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## The Effects Of Personalized Dietary Education On Glycosylated Hemoglobin Levels In Adult Diabetic Patients

Lacey Gentry

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**THE EFFECTS OF PERSONALIZED DIETARY EDUCATION  
ON GLYCOSYLATED HEMOGLOBIN LEVELS  
IN ADULT DIABETIC PATIENTS**

by

**Lacey T. Gentry**

**A Thesis  
Submitted in partial fulfillment of the requirements  
for the Degree of Master of Science in Nursing  
in the Division of Nursing  
Mississippi University for Women**

**COLUMBUS, MISSISSIPPI  
AUGUST, 1998**

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The Effects of Personalized Dietary Education  
on Glycosylated Hemoglobin Levels  
in Adult Diabetic Patients

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## Abstract

Diabetes mellitus is a complex and multifactorial disease process with numerous debilitating outcomes if improperly managed. This chronic illness requires continuing medical care and education to prevent acute exacerbations and to reduce the risk of long-term complications. The primary manifestation, hyperglycemia, can be the result of various elements. One major cause of hyperglycemia is inappropriate dietary intake which results in detrimental short- and long-term effects. A glycosylated hemoglobin measurement can be utilized as a marker in monitoring long-term glycemic control. This quasi-experimental study examined the effect of personalized dietary education on glycosylated hemoglobin levels in adult diabetic patients. The study was guided by the null hypothesis: There will be no difference in glycosylated hemoglobin levels in adult diabetic patients before and after a personalized dietary teaching intervention program. Pender's Health Promotion Model provided the theoretical framework in interpreting dietary teaching's effect on glycemic management. The sample

consisted of adult diabetic patients in rural Mississippi primary care facilities. Data were compiled using a demographic survey and the results of glycosylated hemoglobin testing obtained at baseline and two to three month post-intervention. Data were analyzed using descriptive statistics and the dependent t-test. Results indicated no significant reduction in the mean difference of the post-intervention glycosylated hemoglobin levels ( $p = 0.853$ ). Additional findings were brought out by researcher analyzed demographic questionnaires. Recommendations for future research included replication of this study with a larger sample utilizing different geographical areas and different health care providers. Conduction of a similar study over a longer period of time utilizing multiple dietary educational interventions and several glycosylated hemoglobin measurements as determinants of long-term dietary compliance was further recommended.

Dedication

In Loving Memory

of

Jessie Mae Denley

Though unable to be physically present when two of my proudest accomplishments and most wonderful dreams were realized - marrying my husband and successfully completing graduate school and becoming a nurse practitioner - her kind spirit and irrepressible pride provided me with strength and character.  
I miss you, Granny.

## Acknowledgements

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Inexpressible gratitude to Peggy Gentry, my "unsung hero" and terrific mother-in-law, whose tireless efforts and typing skills got me through this year.

My sincere thanks also go to my wonderful mother, father,



and brother whose understanding, support, and pride saw me through another educational endeavor. Much appreciation to my Momma, who as my role model, has shown me that the quest for knowledge and life-long learning are the rule and not the exception.

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## Chapter I

### The Research Problem

Diabetes mellitus (DM) is one of the most prevalent diseases in the United States. This disease process is no longer considered an epidemic but is now defined as a public health crisis (C. Cook, personal communication, November 14, 1997). Diabetes is the fourth leading cause of death in the United States. An estimated 16 million Americans, approximately six percent of the population, currently have DM (American Diabetes Association, 1997). Diabetes is the most expensive medical condition in the United States with the medical cost for a diabetic patient four times that of a patient without a diagnosis of diabetes (C. Cook, personal communication, November 14, 1997). One of every seven U.S. health care dollars is spent on diabetes and diabetic complications annually (American Diabetes Association, 1997). Diabetes is an obvious health crisis in Mississippi where the disease has reached endemic proportions. Mississippi has the highest number of self reported cases of DM in the country with approximately 150,000 residents with diabetes, half of whom have not been diagnosed (E. Crook, personal communication, November 14, 1997). Diabetes contributes to 1,600 deaths in Mississippi each year and

greater than 1,000 residents of the state suffer significant diabetes related complications annually. These complications include 650 lower extremity amputations, 150 new cases of end stage renal disease, and 200 cases of blindness (Mississippi Morbidity Report, 1997).

Numerous variables influence the severity of complications in the diabetic population including diet and medicine compliance, genetic influences, comorbid disease processes, and personal resources. Lifelong education and management are imperative in preventing and controlling exacerbations and long-term debilitating outcomes of DM. Treatment is aimed at lowering glycemic levels and thereby decreasing the likelihood of detrimental effects. A major cause of hyperglycemia is inappropriate dietary intake. Dietary education is a most significant factor in successful management of DM (Delahanty, 1993). Effective dietary self-management requires an individualized teaching approach which is appropriate for the personal lifestyle and goals of the individual with DM (Drash, 1996). The focus of this study was the role of personalized dietary education in long-term glycemic control.

#### Introduction to the Problem

Diabetes is a serious, chronic condition for which patients are ultimately responsible for providing 95 percent of their own care (Anderson, 1993). The diet has been identified by many patients as one of the most difficult

parts of managing their diabetes (Travis, 1997). Of all aspects of the prescribed diabetic regimen, diabetic research participants have been least likely to comply with restrictions related to dietary habits (Ary, 1986). The nutritional recommendations of the American Diabetes Association (ADA) have been used as a benchmark for diabetes dietary management. In an effort to improve adherence to diet management, the ADA recently departed from traditional guidelines by advocating individualization of diet based on the patient's lifestyle and the results of clinical monitoring (Drash, 1996).

No one diet best meets the needs for a person with diabetes. All diabetics require individualized nutritional counseling, a diet plan, and ongoing education regarding nutrition and diet. Current practice emphasizes the need to personalize the diet to the person, his or her lifestyle, routine dietary habits, and type of diabetes (K. Davis, personal communication, October 1, 1997). Enhancing compliance to a diabetic diet requires consideration of the patient's personality, motivation, situation and history. In attaining positive dietary outcomes, attention should be given to cultural, ethnic, financial and socioeconomic aspects of the client. Further research is needed regarding the relationship of these aspects as they relate to dietary education and dietary compliance. Several studies have correlated positive dietary outcomes and dietary compliance

with successful dietary education and its beneficial effects on personal knowledge and understanding of dietary principles (Johnson, 1995; Travis, 1997).

Dietary education is a lifelong process in the successful management of diabetes. Therefore, it is imperative that the diabetic regulate the nutritional facet of management in order to prevent complications related to the disease process which are directly attributable to diet. Inappropriate dietary intake results in hyperglycemia which is ultimately the major causative agent of debilitating conditions seen in the DM disease process (Drash, 1996). A glycosylated hemoglobin measurement reflects average blood sugar levels for the preceding three months and can adequately predict the occurrence of complications associated with DM (McCance et al., 1994). The client must be made aware that diabetic dietary noncompliance will result in often severe complications such as neuropathy, retinopathy, nephropathy, heart disease, amputations and peripheral vascular disease.

Adequate nutritional therapy is not only life saving but also is economical as it reduces length of hospital stay, decreases complications, decreases need for costly medications, and lessens the need for high technology treatment (Franz, 1995). Other documented benefits of nutritional therapy include clinical improvements in glucose control, serum cholesterol level, and weight (Johnson,



1995). Nutritional therapy is vital not only as a preventive measure in reducing risk of disease, maintaining health and improving quality of life, but also as a medical management tool in the treatment of acute and chronic diseases such as DM (Johnson, 1994). Therefore, the purpose of this study was to examine the effect of personalized dietary education on long-term glycemic control as evidenced by glycosylated hemoglobin levels (hemoglobin A1c).

#### Significance to Nursing

Patient education is the foundation for positive patient outcomes. Nutritional counseling can serve as a catalyst in the proper management of diabetes, thereby preventing or better controlling debilitating complications. The role of nursing is to provide dietary education to assist with dietary adherence as this is a most essential factor in the diabetic treatment plan (Burrell, 1992). The goal of diabetic dietary education is the facilitation of positive behaviors and the acquisition of knowledge by the diabetic client to efficiently manage the DM disease process (Drash, 1996). The nurse dietary educator acts as the change agent in fostering the patient's development of self-efficacy, self-control and self-evaluation. Through empowerment, the patient becomes motivated and perceives success as attainable and worth the effort (Pender, 1987).

Nursing Practice. This study has numerous implications for the advanced practice nurse. The Family Nurse

Practitioner (FNP) serves as the lifeline to diabetic patients by furnishing nutritional education and counseling, helping motivate patients to adopt good dietary practices and providing diabetic patients with the skills, techniques and strategies necessary to accomplish goals. The FNP must be cognizant of possible barriers to dietary compliance in order to appropriately educate those patients. The nurse clinician also must be aware of the pressing need for preventive patient self-management interventions in the diabetic population. The diabetic patient can be educated by the FNP and involved in realistic and personalized dietary self care. Diabetic markers can be utilized by the FNP to monitor long-term glycemic control in diabetic patients.

One such diabetic marker, glycosylated hemoglobin, can be confidently utilized by the FNP as a predictor and indicator of diabetes. The glycosylated hemoglobin measurement allows the nurse clinician to follow diabetic patients' disease process as it reflects blood glucose levels from previous months. This monitoring offers insight into the actual management and effectiveness of the treatment of diabetics. An acceptable glycosylated hemoglobin range can be set with each patient and used in education in short- and long-term goal setting.

Nursing Education. This investigation into the effects of personalized dietary education on glycosylated hemoglobin levels in adult diabetic patients provides new insight into

the aspect of individualization of diabetic diet teaching and its affect on long-term glycemic control. Nurse educators can utilize the data to demonstrate the effectiveness or ineffectiveness of the personalized dietary educational intervention as measured by glycemic control.

