# MANAGING HbA1c LEVELS THROUGH DIABETES EDUCATION

by

Diane L. Baeza

A Policy Analysis
Presented to the
Faculty of the Department of Public Policy and Administration
School of Business and Public Administration

CALIFORNIA STATE UNIVERSITY, BAKERSFIELD

In Partial Fulfillment of the
Requirements for the Degree of

MASTER OF PUBLIC ADMINISTRATION

June 2, 2011
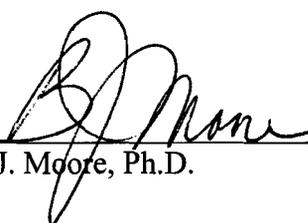
Approved: _____ 6/3/2011
B.J. Moore, Ph.D.   Date

_____ 6/6/11
R.Steven Daniels, Ph.D.   Date

This project is dedicated to my loving daughter Maddallyn whom sacrificed endless hours of playtime to support me in my educational goal and to my wonderful partner Jolhman who supported me throughout this project.

More importantly to my amazing parents Maria and Manuel Baeza who I admire for their hard work and dedication, and raised me to be who I am today.

Acknowledgement

First, I would like to thank Dr. Moore for the continuous words of inspiration and

pushing me to work harder. Without you, I would not be where I am today.

I would like to thank my classmates and professors (Dr. Daniels, Dr. Sun) for all of the

support and help throughout the program.

Table of Contents

Abstract

Type 2 Diabetes mellitus (DM) has reached epidemic proportions in the past several decades due to the advancing age of the population, an increased prevalence of obesity, and decreased physical activity. One in every 14 Americans has diabetes, and another 40% of the population is at risk for developing the disease (Funnell & Kruger, 2004). Every year, diabetes accounts for more than 200,000 deaths, 82,000 amputations, and 44,400 new cases of end stage renal disease and up to 24,000 new cases of blindness in the United States (American Diabetes Association).Diabetes mellitus is characterized by recurrent or persistent hyperglycemia. Hemoglobin A1C measures nonreversible glycosylation of the hemoglobin molecule. HbA1c is a term often used in relation to diabetes; it is used for diabetes diagnosis and how it differs from blood glucose levels. For people with diabetes, an HbA1c level of 6.5% is considered good control, although some prefer numbers closer to non-diabetic levels. This result driven task is completed to determine the patient's compliance level. Diabetes is a largely self-managed illness; diabetes education has long been viewed as an essential component of care. Primary care physicians provide clinical care for the majority of patients with DM but few primary care providers have the resources to assist patients to achieve the level of glycemic control needed to prevent long term complications (Graber, Elasy, Quinn, Wolff, & Brown, 2002). The purpose of this study was to identify best practices in diabetes education measured by lowering HbA1c levels. Teaching and Learning theories will help evaluate the measures of HbA1c levels in diabetes education. Areas of lifestyle behaviors assessed including health responsibility and self-management practices. A total of 64 articles were reviewed to determine and define best practices of diabetes education. The findings were that a significant improvement in healthy lifestyle practices and measuring

of HbA1c levels through diabetes education. The results identified both diabetes education and intervention of clinical staff help support that diabetes education is measured through lowering HbA1c levels.

Measuring HbA1c levels

Through Diabetes Education

Chapter 1

Significance and Background

Type 2 Diabetes mellitus (DM) has reached epidemic proportions in the past

several decades due to the advancing age of the population, an increased prevalence of

obesity, and decreased physical activity. One in every 14 Americans has diabetes, and

another 40% of the population is at risk for developing the disease (Funnell & Kruger,

2004). Every year, diabetes accounts for more than 200,000 deaths, 82,000 amputations,

and 44,400 new cases of end stage renal disease and up to 24,000 new cases of blindness

in the United States (American Diabetes Association).

Diabetes is epidemic in the United States and is clearly one of the most common

problems seen in primary care. An estimated $92 billion is spent annually on diabetes;

without $45 billion is spent on healthcare and $47 billion on disability, work loss, and

early death benefits (Bohannon, 1999). This enormous economic impact is an indicator

that preventing diabetic complications is much more practical than treating diabetic

complications.

Diabetes mellitus is characterized by recurrent or persistent hyperglycemia.

Hemoglobin A1C measures nonreversible glycosylation of the hemoglobin molecule.

HbA1c is a term often used in relation to diabetes; it is used for diabetes diagnosis and

how it differs from blood glucose levels. HbA1c occurs when hemoglobin joins with

glucose in the blood. Hemoglobin molecules make up the red blood cells in the blood

stream. When glucose sticks to these molecules it forms a glycosylated hemoglobin molecule – also known as A1C and HbA1c. The more glucose found in the blood, the more hemoglobin will be present. Due to the fact that red blood cells survive for 8-12 weeks before renewal, by measuring HbA1c an average blood glucose reading can be returned. For non-diabetics, the usual reading is 3.5-5.5%. For people with diabetes, an HbA1c level of 6.5% is considered good control, although some prefer numbers closer to non-diabetic levels. This result driven task is completed to determine the patient's compliance level.

Problem Statement

Diabetes is a largely self-managed illness; diabetes education has long been viewed as an essential component of care. Primary care physicians provide clinical care for the majority of patients with DM but few primary care providers have the resources to assist patients to achieve the level of glycemic control needed to prevent long term complications (Graber, Elasy, Quinn, Wolff, & Brown, 2002).

Usefulness of the Study

The purpose to this study is to examine if diabetes education has an impact on HbA1C levels. The goal of this study is to explore and understand how the intervention of diabetes education influences HbA1C outcomes.

