Improving Knowledge of Type 2 Diabetes in Rural Underserved Adults

Capstone Project
Submitted in Partial Fulfillment of the
Requirements for the Degree of Doctor of Nursing Practice
In the Graduate School of
Texas Woman’s University
College of Nursing
By
Jeri L. Hargrave, MS, RN

February 2010
Dallas, Texas
Acknowledgements

There have been a lot of people who have made my education possible. However, I am especially grateful for my husband, Tom who has always provided the support and encouragement that I have needed. He always believed in me, even when I did not believe in myself. Without his love and support, I would not have been able to finish this project. Thank you for believing in and loving me! I also would like to thank my family for their patience, understanding, and constant encouragement. I would like to thank Family Health Center of Southern Oklahoma for assisting me with the expense of this project. I deeply appreciate Joe Chapin, Julie Collins, and Daniel Webber, my team, who each demonstrated their expertise in this project. Their ideas and input are woven together to form the fabric of this study. Thank you for your contributions! I am very grateful to Dr. Peggy Mancuso whose tireless guidance and encouragement will always be remembered. You have truly been an inspiration to me! Thank you, Dr. Anderson for your direction and support as I have continued this project. I want to thank Dr. White who has provided generous feedback, enduring guidance, and support which I am grateful for. Without you, Dr. White, this project would not have been possible! Thank you for all you’ve done!
# TABLE OF CONTENTS

ABSTRACT .................................................................................................................. 5  

INTRODUCTION ............................................................................................................. 6  
  Statement of the Problem ......................................................................................... 6  
  Problem Identification ............................................................................................... 8  
  Significance of the Study .......................................................................................... 9  

PURPOSE .......................................................................................................................... 10  
  Purpose of the Study .................................................................................................. 10  
  Hypotheses and Research Questions ....................................................................... 11  

CONCEPTUAL FRAMEWORK ....................................................................................... 11  

REVIEW OF LITERATURE ............................................................................................ 15  
  Diagnosis of Type 2 Diabetes .................................................................................... 15  
  Insulin Resistance ...................................................................................................... 15  
  Type 2 Diabetes Risk Factors .................................................................................... 16  
  Pre-diabetes ................................................................................................................ 17  
  Diabetes Prevention Studies ....................................................................................... 18  
    Finnish Diabetes Preventive Study .......................................................................... 18  
    Da Qing Study ......................................................................................................... 18  
    United Kingdom Prospective Diabetes Study ......................................................... 19  
    Diabetes Prevention Program .................................................................................. 19  
  Gaps in Literature ....................................................................................................... 21  
  Need for the Project ................................................................................................... 21  

PROJECT IMPLEMENTATION AND RESULTS .............................................................. 22  
  Project Objectives ...................................................................................................... 22  
  Timeline ....................................................................................................................... 22  
  Methodology ............................................................................................................... 23  
  Project Requirements ................................................................................................. 23  
  Project Sessions ......................................................................................................... 23  
    Session 1 .................................................................................................................. 23  
    Session 2 .................................................................................................................. 24  
    Session 3 .................................................................................................................. 24  
    Session 4 .................................................................................................................. 25  
  Instruments ................................................................................................................. 25  
    Patient Activation Measure ..................................................................................... 25  
    Eating Styles Questionnaire .................................................................................... 26  
    Diabetes Knowledge Questionnaire ......................................................................... 26
Abstract

A quasi-experimental pilot study was conducted among rural-dwelling, medically underserved adults to determine if participation in the National Institutes of Health (NIH) diabetes program Small Steps, Big Rewards can improve type 2 diabetes knowledge (2010). Forty non-diabetic participants were recruited through a convenience sample of residents of Johnston County in rural southeastern Oklahoma. Small Steps, Big Rewards, is a 4-week educational intervention developed by the NIH that employs an interdisciplinary approach. In this study, participants met once a week for 4 weeks with a Family Nurse Practitioner (FNP), Registered Dietician (RD), or Physical Therapist (PT). Each educational session lasted no more than 2 hours. Pre and post educational interventions were employed to assess type 2 diabetic knowledge and behavior changes using the following tools: Patient Activation Measure, the Eating Styles Questionnaire, and the Diabetes Knowledge Test. Using the computer statistical software package SPSS, mean changes in outcomes were tested using matched paired t-tests. Assessment of patient knowledge and behavior changes following the educational intervention demonstrated increased patient activation, increased knowledge of diabetes, and improved eating styles. These findings indicate that the educational intervention had a statistically significant effect on characteristics central to diabetes prevention, specifically patient activation, knowledge, and behaviors.
Improving Knowledge of Type 2 Diabetes in Rural Underserved Adults

Statement of the Problem

Escalating health care costs are major concerns for Americans. Complications of diabetes, such as retinopathy, nephropathy, and neuropathy, contribute to these escalating health care costs (Zimmet, Alberti, & Shaw, 2001). The World Health Organization (WHO) estimated that 4% to 5% of health budgets are spent on diabetes related illnesses (Kambouris, 2005). In 2007, there were approximately 23.6 million diabetics in the United States (U.S.), with an estimated 1.6 million new cases diagnosed that year in people aged 20 and older. According to the 2007 National Diabetes Fact Sheet, there were an estimated 5.7 million people who were undiagnosed with diabetes and approximately 57 million people with pre-diabetes in the United States (American Diabetes Association [ADA], 2009a). If the current trend continues, it is projected that by 2030 the number of people with diabetes will rise to an estimated 366 million worldwide (Wild, Roglic, King, Green, & Sicree, 2004).

Diabetes refers to the disorders in which the body has difficulty regulating blood glucose. The body either no longer makes insulin or the insulin it does make is no longer effective (Tierney, McPhee, & Papadakis, 2006). The major classifications of diabetes are type 1, type 2, and pre-diabetes. Type 1 diabetes is due to pancreatic islet beta cell destruction, which results in insulin deficiency (Tierney et al., 2006). Type 2 diabetes, the most common type of diabetes, results from a combination of impaired response to insulin (insulin resistance) and an accompanying deficiency of the response of pancreatic beta-cells to glucose (Tierney et al., 2006). Pre-diabetes is a condition in which individuals have blood glucose levels higher than normal but not high enough to be classified as diabetic (ADA, 2009b). From 2003 to 2006, 25.9 % of U.S. adults aged 20 and older had pre-diabetes (National Institutes of Health [NIH] 2009a). In Oklahoma in 2007,
it was estimated that 273,000 adults had diabetes compared to 68,000 in 1994 (Center for Disease Control [CDC], 2009a).

Diabetes is a national health problem, but also one of particular concern for Oklahoma residents because of a large number of at-risk populations, including rural residents and individuals of Native American descent (Bursac & Campbell, 2003). The age adjusted death rate for diabetes among Native Americans in Oklahoma is nearly 200% higher than the rate for Caucasians (CDC, 2009b). The prevalence of diabetes in Native Americans in Oklahoma is much higher than the national average (Bursac & Campbell). The prevalence rate of diabetes among Oklahoman adults is 13% for Native Americans, compared to 7% for Caucasians.

Rural residents are affected by disease and injury in larger numbers than their urban counterparts, with health disparities specifically noted in the areas of injury-related deaths, cardiovascular disease, cancer, and diabetes (Keppel, Pearcy, & Klein, 2004). Diabetes ranks as one of the most significant of these health concerns. Compared to urban areas, rural areas experience a 17% higher prevalence rate of diabetes. In Oklahoma, 65 out of the 77 counties are considered rural (National Association of Rural Action Caucus, 2005). The burden of diabetes in rural communities is further compounded by high rates of obesity and sedentary lifestyles (U.S. Department of Health and Human Services, 2002). Compounding the problems in rural areas are limited resources to effectively diagnose and manage diabetes, reinforcing the need for an emphasis on preventive treatment (Keppel et al.). Jackson, Batts-Turner, Falb, Yeh, Brancati, & Gary (2005) found that the prevalence of obesity was 23% for rural adults compared to 20.5% for their urban counterparts. There is evidence that rural communities have increased rates of poverty, limited access to insurance and specialty medical care, and minimal exposure to diabetes education, all of which exacerbate the associated complications of managing and
detecting diabetes (Moscovice & Rosenblatt, 2000). The impact of diabetes in rural communities has earned it prominence as a top three priority area in *Rural Healthy People 2010* (Gamm, Hutchison, Dabney, & Dorsey, 2003).

**Problem Identification**

Pre-diabetes is a condition characterized by blood glucose levels higher than normal but not high enough to be classified as diabetic (ADA, 2009b). Normal fasting blood glucose is below 100mg/dL. A person is considered pre-diabetic if that individual has a fasting blood glucose level between 100-125mg/dl. People with pre-diabetes have an increased risk of developing type 2 diabetes, cardiovascular disease and stroke (CDC, 2009c). People who develop type 2 diabetes do not go directly from normal blood glucose to becoming a type 2 diabetic; almost all go through a phase called impaired glucose tolerance. Progression to diabetes among those with pre-diabetes is not inevitable. Studies have shown that people with pre-diabetes who lose weight and increase their physical activities can prevent or delay diabetes and return their blood glucose levels to normal (Rizvi, 2004).

An individual is considered to be diabetic when the fasting blood glucose is greater than 126mg/dL (ADA, 2010). In the recent report of the Standards of Medical Care in Diabetes, the ADA (2010) also recommends the use of HbA1c to diagnose diabetes, with a threshold of greater than or equal to 6.5%. According to the ADA (2010), unless the patient is clearly diabetic, any test positive for the diagnosis of diabetes should be repeated to rule out lab error (p.S13). However, if two different tests are performed such as, HbA1c and a fasting blood glucose on the same patient and both prove above threshold then the diagnosis of diabetes can be confirmed (ADA, 2010). The ADA stated, “if two different tests are available on an individual and the results are discordant, the test whose result are above the diagnostic cut point should be repeated,
and the diagnosis is made upon the basis of the confirmed test” (2010, p.13). One example would be if the patient had two results of HbA1c above 6.5% but the fasting blood glucose was less than 126mg, the person should still be considered to be diabetic. Diabetes occurs when the insulin that the body produces is no longer efficient at maintaining normal glucose levels. When there is too much glucose in the blood, symptoms of diabetes occur (NIH, 2009a). Type 2 diabetes can be managed with oral medication, insulin, and/or lifestyle modifications. The cornerstone for the control of type 2 diabetes and its sequelae is to prevent the development of the disease, and, if diabetes has already developed, to prevent its accompanying complications. Diabetes can lead to serious complications and premature death, with cardiovascular disease and strokes accounting for approximately 80% of deaths in people with diabetes. Diabetes is the leading cause of new cases of blindness among adults 20 to 74 years of age. More than 60% of lower limb amputations occur among people with diabetes (CDC, 2009a).

**Significance of the Study**

In 2007, the calculated total healthcare costs for diabetes in the United States was nearly $174 billion including direct medical costs, as well as costs related to disability claims, work loss and premature mortality (NIH, 2009b). These costs are projected to increase to $192 billion by 2020 (Zang, Engelgau, Norris, Gregg, & Narayan, 2004). Community based education and treatment programs aimed at improving diabetes awareness will help stop this upward trend of increased costs, complications, and death. Morbidity and cost can be reduced more effectively through prevention than treating the disease once it has been diagnosed (Marrero, 2007).

