow-up telephone calls I made to you through April 2011. Also, I would copy the lab results to track your diabetes.

The clinic will remove your name and any other identifying information from all of the pages before they release it to me. I will label each page with a study number. Your information will be identified by an ID number only.

I will give each participant a summary of the study. The results of this study will be used to improve the role of the clinic diabetes educator. Therefore the results have the potential to improve the care of future clinic patients with diabetes. If you decide to share your information and participate in the evaluation research study, I do not anticipate any specific risks. You will not be penalized if you decide not to participate. You can continue to get services at the clinic and see the diabetes nurse educator. If you do not sign the permit, I will not copy any information about your care.

If you agree to participate in my study, please sign on the line at the bottom of the page. Participation will not take any more of your time. I will just analyze the progress you made managing your diabetes.

This study has been approved by the California State University, San Bernardino (CSUSB) Institutional Review Board. In case of complaints about the study, participants may contact the director of MSN Program at the university. Contact information:

BRIJESH PATEL

Brijesh Patel

Teresa Dodd-Butera, RN, MSPH, PhD, DABAT
Coordinator of Graduate Program in Nursing
California State University San Bernardino
5500 University Pkwy San Bernardino, CA
909.537.7241 tdbutera@csusb.edu

Thank you for your interest in the diabetes educator research project. Please sign below if you wish to participate in the program.

I want to participate in Brijesh Patel's evaluation research study of the effectiveness of diabetes educator. He may copy all the information he requested about my diabetes while I received his care.

Participant's Signature: _____ _____ Date: _____

Printed Name: _____ ____

CALIFORNIA STATE UNIVERSITY, SAN BERNARDINO
PALM DESERT CAMPUS

CALIFORNIA STATE UNIVERSITY, SAN BERNARDINO
INSTITUTIONAL REVIEW BOARD COMMITTEE
APPROVED 04/18/11 VOID AFTER 04/17/12
IRB# 10064

La Investigación de la Evaluación de Paciente de Citas de Educador de Diabetes
Consentimiento de Información

Me llamo Brijesh Patel, soy un graduado estudiante de la escuela de enfermería de California Universidad Pública de San Bernardino. Soy el educador de diabetes, que ha estado hayundando en el Indio Familiar Central en Indio, CA y le e llamado para ayudarlo a manejar su diabetes sobre los últimos varios meses. Como la parte de mis estudios graduados, yo realizo un estudio de investigación de evaluación en la importancia de esta forma de la educación de la diabetes y seguimiento regular para mejorar por teléfono actividades de ser-cuidado de diabetes y niveles de nivel de azúcar en la sangre.

Con su permiso, el dispensario me dará una copia de la información que registré en su registro durante cada visita conmigo en el dispensario y durante las llamadas telefónicas segundas que hice a usted por abril 2011. También, copiaría los resultados de laboratorio para rastrear su diabetes.

El dispensario no usara su nombre y quitara otra información de identificación de todas páginas antes que me lo den. Marcaré cada página con un número de estudio. Por lo tanto su información será identificada por un número de identificación sólo.

Voy a dar a cada participante un resumen del estudio. Los resultados de este estudioserán utilizados para mejorar el papel del educador en diabetes clínica. Por lo tanto los resultados tienen el potencial para mejorar la atención clínica de los pacientes con diabetes en el futuro. Si usted decide compartir su información y participar en el estudio de investigación de evaluación, no anticipar los riesgos específicos. Usted no será penalizado si decide no participar. Usted puede continuar recibiendo servicios en la clínica y ver la enfermera educadora. Si usted no firma el permiso, no voy a copiar toda la información sobre su cuidado.

Si concuerda en tomar parte en mi estudio, por favor signn en la línea en el fundo de la página. Su participación no tomará más de su tiempo. Acabo de analizar el progreso que usted hizo manejando su diabetes.

Este estudio ha sido aprobado por la California Universidad Pública, San Bernardino (CSUSB), la Tabla Institucional de Revisión. En caso de quejas acerca del estudio, los participantes pueden contactar al director de Programa de MSN en la universidad. Información de Contacto:

BRIJESH PATEL

Teresa Dodd-Butera de, RN, MSPH, PHD
Coordinadora de DABAT de Programa Graduado a Cuidar
California Universidad Pública San Bernardino
5500 Universidad Pkwy; San Bernardino, CA
909.537.7241 tdbutera@csusb.edu

Gracias por su interés en el proyecto de investigación de educador de diabetes. Por favor firme su nombre abajo si desea tomar parte en el programa.

Quiero tomar parte en estudio de investigación de la evaluación de Brijesh Patel de la eficacia de educador de diabetes. Puede copiar toda la información que solicitó acerca de mi diabetes mientras recibí su cuidado.