Methods of the study

All information obtained from this study will gathered by utilizing past and present experimental assessments, qualitative data, scholarly journals, peer reviews, and

government documents. In order to find a solution to the problem, a literature and content analysis will be conducted to determine how diabetes education impacts the HbA1C outcomes. The method to determine diabetes education intervention based on the theories associated with health education (empowerment, radical and preventive theories), adult education (humanist, cognitive and behaviorist theories). This will align patient education to an experiential learning process within which beliefs about self-efficacy. The importance of education will not necessarily result in behavioral change, but will affect changes across a range of variables including: knowledge; skills; understanding; attitudes and/or behavior. At the end the researcher, will determine if the research can support the problem in theory.

Chapter 2

Literature Review

The purpose of Chapter 2 is to review the literature regarding diabetes education, health care intervention in diabetes, and learning theories. Diabetes (DM) is described as a chronic disorder characterized by a deficiency of insulin secretion and/or insulin effect, resulting in hyperglycemia, disturbances of carbohydrate, fat and protein metabolism, and a constellation of chronic complications (Brasher, 2002; McCance & Huether, 2002). The condition has been recognized for millennia. First described in the Egyptian Ebers Papyrusm, written about 1500 B.C., it was named by early Greek physicians who named it "diabetes," Greek for "fountain" or "siphon," due to the copious urination that is one of the hallmarks of the disorder in its early untreated state (Sherwood, 1997, p.57). These early Greek physicians also noted that the urine had a sweet odor and taste, hence the term mellitus, which comes from the Latin word for honey (Sherwood, 1997).

There are two types of DM, type1 and type 2. Type 1 DM usually occurs before the age of 35 and causes an insulin-dependent condition. Cells in the pancreas produce little or no insulin and the person needs insulin injections to survive. Type 2 DM usually begins after age 45, although some people may develop type 2 at a younger age. The pancreas still produces insulin in small amounts, but the output is inadequate to meet the body's needs. This form of DM may be controlled with diet and exercise, but medication is often necessary and sometimes even insulin is required (Phipps, Sands, & Marek 1999).

The prevalence of type 2 DM is higher than that of type 1 DM. Research indicates this is due to factors that predispose individuals to the disease such as lifestyle, obesity, and genetic predisposition. The incidence of type 2 DM has increased in the past thirty five years representing ninety to ninety-five percent of the estimated eight million individuals who have been diagnosed with diabetes (Strand, 2002).

Type 2 DM is characterized by cellular resistance to insulin. This is a less than adequate response to and utilization of insulin by the target tissues: muscle, liver, and adipose tissue. Since the exact pathophysiology of the disease is unclear, many different causes are attributed to this insulin resistance. However, it has been established that obesity, genetics, inactivity, illnesses and age play a large role in its occurrence (McCance & Huether, 2002).

Hemoglobin A1c

A glycosylated hemoglobin A1c reading reveals an average blood glucose level over a three month period and can be used to predict the risk for diabetes complications. This refers to a high level of blood glucose, when the sugar molecules attach themselves irreversibly to molecules in the red blood cells. The red blood cells store the glucose information for about 4 months. An HbA1c blood test reflects the average blood glucose results in the format of a percentage. The greater the HbA1c value, the higher the risk for diabetes complications. The American Diabetes Association recommends an HbA1c of 7% or lower (Margolis, 2003).

A lower daily blood glucose average results in a better hemoglobin A1c percentage. In many diabetic patients this goal can be achieved with proper diet, exercise, and

medication management. Through tight control of blood sugar, patients are able to reduce the risk of long term complications of type 2 DM (Diabetes Control and Complications Trail Research Group, 1993; UK Prospective Diabetes Study [UKPDS] Group, 1998).

Many of the long term complications of type 2 DM develop if the body consistently maintains an elevated circulating level of blood glucose. These complications include: (1) stroke; (2) blockage of arteries which results in poor circulation and possibly heart disease; (3) impotence; (4) gangrene; (5) impaired eyesight which may progress to blindness; (6) infections especially in the urinary tract (kidney and bladder; (7) skin infections and deep sores that heal poorly (8) and impaired kidney function which may progress to kidney failure (McCance & Huether, 2002).

Nutrition and Diabetes

Dietary recommendations for the treatment of individuals with type 2 DM consist of an individualized prescription aimed at achieving glycemic control by reducing carbohydrate and calorie intake. Dietary management is the most essential aspect of glycemic control and is viewed as being the most challenging (Whittermore et al., 2002). Whittermore and colleagues (2002) addressed lifestyle change in type 2 DM was multifaceted and complex. Challenges to the process of integrating lifestyle change included reconciling emotions, composing a structure, striving for satisfaction, exploring self and conflicts, discovering balance, and developing a new cadence to life. The challenges required acknowledgement in lifestyle change, coupled with knowledge of the individual patient, may improve the order for participants to progress toward integration. The goal of nutrition management is for the patient to explore how her or his body

metabolizes food. Knowing which foods have the greatest effect on blood glucose levels lets the patient adjust meals accordingly, without necessarily having to give up all foods of certain type (Bartol, 2002).

Studies show that dietary management is often viewed as "dieting," with reports of feeling deprived and resisting temptation as common barriers (Whittermore et al., 2002). With this barrier in mind, educators should encourage patients to make small, realistic changes that can be continued for life rather than trying dramatic short-term diets (Bartol, 2002). One change that is effective is to encourage the use of healthy snacks, such as, carrots or celery instead of those high in fat and carbohydrates.