Nursing Theory. This study utilized Pender's Health Promotion Model as the foundation to implement personalized dietary education in adult diabetic patients and examined how it affects hemoglobin A1c levels. Pender's (1987) theory recognizes that participation in health promoting behaviors is directly related to primary motivational mechanisms such as the patient's value of his or her own health, the patient's desire for health, the patient's concept of health, and the patient's perception of barriers to health promoting behaviors. This theory has served as the framework to conduct research by identifying primary motivational mechanisms and their impact on health and care. This research served to substantiate the value of Pender's theory and provides a solid basis for conducting new research on primary motivational mechanisms (Pender, 1987) as the researcher examined the effects of health promotion after the implementation of personalized dietary education and the collection of glycosylated hemoglobin levels.

Nursing Research. This comparison of pre-intervention and post-intervention glycosylated hemoglobin levels was explored to further determine the impact of personalized

dietary education on long-term glycemic control. Minimal research has been found on the implementation of one-on-one personalized dietary education in adult diabetic patients. No specific nursing-based research has been found on this topic. There is a need for nursing research involving personalized dietary education in adult diabetic patients and how it effects hemoglobin A1c levels. Nurses provide the majority of diabetic nutritional counseling in rural areas with limited support from registered dietitians as well as physicians. This study sought to provide a stimulus for nursing research and a foundation to expand current knowledge.

#### Theoretical Framework

Pender's Health Promotion Model (1987) served as a foundation for this study. The Health Promotion Model (HPM) postulates that participation in health promoting behaviors is the result of cognitive-perceptual factors which are influenced by situational, personal, and interpersonal characteristics. Concepts of the HPM provided a framework for this study which examined the effect of personalized dietary education on glycosylated hemoglobin levels in adult diabetic patients. These concepts are defined as "primary motivational mechanisms" (Pender, 1987, p. 60). The first of seven concepts is the importance of health. Seeking health care is directly equivocated with the individual's value of his or her own health. The current study utilized

a clinic setting. Those who presented to the clinic, according to the HPM, valued their health highly enough that they came to the clinic for assessment and treatment. The second concept centers around the patient's perception of health. The HPM advocates that when the desire for health exists, the individual becomes motivated as that person perceives his or her personal ability to change the current health status. By utilizing the HPM, the current study encouraged patient participation in personalized dietary education. This HPM concept lends itself to motivate patients in their desire for healthy dietary intake which can in turn improve overall well being. The third major factor of the HPM deals with the individual's perceived self-efficacy, the belief of an individual that a behavior is attainable. This perception directly impacts the likelihood of that behavior's occurrence. If the diabetic patient held the belief that changing or modifying a diet plan was possible and worthwhile, then the occurrence of the desired behavior was positively influenced.

The fourth factor, definition of health, is the individual's concept of health. According to the HPM, this definition can influence the types of behavior changes attempted. For purposes of this study, positive definitions of health conveyed by the patient promoted compliance and well being. The fifth concept favors the belief that perceived health status can determine if health promotion

behaviors will be undertaken. In the study, as the patients presented to the clinic they obviously felt some degree of wellness or illness. For the purpose of the study, the researcher desired to encourage and promote a feeling of wellness in all participants. The desire for wellness often perpetuates health promoting behaviors.

Perceived benefits of behaviors, the sixth concept of the HPM, postulates that if benefits of actions are considered high, the health promoting behaviors will be initiated or continued. The HPM advocates that participants were to be informed of benefits of dietary compliance and the fact that dietary compliance directly affects blood glycemic levels which can determine the likelihood of complications such as nephropathy, neuropathy, retinopathy, and amputations. The seventh and final concept is perceived barriers to health promoting behaviors. This concept maintains that an individual's perception of the difficulty or unattainability of the activity may influence the likelihood of his or her engaging in that behavior. In utilizing the HPM, the researcher proposed to examine these beliefs during the educational intervention.

Health, according to the Health Promotion Model, is seen as a positive high-level state. Each individual possesses a unique definition of health and a highly individualized set of cognitive-perceptual and modifying factors. Modifying factors were those which have an

indirect influence on behaviors including demographic and biologic characteristics, interpersonal influences and behavioral and situational factors. Examples included age, gender, educational level, income, weight, expectations of significant others, and family patterns of health care behaviors.

This study was contingent upon the individual's motivation to attain and value health while practicing health promotion behaviors. All individuals were unique and responded to cognitive-perceptual and modifying factors differently. By utilizing Pender's Model, the researcher sought to identify the effects of health promotion after the completion of personalized dietary counseling as it affects a compliance marker of glycosylated hemoglobin.

#### Assumptions

For the purpose of the study, the following assumptions were made:

1. Dietary compliance can be measured by glycosylated hemoglobin levels.
2. The glycosylated hemoglobin meter is a reliable measure of hemoglobin A1c levels.
3. Individuals value personal health and will strive to attain or maintain their highest level of wellness.
4. Individuals will answer all questions honestly.

#### Purpose of the Study

The purpose of the study was to examine the effects of

personalized dietary education on glycosylated hemoglobin levels in adult diabetic patients.

### Statement of the Problem

Diabetes is a chronic condition that requires long-term medical management and adequate education to prevent both acute and chronic complications. As the number of diabetics in the population continues to grow, it has become imperative that diabetic dietary education reach those affected by the disease and be effective in the management of diabetes (Drash, 1996). By monitoring patients' levels of glycosylated hemoglobin and dietary intake, the diabetic individual and the nutritional counselor can better evaluate nutrition related outcomes (Drash, 1996). The focus of this study was dietary education's impact on hemoglobin A1c levels in adult diabetic patients.

### Research Hypothesis

The null research hypothesis for this study was as follows: There will be no difference in glycosylated hemoglobin levels in adult diabetic patients before and after personalized dietary teaching intervention program.

### Definition of Terms

For the purpose of this study, terms were defined as follows:

#### Glycosylated hemoglobin level:

Theoretical: a measure of blood glucose bound to hemoglobin which reflects an average blood sugar level for a



two to three month period preceding the test is directly proportional to the amount of glucose available in a 120 day span.

Operational: the serum glyceic hemoglobin (Hemoglobin A1c) level of subjects as measured by the same Bayer DCA 2000 glycosylated hemoglobin meter at baseline and three months post-intervention.

Adult diabetic patient:

Theoretical: a person who has gained maturity and is afflicted with a chronic disorder of carbohydrate metabolism in which no or too little insulin is produced by the body whereby oral hypoglycemic agents and/or insulin is occasionally needed to control hyperglycemia.

Operational: a person who is able to read by self report, between the ages of 35-55, currently diagnosed with insulin dependent diabetes mellitus or non-insulin dependent diabetes mellitus for greater than six months and who may or may not be diagnosed with other comorbid diagnoses.

Dietary teaching intervention program:

Theoretical: instruction involving exchanged-based eucaloric meal patterns in compliance with American Diabetes Association (ADA) recommendations.

Operational: individualized one-on-one nutritional counseling based on patients' personal dietary preferences and ADA guidelines.

### Summary

Diabetic dietary compliance and glycemic control affect diabetic outcomes and are of major concern to the health care providers. Health promotion efforts undertaken by the researcher were geared toward the often underserved rural target population.

This chapter sought to establish a relevant research problem and relate its significance to nursing. By presenting a theoretical framework strongly based in health promotion, organization was provided to guide the research. Assumptions, the purpose of the study, the problem statement, the research questions, and relevant terms were defined and presented in order to clarify key concepts within the study.

## Chapter II

### Review of Literature

Numerous studies have been conducted on the concept of glycosylated hemoglobin as both a glycemic marker and a predictor of diabetic complications. A review of the literature revealed diabetic studies related to glucose levels as a predictive measurement of diabetic complications, the facilitation of compliant diabetic behaviors after a behavior-based intervention program, contingency contracting and the facilitation of positive nutritional behaviors in diabetics, the effectiveness of medical nutritional therapy on non-insulin dependent diabetes mellitus patients, the effectiveness of diabetes education as measured by long-term glycemic control, and dietary intake of insulin dependent diabetic individuals as compared to current nutritional guidelines.

One study found in the review of literature was conducted by McCance et al. (1994). McCance et al. examined diabetes among the Pima Indian residents of the Gila River Indian Community in Arizona. The purpose of the study was to compare the ability of tests measuring two hour plasma glucose, fasting plasma glucose, and hemoglobin A1c concentrations in predicting the specific microvascular

complications of non-insulin dependent diabetes mellitus. The major research question was the accuracy of hemoglobin A1c and fasting plasma glucose concentration as diagnostic tests for diabetes complications as compared to the more commonly utilized two-hour oral glucose tolerance test (McCance, 1994).

The variables of the study included the hemoglobin A1c measurement, the fasting plasma glucose concentration, and the oral glucose tolerance test. Outcome variables included the development of retinopathy and nephropathy. Plasma glucose concentration was defined as the concentration of glucose in the plasma as measured by the potassium ferricyanide method with an autoanalyzer. Glycated hemoglobin was defined as a method of monitoring diabetic complication as measured by electrophoresis and high performance liquid chromatography. A third monitoring method related to diabetic complications, glucose tolerance testing, was defined and measured by the potassium ferricyanide method with an autoanalyzer. Diabetic retinopathy was defined by the presence of at least one micro-aneurism or hemorrhage in the eye or proliferative retinopathy. Nephropathy was defined as a protein to creatinine ratio of greater than or equal to 1.0 g:mmol (113 mg protein:mmol creatinine).

The researchers adopted a model with logarithmic transformation and common variance as the means of comparing

a dichotomy of each of the three test variables against the biological and clinical end point. Minimal research had been conducted previously regarding the usefulness or uselessness of the two-hour glucose tolerance test, the glycated hemoglobin percentage, and the fasting plasma glucose concentration in predicting the prevalence and incidence of microvascular complications related to diabetes.