There are accepted protocols for the treatment of type 2 diabetes, but these can be costly, especially to patients with little income. Most type 2 diabetics will need a glucometer, glucometer test strips, medication, routine labs, regular visits to a podiatrist, ophthalmologist, and diabetic and
nutritional education. There are also non-fiscal costs associated with diabetes complications, such as a decrease in the quality of life, an increase in pain and suffering, and a reduction in life span that could be avoided through prevention (Brown, Hodgson, & Rice, 1996). Recent clinical trials have demonstrated that progression from pre-diabetes to diabetes in high risk individuals can be avoided through behavioral lifestyle interventions (Knowler, Barnett-Connor, Fowler, Hamman, & Lachin, 2002).

From the years 2001 to 2002, the estimated cost of treating diabetes and its complications increased by $32 billion (Hogan, Dall, & Nikolov, 2003). Adults with diabetes and cardiovascular disease have death rates about two to four times higher than those adults without diabetes (Saydah, Fradkin, & Cowie, 2004). Medical costs for people with diabetes are more than double those costs for people without diabetes. Costs of diabetes and diabetic related complications are particularly high among older adults, certain ethnic groups, and people of low socioeconomic status. Approximately one out of every ten healthcare dollars spent in the United States goes toward the treatment of diabetes (ADA, 2009c). The financial cost of diabetes places a tremendous burden on patients with the disease, increasing their risk of complications such as retinopathy, end stage renal disease, and cardiovascular disease.

Purpose

Purpose of the Study

The purpose of this pilot study was to evaluate whether (a) the National Institutes of Health’s (NIH) educational intervention, Small Steps, Big Rewards Prevent Type 2 Diabetes (NIH, 2009c) would improve the knowledge of prevention of type 2 diabetes in rural-dwelling, underserved adults aged eighteen and older and (b) to identify individuals with impaired blood glucose and abnormal lipid levels for participant education. Oklahoma has an increased
prevalence of diabetes, exceeding the national average during the past decade. Approximately 277,500 Oklahomans, 18 and older are estimated to have diabetes (State of the State Health Report, 2008). In 2008, diabetes was more common among older individuals, with one in every five Oklahomans aged 65 years and over diagnosed with diabetes (State of the State Health Report).

**Hypothesis and Research Questions**

The hypothesis of this study is that participants in this educational intervention will demonstrate an increase in type 2 diabetic knowledge prevention from pre-to post-intervention. Additionally this study addressed the following research questions:

Research Q1: What is the type 2 diabetic knowledge level of rural-dwelling adults who participate in this study?

Research Q2: Do rural-dwelling adults over the age of 18 indicate they believe that their performance of preventive behaviors can improve their health?

Research Q3: Is there a significant difference in the participants’ *Eating Styles Questionnaires* scores and their low density lipoprotein (LDL) values?

Research Q4: Is there a significant difference between the participants’ *Diabetic Knowledge Questionnaire* scores and their HbA1c values?

Research Q5: Is there a significant difference between the stage of the *Patient Activation Measure* and the participants’ LDL and HbA1c lab values?

**Conceptual Framework**

The chronic care model (see Figure 1) is a framework for enhancing healthcare delivery and is based on a paradigm shift from the current model of an acute–care- based healthcare system to a prevention-based healthcare system (Bodenheimer, 2002). McGinnis and Foege (1993)
estimated lifestyle behaviors contribute to 50% of the mortality from the ten leading causes of death from chronic illness. Collaborative efforts through the use of the chronic care model (CCM) may aid in the reduction of the burden of chronic disease in the future. Finding effective strategies for the prevention and management of chronic diseases will be a major challenge for health care in the 21st century. Through redesign, the healthcare system will move from a focus on acute, episodic care to care designed to decrease the burden of chronic disease. Education is a cost-effective element for effective disease management and affords opportunities to avoid expensive medical treatments and potential comorbidities. In an effort to improve the care to people with chronic illness or the delivery of a preventive intervention, changes and improvements must be made to the current healthcare system, such as those implemented with the CCM (McGinnis & Foege).

There is a great deal of overlap in the healthcare system with changes and characteristics required to deliver quality preventive and chronic illness care. In both preventive and chronic care, there are shared similarities such as: (a) regular screening and counseling for health behavior changes to prevent disease, (b) ongoing planned care with proactive follow-up, (c) patient involvement in adherence to complex screening, behavior change and treatment plans and (d) access and linkages to community resources outside the health care setting. The CCM focuses on delivery of healthcare that encourages productive interaction between informed patient who takes an active part in their health management, and a prepared proactive practice team (Wagner, Austin, & Von Korff, 1996).
The premise of the CCM is that quality care cannot be delivered in isolation and can be enhanced by community resources, self management support, delivery system design, decision support, clinical information systems, and organizational support, symbiotically enhancing patient-provider relationships (Bodenheimer, 2002). The availability of appropriately tailored
educational resources, skills training, and psychosocial support are the key elements of the CCM (Glasgow, Orleans, Wagner, Curry, & Solberg, 2001). Self-management support prepares the patient to understand personal contributions to the process and to play an active, collaborative role in establishing achievable goals. Successful self management programs rely on a collaborative process between patients and providers to define problems, set priorities, establish goals, identify barriers and create treatment plans (Glasgow et al., 2001). Community resources address social, economic, and environmental barriers to achieving patient goals. Delivery system design applies outreach procedures, including the use of telephone counseling and patient education fliers that have successfully provided support for patients as they begin to make lifestyle behavior changes and attempt to maintain those changes (Orleans, Schoenbach, & Wagner, 1991).

Decision support ensures that the healthcare professionals have ready access to relevant clinical and preventive knowledge. Decision support tools and prompts are important for prevention because in the absence of symptoms, providers may be less likely to initiate recommended preventive services. System prompts and reminders are needed to translate guidelines and education into action (Solberg, Brekke, & Fazio, 2000). Clinical information systems are also critical to prompt and support planned preventive care. Chronic disease prevention and management constitute a major part of the practices of the medical profession. Because chronic care management and prevention needs are usually not urgent, they are often not addressed. Finally, within the healthcare organization, quality improvement of preventive services will likely fail without the support of the larger healthcare organization and its leadership. While the CCM appears to fit with preventive care, the community resources
component of the model is especially important because a greater proportion of preventive interventions are conducted outside the clinical setting.

Review of Literature

*Diagnosis of Type 2 Diabetes*

Diagnostic criteria for type 2 diabetes include one of the following: fasting plasma glucose $\geq 126\text{mg/dL}$, random plasma glucose blood $\geq 200\text{mg/dL}$, two hour plasma glucose $\geq 200\text{mg/dL}$ and hemoglobin A1c (HbA1c) $\geq 6.5\text{mg/dL}$ (ADA, 2010). Screening for diabetes should be considered in adults of any age who are overweight or obese (body mass index $\geq 25$) and who have one or more additional risk factor for diabetes (ADA, 2010). In the event of no risk factors, screening should begin at age 45. The risk of developing this form of diabetes increases with age, obesity, and lack of physical activity. Most people with this form of diabetes are obese and obesity itself causes some degree of insulin resistance. Type 2 diabetes occurs more frequently in women with prior gestational diabetes mellitus and in individuals with hypertension or dyslipidemia, and its frequency varies in different racial or ethnic groups. There is a large portion of the population with type 2 diabetes who remain unaware of their condition. A positive aspect of the HbA1c is that it can be obtained regardless of the prandial state. Clinical studies have shown a strong correlation between the concentration of glycated hemoglobin and the mean level of blood glucose over the preceding 1 to 3 months (Schnedl, Krause, Halwachs-Braumann, Trinker, & Lipp, 2000).

*Insulin Resistance*

This increasing prevalence of diabetes cannot be separated from the rising rates of obesity and physical inactivity (ADA, 2010). Approximately 80% of people with type 2 diabetes are overweight at diagnosis, and thus the more overweight a person is, the greater the risk of diabetes
Improving Knowledge 16

(Williams & Pickup, 2004). Both obesity and physical inactivity result in insulin resistance, which is one of the underlying causes of type 2 diabetes (Chisholm, 1997; ADA, 2010). Insulin resistance is the first stage in type 2 diabetes. Skeletal muscle and the liver are target tissues for insulin resistance. Insulin attaches normally to receptor sites on the hepatic and muscle cells but is unable to move glucose out of the bloodstream and into the cell. During this stage the patient continues to produce normal or even high amounts of insulin sufficient to overcome the resistance; however, the patient will experience postprandial hyperglycemia (Hu et al., 2004).

Elevated postprandial blood glucose levels caused by insulin resistance at the cellular level result in an elevation of fasting glucose concentrations. Fasting blood glucose levels are further elevated as insulin secretion decreases thereby stimulating an increase in hepatic glucose production (ADA, 2009a). Obesity is known to cause or exacerbate many co-morbid conditions such as diabetes, hypertension, dyslipidemia, coronary heart disease, stroke, certain cancers, and obstructive sleep apnea (Ness-Abramof, Nabriski, & Apovian, 2004).

Type 2 Diabetes Risk Factors

Type 2 diabetes accounts for 90 to 95% of all cases of diabetes and is more prevalent with advancing age, obesity, family history of diabetes, history of gestational diabetes, physical inactivity, impaired glucose metabolism, and ethnicity (CDC, 2009c). Genetic and environmental risk factors related to type 2 diabetes include an intake of excessive calories leading to a body weight greater than 120% of ideal body weight, intra-abdominal obesity, hypertension, high density lipoprotein cholesterol less 35mg/dL, triglycerides levels greater than 250mg/dL, history of gestational diabetes, a first degree relative with type 2 diabetes, physical inactivity, advancing age, and a high risk ethnic group background (Tierney et al., 2006). Insulin resistance is increased as body weight increases because fat interferes with the body’s ability to use insulin.
Sedentary lifestyle and obesity act synergistically in the development of type 2 diabetes. Muscle cells have more insulin receptors than fat cells, so a person can decrease insulin resistance by exercising and becoming more active. Exercise lowers blood sugar levels and assists insulin to be more effective.

**Pre-diabetes**

Pre-diabetes is a precursor to diabetes; people with pre-diabetes will eventually develop diabetes unless they make changes in their eating habits and their physical activity levels. Pre-diabetes is sometimes referred to as impaired fasting glucose (IFG). Most of these pre-diabetic patients are overweight but those who are not considered obese by traditional weight criteria may have an increased percentage of body fat distributed predominantly in the abdominal area. Most of the time this patient goes unnoticed because hyperglycemia develops gradually and at earlier stages is not severe enough for the patient to notice symptoms (ADA, 2010). The insulin secretion is defective in these patients and insufficient to compensate for insulin resistance. Studies have shown that most people with pre-diabetes will develop diabetes within 10 years, unless they lose 5% to 7% of their body weight (Eriksson & Lindgarde, 1991; Tuomilehto, Lindstrom, & Eriksson, 2001). Pre-diabetes can be diagnosed by a fasting blood glucose, glucose tolerance test or hemoglobin A1C (ADA, 2010). The categories for increased risk for diabetes are fasting blood glucose of 100 mg to 125mg/dL, 2-hour post prandial glucose of 140mg to 199mg/dL, and HbA1c of 5.7 to 6.4%. Individuals with an HbA1c of 5.7 to 6.4% should be informed of their increased risk for diabetes and counseled about effective strategies, such as weight loss and physical activity, to lower their risks.
Diabetes Prevention Studies

**Finnish Diabetes Prevention study.** In the Finnish Diabetes Prevention study (Tuomilehto et al., 2001), 522 overweight participants, men (n=172) and women (n=350) were randomized to either, brief diet and exercise counseling (control group, n = 247) or to an intensive individual instruction of weight reduction and physical activity (intervention group, n = 253). The cumulative incidence of diabetes after four years was 11% in the intervention group (95% CI) and 23% in the control group (95% CI). These findings resulted in a 58% reduction in diabetes for those individuals in the lifestyle intervention group (p ≤ .001). The proportion of patients per year progressing to type 2 diabetes was 3.2% in the intervention group versus 7.8% in the control group. The reduction in the incidence of diabetes was shown to be directly associated with changes in lifestyle.