Exercise and Diabetes

Exercise is probably the least expensive and most cost effective therapy available for treating individuals with type 2 DM. Pigman, and Krousei-Wood (2002) examined the role of exercise for type 2 DM management. The authors randomly selected three hundred patients with type 2 DM who had been seen at the Department of Veterans Affairs Medical Center in New Orleans, Louisiana. Medical records from October 1997 to 2000 were reviewed. Information about exercise, alcohol intake, smoking, medications, laboratory results, and other variables was extracted from medical records. Patients with mean HbA1c <8% were compared with those who had poor diabetic control >/=8%. The effect of exercise in the management of type 2 DM was assessed. After adjustment for other variables, patients with exercise had an odds ratio of 2.71 for poor diabetic control compared with patients with exercise. These findings suggest that exercise by itself is important for type 2 DM management. Physical activity increases

insulin sensitivity, improves glycogen storage, allows for more efficient use of glucose in muscles, and reduces mortality (Whittemore, Chase, Mandle, & Roy, 2002). Exercise can reduce insulin resistance and increase glucose uptake for as long as 72 hours (Bartol, 2002). Exercise has also been found to facilitate weight loss, reduce blood pressure and lipid levels, foster a sense of wellbeing, and decrease cardiovascular risks (Bartol, 2002).

Unfortunately, good habits are hard to form and easy to break. This is an important fact to remember when educating individuals with type 2 DM. Patients should be encouraged to exercise daily rather than every other day. The most effective style of education is to help the patient explore how exercise can be incorporated into individual lifestyles (Bartol, 2002).

Education

"Learning defies easy definition and simple theorizing" (Montgomery, V., Cayer, N. J., & Cook, S., 1993, pg. 135) because learning covers such a wide spectrum of learning conditions. The first concept is Maslow's hierarchy of needs that comes from Dr. Abraham Maslow's 1943 article, A Theory of Human Motivation (see Figure 1, Appendix). In it, the psychologist set out goals toward which humans directed their activities to reach, and the prerequisite goals for each one. The first needs, Maslow theorized that human activity strove to achieve were the physiological needs of staying alive, followed by safety from harm, acceptance into a social system, and the need to esteem (Maslow, 2000). In relation to this study, the patient must have self-motivation in order to make lifestyle changes and successfully lower HbA1c levels. The second concept is "…learning can be thought of as a process by which behavior changes as a

8

result of experiences" (Maples and Webster, 1980, p.1) see learning as primarily externally induced. Behaviorism expressed how a given stimulus gets connected to a particular response (learning) and suggests that desired responses can be reinforced by rewards and repetition. These behaviors include proper diet/nutrition and regular exercise in order to help meet normal measures of HBa1c levels.

Teaching

The goal of education is essentially a process of creating lifelong learners through developing within the learner a continued desire to learn (Montgomery, V., Cayer, N. J., & Cook, S., 1993). This is achieved through diabetes education by starting with the development of the patients' receptivity; awakening patient interest, teaching by example, and presenting profound content. Understanding the logic behind theory of teaching as 'what we see we become.' Teaching methods which patients understand and learning theories can be useful for different purposes. Educational objective and methods need to be tailored to match the person's preferred learning style and literacy level. The American Association of Diabetes Educators (AADE) sets the scope and direction for the practice of diabetes education to promote healthy living through self-management of diabetes. This collaborative process engages diabetes patients who are at risk for diabetes to gain knowledge and skills needed to modify their behavior and successfully self-manage lowering HbA1c levels. The collaborative role operated to empower patients who are able to understand what to expect from their health care and what is expected of them. Through understanding patients gain a sense of empowerment in managing their health condition. The patient will become aware of these benefits through the action of education and support of the nursing staff. The illustration in Table 1, Training Principles

by Learning Phases, indicates learning, and retention of that learning do not necessarily translate into transfer of the learning to the job and maintenance of the learning (Wart, Cayer, Cook, 1993). Perceived self-efficacy also plays a key role in patients attaining goals. Although this pattern of learning is closely related to behavior modeling, the focus shifts from introducing skills and information to refining performance in a teaching or learning setting.

Diabetes Patient Education

Peterson and Hughes (2002) found that the theory of learning there is a strong link between the readiness to change and clinical success in a diabetes educational program. An empowerment –based program is patient-centered rather than content-driven and is designed to provide patients with the knowledge and skills they need to make informed choices. In addition, patients are helped to identify and achieve their own goals rather than goals chosen by healthcare professionals. This approach acknowledges the expertise of the patient in knowing his or her own values and abilities. Education incorporates behavioral and affective aspects along with information have better outcomes.

Summary

Diabetes is a largely self-managed illness; diabetes education has long been viewed as an essential component of care. Primary care physicians provide clinical care for the majority of patients with DM but few primary care providers have the resources to assist patients to achieve the level of glycemic control needed to prevent long term complications (Graber, Elasy, Quinn, Wolff, & Brown, 2002). Proponents of the learning theory have rightly pointed out that most learning theories leave out (or understate) the

importance of the learners' motivation for self-improvement, the experience possessed by interest (and capacity) in taking charge of their own learning. In this research project I will evaluate learning and teaching theory to determine what needs to be learned, how it should be learned, and what specific goals should be constitute success in the learning process to lower HbA1c levels.

Chapter 3

Methodology

The research design for this study is non-experimental design using qualitative methods the study was conducted by reviewing scholarly articles, journals, and AADA (Accredited American Diabetes Association) articles. During the course of this study, learning and teaching theories were researched to evaluate the effectiveness of diabetic patient's compliance with the reflection of Diabetes Education. Core of the article topics were commonly part of the curriculum taught in comprehensive programs that have demonstrated successful outcomes. The curriculum, a coordinated set of courses and educational experiences, includes learning outcomes and teaching strategies. The curriculum reflects evidence and best practice guidelines.

Data Analysis

A systematic review of the medical literature was performed with the assistance of an expert librarian, using the computerized database Pub Med, Lexus Nexus, Google, MEDLINE and Health Star to identify assessments of disease management programs in different areas. English language studies published from the period January, 1989 through January, 2009 with an interest in disease management. Sample size of research collected were 37 scholarly articles involving the search terms included the following patient care, guidelines, and diabetes best practices, monitoring HbA1c, compliance, education, teaching, compliance measures and Diabetes, health education, blood glucose monitoring, patient education. A hand search of bibliographies from relevant articles and reviews were also conducted, and the opinions from expert physicians and professors in

the field were solicited to identify other references. Titles and abstracts of articles extracted by the search were reviewed for relevance, and if potentially relevant the full-text article was retrieved. To be included in the reviews of the effectiveness, studies had o be (1) primary investigations of education interventions selected for evaluation (2) published in English, and (3) provide information of one or more outcomes of interest and (4) meet the minimum standards. All studies with concurrent or before and after results.