The researchers utilized both a longitudinal and a cross sectional analysis to determine the relationship between complications and concomitant test results for subjects who were non-insulin dependent diabetics, age 25 years and older. Subjects receiving insulin or oral hypoglycemic treatments subjects were excluded from the study. In the cross sectional analysis an effort was made to determine the prevalence of retinopathy or nephropathy in 960 subjects by the two-hour glucose tolerance test, hemoglobin A1c level, and fasting plasma glucose measurements. All subjects were included regardless of the prevalence of retinopathy or nephropathy. The longitudinal analysis was conducted from January 1, 1982 through November 30, 1991. These subjects were free of retinopathy and nephropathy at their first examination when the three lab tests were conducted. The subjects were followed and tested every two years until they developed a complication or until the study concluded. In the cross-sectional analysis the

frequency distributions of the three test variables were plotted on a model of two overlapping Gaussian distributions. The longitudinal analysis estimated the cumulative incidence of the complications on Kaplan-Meier survival curves and compared the data using log rank statistics. The cross-sectional and longitudinal studies were then compared using a receiver operating on characteristic curves based on the two-hour and fasting plasma glucose and glycated hemoglobin concentrations (McCance, 1994).

McCance et al. (1994) noted all three lab tests were predictive of retinopathy  $P < 0.0001$  and nephropathy as two-hour plasma glucose  $P < 0.05$ ; fasting plasma glucose concentration  $P < 0.01$ ; and hemoglobin A1c  $P < 0.05$ . Two-hour plasma glucose concentration showed a slightly greater accuracy statistically for predicting retinopathy. The researchers stated that each measure of glycemia "antimodal cut off points had comparable sensitivity and specifically for the presence of retinopathy and for nephropathy, though hemoglobin A1c concentration tended to be the most specific and two-hour plasma glucose concentration the most sensitive measure" (McCance, 1994, 1327). However, none of the lab variables differed significantly for the prediction of incidence of retinopathy or nephropathy. McCance et al. found that prolonged hyperglycemia better predicts the complication of

retinopathy rather than nephropathy. The researchers noted a weaker association between the degree of glycemia and nephropathy as related to the strong relationship between the degree of glycemia and retinopathy. The researchers stated that although the two-hour glucose tolerance test has been utilized as the universal diabetic diagnostic test for the past 40 years there are other more practical and less expensive measuring tools. They concluded that when measuring the risks of complications of diabetes mellitus, hemoglobin A1c and fasting plasma glucose concentration were just as useful diagnostic measurements as two-hour plasma glucose concentration. One suggestion the researchers surmised was that longitudinal and cross-sectional analysis provide important complementary information and lead to similar conclusions.

This study established hemoglobin A1c as a reliable and cost effective predictor of diabetes mellitus and the complications associated with the disease process. McCance et al. (1994) concluded that the glycated hemoglobin measurement warranted more research as it could possibly be utilized as an indicator of diabetic management since it reflected the average blood glucose level for the preceding two to three months. The proposed study utilized a hemoglobin A1c measurement before and after a personalized nutritional counseling session as a indicator of dietary compliance.

In another study, Glasgow, Toobert and Hampson (1996) examined a behavior-based intervention program utilizing diabetic patients in an outpatient setting and the effect of the intervention in facilitating compliant behaviors. The purpose of the study was to evaluate the effectiveness of a brief medical office-based intervention in helping adult diabetic patients comply with a healthy, low saturated fat eating plan. Other purposes mentioned included evaluating the impact of intervention on physiological outcomes such as cholesterol and hemoglobin A1c levels as well as the impact on participants' quality of life. Diverse patient subgroups also were evaluated as to the efficiency of the intervention. The major research question involved the efficacy of a brief office-based intervention utilizing dietary education and the resulting changes in a dietary self care (Glasgow et al., 1996).

The dependent variables of the study included dietary measures of the Kristal Food Habits Questionnaire (FHQ), a four-day food record, biological measures composed of patient's height, weight, body mass index (BMI), serum cholesterol, and hemoglobin A1c levels. Quality of life was measured utilizing the Medical Outcomes Study (MOS) Short-Form General Health Survey. A patient's medical visit satisfaction survey was developed and utilized. Initial variables which were assessed included stage of dietary change as measured by the stage model of behavior change,



the summary of Diabetes Self-Care Scale, and a scale derived from Hampson et al. (1990) which assessed personal models of diabetes. Multidimensional Desire for Control Scales by Anderson et al. (1989) was utilized to assess desire for participation.

The Kristal FHQ was defined as a twenty-item tool utilized to figure the four dimensions dietary habits related to fat intake. These dimensions include increasing consumption of fruit and vegetables, avoiding flavoring foods with fats, nutritiously altering meat choices, and replacing high-fat foods with low-fat foods. This test's reliability was previously validated with other dietary measures. Four day food records revealed the participants' dietary intake over a 96-hour period and was scored on the basis of calories consumed daily from fat and saturated fat as measured by the University of Minnesota Nutrition Data System database (Glasgow et al., 1996).

For the purpose of the study, weights was measured in kilograms and height was measured in meters which were converted to the body mass index which is equivalent of  $\text{kg}/\text{m}^2$ . Serum cholesterol was defined as the measure of cholesterol content in the blood which is described as a major heart disease risk factor. The hemoglobin A1c was defined as a marker of long-term glycemic control and measured by utilizing the Abbott Diagnostics automated

adapted affinity chromatography method. Other instrumentation also was utilized in the study.

The Medical Outcomes Study Short-Form General Health Survey is a twenty-item questionnaire which weigh five diverse dimensions including Physical Functioning, Role Functioning, Social Functioning, Mental Health, and Health Perception. The patients' medical visit satisfaction survey was developed for this study and contained seven items which measured the patients' perception of effectiveness of the health care team and the patients' perception of diabetes and personal self care activities. The stage of dietary change, the Summary of Diabetes Self Care Scale, and a personal model diabetes scale assessed participants' personal models of diabetes and were defined as tools to measure patients' acquiescence of the relevance and treatment of DM. The Multidimensional Desire for Control Scales was defined as measure of desire for participation in the study (Glasgow et al., 1996).

Glasgow et al. (1996) utilized a conceptual framework based on the social learning theory, the social cognitive theory and systems approaches in relation to the self-management of DM. Social learning factors that influence diabetes self-management had been identified in previous research by Glasgow et al. and included self-efficacy, barriers to adherence, problem-solving skills, and social support. Patients were randomly selected within two

physicians' practices to receive either usual care or brief intervention conditions. Inclusion criteria were having IDDM or NIDDM, being 40 years of age or older, and being in charge of diabetic dietary self-management (Glasgow et al., 1996).

Perspective participants were mailed a letter from their physician three weeks before a scheduled office visit which detailed the project and supported patients' participation. Included with this letter was an informed consent statement, a four-day food record form, and a short form of the General Health Survey.

The patient was notified by phone a few days later by a project staff member who explained the project, answered questions, and established desire for participation. The 57 to 66 percent who chose to participate were then given verbal and written directions and an example for completing the four-day food diary which was to include three week days and one weekend day. After completing the diet record, the participants were to mail it in so the nutritional content could be analyzed before their office visit.

When the patients arrived for their scheduled clinic visit, they completed touch screen computerized baseline variable assessments with the assistance of a research staff member. They were weighed, measured and hemoglobin A1c and cholesterol levels were obtained. A Food Habits Questionnaire was also completed. Also assessed were

dietary stage of change, Summary of Diabetes Self-Care Scale, personal models of diabetes, beliefs about seriousness of diabetes and treatment, desire to participate, and a quality of life scale. Exclusion factors included patients without diet-related problems, weight less than or equal to 120 percent of ideal, and/or cholesterol level less than or equal to 200 mg/dl, and/or hemoglobin A1c less than or equal to nine, and/or dietary intake of less than or equal to 30 percent of calories from fat, and/or a Summary Score on the FHQ of less than 2.5 (Glasgow et al., 1996).

Patients in the usual care condition (control group) were informed of researchers' appreciation of their participation in the study, were seen by the MD, and were reassessed at their regularly scheduled three-month follow-up visit. Those patients in the brief intervention group (experimental group) completed an additional assessment using the touch screen computer which identified barriers to dietary self care. A personalized diet was developed for each patient and personal goals and strategies were set which centered around reducing saturated fat intake. Patients' fat intake and barriers to low fat eating by that particular patient was evaluated by research staff member and patient and this information was attached to the patients' chart. The MD then saw the patient and encouraged the patient to work on decreasing fat intake.

After the visit, the patients met with an intervention staff member and specific goals and strategies were developed. The patient received a copy of this and completed a self-efficacy rating which measured patients' confidence levels in achieving a goal. Those who scored high enough (85%) received an interactive take home video related to barriers of healthy eating and strategies to achieve health eating goals. Those scoring lower than 85 percent returned to the clinic within the next week to view the same video using the touch screen system.

Follow-up phone calls were made by research staff members to the intervention subjects within the next one to three weeks regarding goal attainment and barriers to healthy eating. This group was also reassessed at three month follow-up visits.

Initial analyses evaluated the relationship of baseline conditions on dependent variables, the effect of the MD on intervention and attrition. The researchers found no significant interaction effects by the physician or the interventionist that the patients saw. Attrition rates were found to be 12 percent in the brief intervention group and 11 percent for usual care. Multivariate analyses of covariance (MANCOVAs) were utilized to evaluate the intervention effects on dietary behavior, physiological outcomes, and quality of life. In dietary behavior, the MANCOVA was highly significant (Wilks' = 0.91 P = 0.022) in

those subjects who received brief intervention as compared to the control. Using ANCOVAs the researchers determined improvement in score on FHQ, percent of calories from fat, and saturated fat and kilocalories consumed per day. Physiological outcomes also were significant as measured by the MANCOVA (Wilks' = 0.90  $p = 0.001$ ).

Using ANCOVAs the researchers found reductions in the cholesterol values in the experimental group but no significance on hemoglobin A1c resulted. An overall greater satisfaction with the office visit also was determined in the experimental brief intervention group. The intervention itself was found to be widely applicable to most patients as variables that were not correlated to outcome included age, education, insulin taking status, number of other chronic conditions, and desire for participation in DM management (Glasgow et al., 1996).