**Da Qing study.** The Da Qing study (1997) examined the effect of a 6 year diet and exercise intervention in Chinese subjects with impaired glucose testing and a mean age of 45 (Pan, Li, Hu, Wang, Yang, An). In the Da Qing study, there were 577 participants, men (n=283) and women (n=247). Of the 577 participants with impaired glucose testing, 530 completed the study. Most of the 47 lost at follow up were because of migration from the region. Eligible participants were randomized into one of 4 groups: physical activity (n=141), diet (n=130), diet and physical activity (n=126), or to the control group (n=133). The diet, exercise, and diet-plus-exercise interventions were associated with 31% (p < .03), 46% (p < .005), and 42% (p < .005) reductions in risk of developing diabetes, respectively. The relationship between the amount of weight lost and diabetes incidence was inconsistent and all three interventions were similarly effective in preventing diabetes.
United Kingdom Prospective Diabetes Study (UKPDS). The United Kingdom Prospective Diabetes Study (1998), identified that the complications of type 2 diabetes can be reduced by intensive management using existing treatment protocols. The 20 year study recruited over 5,102 participants with newly diagnosed type 2 diabetes between 1977-1997. The UKPDS was designed as a randomized clinical trial comparing the effects of pharmacological monotherapies, versus a diet control group, on the cardiovascular and microvascular complications of type 2 diabetes. The three main monotherapies to which all participants (N=4,209) were randomized were sulfonylureas and/or insulin (n=2,729) or metformin (n=342), or the diet control group (n=1138). The UKPDS has provided strong support for the ADA’s position that vigorous treatment of diabetes can decrease the morbidity and mortality of the disease by decreasing its chronic complications. Epidemiological analysis of the UKPDS data showed a continuous relationship between the risks of microvascular complications, such as a 35% reduction in the risk of complications for every percentage point decrease in HbA1c. The results show that lowering blood glucose reduces the incidence of microvascular complications in type 2 diabetes.

Diabetes Prevention Program (DPP). The National Diabetic Education Prevention’s campaign Small Steps, Big Rewards, Prevent Type 2 Diabetes, is based on the Diabetes Prevention Program (DPP). DPP was a randomized clinical trial of diabetes prevention in (N=3,234), consisting of overweight men (n=1035) and women (n=2,199), ranging from 25 to 85 years of age with impaired blood glucose tests (Knowler, et al., 2002). Participants were randomly assigned into one of three groups: standard lifestyle recommendations plus metformin (n=1073), standard lifestyle recommendations plus placebo (n=1082), or intensive lifestyle modifications (n=1079), with nearly 3 years of patient follow-up.
The goal of the program was to achieve and maintain ≥7% reduction in body weight through a low-calorie, low-fat diet plus physical activity of moderate intensity for at least 150 min/week. Participants in the lifestyle intervention group had a significantly greater mean reduction in body weight ($p < .001$). The cumulative incidence of diabetes during the follow-up period was lower in the lifestyle intervention and metformin groups than in the placebo group, with incidence rates of 4.8, 7.8, and 11.0 cases per 100 person-years, respectively (Tuomilehto, 2007). The DPP demonstrated that for every seven participants treated with aggressive lifestyle modification, one case of diabetes was prevented. Participants with the standard care and metformin decreased the risk of type 2 diabetes by 31%. The study provided evidence that weight loss was the predominant predictor of reduced diabetes incidence; there was a 16% reduction in risk for every kilogram of weight lost (NIH, 2009c). Small Steps, Big Rewards emphasizes that through modest lifestyle changes including healthier diets and increased physical activity people can prevent or delay the onset of type 2 diabetes. The DPP found evidence that modest weight loss and regular physical activity, such as brisk walking for 30 minutes a day 5 days a week, reduces the risk of the pre-diabetic adult of developing type 2 diabetes by half (NIH).

Physical activity is inversely associated with health outcomes such as coronary heart disease, hypertension, type 2 diabetes, osteoporosis, colon cancer, and depression. Physical activity is an important component for weight loss and maintaining optimum weight (Jakicic & Otto, 2005). Benefits of physical activity include improved insulin sensitivity and weight control, reduction of cardiovascular risk factors, and a healthier mental outlook. Exercise decreases the effects of counter regulatory hormones such as, glucagon. This in turn decreases hepatic glucose output, resulting in improved glucose control. Exercise induced enhancement of insulin is
independent of weight loss (Hu et al., 2004). The DPP study found that people at increased risk for type 2 diabetes can prevent or delay the onset of the disease by losing 5% to 7% of their body weight through increased physical activity and a reduced fat, low calorie diet.

**Gaps in Literature**

There are few studies in the literature that have documented the effectiveness or outcomes of pre-diabetes prevention education in rural medically underserved communities. This study will help fill the gap in knowledge that exists between rural and urban populations with pre-diabetes. Specifically, this pilot study will assist in improving the knowledge about prevention of type 2 diabetes in rural Oklahoma.

**Need for the Project**

Rural counties tend to have populations that are older and poorer than urban, factors that often predict poorer health. Rural regions present many barriers to obtaining healthcare and education (Henly, Tyree, Lindsey, Lameth, & Burd, 1998). Individuals living in rural communities encounter difficulties obtaining appropriate healthcare because of distance from health clinics, financial limitations, cultural barriers, mistrust, communication issues, and high rates of health illiteracy. Johnston County, where this pilot study was held, has been designated as a medically underserved rural area by the U.S. Human Resources and Services Administration (2009). Rural citizens living in medically underserved regions usually experience high rates of unemployment and have less education compared to urban areas (Kaiser Family Foundation, 2008a). In 2006, there were 30.3 per 100,000 population diabetic deaths in Oklahoma compared to 23.3 per 100,000 in the U.S. In 2005, the prevalence of diagnosed diabetics in Oklahoma was 8.5 per 100 adults compared to 5.5 per 100 adults nationally (Kaiser Family Foundation, 2008). Accessibility to preventive education and healthcare can be challenging for rural adults due to
geographic constraints, economic decline, and/or health insurance limitations. Over the past year, Oklahoma healthcare providers in Johnston County have become concerned about the increase number of pre-diabetic diagnoses with lack of knowledge about prevention of type 2 diabetes.

Project Implementation and Results

*Project Objectives*

The objective of this pilot study was to evaluate whether the NIH educational intervention, *Small Steps, Big Rewards, Prevent Type 2 Diabetes* would improve the knowledge of type 2 diabetes prevention in rural-dwelling, underserved adults aged 18 and older as assessed by pre and posttest interventions. The desired outcomes of this study were: (a) to develop a partnership with the community by providing a rural-adapted education intervention to improve knowledge of prevention of type 2 diabetes, (b) to provide the Family Health Center of Southern Oklahoma with a standardized teaching module adapted for the rural population and an analysis of its effectiveness, (c) to provide the NIH with the analysis done on our underserved, rural population and (d) to assist in fulfilling one of the objectives of Healthy People 2010 (United States Department of Health and Human Services, 2002) by establishing a community-based health education program for the rural population.

*Timeline*

The study was divided into three phases: (a) planning and coordinating teaching sessions with the RD, PT and FNP. This initial step began on June 1, 2009 and consisted of several meetings for collaboration of materials for *Small Steps, Big Rewards* and division of roles and supplies, (b) the educational project sessions were held on October 22, 29, November 5, 12 from
6:30 p.m. until 8:00 p.m., and the (c) statistical analysis of the intervention began on December 1, 2009 and the project was completed on March 1, 2010 (see Appendix B).

Methodology

The methodology for this educational intervention was the National Diabetes Education Program, *Small Steps, Big Rewards, Prevent Type 2 Diabetes* (NIH, 2009c). The program employed an interdisciplinary approach by utilizing an FNP, a RD and a PT. Participants for this study were recruited from the population of Johnston County (Oklahoma) using advertisements in the local newspaper, and fliers given out to residents and word of mouth (see Appendix C). Criteria for participation in the study required participants to be rural dwelling, English speaking, and non-diabetic aged 18 and older.

Project Requirements

Texas Woman’s University (TWU) Institutional Review Board’s (IRB) approval for this project was secured (see Appendix D), as well as the supporting agency, Family Health Center of Southern Oklahoma (see Appendix E). All lab analyses were done using sterile technique by an experienced lab technician. The total cost of the project was $1880.67 (see Table 1) with the majority of the expense provided by the Family Center of Southern Oklahoma, a rural community health center.

Program Sessions

Session 1. Prior to any data collection, consents were reviewed, discussed, and signed. Each participant was given a copy of the signed consent (see Appendix F). After signing of the consents, each participant was asked to complete a series of paper and pencil instruments. The primary investigator (PI) was available to answer questions for the participants during the completion of the paper-and-pencil instruments. The questionnaires were completed in the private
meeting room at the Family Health Center of Southern Oklahoma. Only adults participating in the study were allowed in the private meeting room. The questionnaires included: (a) *General Information Form* (see Appendix G), which collected statistical information such as age, gender, marital status, ethnicity, brief health history, and level of education, (b) *The Eating Styles Questionnaire* (see Appendix H) which identified behaviors associated with reducing fat intake, (c) *Michigan Diabetic Research Treatment Center (MDRTC) Diabetic Type 2 Knowledge Test* (see Appendix I) which identified the participants’ knowledge of risk factors associated with type 2 diabetes and (d) *Patient Activation Measure* (see Appendix J) which identified information regarding patient’s engagement and measures related to health behaviors and outcomes. Permissions to use *The Eating Styles Questionnaire*, MDRTC, and the *Patient Activation Measure* are in Appendices K, L, and M consecutively. Participants were provided with an overview of the sessions, purpose of the program, and session calendar dates. Everyone who participated this session received a Subway gift card.

**Session 2**. The FNP gave participants an overview of type 2 diabetes, risk factors, and pre-diabetes. A RD provided instructions on healthy snacking, fat content in foods, portion control and small steps that participants could do to improve their diet. At this session, each participant received a *Small Step, Big Rewards* educational toolkit which included an educational food guide, and a food and exercise journal to record their food intake and physical activity.