The pool of accepted disease management assessments, and those aimed at the compliance level of a type II Diabetic with the provisions of Diabetes Education were selected. Study information was abstracted from the accepted articles using an intervention strategies and outcomes of interest. All components of the diabetes best practice intervention were identified using classification based the impact of learning and teaching methods which overall impacted change in behavior. Clarifying the target population and determining its self-management educational needs. The assessment process should identify the educational impact for the individuals with diabetes. Diabetes education is a critical component of diabetes treatment, the majority of individuals with diabetes do not receive any diabetes education therefore questioning if these targeted individuals meet the required degree of compliance.

Limitations

Each article that met the criteria was evaluated by determining the practiced measures of the research and the methodology in determining the results. Although the studies intended purpose was to evaluate the effectiveness of Diabetes Education

measured by HbA1c levels collected research provided a wide spectrum of other information involving culture and ethnic bias. In addition limitation such as, clinical studies involving medication, foot care, Retinopathy, and nutrition also played a role in determining the effectiveness in diabetes education, however in this study were not recognized. The goal of this study was to measure the impact that independent variable had on the HbA1c value and lifestyle change.

Textual Analysis

Hermeneutics will be employed as theoretical bases as the purpose of hermeneutics is to establish guidelines and rules for interpretation of written documents and is a search for concepts and meanings from textual representations of reality.

"The importance of extending the scope of interpretation to the "other side" of textual analysis, where interpretation is technical interpretation: "*the complete understanding of style*" (pg.159, Schleiermacher).

Understanding that HbA1c is a measure of explaining where an individual is with a disease as a base to seek if there is a need of diabetes education intervention. Igniting a need to explain and express the importance of diabetes education as a component to an individual's well-being. Hermeneutics in any field should consider: the use of word definitions, as to determine carefully the meaning of the word. There are two basic methods of defining words, contextual analysis or, the analysis of the context of the writing: and the literary types and forms poetry, parable, historical narrative, dialogue, prophecy, etc. Accurate communication clear understandings are difficult when words are used imprecisely or ambiguously. The syntactical distinctive is designed to consider

14

meaning arrangement of the word in a sentence. Hermeneutics will be couples with a data analysis tool; content analysis (Leadership, 2008). Diabetes Education is a component of one element which can be expressed in distinct forms and a variety of positions, but the result is the key to the purpose intended of the research.

Content analysis offers several advantages to researchers who consider using it. The focus on the communication expressed directly via texts, transcripts, and aspect of the interaction.

Chapter 4

Findings of Content Analysis

A total of 64 articles were reviewed for this study. The initial sample identified an additional 129 references. A total of 98 titles were accepted for further screening, and 71 abstracts met criteria. Sixty-five percent of the accepted abstracts failed to meet topic criteria when the articles were reviewed. Twenty-four studies dealt with diabetes mellitus. The articles were retrieved from 2001 to 2009. Of the 24 studies meeting the diabetes education criteria, 19 studies were randomized clinical trials and 5 studies were nonrandomized controlled studies. More than half of the studies were conducted in United States 6 were carried out in the United Kingdom, and Austria, and the Asia. Study duration ranged from six months to 48 months, while the duration of disease management intervention ranged from several days to 48 months. Studies were financially supported by research grants provided by the government, nonprofit research entities, academia or foundations. Four studies assessed disease management costs in relation to a primary care or health maintenance organization setting, while cost per patient and cost of program implementation were assessed in 2 studies each. Different interventions were used, ranging from visual patient education sessions to centrally administered training.

Analysis

From the textural findings, two categories emerged to answer the research question. What are the factors involved to lowering HbA1c levels? How to deliver the education? Interventions were categorized based on educational focus (lifestyle behaviors), and outcomes were classified as knowledge, self-care skills, frequency of glycemic monitoring and Screening for Retinopathy. More importantly the findings of

the study identified several training concepts integrated with diabetes education to help assist patients with reaching HbA1c adherence levels. These interventions were used to determine health outcomes; further research is needed that links theory-based variables to diabetes education outcomes (Knight, Badamgarav, Henning, Hasselblad, Glad, & Ofman, 2005).

Of the findings two research studies focused on self-determination theory and competence or self-efficacy from social learning theory to glycemic control and adherence outcomes. As discussed in Chapter 2 social learning theory does not directly contradict behaviorism but stresses the importance of observation and social context. Patients feel more competent and autonomous; they will have better glycemic control and better quality of life if social learning theory application is intervened. Clinic service components found in this study were the important role health care professionals played in assisting patients to comply with diabetes education to help raise adherence level. Patients who rated communication with their doctors as low had higher HbA1c levels and lower glucose monitoring. Patients whom obtained minimal to no interaction with diabetes education reported less satisfaction with treatment and lower well-being. They were also heavier, had higher triglyceride levels, and had less knowledge about diabetes. On the other hand, there were no significant differences in HbA1c. The results of collected studies demonstrated significant decreases of HbA1c over 1 year for over 689 patients from the methods retaining and learning to self-manage diabetes. In the Williams et. Al. study, patients who received health care integrated with diabetes education felt more autonomy and believed they had greater support. In addition, they improved their glycemic control over 12 months, and they reported greater regulation of their treatment

regimen. In addition, the studies reviewed also obtained thorough information regarding the strong involvement of medical providers in reflection of patients post follow-up protocol to support diabetes education programs. Together, these studies suggest patients with Type II diabetes innately take responsibility for their self-management behaviors, and obtain support in obtaining self-management by integrating social learning theory.