Glasgow et al. (1996) concluded that future interventions patterned after their study could demonstrate both cost-effective and produce beneficial changes in dietary behavior. The authors found the decrease in cholesterol level promising as the majority of individuals diagnosed with diabetes die from coronary heart disease complications. The personally developed dietary interventions and computer driven assessment and evaluation systems were concluded as being worthy approaches to diabetes dietary management. The researchers found it

discouraging that hemoglobin A1c levels and quality of life improvements were not significantly changed (Glasgow et al., 1996).

Recommendations by Glasgow et al. (1996) for future research included studies to be conducted to determine long-term validity and the basic principles of inexpensive, office-based dietary interventions. They also suggested research on automated systems and feedback and its impact on patient-provider relations. Intervention delivery modes such as office staff, computer, interactive video, and telephone counseling were suggested to be evaluated related to cost-effectiveness. Lastly the researchers suggested that the generalizability of the intervention should be assessed by future research with the variables of other provider settings, multiple risk factor interventions, and other chronic illnesses.

According to Glasgow et al. (1996), this study is critical to the future of diabetes dietary self management. The significance of the findings validated the dietary interventions' effectiveness. By empowering the diabetic client with control over dietary management by methods chosen and goals set by the individual client, the evidence indicated that positive changes will most likely occur. The Glasgow et al., study laid the ground work for future patient empowerment and effective diabetic dietary counseling. The proposed study will similarly utilize an

office-based dietary education intervention and monitor the hemoglobin A1c measurement indicating the level of dietary self-care.

In another study, Boehm, Schlenk, Funnell, Powers, and Ronis (1997) examined the affects of contingency contracting and the facilitation of positive nutritional behaviors in diabetics. The purpose of the study was to determine how psychosocial adjustment to diabetes affects the compliance with nutritional recommendations based on self-reported completion of contingency contracts. The major research questions involved the specific components of psychosocial adjustment identified by the Diabetes Care Profile and their correlation with contingency contracting for compliance with dietary guidelines.

The Health Belief Model (HBM) provided the conceptual framework of the study as the HBM lends itself as a predictive component of self-management such as adherence to dietary recommendations. The Health Belief model infers a person's adherence to nutritional guidelines based on the person's perception of the disease severity, personal susceptibility, benefits of regimen, and types of obstacles as the person is continuously incited with internal and external stimuli and cues.

Variables of the study were dietary adherence, psychosocial adjustment to diabetes as measured by the Diabetes Care Profile (DCP), and contingency contracting.



Adherence was defined as the patient's compliance with learned specific nutritional recommendations which entail modifying previous dietary patterns, initiating new dietary behaviors, and monitoring the effects of these dietary patterns on glycemic control while maintaining an exercise regimen.

Psychosocial adjustment is defined as the degree to which the diabetic has adapted to the psychological and social factors of the disease process. Psychosocial adjustment was measured by the DCP which is a standardized assessment tool used to determine factors of diabetics' psychosocial adjustment. This tool is used in predicting patient compliance with nutritional recommendations that occurs during and after the implementation of behavioral interventions. A definition of contingency contracting involved the process in which the diabetic counselor and the diabetic patient agreed upon a personalized, signed agreement that outlines expected behavior and the rewards for positive behavior.

Boehm et al. (1997) utilized a subsample of 117 non-insulin dependent diabetes mellitus (NIDDM) patients obtained from a larger randomized clinical trial. Inclusion criteria consisted of a baseline and final remeasurement of hemoglobin A1c, random assignment into groups that wrote contingency contracts with nurses, and a minimum of one contingency contract written during the treatment period.

Instrumentation included the DCP and a Behaviors Schedule. The DCP was utilized to measure the components of psychosocial adjustment including control problems, social impact, emotional impact, barriers to adherence, benefits to regimen, extent of regimen, risk of complications, social support, and support ratio. The Behaviors Schedule was developed as a classification system for factors related to the contingency contracts. The schedule includes coding rules with key words and examples and scoring instructions in rating behaviors in the contingency contracts. An example of positive adherence behavior from the Behaviors Schedule includes the phrase, "I will substitute a piece of fruit for potato chips for a bedtime snack three times a week for four weeks" in the contingency contract (Boehm et al., 1997).

A demographic questionnaire was completed and baseline data were then obtained consisting of hemoglobin A1c, height, weight, and DCP information. Subjects were randomly assigned to four groups consisting of contingency contracting or attention control groups. The attention control group did not write contingency contracts but did receive routine care and consistent follow-up visits by a clinical nurse specialist. The remaining three groups wrote contingency contracts each visit. One group, the compliance group, followed a strict diabetic diet regimen with focused behaviors. The behavior strategies group focused on one

behavioral strategy such as self-monitoring, stimulus control, dividing the behavior into small steps, or self-reinforcement. In this second group, behavior analysis was examined between the nurse and the patient. The third set of subjects was labeled the behavioral strategies with instruction group. They received programmed instruction about behavioral analysis and behavioral strategies and participated in behavior analysis with the nurse. In these last three groups a desired behavior was identified and included as a favorable outcome in the contingency contract. Most subjects negotiated one contingency contract per visit and were allowed to select the desired behavior to include in the contract in order to increase compliance and success (Boehm et al., 1997).

Numerous types of data analyses were utilized for the study. Contingency contracts were measured for central tendency and variability. Logistic regression and chi-square tests were utilized to define relationships between DCP predictors and contingency contracting for adherence to nutritional guidelines. The majority of components of psychosocial adjustment in the DCP were found to possess internal consistency reliability by utilizing Crombach's alpha. Eight of ten factors had alpha coefficients greater than or equal to .70. Correlations between components of the psychosocial adjustment in the DCP and the dichotomous measures of contingency contacting were established by

utilizing Pearson and point-biserial correlation coefficients. "Low to moderate correlations existed between contingency contracting for adherence to nutritional guidelines and regimen adherence ( $P < .01$ ), social support ( $P < .05$  and  $P < .01$ ), social support ( $P < .05$  and  $P < .01$ ), and support ratio ( $P < .01$ ). Low contingency contracting for adherence to dietary regimen was correlated with high regimen adherence, high received social support and high support ratio" (Boehm et al., 1997, p. 161). Interestingly, 44 percent of participants reported receiving less social support than desired, 19 percent received desired support and 37 percent received more support than desired from family, friends and significant others. "The overall multivariate logistic regression for predicting contingency contracting for adherence to nutrition recommendations was significant,  $X = 22.21$ ,  $p < .05$  (Boehm et al., 1997, p. 163). However, no significant differences emerged "in adherence to nutritional recommendations among contingency contracting groups" (Boehm et al., 1997, p.163). Boehm et al. (1997) found that participants who perceived higher regimen adherence and a higher support ratio were less likely to participate with the nurse in contingency contracting for adherence to dietary guidelines. Therefore, those participants who felt they were effectively adhering to nutritional guidelines were less likely to propose changes in behaviors by completing a contingency contract.

Those patients who viewed support systems as adequate participated in more adherent behaviors but completed fewer contingency contracts. Subjects who saw support systems as being overbearing were inclined to engage in contingency contracting to assist with adherence. Boehm et al. explained that possibly these patients saw the contingency contracting as a positive enforcer while the nagging support system was viewed in a negative light related to compliance.

Recommendations from Boehm et al. (1997) included further assessment of adherence to nutrition regimen in order to possibly identify patient-skewed self-evaluations. The researchers also proposed that communication skills, assertiveness strategies, problem-solving techniques, and self-efficacy enhancement be included in patient self-management training. An investigation into the amount and type of social support is suggested by the researchers to be integrated into the assessment process of diabetic educators (Boehm et al., 1997).

The findings from the Boehm et al. (1997) study indicate that social factors such as family support and perceived higher regimen adherence directly affect the initiating of contingency contracting. The researchers concluded that contingency contracting is a unique concept which can assist the diabetic client in goal setting and goal attainment. The study by Boehm et al. provides insight to how psychosocial adjustment components affect diabetic

regimen self management particularly in the area of adherence to nutritional recommendations. Goal setting was utilized in the proposed study by way of a target glycosylated hemoglobin measurement jointly set by patient and researcher.

Johnson and Valera (1995) utilized a retrospective quality improvement audit to evaluate the effectiveness of medical nutritional therapy (MNT) on clinical outcomes of non-insulin-dependent diabetes mellitus (NIDDM) patients. The purpose of the study was to examine clinical outcome data as an indicator of quality care in order to establish the necessity for MNT. The major research question involved the analysis of specific process and outcome criteria and their correlation with standards of quality assurance outcomes as related to the implementation of MNT in NIDDM patients.

The researchers utilized primary-care centers and neighborhood health centers in the ex post facto study. Eligible patients included those with NIDDM who participated in at least three MNT sessions over a one and one half year period including one initial assessment and two follow-up visits. Participants also had to have controlled chronic disease. The same registered dietitian (RD) provided MNT for each group (Johnson et al., 1995).

A chart review was utilized to examine demographic data as well as process and outcome criteria. Demographic data

included the date of MNT visit, weight, random measurement of blood glucose level, other lab values including hemoglobin A1c level, and medication changes (Johnson et al., 1995).

Process criteria included the dietitian completing a comprehensive health and nutritional history, planning and instructing the patient in appropriate nutritional interventions, including moderate exercise to promote glycemic and lipidemic control and weight loss. The dietitian documented patient's comprehension, motivation, and likelihood of adherence to treatment plan. The plans for monitoring follow-up and coordination of care with primary-care provider and nursing staff was also documented by the dietitian. The final process criteria included the dietitian reinforcing and monitoring symptoms of hypoglycemia and hyperglycemia. Outcome criteria included that a patient's blood glucose level decrease by at least ten percent within two weeks of initial visit, hemoglobin A1c levels approach normal within three months of initial visit, blood lipid levels approach normal within two months of attaining glycemic control; and medication dosage decrease over a six-week period while adhering to an appropriate nutrition plan (Johnson et al., 1995).