**Session 3**. The first half of this session was covered by a PT who addressed the importance of participants incorporating small steps into their exercise program. As a part of the *Small Steps, Big Rewards* program, there was discussion of the importance of counting daily steps by the use of a pedometer. During this part of the session, each participant in this session received a pedometer with instructions for use.
In the second half of session three, the RD explained and taught the importance of calorie counting, dining wisely, label reading, and grocery shopping on a budget. At the end of this session, participants were given appointment times to have a fasting lipid panel and HbA1c testing. Both the lipid panel and the HbA1c were processed in the lab on site at Family Health Center of Southern Oklahoma by an experienced lab technician.

Session 4. Post-tests (Eating Styles Questionnaire, MDRTC Diabetes Knowledge Test, and the Patient Activation Measure) were repeated during this final session. In a private meeting room, the PI gave each participant their printed lab report and reviewed their lab findings. For all abnormal lab values, the participant was referred to his or her primary care provider (PCP). If the participant did not have a PCP, the participant was given a list of providers to choose from in the Johnston County area. Participants were encouraged to ask questions after the post-test intervention was completed. At all previous sessions, participants were invited to place their name in a raffle to be conducted at the end of the forth session. The raffle for a $100 grocery card and a $50 savings bond was conducted. Participants were thanked for their participation and encouraged to continue the newly learned healthy habits.

Instruments

The Patient Activation Measure (PAM). The PAM questionnaire, developed by Hibbard, Stockard, Mahoney, and Tusler (2004), is a 13-item instrument used to assess a patient’s progress through the 4 stages of activation. The PAM is useful for most all educational levels and has 6th grade readability as measured by the Flesch-Kincaid. Studies (Hibbard et al., 2004) indicated that the measure has a high level of construct and criterion validity. Cronbach’s alpha for this instrument was .91 (Hibbard et al., 2004). The questionnaire is based on the assumption that patients who are informed, active participants in their care often experience improved cost-
effective outcomes (Wagner, 1996). Patient activation is defined as an individual’s propensity to engage in healthy behaviors that lead to improved patient outcomes (Hibbard et al., 2004). The PAM assesses the participant’s knowledge, skills, and confidence for self-management. Studies have shown that higher levels of patient activation were independently associated with a higher performance of self-management behaviors (Mosen, Schmittdiel, Hibbard, Sobel & Remmers, 2007). Activation for the patient appears to involve 4 stages: (a) believing one’s role is important, (b) having the confidence and knowledge necessary to take action, (c) actually taking action to improve one's health, and (d) staying the course even under stress (Hibbard et al., 2004).

The Eating Styles Questionnaire (ESQ). The ESQ developed by Dr. Hargreaves, consists of 16- items and was used to assess behaviors associated with reduced fat dietary intake. This test also has a 6th grade readability as measured by the Flesch-Kincaid. Nutritional knowledge has been shown to be one of the key factors to improving eating behaviors in adults (Schlundt, Hargreaves, & Buchowski, 2003). Cronbach’s alpha for this instrument was .90 with the correlation between ESQ total score and percentage of energy from fat was -.65 and with fiber intake -.40, representing good validity for prediction of dietary fat and moderate validity for dietary fiber (Hargreaves, Schlundt, Buchowski, Hardy, & Rossi, 1999). This instrument assigns the individual to a stage of change with each stage requiring different interventions for transition to the next stage. An ESQ cutoff score of 50 was used to assign the participant to the preparation stage and a score of 57 to the action stage (Hargreaves et al., 1999).

Michigan Diabetes Research and Training Center’s (MDRTC) Diabetic Knowledge Test. MDRTC Diabetes Knowledge Test was administered to assess the general knowledge of diabetes of the adults participating in this study. The test has 23 items; however, only items 1 through 14
were employed in this study. Questions 1 through 14 pertain to general diabetic knowledge and 15-23 are specific to type 1 diabetes. There are psychometrics for the validity of both the short test (1-14) and the long test (1-23). The instrument takes appropriately 15 minutes to complete. The test’s readability was measured by the Flesch-Kincaid grade level, and rated at the 6th grade reading level. All the comparisons done on this instrument support its validity with Cronbach’s alpha for the test being in the low to mid 70’s (Fitzgerald, Hess, Barr, Anderson, & Hiss, 1998).

*Lipid Panel and HbA1c.* As part of this study, each participant had a lipid panel and HbA1c drawn. The lipid panel included total cholesterol, low density lipoprotein (LDL), high density lipoprotein (HDL), and triglyceride levels. The blood was analyzed using the Cholestech LDX system (Santee, 2002). The Centers for Disease Control and Prevention (CDC) has established the Cholesterol Reference Method Laboratory Network (CRMLN) to ensure nationwide standardized of lipid measurements consistent with National Education Cholesterol Program (NCEP) goals. Accuracy and precision on the Cholestech LDX was certified by the CRMLN (Santee, 2002). These results confirm that accuracy and reproducibility of a point of care lipid profile method is comparable to a centralized laboratory testing. Correlation coefficients for these tests exceeded 0.987 (Santee, 2002).

The Afinion AS 100 was used for the HbA1c analysis. An evaluation of the Afinion AS100 analyzer revealed 0.9% coefficient of variation (Arabadjief & Nichols, 2009). Family Health Center of Southern Oklahoma assisted with the cost of the lab analysis; therefore, due to budgetary restraints a choice was made between either fasting blood glucose or HbA1c blood test. The HbA1c was chosen because it requires a non-fasting specimen and provides a more accurate picture of the participant’s average blood glucose level over the previous three month period. Hemoglobin is a protein molecule found in red blood cells with an average life span of
120 days. When glucose binds to red blood cells, the hemoglobin becomes modified in a process called glycosylation. Elevated levels of glycosylated hemoglobin are strongly associated with complications of diabetes (ADA, 2010; Cagliero, Levina & Nathan, 1999; Sacks, Bruns, Goldstein, Maclaren & McDonald, 2002). This test provided information regarding the presence of diabetes or participants at risk. Patients who have an elevated HbA1c but do not have diabetes may need careful follow-up and lifestyle changes to reduce the risk of diabetes (Edelman, Olsen, Dudley, Harris, & Oddone, 2007). HbA1c is a highly specific and convenient alternative to fasting plasma glucose for diabetes screening and is a valuable tool for identifying individuals with undiagnosed diabetes (Rohlfing, Little, Weidmeyer, England, & Madsen, 2000). The ADA and the International Diabetes Federation joined forces to recommend the use of HbA1c for the diagnosis of diabetes (Saudek et al., 2008).

**Deliverables**

In supporting this project, the Family Health Center of Southern Oklahoma gained information needed to promote a healthier community. The participants had an increased knowledge of the prevention of type 2 diabetes and hopefully will pursue a healthier lifestyle. Another potential benefit of this study was the enjoyment and satisfaction experienced by the participant's membership in a group learning environment. Because of the enjoyment and satisfaction that was experienced while participating in this study, participants may seek out other available health education opportunities. The goal of this project was to assist the underserved, rural population to improve their quality of life through an educational intervention on the prevention of type 2 diabetes. Upon completion of this project, the NIH and Family Health Center of Southern Oklahoma will be provided with an analysis of the rural-adapted standardized teaching intervention, *Small Steps, Big Rewards, Prevent Type 2 Diabetes.*
Evaluation

Sample Characteristics

The participants in the educational program had a mean age of 34 years with a range from 19 to 65 years. The majority of participants were white married women who were middle aged and possessed a high school or technical education. Twelve percent identified their ethnic background as American Indian while Hispanic participants were 10% (see Table 2). Sixty percent of the participants in this study considered themselves as being in good health. Eighty-eight percent of the sample group reported they had no daily exercise regimen, with 12% performing daily exercises. Eight of the initial 40 participants were not present at the fourth session and were unable to complete endpoint assessments. Per statistical analysis, participants who did not complete the sessions were not significantly different from completers in terms of demographics or baseline characteristics.

Results

All data in this study were analyzed using the statistical analysis software package SPSS version 17.0. Data analysis for this study was conducted by the PI and a statistician. Descriptive analyses including frequency and means were computed for variables including age, gender, educational level, HbA1c, low and high density lipoprotein, total cholesterol, triglycerides, PAM questionnaire, MDRTC Diabetes Knowledge test, and ESQ. To assure data base accuracy, 10% of the collected data was reviewed and audited prior to data analysis. The study design was based upon the intention-to-treat; therefore, the 40 participants who attended the type 2 diabetes educational intervention and completed baseline assessments were included in statistical analysis. No data errors were found. All data were normally distributed with skewness and kurtosis values less than two. Assumptions for normality, homogeneity of variance, interval data,
and independence were tested and met. Mean changes between baseline and endpoint were assessed using matched pairs $t$-tests.

The hypothesis of this study sought to determine if participants in this educational intervention would demonstrate an increase in type 2 diabetic knowledge prevention from pre to post intervention. Diabetes knowledge was tested pre and post intervention by the DKT version 1 and 2 respectively. Diabetes knowledge scores increased by 6.3% (95% CI=2.2% to +10.5%; $p=.003$) from 76.3 at baseline (95% CI, 71.8 to 80.7) to 81.1 (95%CI, 77.0 to 85.2) at endpoint. Eating styles increased by 30.3% (95%CI, +22.5% to +38.1%; $p<0.001$) from 28.0 (95% CI, 25.7 to 30.3) at baseline to 36.5 (95%CI, 34.6% to 38.4) at endpoint (see Figure 2). Based on these findings, the hypothesis of this study was supported and retained.

Figure 2. Change in Patient Activation, Diabetic Knowledge, and Eating Styles with educational intervention (N=32).
Research Question 1 sought to determine what changes in type 2 diabetic knowledge occurred for participants from pre to post intervention. Paired t-tests were computed for each individual test question on the DKQ, PAM, and ESQ. Paired sample t-test did reveal a significant overall increase in type 2 diabetes knowledge from pre to post intervention ($p=.005$, $p<.001$, $p<.001$, respectively).

Research Question 2 tested readiness to initiate healthy behavior changes measured by the PAM. Patient activation increased by 21.6% (95% confidence interval [CI], +14.9% to +28.3%; $p<0.001$) from 65.7 (95% CI, 62.3 to 69.1) before the educational intervention to 79.9% (95% CI, 76.3 to 83.5) after the final session.

Research Question 3 was designed to discover if there was a relationship between the participants’ ESQ and their LDL values. Interestingly, there was no correlation noted between LDL values and ESQ at baseline ($r=.09$, $p=.62$). There was a slight correlation between the LDL values and the endpoint ESQ score ($r=.29$, $p=.11$). One reason for the small correlation could be the small sample size. The participants with higher LDL values showed the most improvement in low fat eating styles. Before the intervention, 26 (65%) participants strongly agreed with the statement, “I can help prevent or reduce problems associated with my health.”
The remaining 14 (35%) participants reported simple agreement with the statement. However, following the final educational session, 90.3% of completers reported strong agreement (i.e., confidence in personal health prevention; see Figure 3). An analysis of completers ($p=.03$) and an analysis of the inputed dataset ($p=.02$) both demonstrated a statistically significantly increased confidence in participant’s ability to prevent and reduce health problems.