Four studies involving 201 patients assessed the effect of disease management on the frequency of glycemic monitoring. The studies reported significant increases in performed intervention of diabetes education; the variables of the studies assessed a reflective of patients' experience of their disease. When the learner is more familiar with the material and the learning focuses more on marginal improvements in behavior or skill, behavior-shaping approaches to learning are often employed. For example, the results of the implementation of a disease management program in Germany are consistent with the variety of theories, including self-determination theory and social learning theory (Whittermore, Chase, & Mandle, 2002). For patients the program seems to enhance patient involvement and choice (both central and autonomy), and improves glycemic control in the long term. Mimicry is enhanced when behavior rehearsal is immediate, but vicarious learning allows for later learning as well. The learner is not passive: he or she must attend to be motivated to use it because of reinforcing social factors (Wart, Cayer, Cook, pg.136).

Service Delivery-Variety of learning processes

Several researched articles examined a combination of different educational and teaching methods. One study demonstrated that pictorial flashcard education combined

with a one-to-one teaching program can improve knowledge about diabetes, increase self-caring behavior and affected some attitudes toward diabetes. Low literacy levels and inexperience of formal education did not stop patients from learning about diabetes and how to control their current stage within the disease. As mentioned in Chapter 2 training must recognize at least three major inputs that will affect the learning outcomes. First, the trainee (patient) characteristics will play a role in how learning is approached, what instructional methods will be useful, and what sorts of goals are suitable. Second, the work environment from which learner (patient) comes and to which he or she will return is important. Third, the trainer (educator) must choose the learning principles that he or she will use to promote learning. In this context diabetes education cannot be divided in separate constituents of visual learning, one-to-one interviews and reinforcement, as all of these are important in education theory in producing a change in behavior and attitude.

Group education in combination with individual education was commonly used as 13 of 18 interventions applied that form. Two studies compared group and individual education. The most common delivery methods were face to face (18 studies) and one study used a combination of telecommunication and written instructions. Computers have been used recently as an educational tool in a number of studies, and effects on glycemic control have been mixed: positive results in 10 studies and 3 negative results in others. Additionally, videotapes have been used as adjuncts for teaching. All interventions apart from one used collaborative teaching methods such as goal setting, problem solving and cognitive reframing. Differences in setting, delivery and teaching method were related to differences in HbA1c pre to post intervention patients are mentored through the same

capacity and followed through on any weaknesses they obtain and strengthen self-management.

A particular study examined the period of education interventions, and determined longer interventions apparently generate greater patient learning, since skill performance outcomes associated with longer interventions yielded larger effects than did shorter interventions. The studies confirmed that patient education increases over time, at least beyond the first year. Another interesting finding is that the pattern of hemoglobin levels over time following the intervention were at the required lower level from the standard HbA1c level of less than 7.5 (according to the Diabetes Association standards). Studies demonstrated that the length and time frame was not apparent to the affect it incurred on HbA1c levels. Since the amount of time spent in the educational process does not explain the outcomes, perhaps the quality of education is the key.

A study was examined regarding diabetes education in the hospital setting. The initial stage of the educational program consisted of three sessions between the educator and the patient involving diabetes education. The educational environment was provided for the patients to effectively follow the educational content: (a) what diabetes is and (b) the factors affecting metabolic control (diet, exercise, measuring blood glucose, and urine control). The education was both verbal and in question-answer forms. Hospital-based programs produced larger effects for knowledge and metabolic control outcomes. An example outpatient programs integrated larger effects for HbA1c levels and control variables are twice as large for hospital-based programs when compared to outpatient education. Out of necessity, content and education approaches must be general and applicable to all typed of patients. Thus, how well the contact is taught could be more

important than how long it taught. Positive effects of self-management training on knowledge, frequency and accuracy of self-monitoring of blood glucose, self-reported dietary habits, and glycemic control were demonstrated in studies. The improvement of metabolic control in the patients with diabetes was achieved through the application of a planned education. Because the education provides the patient to carry out self-care on a routine basis, it is a vital for achieving good metabolic control (Luzio, 2007).

Summary

A large number of controlled trails of the effectiveness of self-management training in individuals with Type II diabetes have been performed. Despite limitations in methodology and population of characteristics, settings, interventions, outcomes, and lengths of follow-up, a number of generalizations can be made from these studies. In reviewing the literature, it has been clear that diabetes self-management education lowers HbA1c levels. Interventions of the early 1970s into the collaborative, more theoretically based have been recognized to effectively help assess disease management. Although only randomized, trials were reviewed; there is an important body of literature with other study designs. It was more difficult to draw conclusion from non-experimental designs than from an experimental design. Nonetheless, sufficient information from the information collected on the studies revealed important information about the effectiveness of interventions. The information researched and gained from reviewing number of studies regarding diabetes education.

Chapter 5

Conclusions and Recommendations

The purpose of this study was to identify best practices in diabetes education measured by lowering HbA1c levels. As specified in Chapter 4, learning and teaching theories were researched to evaluate the effectiveness of diabetic patient's compliance with the reflection of diabetes education. The information reviewed reflected significant improvement in lifestyle habits and HbA1c levels. The literature identified several factors which were a strong element in obtaining successful outcomes by integrating diabetes education. The challenging obstacle reviewed in the research were integrating lifestyle change and obtaining a balance with the required to tools to meet adherence HbA1c levels. Self-management is a critical to the health of the person with diabetes, and the objectives for ideal self-management interventions in diabetes are clear: behavioral interventions must be practical and feasible in a variety of settings; the intervention must be effective for long-term. Identifying the challenges during the educational intervention it was demonstrated that diabetes education is a key factor in lowering HbA1c levels.