Twenty-one subjects were monitored for the study with process criteria completed in 19 patients (92%). Descriptive statistics were used to analyze the data. The researchers

found that blood glucose (BG) levels decreased 41 percent from baseline in the majority of patients within two weeks of the initial MNT visit. At the end of the six-month study period, BG levels had decreased 50 percent in greater than three-fourths of the participants after a minimal of three MNT sessions (Johnson et al., 1995).

Johnson and Valera's (1995) research showed a mean weight reduction of two kilograms after the six-month study period. Due to insufficient baseline and comparison data, hemoglobin A1c, serum cholesterol, and serum triglyceride levels were unable to be analyzed preventing outcome conclusions from being drawn. Forty-four percent of those participants who took diabetic medication had less or no need for the drugs after the MNT. The average number of MNT sessions for participants over a six-month period was 4.64 visits. Seventy-six percent of participants showed improved glycemic control after MNT was provided by a RD (Johnson et al., 1995).

The researchers found that implementation of MNT and quality assurance criteria guidelines positively affected glycemic control in NIDDM patients. The researchers stressed the need for documenting clinical outcomes in order to validate the effectiveness of MNT. Johnson and Valera (1995) recommended practice guidelines for practitioners in order to assure quality care by obtaining appropriate lab values in order to monitor patient outcomes.



The researchers were unable to analyze certain lab values due to infrequent and inconsistent ordering of certain lab tests by practitioners at the clinics. Another suggestion included obtaining fasting blood glucose levels as opposed to random blood glucose (RBG) levels at MNT visits. RBG levels were collected in the study due to availability, decreased expense, and effectiveness as an immediate feedback educational tool.

Johnson and Valera's (1995) study supported the assumption that nutritional counseling improves clinical outcomes in NIDDM patients. In the current study, the researcher proposed to implement personalized dietary education as a form of medical nutritional therapy with hemoglobin A1c levels being the outcome variable. By utilizing pre-intervention and post-intervention hemoglobin A1c levels, the current researcher was able to establish the effectiveness or ineffectiveness of personalized dietary education.

Tildesly, Mair, Sharpe and Piaseczny (1996) explored the aspect of outcome analysis after diabetes teaching in patients treated at St. Paul's Diabetes Teaching and Treatment Center (DTTC) in Vancouver, British Columbia. The purpose of the study was to evaluate the effectiveness of diabetes education in a community-based outpatient setting as measured by long-term improvement in diabetes control. Patient subgroups were utilized in evaluating the efficacy

of the educational intervention. The major research question involved the proficiency of large group diabetes education in a community-based outpatient setting and the resulting achievements in long-term diabetic control.

An ex post facto research design was utilized to examine the variables of the study which included hemoglobin A1c measurement percentage of ideal body weight, number of hypoglycemic episodes, and home blood glucose monitoring. Hemoglobin A1c was defined as a measure of long-term glycemic control and was measured by both a cation exchange resin in a disposable column (Bio-Rad hemoglobin A1c microcolumn test) and ion exchange high pressure liquid chromatography (Bio-Rad Diamet analyzer). Percentage of ideal body weight was calculated utilizing the 1983 Metropolitan Life Insurance values for desirable heights and weights for adults. Frequency of home blood glucose monitoring (HBGM) was measured by the number of times the patient reportedly monitored blood glucose each week. The number of hypoglycemic episodes was monitored each month as reported by the patient or another observer of the patient's symptoms of hypoglycemia (Tildesly et al., 1996).

The sample size of 5,823 patients was divided into four subgroups which included patients diagnosed with insulin dependent diabetes mellitus (IDDM), diet-treated non-insulin dependent diabetes mellitus (NIDDM), oral agent-treated NIDDM, and insulin-treated NIDDM. The sample included those

patients who had returned to St. Paul's DTTC for up to eight years. All patients had previously participated in a four-day core program at the DTTC (Tildesly et al., 1996).

Course content taught includes self blood glucose monitoring, basic information about diabetes, diabetic medications, treatment of hypoglycemia, and coping skills. Patients ate all meals at the Center during this four-day period with immediate feedback provided by the staff. Intense dietary counseling and instruction was conducted in a group setting. The patients also met with an endocrinologist daily. At the end of the four day course contact numbers, needed prescriptions, and follow-up appointment dates were given to the patients (Tildesly et al., 1996).

Newly diagnosed diabetics returned three months later for a one day follow-up course. Patients returned to DTTC at three-month, six-month or yearly intervals dependent on the patient's hemoglobin A1c level and the patient's need for follow-up visits as determined by the patient or the staff (Tildesly et al., 1996).

At the initial and follow-up visits, the hemoglobin A1c level was obtained and percentage of ideal body weight was calculated. The number of times per week that the patient performed home blood glucose monitoring was reported by the patient as well as the number of hypoglycemic episodes per month in the IDDM subgroup (Tildesly et al., 1996).

Tildesly et al., (1996) verified the accuracy of the data by randomly comparing 2,000 fields in the data base to the source document data. An error rate of less than one percent was identified, thus validating the data base. T-tests were utilized to determine statistical significance of changes from the patient's initial assessment. Data was represented by standard deviation. In this outcome study, the researchers found that long-term glyceimic improvement was possible and likely in those patients who attended St. Paul's DTTC and returned for follow-up visits. IDDM patients showed improvement in diabetic control without a significant increase in hypoglycemic episodes. However, the IDDM group demonstrated a notable weight gain. All NIDDM groups showed weight loss from baseline to the six- to eight-year marks.

The researchers stressed the efficacy of the diet and weight reduction in improving diabetic control. This was most notable in the diet treated NIDDM group which reduced its weight seven percent from baseline. All four groups increased the frequency of weekly HBGM. Hemoglobin A1c levels declined in all groups. The findings support the fact that knowledge of the hemoglobin A1c levels and frequency of HBGM were crucial determinants of short- and long-term outcomes (Tildesly et al., 1996).

The researchers noted that the follow-up rate for IDDM patients after the initial four day program was 70 percent

while the follow-up rate for NIDDM patients was 85 percent. Those who did not return to the DTTC were unable to be monitored by the researchers. The economic feasibility of the outpatient DTTC is noteworthy as the cost of a one-day DTTC visit is approximately \$106 as compared to a one-day hospital stay at \$800. Other findings included a significant decrease in the cases of diabetic ketoacidosis in DTTC participants. Since the St. Paul's DTTC opened, patients who have attended the DTTC have shown a decline in physician services (Tildesly et al., 1996).

The researchers concluded diabetes education is shown to improved long-term glycemic outcomes. By improving hemoglobin A1c levels complications of diabetes will be minimized (Drash, 1996). The current researcher sought to further examine the relationship between diabetic dietary education and hemoglobin A1c level. The Tildesly et al. (1996) study findings indicated the necessity for comprehensive diabetic education as it positively influences diabetic outcomes. The proposed study similarly utilized an outpatient office-based dietary education intervention and monitor the hemoglobin A1c level as a measure of glycemic control over a three-month time period.

Koehler, O'Leary, Kramer, Caggiula and Dorman (1995) compared dietary intake of IDDM patients with current nutritional guidelines. The purpose of the study was to provide a description of the dietary intake of adults with

IDDM who participated in the Familial Diabetes and Complications study (FDC study), and to compare the data with current nutritional guidelines. The major research question involved the level of dietary compliance in adults with IDDM as related to the American Diabetes Association (ADA) dietary guidelines, US Dietary Guidelines for Americans, and the Food Guide Pyramid. It was inferred by Koehler et al. that the Health Belief Model provided the conceptual for the study as the HBM can serve as a predictive component of self-management such as adherence to dietary guidelines.

Variables of the study were a clinical evaluation to examine demographic data, blood pressure levels, and numerous serum blood levels including fasting blood lipid levels, lipoprotein with calculated low-density lipoprotein cholesterol (LDL-C) levels, serum glucose and hemoglobin A1c levels. A nutritional assessment was completed utilizing the semiquantitative food frequency questionnaire of Willett, Reynolds, Cottrell-Hoehner, Sampson, and Brown (1987).

The clinical evaluation was completed to determine the presence of long-term IDDM complications as well as age, sex, duration of IDDM, level of education, and body mass index. The food frequency questionnaire designed by Willett et al. (1987) asked the participants to estimate, on average, their intake of each of 116 food items over the

previous year. These questionnaires were optically scanned at the Channing Laboratory at the Harvard School of Public Health, Department of Nutrition. Demographic and laboratory data were compared between men and women and analyzed utilizing the t-test (Koehler et al., 1995).

The population was taken from a representative FDC study cohort of multiple sibling families identified from the Children's Hospital of Pittsburgh and the Allegheny County IDDM registries in Pennsylvania. Of the 186 participants (95 men and 91 women) the mean age was 32.2 years with the average duration of IDDM at 19.7 years.

Koehler et al. (1995) noted results indicative of both compliant and noncompliant dietary intake in adult IDDM patients. Mean body mass index (BMI) did not exceed the eighty-fifth percentile. This acceptable BMI encouraged the researchers as the National Institutes of Health have linked obesity with hypertension, insulin resistance, stroke, and ischemic heart disease. Other desirable findings included serum, triglyceride, and high density lipoprotein cholesterol were within desirable limits. LDL-C levels were borderline high in the men participants between the ages of 30 to 40 years old and in women participants younger than 30 years of age. LDL-C levels were found to be high in men older than 40.

According to the National Cholesterol Education Program, classification for coronary heart disease risk the

majority of participants had borderline high mean serum cholesterol levels. Male participants consumed more energy, sodium, cholesterol, and dietary fiber than female participants. Mean hemoglobin A1c level in the study was 10.5 percent with a range of 6.2 to 17.5 percent in all participants (Keohler et al., 1995).

Koehler et al. (1995) found that no statistically significant differences in nutrient intake were detected between subjects in good metabolic control (hemoglobin A1c < 10.2%, n=92) in relation to those subjects with poor metabolic control (hemoglobin A1c > 10.2%, n=94). Saturated fat intake for all participants at 12 percent exceeded the recommended 10 percent total daily intake of saturated fat. Total mean dietary fiber intake in woman at 19 percent fell short of the recommended 20 percent. Men and women reported sodium and protein intakes within the suggested limits.