Figure 3. Change in participant responses to PAM question 3 (i.e. I am confident I can help prevent or reduce problems associated with my health). *Significance tested by Wilcoxon Signed Rank test ($p<.05$)
Research Question 4 was designed to discover if there was a relationship between the participants’ Diabetic Knowledge Questionnaire and their HbA1c values. There was a moderate correlation between initial diabetic knowledge scores and the participants’ HbA1c ($r=.46$, $p=.009$). The scores revealed the participants who had higher HbA1c values had greater diabetic knowledge. One explanation for this could be that those with higher HbA1c values may have been exposed to more information about diabetes, or previously sought diabetes information.

Research Question 5 was designed to discover the relationship between the participants’ stage of the Patient Activation Measure and their LDL and HbA1c values. There was no correlation identified between the initial patient activation scores and the participants’ HbA1c values ($r=.05$, $p=.767$) or LDL values ($r=-.13$, $p=.495$). There was a moderate correlation found however, between the participants’ endpoint ESQ and the PAM scores ($r=.40$, $p=.025$). Patient activation at baseline did not predict changes in eating styles ($p=.58$) or diabetes knowledge ($p=.24$); however, increases in PAM across the intervention were concordant with increases in ESQ ($r=.31$, $p=.05$). Participants with LDL > 129 was predictive of an improvements of eating style ($r=.33$, $p<.05$).

Discussion of Findings

In this study, 38% of participants were found to have undiagnosed type 2 diabetes based on HbA1c >6.5, and 28% met the criteria for pre-diabetes with HbA1c 5.7 to 6.4 (see Table 3) (ADA, 2010). Each participant was given individualized counseling concerning their lab results. Most participants with abnormal lab results were surprised about the findings. The participants who had abnormal results were informed of their increased risk for diabetes and counseled about effective strategies, such as weight loss and physical activity, to lower their risk. They were also instructed to follow up with their primary care provider for further tests. One of the strengths of
this study was the use of the HbA1c and lipid analysis in an effort to empower participants with information about glycemic and cholesterol control. Providing the participants with information concerning their HbA1c and lipid results promoted an increased awareness of their test results while also encouraging a proactive preventive approach. Given the fact recruitment for this study came from a rural, underserved area, many of the participants who were diagnosed during this study verbalized they would have not been able to afford these lab tests otherwise.

In contrast to the overwhelming changes required by many preventive health programs, this study focused on small incremental changes that the participant can afford to acquire a healthier lifestyle. Another strength of this study was the quality of the intervention, *Small Steps, Big Rewards*. Each participant in this study received a *Small Steps* informative educational tool kit which by feedback from the participants was quite helpful. Several of the participants have given feedback to the PI that they have incorporated a walking regimen into their daily activity.

Sample size was a major limiting factor of this quasi-experimental pilot study. The findings of this study are only generalizable to the participants in this study. The Hawthorne effect may have been a threat to external validity in that participants may have answered tools differently because they knew they were in a research study.

**Conclusion**

Findings of this study suggest that the intervention *Small Steps, Big Rewards* had a statistically significant impact on participants’ willingness to adapt a healthier lifestyle. One of the most economical ways to fight the growing cost of healthcare is through prevention of chronic illnesses. In this study, educating participants with specific lifestyle changes enabled individuals to make healthy lifestyle changes in a short amount of time. Interventions like these may be one way of addressing the growing epidemic of diabetes in rural populations. Conducting
this study was a rewarding experience. The study findings indicate rural-dwelling adults desire healthier preventive behaviors. A surprising result of this study was that 38% of the participants had undiagnosed type 2 diabetes. Many of the participants in this study had not had lab work “in years” due to the cost of lab work and their uninsured status. If not for this project, these individuals would probably continue to be undiagnosed and untreated. For the participants diagnosed with type 2 diabetes, participation in this study may prolong life. Future studies need to address the benefits and explore means of expanding preventive services offered to rural dwelling adults. Findings from this study, which include a collaborative partnership approach (community and the NIH’s preventive education program), can be applied to other rural communities in which there is limited access by rural residents. Money spent promoting health education, wellness, and self-management of diabetes in rural areas might be less costly than the eventual money spent caring for the diabetic complications of the rural adult. The majority of participants in this study showed evidence of increased in knowledge of type 2 diabetes, healthy eating habits and readiness to change. It was encouraging in that the participants who received this intervention had gains in the areas of empowerment and readiness to change their behavior, which supports the potential opportunity for translating their improved knowledge into behavior change.

Widespread dissemination and implementation of preventive education programs (i.e., *Small Steps, Big Rewards*) to rural populations can help reduce the barriers to access for rural residents. One way the findings from this study will be disseminated is through publication in the *Journal for Rural Health*, a peer-reviewed journal. Findings from this study have also been shared at a staff meeting at the Family Health Center of Southern Oklahoma and during the Johnston County community health action committee. Also the PI has submitted a request to
deliver a poster presentation of her study at the 16th Annual Oklahoma Nurse Practitioner Conference. Due to the significant findings from the study, the FNP was asked to give a presentation concerning the findings at the Southeastern Oklahoma Diabetes Conference held at the University of Southeastern Oklahoma in April. Due to the increase interest and support from this study, the administration of the Family Health Center of Southern Oklahoma has initiated monthly preventive health meetings. Since the pilot study was conducted the public has communicated the desire to have the Small Steps, Big Rewards program held again in our rural community for those that were unable to attend when it was held previously. This rural community appears to be a promising channel for wide-scale dissemination of this low-cost approach to lifestyle diabetes prevention.
References


National Association of Rural Action Caucus (2005). Oklahoma rural communities rely on social security income nearly twice as much as non-rural communities.


organization/campaigns/SmallStepsBigRewards.aspx


APPENDIX A

Letter for Permission for Figure 1
February 18, 2010

116 South Oak Hill Lane
Atoka, Oklahoma 74525

Dear Ms. Hargrave:

Thank you for your request to print the following from *Effective Clinical Practice*:

Figure 1: Edward H. Wagner, MD, MPH, Chronic Disease Management: What Will It Take To Improve Care for Chronic Illness? Effective Clinical Practice, Aug/Sept 1998, Vol 1

Permission is granted to republish the preceding material with the understanding that you will give appropriate credit to *Effective Clinical Practice* as the original source of the material. Any translated version must carry a disclaimer stating that the American College of Physicians is not responsible for the accuracy of the translation. This permission grants non-exclusive, worldwide rights for this edition in print only. ACP does not grant permission to reproduce entire articles or chapters on the Internet. This letter represents the agreement between ACP and Jeri Hargrave for request ROECP1016414 and supersedes all prior terms from the requestor.

Thank you for your interest in *Effective Clinical Practice*. If you have any further questions or would like to discuss the matter further, please contact me at 856-489-8555 or fax 856-489-4999.

Sincerely,

Gina Brown
Permissions Coordinator
APPENDIX B

TIMELINE
Improving Knowledge

TimeLine

June 1- August 2009- Several meetings with team to discuss planning and coordinating teaching sessions with the RD, PT and FNP. Weekly meeting during this time frame for collaboration of materials for Small Steps, Big Rewards and division of roles and supplies. Collect permission to use all instruments.

July 5- August 2009- Complete NIH Office of Research “Protecting Human Research Participants”, Meet with Dr White several times concerning project and IRB application. Meet with administrator for use of building and discuss supplies needed for study.


September 5- October 22, 2009- Meet with team to clarify roles and discuss sessions. Enlist participants for study, place article in local newspaper, hand out fliers. Hold meetings at local functions i.e., chamber of commerce, senior centers and luncheon meeting at local junior college. Copy all material needed, number all data collection tools and have all supplies together by September 30, 2009. Plan healthy snacks to serve. Collect gifts given by community. Meet with Dr. White for guidance on project.

October 22- November 12, 2009- Hold educational sessions, Small Steps, Big Rewards at the Family Health Center of Southern Oklahoma.

December 1- January 31, 2010- Input analysis: Meet with statistician several times concerning analyses. Wrote for permission to use chronic care model figure for Capstone paper. Meet with Dr. White for guidance on project.

APPENDIX C

Recruitment Flier
Are you at risk for developing Type 2 Diabetes?

More than 18 million Americans live with diabetes everyday. More than 54 million Americans are at risk for developing Type 2 diabetes. There are steps that you can take that can prevent or delay the onset of diabetes; not huge steps but Small Steps that can lead to Big Rewards.

A study will be done using the National Institute of Health’s Small Steps, Big Rewards; the goal is to improve knowledge on the prevention of Type 2 diabetes. The study is being made available to rural adults in Southeastern Oklahoma. The study will be conducted one day a week for 4 weeks. Individual participation will require no more than 8 hours of your time.

Dates and Times of meetings:

October 22, 2009 at 6:30pm
October 28, 2009 at 6:30pm
November 5, 2009 at 6:30pm
November 12, 2009 at 6:30pm

Participants will receive:

- Free educational booklet, food guide and journal
- Free Lipid panel, consisting of total cholesterol, low and low density lipoprotein and triglycerides
• Free HgA1C blood test, which checks the average blood glucose over the past 3 months
• Free pedometer
• A Free raffle for a $100 grocery card

Location:
Family Health Center of Southern of Oklahoma
610 E. 24th St
Tishomingo, Oklahoma

To participate you must be:
• 18 years old or older
• Able to read and write in English
• Able to find transportation to the classes
• You must not presently be diagnosed with Type 1 or Type 2 diabetes
• You must not currently be pregnant

For more information contact:
Jeri Hargrave MS, ARNP: 580-889-7891
APPENDIX D

TWU Institutional Review Board Approval for Study
October 14, 2009

Ms. Jeri Hargrave
116 South Oak Hill Lane
Atoka, OK 74525

Dear Ms. Hargrave:

Re: Improving Knowledge of Type 2 Diabetes in Rural Underserved Adults

Your application to the IRB has been reviewed and was approved on 10/14/2009. This approval is valid for one (1) year. The study may not continue after the approval period without additional IRB review and approval for continuation. It is your responsibility to assure that this study is not conducted beyond the expiration date.

Any changes in the study or informed consent procedure must receive review and approval prior to implementation unless the change is necessary for the safety of subjects. In addition, you must inform the IRB of adverse events encountered during the study or of any new and significant information that may impact a research participant’s safety or willingness to continue in your study.

Remember to provide copies of the signed informed consent to me at the Presbyterian campus when the study has been completed. Include a letter providing the name(s) of the researcher(s), the faculty advisor, and the title of the study. Upon receipt of these consent forms the committee will issue a statement ending its involvement with this project. Graduation may be blocked unless consents are returned.

The Institutional Review Board is pleased to acknowledge your sense of responsibility for ethical research. If you have any questions concerning this review, please contact me at (214) 706-2461 or email SLin@twu.edu.

Sincerely,

Dr. Suh-Jen Lin, Chair
Institutional Review Board - Dallas

cc: Dr. Stephanie Woods, College of Nursing - Dallas
    Dr. Teri White, College of Nursing - Dallas
    Graduate School
APPENDIX E

Family Health Center of Southern Oklahoma Permission
September 1, 2009

To Whom It May Concern:

The Family Health Center of Southern Oklahoma (FHCSO) is excited to grant Jeri Hargrave, ARNP the ability to conduct her doctoral capstone resource study, *Improving Knowledge of Prevention of Type Two Diabetes in Rural, Underserved Adults*. Jeri will be able to utilize our facility on the evenings of her sessions. She will also be able to enlist our clientele to participate in her study. FHCSO is willing to collaborate with her on any level to ensure her success.