Recommendation 1: Managing Diabetes with the involvement of Nurses

The involvement of nurses in a hospital outpatient clinic on diabetes education according to the studies is most effective due to the change of measures from HbA1c levels. The research demonstrated that the theoretical model of proactive coping can be translated into a practical course that is effective in the context of diabetes education. The findings in Chapter 4 can support that hospital based programs that focus largely on the full support of the nursing staff produced larger effects for knowledge and metabolic

control outcomes. Diabetes is a chronic illness that requires continuing medical care and patient self-management education to prevent care and patient self-management education to prevent acute complications and to reduce the risk of long term complications (American Diabetes Association, 2001). The development of a patient-centered education system (individualized education) with the full involvement of the nursing staff whether in a clinic, hospital and/or outpatient clinic setting can help gain adherence levels by lowering HbA1c levels in diagnosed diabetic patients. Integrating patient-centered education system can help support the involving clinical components of diabetes such lipid, triglycerides, cholesterol, urine glucose and neuropathy by helping a patient meet the necessary standards to better lifestyle. This recommendation would be patient centered and focused on their needs. Diabetes is a disease that requires continuous patient education, last a lifetime, and teaching individuals with diabetes how to manage their disease is a part of their treatment plan (Mollaglu, Beyazit, 2007).

Recommendation 2: Establishing patient/clinician relationships to assist in self-management

Diabetes education has long been accepted by many health professionals as an integral part of diabetes care, but diabetes educators continue to be challenges daily to defend the effectiveness of their interventions and to describe best practice. As discussed in the findings in Chapter 4, medical providers are an important component of the delivery of successful outcomes for patient compliance. The Institute for Healthcare Innovation Improvement's Breakthrough Series methodology, the MacColl Institute for Healthcare Innovations Chronic Care Model focuses on the first year of diabetes treatment to involve the care of a provider. Suboptimal care has been found in academic

medical centers, private doctor offices, managed care organizations are meeting the needs of patients by assisting in post diabetes education treatment (Chin, 2004). Healthcare providers play an important role in assisting patients to pursue behavioral change when it involves diabetes. Studies suggest that health care providers do not always provide consistent interaction with patients during diabetes education. Healthcare providers are not involved, and expect surrounding departments to comply with follow-up and treatment of the patient. The treatment can entail educational component of managing nutrition, medications, and understanding the disease. For the most part healthcare providers write the medication script and request patient begin to use glucometer to assist them in maintaining compliance levels. Patient receiving treatment seeks advice from diabetes educator, nutritionist and/or referring departments but never the follow-up from the referring provider. The primary aim of the intervention was to help patients tackle specific self-care issues using the guidance of the provider. The peer support of and attention to understand the benefits of diabetes education. Providers need to involve themselves in the post interventions of diabetes education to help support compliance. Diabetes education needs to incorporate provider education, provider feedback, provider reminders to assist with patient disease control.

Recommendation 3: Integrating Post and Follow-up of HbA1c level labs

For a person with diabetes, self-management is the key to good control. One of the key elements of effective self-management is behavior change. Diabetes education provides a person with diabetes the knowledge and skills necessary to modify behavior and successfully manager their diabetes. Diabetes educators are experts at fostering behavior change. For individuals referred to diabetes education programs meetings

should require a one-on-one with an educator and or referring provider. Individuals are provided counseling regarding a blood glucose monitor and instructed on how to perform a blood sugar test. Molding the patient to this change of environment is not the problem the problem arises when the patient reaches a level of compliance and then on in post treatment does not attain to the developed education and the continuation of patient compliance is poor.

I recommend that after the patient has been through a series of educational sessions within a period of three to six months a yearly follow-up to evaluate goals and determine if changes in treatment are needed. Diabetes education programs have shown an average of two percent decrease in hemoglobin A1c for individuals who return for three month follow-up (Chin, 2004). Ongoing post intervention is important component in stabilizing individuals whom are not capable of managing their condition independently. Often times individuals who are unable to attend group education or need more education for such things as insulin instruction, insulin pump initiation or more individual meal planning, one-on-one counseling should also be provided with a post educational intervention.

Summary

In all, the results of this study supported, that diabetes education measured by lowering HbA1c levels, and intervention of learning and teaching theory to help mold the behavioral change in a needed regimen. Literature reviewed confirmed learning and teaching individuals with chronic disease in this case Diabetes can promote healthy lifestyle behaviors following educational intervention. Self-management is critical to the

health of the person with diabetes, and the objectives for ideal self-management

interventions in diabetes are clear: behavioral interventions must be practical and feasible

in a variety of settings.

References

AADE Guidelines for the Practice of Diabetes Self-Management Education and Training (2009).*American Association of Diabetes Educators*. Chicago, Illinois, 20, 22-25.

Aldelgadir, M., Elbagir, M., Eltom, M.,& Berne, C. (2006). The influence of glucose Self-monitoring on glycemic control in patients with diabetes mellitus in Sudan. *Diabetes Research and Clinical Practice*, 74(1),90-94.

American Association of Diabetes Educators. Standards for outcomes measurement of diabetes Self-management education. *Diabetes Educ.* 2003;29:804-816.

American Diabetes Association. (2001). Standards of medical care in diabetes. *Diabetes Care*, 30, 4-41.

Bartol, T. (2002). *Clinical applications of pathophysiology: Assessment, diagnostic reasoning, and management* (2nd ed.). St. Louis, MO: Mosby.

Brashers, V. L. (2002). *Clinical applications of pathophysiology: Assessment, diagnostic reasoning, and management* (2nd ed.). St. Louis, MO: Mosby.

Centers for Disease Control and Prevention. Rates of preventive care practices per 100 adults with diabetes, United States. http://www/cdc.gov/diabetes/statistics/preventive/fALLPractices.htm.2005. Access May 2011.