The researchers found that glycemic control was not necessarily affected by nutritional intake. However, dietary inconsistencies such as addition or deletion of food items from meals or snacks have been shown to be related to a higher hemoglobin A1c level. Under-reporting of intake may also have been a factor in the observation that dietary consumption did not affect glycemic control as some participants were less likely to report dietary noncompliance. The participants were also asked to recall dietary intake for the past year which could have led to



many discrepancies between actual intake and recalled intake (Koehler et al., 1995).

Suggestions for future research included examining adherence to other aspects of nutritional care such as mealtimes that coincide with insulin regimen, proper insulin dose, and compliance with insulin regimens. Koehler et al., (1995) recommend continued education and evaluation of IDDM patients on dietary intake as education lessens the risks for the development of nutrition related complications. The researchers further suggested individualized nutrition advice along with information on insulin adjustments and general diabetic care for those IDDM patients desiring to maintain or improve metabolic control (Koehler et al.).

The Koehler et al. (1995) study examined dietary intake of IDDM patients, as well as numerous variables including hemoglobin A1c levels. The current researcher implemented personalized dietary education for each participant and determined the level of glycemic control by obtaining a pre-intervention and post-intervention hemoglobin A1c measurement.

The literature reviewed has addressed the variables that were examined in the current study. Hemoglobin A1c has been adequately established as a diabetic control marker and often a predictor of complications related to uncontrolled DM. Brief office-based dietary education interventions were found to possess validity by utilizing personally developed

dietary plans. Goal setting was found to be effective in goal attainment in diabetic patients. The necessity of nutritional therapy was established as it improved clinical outcomes in both insulin-dependent and non-insulin-dependent diabetics. A need was also founded in the area of nutrient intake as it relates to the ADA Guidelines, the US Dietary Guidelines for Americans, and the Food Guide Pyramid due to occasional non-compliant dietary intake in diabetic patients. By implementing valuable pieces from each reviewed study, the researcher proposed to examine the effect of personalized dietary education on hemoglobin A1c levels in adult diabetic patients.

Delahanty and Halford (1993) examined the role of specific diet behaviors utilized in achieving glucose control as evidenced by hemoglobin A1c levels. The purpose of the study was to determine whether certain diet-related behaviors practiced by insulin dependent diabetes mellitus (IDDM) patients in the intensive treatment group of the Diabetes Control and Complications Trial (DCCT) were associated with lower hemoglobin A1c levels. The major research hypothesis proposed that identifying and promoting appropriate dietary behaviors may simplify self-care routines and improve adherence and glycemic control.

This research was conducted as a DCCT ancillary study. The DCCT was a prospective, randomized, multi-center trial designed to compare the effects of intensive therapy aimed

at achieving near normal blood glucose levels with the effects of conventional therapy on the development of long-term complications. The participants received intensive treatment including insulin therapy via insulin pump or three or more insulin injections daily, blood glucose monitoring four or more times daily, and extensive dietary instruction to promote normoglycemia and appropriate meal planning. Eligibility requirements for participation in Delahanty and Halford's (1993) study included participation in the DCCT for a minimum of 18 months, a diagnosis of IDDM for one to fifteen years, were 13 to 39 years of age, and had no other major medical problems or diabetic complications.

An 84 item Diet Behavior Questionnaire developed by the researchers was distributed to all DCCT intensive treatment group patients who agreed to participate. After one year, 90 percent of potential participants had completed the self-administered questionnaires and mailed them to the DCCT Coordinating Center. Variables of the study included hemoglobin A1c level, dietary implementation methods, adherence to meal plans, managing expected changes in food intake, treatment of hypoglycemic and hyperglycemic reactions, consumption of concentrated sweets, and timing of insulin in relation to meals and snacking habits.

Glycemic control was assessed by hemoglobin A1c assays in the DCCT Central Biochemistry Lab using an HPLC method.

Mean hemoglobin A1c was calculated based on the mean of monthly hemoglobin A1c results from the previous 12 months. The survey questionnaire was previously tested for validity and analysis of the data was used to refine the survey instrument and narrow the focus of the study (Delahanty and Halford, 1993).

The sample size of 623 participants was divided into various subgroups based on questionnaire responses to certain items. Those who did not respond to a particular questions were dropped from that comparison. When no single questionnaire item adequately captured a behavior pattern, responses to several related items were aggregated into a composite index. Contiguous categories were combined when necessary to provide relatively well-balanced sample sizes (Delahanty and Halford, 1993).

Wilcoxon's rank-sum test was utilized to test for differences between two groups. Because hemoglobin A1c levels were expected to vary monotonically across categories when more than two groups were compared, Delahanty and Halford (1993) used the Jonckheere-Terpstra test for ordered alternatives.

The researchers stressed the efficacy dietary adherence in improving glycemic control. Subjects who reported following their prescribed meal plans greater than 90 percent of the time had an average hemoglobin A1c level 0.9 points lower than subjects who reported following their meal

plans less than 45 percent of the time. Delahanty and Halford (1993) also noted that overconsumption of food used to treat hypoglycemia was associated with a significantly higher Hb A1c. A difference of 0.5 in average hemoglobin A1c was found between groups who reported "never eating until feeling better" and those who reported "almost always" ate until they felt better. The researchers found that patients who reported promptly responding to high values from self-blood glucose monitoring showed a significant tendency to achieve lower Hb A1c levels than those who did not. Those who frequently responded to high blood glucose levels via more insulin, decreased food intake, or less carbohydrate intake had Hb A1c levels 0.5 lower than those participants who responded to high glucose levels less than 50 percent of the time.

The researchers also noted that patients who reported extra nighttime snacking beyond their prescribed meal plan three or more times a week had higher hemoglobin A1c levels than those who did not. Interestingly, patients who consumed prescribed evening snacks more consistently tended to have lower hemoglobin A1c levels than those who occasionally consumed bedtime snacks. Patients who reported "almost always" adjusted insulin dose for meal size and content had mean Hb A1c levels 0.5 points lower than those patients who "never" adjusted insulin. No significant relationship was found between timing of insulin injection for food intake

and hemoglobin A1c. Very few subjects reported consuming concentrated sweets and the data did not clearly indicate a relationship between eating sweets and hemoglobin A1c level. Covariates analyzed included age, sex, time in follow-up, diabetes duration, insulin dose, alcohol use, smoking, exercise level, body weight, and change in body mass index from baseline. None of these covariates appeared to vary systematically with hemoglobin A1c (Delahanty and Halford, 1993).

Delahanty and Halford (1993) concluded that certain diet-related behaviors were associated with lower HbA1c levels indicating better glycemic control and ultimately fewer diabetic complications. The researchers admit that the results from this study may not be valid in populations not supported by an interactive health care team including dietitians, physicians, and nurses. Delahanty and Halford (1993) also stress that intensive diet-teaching provided patients with a tool to evaluate diet consistency and means to improve glycemic control. The researchers also note that previous studies suggest that when therapeutic regimens for individuals with diabetes are simplified, compliance is improved.

The current researcher sought to further explore the relationship between personalized diabetic dietary education and hemoglobin A1c levels. Delahanty and Halford's (1993) findings indicated the need for comprehensive yet simplified

diabetic education as it positively correlates with favorable diabetic outcomes. The proposed study sought to monitor hemoglobin A1c levels as a measure of glycemic control before and after a diabetic dietary education intervention.

In summary, few studies were found to establish a relationship between dietary compliance and glycemic control. The specific impact of a personalized dietary educational intervention on hemoglobin A1c levels on adult diabetic patients was not found.

## CHAPTER III

### The Method

The current study sought to examine the impact of dietary education on long-term glycemic control as measured by hemoglobin A1c levels. The population of concern for this study was adult diabetic patients living in rural Mississippi. The research method utilized included a chart review, personal administration of a demographic questionnaire by the researcher, diet instruction, and hemoglobin A1c levels drawn at baseline and again two to three months post-intervention. In this chapter, the methods used to examine the variables of interest are described.

#### Design of the Study

The purpose of this quantitative study was to determine whether personalized dietary education increased compliance in adult diabetic patients as evidenced by a more acceptable glycosylated hemoglobin level. The research design used in the study was quasi-experimental as an attempt was made to randomize subjects and manipulate the independent variable by subjecting all participants to the personalized dietary educational intervention. The study examined hemoglobin A1c levels at pre-intervention and post-intervention. A demographic data/diet history form was developed to obtain



necessary information regarding individual patient's diet preferences and dietary practices in order to personalize the educational portion of the intervention to each unique patient. This data was utilized to modify a basic lesson plan to best suit each patient. Diet education was conducted in the clinic setting with one-on-one instruction and the use of visual aids and food cards.

### Variables

The independent variable and variables of interest was adult diabetic patients' hemoglobin A1c level at baseline and post-intervention. Since the study had a quasi experimental design, no control group was utilized. Controlled variables include the client's age and length of illness. Possible intervening variables included the client's physical and mental status, educational level, socioeconomic status, and the client's interest in participation in the study.

### Setting, Population, and Sample

The setting for this study was five counties of Mississippi served by rural primary care clinics. One clinic utilized an attending physician as a health care provider while the other clinic was staffed by a full-time FNP with a collaborative physician housed in another clinic. These clinics were chosen based on convenience of the researcher and the supportive nature of the staff. The target population was adult diabetic patients who consented

to participate in the study. Eligibility criteria included that the patient have a diagnosis of insulin dependent diabetes mellitus or non-insulin diabetes mellitus for greater than six months. Patients with comorbid diagnoses were not excluded from the study. The participants were between the ages of 35-55 and were able to read by self report.

The researcher returned to the clinic approximately one week later to obtain the list and verify eligible participants by chart review. A convenience sample was obtained utilizing the fish bowl method as all eligible participants' names were placed in a container and randomly drawn with every other name considered a potential participant in the study. The researcher utilized a sample size of 30 eligible participants.