Sincerely,

[Signature]

Tina Davis,
Executive Director

*610 EAST 24TH STREET * TISHOMINGO, OK 73460 * (580) 371–2343 * Fax (580) 371-2451
APPENDIX F

Study Consent Form
TEXAS WOMAN’S UNIVERSITY
CONSENT TO PARTICIPATE IN RESEARCH

Title: Improving Knowledge of Type 2 Diabetes in Rural Underserved Adults

Investigator: Jeri Hargrave, MS, ARNP  g_hargrave@twu.edu.  550-889-7891
Advisor: Terri White, FNP-C, Ph.D  TWhite2@twu.edu  214-689-6533

Explanation and Purpose of the Research
You are being asked to participate in a research study for Jeri Hargrave’s capstone project at Texas Woman’s University. The purpose of this research is to determine the impact of the National Institute of Health’s educational intervention of Small Steps, Big Rewards on improving knowledge of Type 2 diabetes. The major outcome to be measured will be knowledge of prevention of Type 2 diabetes.

Research Procedures
For this study, the investigator will hold weekly educational sessions for 4 weeks. If you choose to participate in this study, you will be asked to give a blood sample and to attend meeting lasting no more than one and a half hours. There will also be breaks, healthy snacks and water provided. Your maximum total time commitment in this study is estimated to be no longer than 8 hours.

Potential Risks
Potential risks related to your participation in this study include fatigue, embarrassment related to your lack of knowledge about Type 2 diabetes and prevention, potential lack of privacy during blood draw and loss of confidentiality. Participants’ documented personal information will only be known and available to the investigator. Participants will be given a unique identification number which they will use to identify all submitted materials. No individual participant’s test results will be shared with the group. Each participant will receive his or her own information. Each participant will be asked not to disclose any information about another member’s identification or personal information.

Participant’s initials
____________
All participants’ information will be kept in a locked file cabinet at Family Health Center of Southern Oklahoma. Informed consent will kept in a separate locked cabinet from the completed instruments.

All participants’ information will be destroyed by a mechanical shredder. It is anticipated that the results of this study will be published in the investigator’s capstone project as well as in other research publication. However, no names or other identifying information will be included in any publication.

To decrease the chance of fatigue, there will be regular breaks. All participants will be encouraged to take breaks as needed, and to stand, stretch and walk as necessary. All forms will be printed in 14 point font to decrease the chance of eye strain. All participants will be encouraged to tell the researcher if they need help to complete the forms. Participants will be encouraged to approach the P.I. if they feel any embarrassment so that the situation can be discussed, and if possible remedied. All blood values will be given to the study participant privately with explanations provided. If there are abnormal blood values the participant will be instructed to make an appointment with their primary care provider, however, if there is no provider the participant will be given a list of local providers in which to choose from. To decrease the lack of privacy and discomfort during blood draws, the blood will be drawn in a private room connected to the lab at Family Health Center of Southern Oklahoma by an experienced lab technician.

The researcher will try to prevent any problems that could happen because of this research. You should let the researchers know at once if there is a problem and they will help you. However, TWU does not provide medical services or financial assistance for injuries that might happen because you are taking part in this research.

**Participation and Benefits**

Your involvement in this research study is completely voluntary, and you may discontinue your participation in this study at any time without consequences.

Participant’s initials

__________
The potential benefit is access to information and education about prevention of Type 2 diabetes and as a result the participant could be motivated to seek a healthier lifestyle. During this study, you will receive the *Small Steps, Big Rewards* educational booklet, food guide and food journal, a free lipid panel (triglycerides, total cholesterol and lipoprotein) and a free glucose evaluation (HgA1C) and a pedometer. There will also be a free raffle for a $100 grocery card at the last session. When this study is complete, a summary of the results of this study will be mailed to you upon request.

**Questions Regarding the Study**
If you have any questions about the research study you may ask the researchers; their phone numbers are at the top of this form. If you have questions about your rights as a participant in this research or the way this study has been conducted, you may contact the Texas Woman’s University Office of Research and Sponsored Programs at 940-898-3378 or via e-mail at **IRB@twu.edu**. You will be given a copy of this signed and dated consent form to keep.

__________________________  __________________________ 
Signature of Participant     Date

* If you would like to receive a summary of the results of this study, please provide an address to which this summary should be sent:

_________________________________________________________________________

_________________________________________________________________________

_________________________________________________________________________
APPENDIX G

General Information Form
General Information Form

1). Age: ____

2). Please circle your gender: Male or Female

3). Please circle your race: Caucasian, African American, Hispanic, American Indian, Pacific Islander, other (note): _______

4). Please circle your marital status: Married, Single, Partnered, Divorced Widow, Widower

5). Please circle your level of education: Some High School, High School Graduate, Technical School, College Graduate, Advanced College Degree (Master or Doctorate)

6). How would you describe your health? Please circle one.

   Excellent
   Good
   Fair
   Poor

7). Please circle any medical condition you have. You may circle more than one.

   Thyroid disease
   Emphysema
   Cancer
   Rheumatoid arthritis
   Heart Disease
   Stomach ulcers
   Liver Disease
   Chronic obstructive pulmonary disease (COPD)
   Gastroesophageal reflux disease (GERD)
   High Blood Pressure
   Kidney Disease
   Asthma
   Colitis
   Osteoarthritis
   Gout
   Intestinal Disease

8). Do you exercise most days? Please circle one. Yes or No
APPENDIX H

Eating Styles Questionnaire
## Eating Styles Questionnaire

How often does each statement describe your behavior?

<table>
<thead>
<tr>
<th></th>
<th>Never</th>
<th>Rarely</th>
<th>Sometimes</th>
<th>Usually</th>
<th>Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>I avoid eating hamburgers, fried chicken, french fries, and other high-fat foods at fast food restaurants.</td>
<td>Never</td>
<td>Rarely</td>
<td>Sometimes</td>
<td>Usually</td>
</tr>
<tr>
<td>2.</td>
<td>When I eat at a restaurant, I look for low-fat foods to order.</td>
<td>Never</td>
<td>Rarely</td>
<td>Sometimes</td>
<td>Usually</td>
</tr>
<tr>
<td>3.</td>
<td>I choose snack foods that are low in fat or fat free.</td>
<td>Never</td>
<td>Rarely</td>
<td>Sometimes</td>
<td>Usually</td>
</tr>
<tr>
<td>4.</td>
<td>When I want to eat meat, I choose baked, broiled, or broiled chicken without skin instead of red meat.</td>
<td>Never</td>
<td>Rarely</td>
<td>Sometimes</td>
<td>Usually</td>
</tr>
<tr>
<td>5.</td>
<td>I avoid eating red meat (beef, ham, liver, or pork).</td>
<td>Never</td>
<td>Rarely</td>
<td>Sometimes</td>
<td>Usually</td>
</tr>
<tr>
<td>6.</td>
<td>When I eat red meat (beef, hamburgers, ham, hot dogs, or pork), I choose lean cuts or trim off the fat (answer always if you never eat red meat).</td>
<td>Never</td>
<td>Rarely</td>
<td>Sometimes</td>
<td>Usually</td>
</tr>
<tr>
<td>7.</td>
<td>When I eat lunch meats (bologna, sliced ham, sliced turkey, salami), I often choose cuts that are low in fat or fat free (answer always if you never eat lunch meats).</td>
<td>Never</td>
<td>Rarely</td>
<td>Sometimes</td>
<td>Usually</td>
</tr>
<tr>
<td>8.</td>
<td>I avoid using butter, margarine, gravy, regular mayonnaise, and salad dressings made with oil.</td>
<td>Never</td>
<td>Rarely</td>
<td>Sometimes</td>
<td>Usually</td>
</tr>
<tr>
<td>9.</td>
<td>I eat 5 or more servings of fruits and vegetables every day.</td>
<td>Never</td>
<td>Rarely</td>
<td>Sometimes</td>
<td>Usually</td>
</tr>
<tr>
<td>10.</td>
<td>When I have a choice between a regular product and one that is low in fat or fat free, I choose the low-fat or fat free product.</td>
<td>Never</td>
<td>Rarely</td>
<td>Sometimes</td>
<td>Usually</td>
</tr>
</tbody>
</table>
APPENDIX I

Michigan Diabetes Research and Training Center’s Diabetes Knowledge Test Short Version
Michigan Diabetes Research and Training Center Diabetes Knowledge Test

1. The diabetes diet is:
   a. the way most American people eat
   b. a healthy diet for most people
   c. too high in carbohydrate for most people
   d. too high in protein for most people

2. Which of the following is highest in carbohydrate?
   a. Baked chicken
   b. Swiss cheese
   c. Baked potato
   d. Peanut butter

3. Which of the following is highest in fat?
   a. Low fat milk
   b. Orange juice
   c. Corn
   d. Honey

4. Which of the following is a “free food”?
   a. Any unsweetened food
   b. Any dietetic food
   c. Any food that says “sugar free” on the label
   d. Any food that has less than 20 calories per serving.

5. Glycosylated hemoglobin (hemoglobin A1) is a test that is a measure of your average blood glucose level for the past:
   a. day
   b. week
   c. 6-10 weeks
   d. 6 months

6. Which is the best method for testing blood glucose?
   a. Urine testing
   b. Blood testing
   c. Both are equally good

7. What effect does unsweetened fruit juice have on blood glucose?
   a. Lowers it
   b. Raises it
   c. Has no effect
8. Which should not be used to treat low blood glucose?
   a. 3 hard candies
   b. ½ cup orange juice
   c. 1 cup diet soft drink
   d. 1 cup skim milk

9. For a person in good control, what effect does exercise have on blood glucose?
   a. Lowers it
   b. Raises it
   c. Has no effect

10. Infection is likely to cause:
    a. an increase in blood glucose
    b. a decrease in blood glucose
    c. no change in blood glucose

11. The best way to take care of your feet is to:
    a. look at and wash them each day
    b. massage them with alcohol each day
    c. soak them for one hour each day
    d. buy shoes a size larger than usual

12. Eating foods lower in fat decreases your risk for:
    a. nerve disease
    b. kidney disease
    c. heart disease
    d. eye disease

13. Numbness and tingling may be symptoms of:
    a. kidney disease
    b. nerve disease
    c. eye disease
    d. liver disease

14. Which of the following is usually not associated with diabetes:
    a. vision problems
    b. kidney problems
    c. nerve problems
    d. lung problems
APPENDIX J