Covera-Tindel, T., Doering, L., Gomez, T., &Dracup, K. (2004). Predictors of non-compliance to exercise training in heart failure. *Journal of Cardiovascular Nursing*, 19(4), 269-277.

Diabetes Control and Complications Trial Research Group. (1993). The effect of intensive treatment of diabetes on the development and progression of long-term complications in insulin-dependent diabetes mellitus. *New England Journal of Medicine*, 329, 970-990.

Federation of European Nurses in Diabetes. (2005). The European Union and diabetes: Why should diabetes stakeholders, like FEND and the International Diabetes Federation—European Region, think it necessary to spend time and effort in trying to influence the European Union? *Journal of Diabetes Nursing*.2 (2),80-82.

Frank-Stromborg, M., Olsen, S.J., & Pender, N.J. (2004).*Instruments for clinical health care research* (3rd ed.). Sudbury, MA: Jones and Bartlett.

Graber, A.L., Elasy, T.A., Quinn, D., Wolff, K., & Brown, A. (2002). Improving glycemic control in adults with diabetes mellitus: Shared responsibility Primary care practices. *Medscape*, 95(7), 684-690.

Knight, K., Badamgarav,E., Henning,J.M., Hasselblad,V., Gano, A.,Ofman, J.J., & Weingarten, S.R.(2005). A Systematic Review of Diabetes Disease Management Programs. *American Journal of Managed Care*.11:242-250.

Luzio, S., Piehlmeier, W., Tovar, C., Eberl, S., Laztzsch, G., Fallbohmer, E., et al. (2007). Results of the pilot study of DIADEM—A comprehensive disease management programme for type 2 diabetes. *Diabetes Researched and Clinical Practice.* 76(3),410-417.

Margolis, S. (2003). *Hemoglobin A1c*. Retrieved March 23, 2011, from http://www.healthatoz.com.healthatoz/Atoz/dc/tp/tphemo.html

Chin,M.H.,Cook, S., Drum, M.L., Jin, L., Gullen, M., Humikowski, C.A., Koppert, J., Harrison, J.K., Lippold, S., & Schaefer, C.T. Improving Diabetes Care in Midwest Community Health Centers with the Health Disparities Collaborative. 2004. *American Diabetes Association.* 27:2-8.

McCance, K. L., & Huether, S. E. (2002). *Pathophysiology* (4th ed.). St. Louis, MO:

Mosby.Montgomery, W. V., Cayer, J.N., & Cook, S. (1993). *Handbook of Training and Development for the Public Sector*. New York, NY.

Mollaoglu,m., & Beyazit, E.(2007).Influence of diabetic education on patient metabolic control. *Applied Nursing Research*. 22(2009) 183-190.

Nathan, D.M. (2002). Initial Management of Glycemic in Type 2 Diabetes Mellitus. *The New England Journal of Medicine,* 347(17), 1342-1349.

Pender, N.J., Murdaugh, C.L., & Parsons, M.A. (2002). *Health promotion in nursing Practice.* (4th ed.). Upper Saddle River, NJ: Prentice Hall.

Peterson, K. A., & Hughes, M. (2002). Readiness to change and clinical success in diabetes educational program. *Journal of American Board of Family Practice*, 15(4), 240-289.

Phipps, W. J., Sanda, J. K., & Marek, J. F. (1999). *Medical - Surgical nursing* (6th ed.). St. Louis, MO: Mosby.

Pigman, H. T., Gan, D. X. & Krousei-Wood, M. A. (2002). Role of exercise for type 2 diabetic patient management. *Southern Medicine Journal*, 15(4), 64-78.

Sherwood, L. (1997). *Human physiology* (3rd ed.). Belmont, CA: Mosby.

Strand, R. *Diabetes mellitus* – type II. Retrieved March 23, 2011, from
http://www.bionutrition.org/case_studies/diabetes_mellitus_2.asp

Wart, V.M, Cayer, N.J., & Cook, S. (1993). Handbook of Training and Development for
the Public Sector. (Vol 32.140-171). NY. Jossey-Bass.

Whittermore, R., Chase S.K., Mandle, C. L., & Roy, S. C. (2002). Lifestyle change in
type 2 diabetes. *Nursing Research*, 51(1), 9-26.

APPENDIX A

Figure 1.

Self-Actualization

(Achieving individual potential)

Esteem

(Self-esteem and esteem from others)

Belonging

(Love, affection, being a part of groups

Safety

(Shelter, removal from danger)

Physiological

(Health, food, sleep)