#### Data Collection

Approval for the proposed study from the Mississippi University for Women Committee on the Use of Human Subjects in Experimentation was obtained initially. Notification was made in person to the attending physician/nurse practitioner at the primary care clinics in order to obtain oral and written consent for participation in the study and consent for chart review (see Appendix C). Clinic staff were informed about the research study and they helped to identify potential subjects by compiling a list of patients meeting eligibility criteria. The researcher returned to the

clinic approximately one week later to obtain the list and verify eligible participants by chart review. Subjects' names were randomly selected using the fish bowl method from a list of eligible participants. The researcher phoned each participant to explain the purpose of the research study and obtain verbal consent for participation in the study. Clinic visits were set up for those consenting to participate. Patients were instructed to maintain their current diet. Potential participants were informed that at the first visit, a baseline hemoglobin A1c finger stick would be obtained.

At the first clinic visit, an oral and written consent was obtained (see Appendix D) after the purpose of the research study and assurance of anonymity was given by the researcher to the participant. The Diabetic Dietary Questionnaire was then administered by the researcher to the participant (see Appendix B). This demographic data/dietary questionnaire was used to develop personalized diet plans for each patient, consisted of 31 questions, and took approximately five minutes to complete. The questionnaire was administered by the researcher to further evaluate patient responses. Following the questionnaire, a baseline hemoglobin A1c was obtained. The researcher then weighed each participant and calculated the patient's ideal body weight in order to utilize the specific caloric ADA diet for teaching purposes.

The researcher then conducted a one-on-one dietary intervention program with each participant which consisted of an individualized diabetic diet lesson plan (see Appendix F). A lesson plan was used consisting of visual aids (see Appendix E), simplistic language, and food cards. The researcher designed demographic data/diet history form provided information needed for personalization of dietary education lesson plans.

This questionnaire explored the participant's current status including questions regarding age, gender, race, educational level, how the participant managed his or her diabetes, and the duration of the disease process. Other questions asked pertained to who bought and prepared the participant's food and the monthly amount spent on groceries. The participant's current living arrangement, which included how many people at meals in the participant's home, was assessed. The questionnaire also included inquiries into previous dietary teaching and the participant's understanding of following a diabetic diet. Frequency of meals, favorite foods, and food preparation methods were assessed. The participant was also asked to rate his or her health and if he or she believed that dietary control would improve overall health.

The food cards were color coded to represent the six exchange categories based on current ADA dietary recommendations. Serving sizes were discussed and the food

cards were used to represent the total number of dietary exchanges allowed per day for the individual client.

Arrangements were made to contact the participants by phone to schedule a three-month follow-up visit. The patient returned to the clinic three months post-intervention and a second hemoglobin A1c level and weight was obtained. Patients were asked to notify the researcher or clinic if the second appointment time became inconvenient and the visit could be rescheduled. If the patients were unable to return to the clinic for the second visit, the researcher visited each patient at home to obtain the hemoglobin A1c. Consent to visit the participant's home for the post-intervention hemoglobin A1c level was obtained at the initial visit.

#### Instrumentation

Instruments utilized included an electrically powered glycosylated hemoglobin meter (Bayer DCA 2000), scales, individualized lesson plans for diabetic diets based on specific ADA diet recommendations, and a diabetic demographic questionnaire. The meter sensitivity of the hemoglobin A1c meter was assessed prior to each blood collection by checking normal controls. The meter was recalibrated each day. The same meter was used to test all participants. Blood specimen collection was obtained by a fingersticks. All materials were provided by the Bayer company at no cost to the participant or the researcher.

A lesson plan was incorporated using visual aids and food cards. A researcher-designed demographic data/diet history form was utilized during the first clinic visit. This form provided information needed for personalization for dietary education lesson plans. Validity of the demographic questionnaire and lesson plan was assumed within the limits of this study due to the tools' simplistic formats, and the submission of the questionnaire and lesson plan to a panel of experts.

#### Data Analysis

After data collection, the results were analyzed using descriptive statistics and the dependent t-test. The dependent t-test was used to analyze glycosylated hemoglobin measurements obtained before and after dietary education intervention in order to determine if personalized dietary education affects long term glycemic control. A level of significance of .05 was set for the performance of a one tailed t-test for independent samples. Descriptive techniques were utilized in examining demographic/diet history characteristics.

#### Limitations

Numerous limitations potentially existed in the current study. The study was limited by a small sample size (N = 30). Although an attempt was made at randomization of eligible participants in the study, no control group was utilized. Generalization of the findings was impossible as

the age group and locale of participants studied was not representative of the entire population. A possible Hawthorne effect may have existed as the researcher personally administered the demographic data/diet history questionnaire. The participants may have answered in a patient-perceived favorable response to the researcher. No pilot study was conducted to determine feasibility and applicability of dietary lesson plans and demographic data/diet history questionnaire.

## Chapter IV

### The Findings

A quasi-experimental one-group study was undertaken to determine if there was a difference in glycosylated hemoglobin levels in adult diabetic patients after personalized dietary education. The goal of the study was to determine if dietary compliance increased after a personalized dietary teaching intervention as measured by an improved hemoglobin A1c level two to three months after a baseline hemoglobin A1c was obtained and diet instruction was implemented.

#### Description of the Sample

The setting for this study was five counties of Mississippi served by primary care clinics. Clinic staff compiled a list of patients meeting eligibility criteria. Eligible participants were verified by chart review and subjects' names were randomly selected from a list of eligible participants. The researcher phoned each participant explaining the purpose of the study, obtaining verbal consent for participation in the study, and scheduling clinic visits for eligible participants.

Demographic data were analyzed using descriptive techniques. These data are presented in Tables 1 and 2.



Findings revealed that the majority of participants were African-American females. Most participants were found to be obese at the initial visit; however, weight loss was noted in the majority of participants at the post-intervention visit. The majority of the sample completed high school or received a high school equivalency degree. Diabetic treatments varied and most participants had been diagnosed with diabetes between one and five years. The greater part of the sample did not receive food assistance and spent more than \$200 monthly on food. Most subjects lived with others and had two to three people eating in the home. Numerous other chronic diseases of participants were disclosed. Most notably, the majority of these diabetics also had hypertension. A greater number of subjects rated their health good or fair and an overwhelming majority stated that they believed controlling diet intake will improve health.

A large majority of participants themselves shopped for food and prepared meals with a family member. Many subjects reported being previously taught about diet by numerous medical personnel within the last year. All subjects stated that they thought it important to follow a diet to control diabetes while the majority stated that they had been told why they should control diet to manage diabetes. Most verbalized understanding of how to follow a diabetic diet and reported doing so on an occasional or daily basis. Most

patients ate three times daily. A large number of subjects reported that they or other persons in their home had other dietary restrictions, and upon further researcher questioning, subjects disclosed types of restrictions. Many subjects preferred chicken as a meat choice but preparation methods varied. A number of subjects specifically mentioned types of meats avoided due to high fat or high sodium content. Vegetable seasoning preferences varied also. Many participants reported eating one to two snacks a day while the majority denied ingestion of daily sweets. Types of snacks and sweets were disclosed by the participants upon further researcher questioning.

The questionnaires were re-evaluated by the researcher after post-intervention hemoglobin A1c levels were collected to further explore differences between those participants who maintained or improved hemoglobin A1c levels and those participants whose hemoglobin A1c levels worsened after the dietary educational intervention. Notable differing factors between the groups included type of diabetic treatment, number of people eating in the home, socioeconomic status, and the person who prepares the meals. Other interesting variables between the groups included the presence of concentrated sweets in the daily diet and understanding how to follow the diabetic diet by self report.

Table 1Demographic Characteristics of Participants by Frequency and Percentage

Variable	f	%
Mean age		42.8
Gender		
Male	11	36.7
Female	19	63.3
Race		
Caucasian	9	30
African American	21	70
Hispanic	0	0
Asian	0	0
Other	0	0
Educational level		
Elementary school	3	10
Junior high school	7	23.3
High school/GED	12	40
Technical school	1	3.3
College	7	23.3
Type of diabetes treatment		
Diet only	7	23.3
Diabetes pills and diet	10	33.3
Insulin shots, diabetes pill and diet	5	16.6
Insulin shots and diet	8	26.6
Years since diagnosed with diabetes		
6 months - 1 year	5	16.6
1 - 5 years	13	43.3
6 - 10 years	6	20
> 10 years	6	20
Money spent monthly on food		
< \$50	0	0
\$50 - \$100	1	3.3
\$100 - \$150	9	30
\$150 - \$200	3	10
> \$200	17	56.6

Table continues

Table 1 continued

Demographic Characteristics of Participants by Frequency and Percentage

Variable	f	%
Receive welfare checks, food stamps, commodities		
Yes	8	26.6
No	22	73.3
Current living arrangement		
Live alone	1	3.3
Live with others	29	96.6
Number of people eating at home		
1	1	3.3
2 - 3	17	56.6
4 - 5	9	30
> 5	3	10
Other chronic disease		
Hypertension	19	63.3
Kidney disease	2	6.6
Other		
Hyperlipidemia	5	16.6
Osteoarthritis	1	3.3
How patient rates health		
Excellent	0	0
Good	11	36.6
Fair	12	40
Poor	7	23.3
Believe that controlling diet intake will improve health		
Yes	29	96.6
No	1	3.3

Note. N = 30

Table 2

Dietary Characteristics of Participants by Frequency and Percentage

Variable	f	%
Person who shops for food		
Self	16	53.3
Family member	4	13.3
Self and family member	10	33.3
Friend/neighbor	0	0
Other	0	0
Person who prepares meals		
Self	12	40
Family member	6	20
Self and family member	12	40
Friend/neighbor	0	0
Meals on Wheels	0	0
Home Health	0	0
Other	0	0
Taught before about diet		
Yes	25	83.3
No	5	16.6
Person who taught about diet		
Dietitian	6	20
Doctor	5	16.7
Nurse	7	23.3
Family/Friend	0	0
Other:		
Lab technician	2	6.7
Social worker	9	30
Coach	1	3.3
Time since diet last explained		
Never	4	13.3
< 1 year ago	18	60
1 - 2 years ago	6	20
> 2 years ago	2	6.6
Ever told why should control diet to manage diabetes		
Yes	29	96.6
No	1	3.3