Patient Activation Measure
Patient Activation Measure (PAM) Instrument

Below are some statements that people sometimes make when they talk about their health. Please indicate how much you agree or disagree with each statement as it applies to you personally by circling your answer. Your answers should be what is true for you and not just what you think the doctor wants you to say. If the statement does not apply to you, circle N/A.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Disagree Strongly</th>
<th>Disagree</th>
<th>Agree</th>
<th>Agree Strongly</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. When all is said and done, I am the person who is responsible for taking care of my health</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Taking an active role in my own health care is the most important thing that affects my health</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. I am confident I can help prevent or reduce problems associated with my health</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. I know what each of my prescribed medications do</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. I am confident that I can tell whether I need to go to the doctor or whether I can take care of a health problem myself.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>6. I am confident that I can tell a doctor I have concerns even when he or she does not ask.</td>
<td>Disagree Strongly</td>
<td>Disagree</td>
<td>Agree</td>
<td>Agree Strongly</td>
<td>N/A</td>
</tr>
<tr>
<td>7. I am confident that I can follow through on medical treatments I may need to do at home</td>
<td>Disagree Strongly</td>
<td>Disagree</td>
<td>Agree</td>
<td>Agree Strongly</td>
<td>N/A</td>
</tr>
<tr>
<td>8. I understand my health problems and what causes them.</td>
<td>Disagree Strongly</td>
<td>Disagree</td>
<td>Agree</td>
<td>Agree Strongly</td>
<td>N/A</td>
</tr>
<tr>
<td>9. I know what treatments are available for my health problems</td>
<td>Disagree Strongly</td>
<td>Disagree</td>
<td>Agree</td>
<td>Agree Strongly</td>
<td>N/A</td>
</tr>
<tr>
<td>10. I have been able to maintain (keep up with) lifestyle changes, like eating right or exercising</td>
<td>Disagree Strongly</td>
<td>Disagree</td>
<td>Agree</td>
<td>Agree Strongly</td>
<td>N/A</td>
</tr>
<tr>
<td>11. I know how to prevent problems with my health</td>
<td>Disagree Strongly</td>
<td>Disagree</td>
<td>Agree</td>
<td>Agree Strongly</td>
<td>N/A</td>
</tr>
</tbody>
</table>
APPENDIX K

Permission to Use Eating Styles Questionnaire
This is a License Agreement between Jeri Hargrave ("You") and Elsevier ("Elsevier") provided by Copyright Clearance Center ("CCC"). The license consists of your order details, the terms and conditions provided by Elsevier, and the payment terms and conditions.

All payments must be made in full to CCC. For payment instructions, please see information listed at the bottom of this form.

Elsevier Limited
The Boulevard, Langford Lane
Kidlington, Oxford, OX5 1GB, UK
1982084
Jeri Hargrave
116 South Oak Hill Lane
Atoka, OK 74525
2251571000484
Aug 17, 2009
Elsevier
Journal of the American Dietetic Association
Stages of Change and the Intake of Dietary Fat in African-American Women: Improving Stage Assignment Using the Eating Styles Questionnaire
MARGARET K. HARGREAVES, DAVID G. SCHLUNDT, MACIEJ S. BUCHOWSKI, ROBERT E. HARDY, SUSAN R. ROSSI and JOSEPH S. ROSSI
November 1999
99
11
8
Thesis / Dissertation
Text extracts
4
Both print and electronic
APPENDIX L

Permission to Use Michigan Diabetes Research and Training Center’s Diabetes Knowledge Test
University of Michigan Health System
Michigan Diabetes Research and Training Center

Survey Instruments

The Michigan Diabetes Research and Training Center (MDRTC) has developed several survey instruments for diabetes patients and health professionals. By downloading the forms you are agreeing to acknowledge the MDRTC as the source of the items in the survey instruments in any written instruments, reports, or publications resulting from their use or reproduction.

Please select the instruments you would like to download from the list below. These instruments are all available in both Word format and PDF format. (Adobe Acrobat Reader is required to view and print PDF files. If you don’t already have Adobe Acrobat Reader, you can download it for free now.)

- Diabetes Care Profile (DCP)
- Diabetes History (DMH)
- Diabetes Knowledge Test (DKT)
- Diabetes Attitude Scale (DAS-3)
- Diabetes Empowerment Scale (DES)
- Michigan Neuropathy Screening Instrument (MNSI)
- Risk Percepcion Survey for Developing Diabetes (RPS-DD)

Diabetes Care Profile - (DCP)

The DCP is a self-administered questionnaire that assesses the social and psychological factors related to diabetes and its treatment. The instrument contains 234 items and sixteen scales. These scales assess the patients’ diabetes attitudes, diabetes beliefs, self-reported diabetes self-care, and difficulties with diabetes self-care. The DCP also contains questions concerning demographic information and self-care practices. Respondents can complete the questionnaire in approximately 30 to 40 minutes.

- Diabetes Care Profile (DCP) [Word or PDF]
- Diabetes Care Profile Scale Formulse [Word or PDF]
- List of articles concerning or using the DCP [Word or PDF]

Diabetes History - (DMH)

The Diabetes History form is used by the Michigan Diabetes Research and Training Center (MDRTC) to collect basic clinical diabetes information from community-based patients involved in a variety of MDRTC projects. The Diabetes History was revised in 1998, with the addition of sections on resource use, patient satisfaction, and potential comorbidities. The revised Diabetes History (version 2.0) consists of five sections of core questions and four sections of additional questions as appendices, which can be added to the core instrument depending upon the needs of the user. The survey instrument is designed to be self-administered.

Core questions include items on the following topics:

- Section 1 - Resource Use
- Section 2 - Medication Use and Medication Changes
- Section 3 - Satisfaction with Diabetes
- Section 4 - Potential Comorbidities
- Section 5 - Demographic / Background Information

http://www.med.umich.edu/mdrtc/profs/survey.html

8/17/2009
APPENDIX M

Permission to Use Patient Activation Measure
NON-EXCLUSIVE, COPYRIGHT LICENSE  
FOR NON-COMMERCIAL, RESEARCH USE ONLY

This non-exclusive, non-commercial Copyright License (the “Copyright License”) is entered into, as of the date of the last signature below (“Effective Date”), by and between Insignia Health, LLC, an Oregon limited liability company (“Insignia”) and Texas Women’s University (“Licensee”).

DESCRIPTIONS AND DEFINITIONS

A. The State of Oregon, acting by and through the State Board of Higher Education on behalf of the University of Oregon, owns the copyright, title, and other related rights in and to the Patient Activation Measure (title “PAM”) and related guidance (collectively titled “PAM Guidance”) developed by Dr. Judith Hibbard and others. Insignia is the exclusive licensee of certain rights related to and is the owner of all trademark rights associated with this technology.

B. The PAM is attached hereto as Appendix A: The PAM Guidance is comprised of the PAM survey scoring table; four different stages in which to classify people participating in a PAM survey; guidelines for responding to people in each stage; benchmark data regarding average scores of people participating in a PAM survey, categorized by age and gender from 45 to 85 years of age, in 5-year increments; and PAM-based Behavior Maps.

C. Licensee desires to use the PAM and the PAM Guidance in its healthcare program by administering, either itself or through a third-party vendor, the PAM and PAM Guidance to Participants (as defined herein).

D. A “Participant” is defined as any individual consumer or potential consumer of health care services who is offered the PAM and/or PAM Guidance.

E. Insignia desires to obtain data from Licensee regarding usage and results of the PAM and PAM Guidance and its impact in supporting patient health. Licensee agrees to share such data with Insignia in an electronic format at least every 12 months, or more often as agreed by the parties.

NOW, THEREFORE, in consideration of the mutual covenants contained herein, and intending to be legally bound, the parties agree as follows:

1. Rights Granted.

   Insignia hereby grants to Licensee a non-exclusive, non-transferable right to reproduce, distribute, and display the PAM and the PAM Guidance to the number of Participants set forth in Section 4(A).

   The rights granted herein do not include the right to sublicense and do not include the right to create derivative works. Licensee may engage a third-party vendor (“Vendor”) to administer the PAM and the PAM Guidance to Participants on Licensee’s behalf, in strict accordance with the terms of this document.

2. Insignia’s Rights.

   Insignia reserves and retains all rights of every kind and nature except those specifically granted to Licensee in this Copyright License, including but not limited to the right to grant any rights to the PAM and the PAM Guidance to other persons or entities upon such terms and conditions as Insignia shall determine. This Section 2 shall survive termination or expiration of this Copyright License.

3. Licensee’s Obligations.

   A. Licensee acknowledges and agrees that Insignia will retain all rights granted to it by the University of Oregon, that the University of Oregon retains all right, title, interest, ownership, and copyright in the PAM and the PAM Guidance, that Insignia retains all right, title, interest, and ownership in the trademarks.
6. Term and Termination.
A. The term of this Copyright License shall commence on the Effective Date and shall continue until the End Date or until terminated in accordance with this Section 6, whichever is earlier ("Term").

B. Insignia may terminate this Copyright License, and the rights and license granted hereunder, for Insignia's convenience, by providing not less than ten (10) days advance written notice to Licensee by electronic communication or otherwise.

C. Upon termination or expiration of this Copyright License, Licensee and any third parties administering the PAM on behalf of Licensee shall cease using, reproducing, distributing, or publicly displaying any portion of the PAM and the PAM Guidance.

D. Termination or expiration of this Copyright License shall not extinguish any of Licensee's obligations under this Copyright License which by their nature continue after the date of termination or expiration, including the obligations set forth in Section 4(B).

E. Licensee acknowledges and agrees that termination of Insignia's agreement with the State of Oregon for the right to the PAM and PAM Guidance shall terminate this license agreement, provided however that Licensee may request continuation of its license by making written request to the State of Oregon within sixty (60) days of Licensee's receipt of written notice of such termination. Such written request for license continuation shall include Licensee's agreement to assume with respect to the State of Oregon all obligations (including obligations for payment) contained in this agreement with Insignia. In such case, the State of Oregon may, in its sole discretion agree to accept or decline such request for assignment of this agreement. Such written request shall be made to Director, Office of Technology Transfer, 1238 University of Oregon, Eugene, Oregon, 97403-1238.

7. Confidentiality.
A. "Affiliate" Defined.
The term "Affiliate" in this section shall refer to any entity that controls, is controlled by or is under common control with Licensee and includes, without limitation, officers, directors, employees, consultants, agents and advisors of and to the Licensee.

B. Acknowledgment of Confidentiality.
Each party hereby acknowledges that it has been or may receive confidential and proprietary information of the other party including, without limitation, the following specific information: (i) technical information, including functional and technical specifications, analysis, research, processes, computer programs, job control language, communications scripts, methods, ideas, "know how" and the like; (ii) business information, including sales and marketing research, materials, plans, provider and beneficiary demographics, provider-specific information and the like; (iii) electronic media claims data in accordance with the Federal Privacy Act of 1974, as amended; and (vi) other valuable information designated in writing by the owner as

A. Assignment. The rights granted hereunder and this Copyright License may not be assigned, transferred, or sublicensed directly or indirectly, by operation of law, contract or otherwise, by Licensee except with the written consent of Insignia, which consent may be withheld at Insignia’s sole discretion.

B. Entire Agreement, Modification, and Waiver. This Copyright License replaces and supersedes any prior agreements between the parties and sets forth the entire agreement between the parties with respect to the subject matter hereof, and may not be modified or amended except by written agreement executed by the parties hereto. No waiver, consent, modification, or change of any terms of this Copyright License shall be binding unless the same is in writing and signed by both parties and all necessary approvals have been obtained. Such express waiver, consent modification, or change, if made, shall be effective only in the specific instance and for the specific purpose set forth in such signed writing.