La Firma del participante: _____ La Fecha: _____

Imprima su nombre: _____

760 341 2883 • fax 909.673.8180
37-500 COOK STREET, PALM DESERT, CA 92211-2900

APPENDIX E

PRE-TEST AND POST-TEST SELF-CARE ACTIVITIES

SURVEY RESULTS

PRE-TEST AND POST-TEST SELF-CARE ACTIVITIES

SURVEY RESULTS

Table 1

1. How often did you follow your recommended food plan over the last seven days?

	Food Plan Response Categories *					
	Always	Usually	Sometimes	Rarely	Never	I don't have a plan
Pre-Test	10.5%	7.9%	26.3%	15.8%	7.9%	31.6%
	n=4	n=3	n=10	n=6	n=3	n=12
Post-Test	26.3%	47.4%	21.1%	0%	5.3	0%
	n=10	n=18	n=8	n=0	n=2	n=0
* Coding: Always=5, Usually=4, Sometimes=3, Rarely=2, Never=1, Not sure=1						

Table 2

2. How often did you successfully limit your calories if recommended?

	Calories Response Categories *					
	Always	Usually	Sometimes	Rarely	Never	Not sure what's recommended
Pre-Test	10.5	10.5	47.4	5.3	13.2	13.2
	n=4	n=4	n=18	n=2	n=5	n=5
Post-Test	21.1	47.4	26.3	0	5.3	0
	n=8	n=18	n=10	n=0	n=2	n=0

* Coding: Always=5, Usually=4, Sometimes=3, Rarely=2, Never=1, Not sure=1

Table 3

During the past week, how often did your meals include high fibers, such as fresh fruits, fresh vegetables, whole grain breads, dried beans and peas, and bran?

	High Fiber Response Categories*				
	Always	**Usually**	**Sometimes**	**Rarely**	**Never**
Pre-Test	21.1	36.8	34.2	5.3	2.6
	n=8	n=14	n=13	n=2	n=1
Post-Test	73.7	23.7	0	2.6	0
	n=28	n=9	n=0	n=1	n=0
* Coding: Always=5, Usually=4, Sometimes=3, Rarely=2,Never=1, Not sure=1					

Table 4

During the past week how often did your foods include high fat foods, such as butter, ice cream, oil, mayonnaise, salad dressing, bacon, and other meat with fat or skin?

	High Fat Response Categories*				
	Always	Usually	Sometimes	Rarely	Never
Pre-Test	5.3	13.2	44.7	23.7	13.2
	n=2	n=5	n=17	n=9	n=5
Post-Test	0	10.5	26.3	52.6	10.5
	n=0	n=4	n=10	n=20	n=4
* Coding: Always=5, Usually=4, Sometimes=3, Rarely=2,Never=1, Not sure=1					

Table 5

During the past week, how often did your foods include sweets and desserts such as pie, cake, jelly, soft drinks (with sugar), or cookies?

	Sweets Response Categories*				
	Always	Usually	Sometimes	Rarely	Never
Pre-Test	7.9	44.7	21.1	18.4	7.9
	n=3	n=17	n=8	n=7	n=3
Post-Test	0	2.6	21.1	52.6	23.7
	n=0	n=1	n=8	n=20	n=9
*Coding: Never=5, Rarely=4, Sometimes=3, Usually=2, Always=1					

Table 6

Of the last 7 days, how many days did you participate in 20 minutes or more of physical exercise?

Exercise Previous Week			
	Mean	Median	Std. Deviation
Pre-Exercise	2.34	1.0	2.68
Post-Exercise	4.16	4.0	2.65

Table 7

Of the last 7 days, how often did you exercise the amount suggested by your doctor or health care provider?

Suggested Exercise Previous Week			
	Mean	Median	Std. Deviation
Pre-Exercise	2.23	1.0	2.66
Post-Exercise	4.16	4.0	2.65

Table 8

Of the last 7 days, how often did you participate in a specific exercise session other than what you do around the house or as part of work?

Exercise other than around the House or as part of Work			
	Mean	Median	Std. Deviation
Pre-Exercise	1.87	1.0	2.35
Post-Exercise	3.97	4.0	2.69

Table 9

On how many of the last 7 days did you check your blood glucose level at least once?

	Glucose Monitoring Response Categories*			
	Every Day	Most Days	Some Days	Never
Pre-Test	36.8	10.5	28.9	23.7
	n=14	n=4	n=11	n=9
Post-Test	71.1	10.5	10.5	7.9
	n=27	n=4	n=4	n=3
*Coding: Every day=4, Most days=3, Some days=2, Never=1				

Table 10

Over the last 7 days, how often did you perform all the glucose monitoring recommended by your doctor or health care provider?

	Prescribed Glucose Monitoring Response Categories*				
	Every Day	Most Days	Some Days	Never	Not Recommended
Pre-Test	31.6	10.5	31.6	21.1	5.3
	n=12	n=4	n=12	n=8	n=2
Post-Test	71.1	10.5	10.5	7.9	0
	n=27	n=4	n=4	n=3	n=0
*Coding: Every day=4, Most days=3, Some days=2, Never=1					

Table 11

How many of your planned insulin injections did you take over the last 7 days?

	Insulin Response Categories*				
	All of them	Most of them	Some of them	None of them	I don't take insulin
Pre-Test	18.4	0	10.5	0	71.1
	n=7	n=0	n=4	n=0	n=27
Post-Test	18.4	0	2.6	0	78.9
	n=7	n=0	n=1	n=0	n=30
*Coding: All of them=4, Most of them=3, Some of them=2, none of them=1					

Table 12

How many of your recommended number of pills to control your diabetes did you take in the past 7 days?

	Oral Medication Response Categories*				
	All of them	Most of them	Some of them	None of them	I don't take pills
Pre-Test	71.1	10.5	2.6	5.3	10.5
	n=27	n=4	n=1	n=2	n=4
Post-Test	92.1	0	0	0	7.9
	n=35	n=0	n=0	n=0	n=3
*Coding: All of them=4, Most of them=3, Some of them=2, none of them=1					

Note: Self-care activities survey questions were used in the Diabetes Dulce Programma by the Riverside County Clinic in 2007.

Toobert, D.J., Hampson, S.E., Glasgow, R. E. (2000). The summary of diabetes self care activities measure. *Diabetes Care*, 23 (7), 943-950.

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