Maslow's Hierarchy of Need Diagram

Theory of Human Motivation
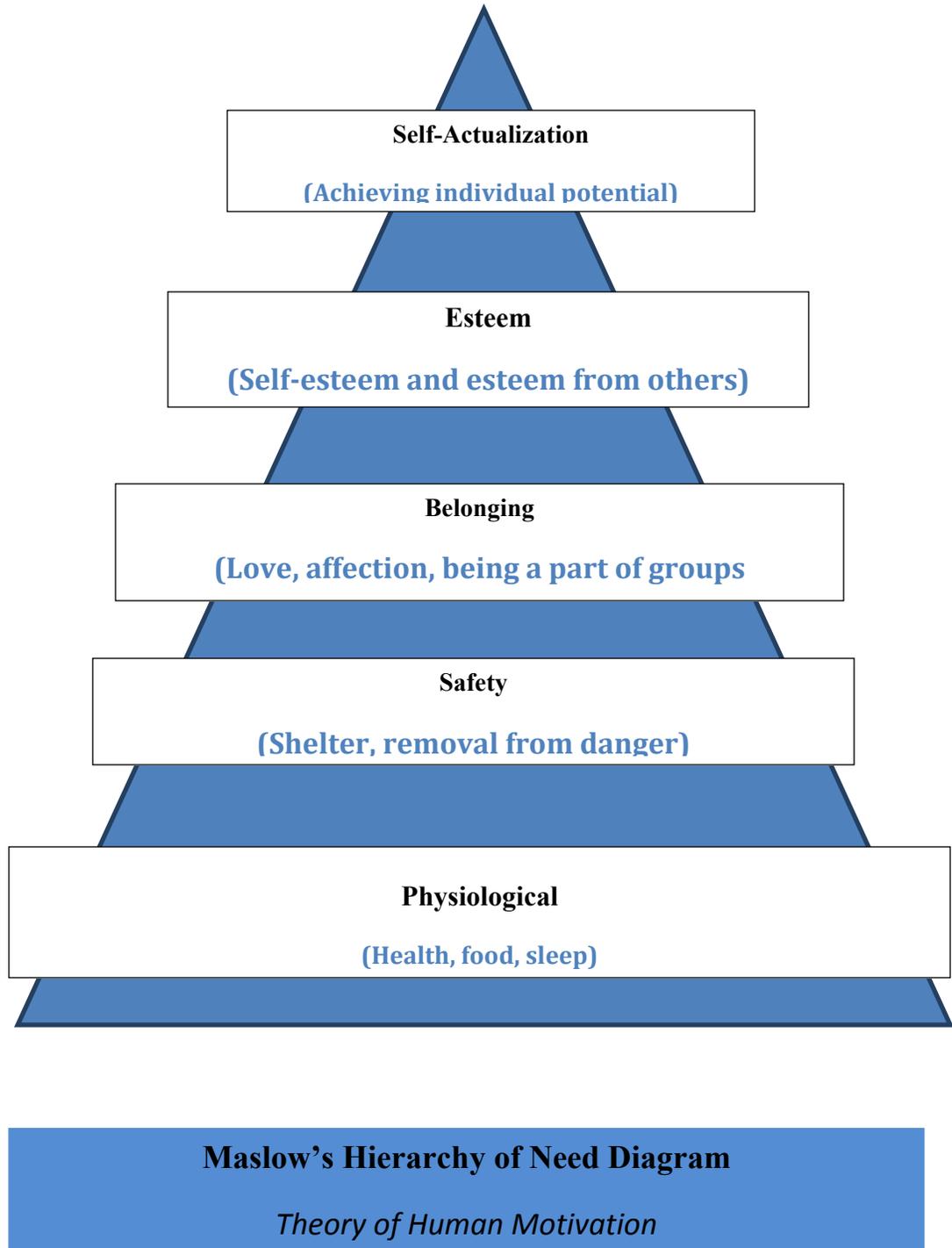
Table 1.

Training Principles by Learning Phases

Pre-training Phase	Instructional Phase	Practice/reinforcement phase
-Setting goals	-Increasing the similarity Of training to the work environment.	- actively involving the learner
		- giving feedback
	-teaching underlying principles	
	- increasing the organization of material.	
	-using variety of techniques and stimuli.	

APPENDIX B

CSU Bakersfield

Academic Affairs

Office of the Grants, Research, and Sponsored Programs (GRaSP)

Mail Stop: 24 DDH Room 108
9001 Stockdale Highway
Bakersfield, California 93311-1022

(661) 654-2231
(661) 654-3342 FAX
www.csub.edu

Institutional Review Board for Human Subjects Research

Anne Duran, Ph.D.
Department of Psychology
Scientific Concerns

Roseanna McCleary, Ph.D.
Masters of Social Work
Scientific Concerns

Thomas Blommers, Ph.D.
Department of Modern Languages
Nonscientific/Humanistic Concerns

Lily Alvarez, B.A
Kern County Mental Health
Community Issues/Concerns

Grant Herndon
Schools Legal Service
Community Issues/Concerns

Tommy W. Tunson, J.D.
Criminal Justice
Community Issues/Concerns

Kathleen Gilchrist, Ph.D.
Department of Nursing
Scientific Concerns

Paul Newberry, Ph.D.
Department of Philosophy/
Religious Studies
Nonscientific/Humanistic Concerns
IRB/HSR Chair

Yeunjoo Lee, Ph.D.
Department of Special Education
Nonscientific/Humanistic Concerns

Steve Suter, Ph.D.
Department of Psychology
Research Ethics Review Coordinator
and IRB/HSR Secretary

Date: 10 March 2011

To: Diane L. Baeza, PPA Student

   cc: Paul Newberry, IRB Chair
         R. Steven Daniels, Public Policy & Administration Department

From: Steve Suter, Research Ethics Review Coordinator

Subject: Protocol 11-38: Not Human Subjects Research

Thank you for bringing your protocol, **"Diabetes Education Measured by HbA1c Levels"** to the attention of the IRB/HSR. On the form "*Is My Project Human Subjects Research?*" you indicated the following:

> I want to interview, survey, systematically observe, or collect other data from human subjects, for example, students in the educational setting. **NO**

> I want to access data about specific persons that have already been collected by others [such as test scores or demographic information]. Those data can be linked to specific persons [regardless of whether I will link data and persons in my research or reveal anyone's identities]. **NO**

Given this, your proposed project will not constitute human subjects research. Therefore, it does not fall within the purview of the CSUB IRB/HSR. Good luck with your project.

If you have any questions, <u>or there are any changes that might bring these activities within the purview of the IRB/HSR</u>, please notify me immediately at 654-2373. Thank you.

Steve Suter, University Research Ethics Review Coordinator

.

The California State University - Bakersfield - Channel Islands - Chico - Dominguez Hills - East Bay - Fresno - Fullerton - Humboldt - Long Beach - Los Angeles - Maritime Academy
Monterey Bay - Northridge - Pomona - Sacramento - San Bernardino - San Diego - San Francisco - San Jose - San Luis Obispo - San Marcos - Sonoma - Stanislaus

32