C. Governing Law. This Copyright License shall be construed and enforced in accordance with the laws of the State of Oregon, without giving effect to the conflict of law principles thereof, and applicable federal law. Any action or suit brought by the parties relating to this Copyright License shall be brought and conducted solely and exclusively in the Circuit Court of Multnomah County for the State of Oregon in Portland, Oregon. Licensee hereby consents to the personal jurisdiction of such courts, waives any objection to venue in such courts, and waives any claim that such forum is an inconvenient forum; provided, however, that if a Claim must be brought in a federal forum, then it will be brought and adjudicated solely and exclusively within the United States District Court for the District of Oregon. BY EXECUTION OF THIS COPYRIGHT LICENSE, LICENSEE HEREBY CONSENTS TO THE PERSONAL JURISDICTION OF SUCH COURT.

D. Notice. Any notice under this Copyright License shall be in writing and be delivered in person or by public or private courier service (including U.S. Postal Service Express Mail) or by certified mail with return receipt requested or by facsimile. All notices shall be addressed to the parties at the following addresses or at such other addresses as the parties may from time to time direct in writing:

For Insignia:
Insignia Health, LLC
Attn: Craig Swanson
Street: 1521 Hunter Rd.
City, State Zip: Wayzata, MN 55391
Facsimile: 

And copy to (which shall not constitute notice hereunder):
Davis Wright Tremaine LLP
Attn: Michael Phillips
1300 SW Fifth Avenue, Suite 2300
Portland, OR 97201-5630
503-778-5299

For Licensee:

Any notice shall be deemed to have been given on the earlier of: (i) actual delivery or refusal to accept delivery, (ii) the date of mailing by certified mail, or (iii) the day facsimile delivery is verified. Actual notice, however and from whoever received, shall always be effective.

E. Severability. If any one or more provisions of this Copyright License shall be adjudicated to be illegal, invalid, or unenforceable in any respect, the validity, legality and enforceability of the remaining provisions shall not in any way be affected or impaired thereby. The parties hereby agree to attempt to substitute for any
TABLE 1

Budget
### Table 1 Budget

<table>
<thead>
<tr>
<th>ITEMS</th>
<th>PRICE</th>
<th>QUANTITY</th>
<th>ESTIMATED COST</th>
<th>ACTUAL COST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lancets</td>
<td>$4.18</td>
<td>1 box</td>
<td>$50.00</td>
<td>$54.18</td>
</tr>
<tr>
<td>Lipid profile cassettes</td>
<td>$112.00/box</td>
<td>3 boxes</td>
<td>$375.00</td>
<td>$336.00</td>
</tr>
<tr>
<td>HgA1c cassettes</td>
<td>$123.00/box</td>
<td>2 boxes</td>
<td>$250.00</td>
<td>$246.00</td>
</tr>
<tr>
<td>Alcohol pads</td>
<td>$2.80/box</td>
<td>1 box</td>
<td>$3.00</td>
<td>$2.80</td>
</tr>
<tr>
<td>Small Steps tool kits</td>
<td>$96.00/25</td>
<td>50</td>
<td>$200.00</td>
<td>$192.00</td>
</tr>
<tr>
<td>Pedometers</td>
<td>$2.49</td>
<td>100</td>
<td>$350</td>
<td>$325.19</td>
</tr>
<tr>
<td>Printing (paper only)</td>
<td>$34.50</td>
<td>1 box</td>
<td>$30.00</td>
<td>$39.50</td>
</tr>
<tr>
<td>Incentives for participants</td>
<td>$450.00</td>
<td>50</td>
<td>$450.00</td>
<td>$400.00</td>
</tr>
<tr>
<td>Healthy snacks/bottled water</td>
<td>$50.00/week</td>
<td>4 weeks</td>
<td>$200.00</td>
<td>$225.00</td>
</tr>
<tr>
<td>Permission to use questionnaires</td>
<td>$60.00</td>
<td></td>
<td>$150.00</td>
<td>$60.00</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td></td>
<td>$2055.00</td>
<td>$1880.67</td>
</tr>
</tbody>
</table>
TABLE 2

Demographics
<table>
<thead>
<tr>
<th>Table 2: Participant Baseline Demographics (n=40)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
</tr>
<tr>
<td>16-24 years</td>
</tr>
<tr>
<td>25-34 years</td>
</tr>
<tr>
<td>35-44 years</td>
</tr>
<tr>
<td>45-65 years</td>
</tr>
<tr>
<td>Gender</td>
</tr>
<tr>
<td>Male</td>
</tr>
<tr>
<td>Female</td>
</tr>
<tr>
<td>Ethnicity</td>
</tr>
<tr>
<td>White non-Latino</td>
</tr>
<tr>
<td>Hispanic</td>
</tr>
<tr>
<td>American Indian</td>
</tr>
<tr>
<td>Asian</td>
</tr>
<tr>
<td>Marital status</td>
</tr>
<tr>
<td>Single</td>
</tr>
<tr>
<td>Married</td>
</tr>
<tr>
<td>Partnered</td>
</tr>
<tr>
<td>Divorced</td>
</tr>
<tr>
<td>Highest Level of Education</td>
</tr>
<tr>
<td>Some High School</td>
</tr>
<tr>
<td>High School</td>
</tr>
<tr>
<td>Technical School</td>
</tr>
<tr>
<td>Undergraduate</td>
</tr>
<tr>
<td>Graduate School</td>
</tr>
<tr>
<td>Self Rated Health</td>
</tr>
<tr>
<td>Poor</td>
</tr>
<tr>
<td>Fair</td>
</tr>
<tr>
<td>Good</td>
</tr>
<tr>
<td>Excellent</td>
</tr>
<tr>
<td>Daily Exercise</td>
</tr>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>No</td>
</tr>
</tbody>
</table>
TABLE 3

Lab Values
### Table 3 Lab Values

<table>
<thead>
<tr>
<th>ID</th>
<th>TC</th>
<th>Trig</th>
<th>HDL</th>
<th>LDL</th>
<th>HgA1C</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1</td>
<td>181</td>
<td>106</td>
<td>70</td>
<td>88</td>
<td>5.5</td>
</tr>
<tr>
<td>#2</td>
<td>151</td>
<td>100</td>
<td>31</td>
<td>100</td>
<td>5.6</td>
</tr>
<tr>
<td>#3</td>
<td>280</td>
<td>226</td>
<td>37</td>
<td>208</td>
<td>6.0</td>
</tr>
<tr>
<td>#4</td>
<td>220</td>
<td>256</td>
<td>35</td>
<td>166</td>
<td>7.0</td>
</tr>
<tr>
<td>#5</td>
<td>245</td>
<td>238</td>
<td>31</td>
<td>167</td>
<td>7.8</td>
</tr>
<tr>
<td>#6</td>
<td>220</td>
<td>180</td>
<td>44</td>
<td>260</td>
<td>7.0</td>
</tr>
<tr>
<td>#7</td>
<td>186</td>
<td>253</td>
<td>60</td>
<td>168</td>
<td>7.0</td>
</tr>
<tr>
<td>#8</td>
<td>176</td>
<td>109</td>
<td>71</td>
<td>83</td>
<td>5.9</td>
</tr>
<tr>
<td>#9</td>
<td>237</td>
<td>289</td>
<td>43</td>
<td>137</td>
<td>7.4</td>
</tr>
<tr>
<td>#10</td>
<td>186</td>
<td>96</td>
<td>59</td>
<td>108</td>
<td>5.9</td>
</tr>
<tr>
<td>#11</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Dropped out</td>
</tr>
<tr>
<td>#12</td>
<td>260</td>
<td>233</td>
<td>24</td>
<td>206</td>
<td>5.9</td>
</tr>
<tr>
<td>#13</td>
<td>156</td>
<td>101</td>
<td>33</td>
<td>110</td>
<td>6.0</td>
</tr>
<tr>
<td>#14</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Dropped out</td>
</tr>
<tr>
<td>#15</td>
<td>175</td>
<td>79</td>
<td>88</td>
<td>71</td>
<td>5.5</td>
</tr>
<tr>
<td>#16</td>
<td>174</td>
<td>189</td>
<td>51</td>
<td>102</td>
<td>7.0</td>
</tr>
<tr>
<td>#17</td>
<td>175</td>
<td>94</td>
<td>59</td>
<td>105</td>
<td>6.0</td>
</tr>
<tr>
<td>#18</td>
<td>191</td>
<td>127</td>
<td>47</td>
<td>119</td>
<td>5.2</td>
</tr>
<tr>
<td>#19</td>
<td>237</td>
<td>230</td>
<td>40</td>
<td>178</td>
<td>7.4</td>
</tr>
<tr>
<td>#20</td>
<td>201</td>
<td>150</td>
<td>56</td>
<td>115</td>
<td>5.3</td>
</tr>
<tr>
<td>#21</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Dropped out</td>
</tr>
<tr>
<td>#22</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Dropped out</td>
</tr>
<tr>
<td>#23</td>
<td>171</td>
<td>231</td>
<td>52</td>
<td>73</td>
<td>5.9</td>
</tr>
<tr>
<td>#24</td>
<td>130</td>
<td>150</td>
<td>40</td>
<td>88</td>
<td>5.8</td>
</tr>
<tr>
<td>#25</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Dropped out</td>
</tr>
<tr>
<td>#26</td>
<td>202</td>
<td>193</td>
<td>48</td>
<td>160</td>
<td>7.2</td>
</tr>
<tr>
<td>#27</td>
<td>227</td>
<td>149</td>
<td>47</td>
<td>150</td>
<td>5.0</td>
</tr>
<tr>
<td>#28</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Dropped out</td>
</tr>
<tr>
<td>#29</td>
<td>186</td>
<td>164</td>
<td>38</td>
<td>115</td>
<td>5.1</td>
</tr>
<tr>
<td>#30</td>
<td>162</td>
<td>85</td>
<td>48</td>
<td>108</td>
<td>5.5</td>
</tr>
<tr>
<td>#31</td>
<td>257</td>
<td>181</td>
<td>34</td>
<td>167</td>
<td>7.6</td>
</tr>
<tr>
<td>#32</td>
<td>122</td>
<td>146</td>
<td>54</td>
<td>89</td>
<td>5.6</td>
</tr>
<tr>
<td>#33</td>
<td>199</td>
<td>119</td>
<td>50</td>
<td>125</td>
<td>6.5</td>
</tr>
<tr>
<td>#34</td>
<td>159</td>
<td>71</td>
<td>39</td>
<td>106</td>
<td>5.6</td>
</tr>
<tr>
<td>#35</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Dropped out</td>
</tr>
<tr>
<td>#36</td>
<td>191</td>
<td>152</td>
<td>40</td>
<td>184</td>
<td>7.0</td>
</tr>
<tr>
<td>#37</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Dropped out</td>
</tr>
<tr>
<td>#38</td>
<td>123</td>
<td>88</td>
<td>39</td>
<td>148</td>
<td>6.0</td>
</tr>
<tr>
<td>#39</td>
<td>210</td>
<td>308</td>
<td>30</td>
<td>201</td>
<td>7.2</td>
</tr>
<tr>
<td>#40</td>
<td>245</td>
<td>286</td>
<td>28</td>
<td>299</td>
<td>7.8</td>
</tr>
</tbody>
</table>