Table continues

Table 2 continued

Dietary Characteristics of Participants by Frequency and Percentage

Variable	f	%
Understand how to follow diabetic diet		
Yes	24	80
No	6	20
Think it important to follow diet to control diabetes		
Yes	30	100
No	0	0
Frequency of following diabetic diet		
< 1 day a week	2	6.6
1 - 3 days a week	12	40
4 - 6 days a week	4	13.3
7 days a week	12	40
Other dietary restrictions for patient or other person in home		
Yes	25	83.3
No	5	16.6
Number of times patient eats a day		
1	2	6.6
2	5	16.6
3	21	70
4	1	3.3
>5	1	3.3
Meat preference (more than one answer)		
Chicken	27	45
Fish	10	16.6
Beef	15	25
Pork	5	8.3
Turkey	2	6.6
Processed Meat	1	3.3

Table continues

Table 2 continued

Dietary Characteristics of Patients by Frequency and Percentage

Variable	f	%
<b>Preferable meat preparation method (more than one answer)</b>		
Fried	15	22.7
Baked	20	30.3
Broiled	9	13.6
Boiled	16	24.2
Grilled	6	9.1
<b>Vegetable seasoning preference</b>		
Butter/margarine	12	20.7
Oil/shortening	7	12
Ham hocks	1	1.7
Fat back	5	8.6
Spices	14	24.1
Salt	12	20.6
Other:		
Smoked turkey neck	1	1.7
Meat	2	3.4
Onion	1	1.7
Light salt	3	5.2
<b>Number of snacks a day</b>		
None	8	26.6
1 - 2	18	60
3 - 4	4	13.3
> 5	0	0
<b>Number of sweets a day</b>		
None	21	70
1 - 2	9	30
3 - 4	0	0

Note. N = 30

### Results of Data Analysis

The null hypothesis for this study was as follows: There will be no difference in glycosylated hemoglobin levels in adult diabetic patients before and after a personalized dietary teaching intervention program. Demographic and diet history characteristics were determined by a researcher designed Demographic Data/Diet History questionnaire. Hemoglobin A1c levels were determined by an electronically powered glycosylated hemoglobin meter (Bayer DCA 2000) at baseline and two to three months post-intervention.

Hemoglobin A1c levels were analyzed using inferential statistical methods. A paired t-test was conducted to assess the differences in mean for pre-intervention and post-intervention hemoglobin A1c levels. These data are presented in Table 3.

These findings revealed that despite a diabetic dietary educational intervention, the pre-intervention and post-intervention hemoglobin A1c levels of participants remained fairly constant. Findings indicated no significant reduction in the mean difference of pre-intervention and post-intervention hemoglobin A1c levels. Therefore, the researcher failed to reject the null hypothesis.



Table 3

Comparison of Glycosylated Hemoglobin Levels Before and After Teaching Intervention Using a Dependent t-test

	<u>n</u>	<u>M</u>	<u>SD</u>	<u>t</u>
Pre-intervention	30	8.496	1.173	0.187
Post-intervention	30	8.456		

Note.  $p = 0.853$

Summary

This chapter sought to describe the sample of participants used in the current study and explain the inferential and descriptive statistical methods utilized in investigating the null hypothesis: There will be no difference in hemoglobin A1c levels in adult diabetic patients before and after a personalized dietary teaching intervention program. Tables were presented to enhance clarity of discussion.

## Chapter V

### The Outcomes

Diabetes mellitus is a multifaceted disease process which can result in many long-term complications if improperly managed. Extensive education and comprehensive medical care are required to prevent acute diabetic exacerbations and to decrease the risk of debilitating diabetic outcomes. Inappropriate diet intake can result in hyperglycemia which is the primary manifestation of uncontrolled diabetes. A marker utilized in monitoring long-term glycemic control is a glycosylated hemoglobin measurement. This quasi-experimental study examined the effect of personalized dietary education on glycosylated hemoglobin levels in adult diabetic patients. The study was guided by the null hypothesis: There will be no difference in glycosylated hemoglobin levels in adult diabetic patients before and after a personalized dietary teaching intervention program. The theoretical framework was provided by Pender's Health Promotion Model by interpreting dietary teaching's effect on glycemic management. Adult diabetic patients served by rural Mississippi primary care facilities comprised the sample. Data were compiled utilizing a demographic survey. The results of hemoglobin A1c testing was obtained at baseline and two to three months post-

was obtained at baseline and two to three months post-intervention. Data were analyzed using descriptive statistics and the dependent t-test.

The effect of personalized dietary teaching was evaluated by obtaining hemoglobin A1c levels. Hemoglobin A1c levels drawn at baseline and two to three months post-intervention were reflective of average blood glucose levels during the previous two to three months and provided data for inferential statistics comparing the differences within the sample. The intervention involved one-on-one personalized diet instruction utilizing an individualized diabetic diet lesson plan. The lesson plan consisted of visual aids, simplistic language, and food cards. The demographic survey provided information needed for personalization of diet. Teaching was also centered around ADA recommendations and patients' ideal body weights.

#### Summary of Significant Findings

The t-test was utilized to measure mean differences in hemoglobin A1c levels. An  $\alpha = .05$  with a  $t = 0.187$  indicated that there was not a significant reduction in the mean differences of the post-intervention hemoglobin A1c in the subjects. Therefore, there was no significant effect of personalized dietary education on long-term glycemic control as evidenced by hemoglobin A1c levels in adult diabetic patients.

Several prior studies support the findings of the current study. Glasgow et al. (1996) found that a brief medical office-based behavior intervention program for diabetics designed to facilitate compliant dietary behaviors was ineffective in improving follow-up hemoglobin A1c levels. In their 1997 study, Boehm et al. utilized contingency contracting as a means of influencing compliance with nutritional recommendations. The researchers noted that only low to moderate correlations existed between continuous contingency contracting for adherence to nutritional guidelines as evidenced by improved hemoglobin A1c levels. Johnson and Valera's (1995) study emphasized the need for tailoring diabetes education to the patient's personal preferences, lifestyle, socioeconomic status. These key elements were also found in the current study.

Another study contacted by Delahanty and Halford (1993) concluded that certain diet-related behaviors were associated with lower hemoglobin A1c levels indicating better control after intensive dietary teaching. However, the researchers admitted that the results may not be valid in populations not continually and intensively supported by an interactive health care team including dietitians, physicians, and nurses.

## Discussion

Statistical findings indicated no significant reduction in post-intervention hemoglobin A1c levels of participants. The statistics indicated that personalized dietary education was not a significant factor in improving glycemic control due to the insignificant variance of the mean.

Demographic data of the sample was also investigated initially based on all participants. The data was then reinvestigated based on those participants' hemoglobin A1c levels that remained the same or improved after the intervention and those participants whose hemoglobin A1c levels worsened after intervention. Prior to data collection, it was the researcher's impression that a fixed income, minimal educational preparation, numbers of individuals in a household, other individuals in a household with dietary restrictions, prior dietary teaching, and perception of current health status and cultural practice tended to influence dietary compliance. Interestingly, several of the following factors were more notable in those participants whose hemoglobin A1c levels either worsened or improved.

Approximately 87 percent of all participants were mildly to morbidly obese. This finding does fit the classic picture of Type 2 diabetic adults. However, greater than 65 percent of participants lost weight after the personalized dietary education intervention. The majority of participants

were African-American women which most accurately describes the population served by these rural clinics according to the health care providers in the clinics, chart review, and the researcher's personal observation. Sixty-six percent of subjects graduated from high school or had a high school equivalent or technical school or college education which is often seen in this type of sample comprised predominantly with baby-boomers. All participants had a minimum of a second grade education. The average age of participants was 42.8 years.

Encouragingly, 100 percent of subjects stated that it was important to follow a diet to control diabetes. However, only 80 percent stated that they understood how to follow a diabetic diet before dietary education was implemented by the researcher. Ninety-seven percent stated that they were previously told why they should control their diet to manage diabetes. This indicates a need for a greater emphasis to be placed on the dietary aspect of diabetic management while continuing to focus on potential complications.

History of prior diet teaching was indicated by 83 percent of the population. Health care providers mentioned in providing dietary education included nurses (23%), social workers (23%), dietitians (20%), doctors (17%), lab technologist (7%), and a coach (3%). The majority of participants stated the diet was explained less than one year ago. While this is encouraging, the researcher noted

that often misconceptions existed between current dietary intake and current diabetic dietary guidelines. This fact was possibly due to noncompliance, inconsistent dietary teaching, cultural practices, or misinformed, underqualified personnel providing the dietary education.

Quite significantly, most subjects or someone in the subjects' homes had other dietary restrictions. Upon further researcher questioning, diet restrictions verbally mentioned included low salt diet, low cholesterol diets and renal diets. Sixty-three percent of participants were also diagnosed with hypertension, six percent had end-stage renal disease and required dialysis, and 16.36 percent were diagnosed with hyperlipidemia in addition to their diabetes mellitus diagnosis. These findings are consistent with current research as a strong association has been observed between Type 2 diabetes and a variety of disorders including obesity, atherosclerosis, hyperlipidemia, and hypertension. This is often referred to as Syndrome X or insulin resistant syndrome (DeFronzo, 1992).

Chicken was mentioned as the most frequently eaten meat. Encouragingly, many participants mentioned other low fat beef products such as ground round and ground sirloin as the second favorite meat choice. Fish was mentioned next, followed by pork and then turkey. On a positive note, processed meat products were mentioned least often as a meat choice. Many participants even commented they specifically

avoided processed meat products due to high fat and high sodium content. The researcher was encouraged that baking was the first choice in type of meat preparation, followed by boiling. However, frying was the third most popular option despite the fact that several participants mentioned they fried foods knowing the detrimental effects, including hyperglycemia and weight gain.

Most subjects reported eating one or two snacks daily. Encouragingly, most snacks included popcorn, graham crackers, fruit, sandwiches, diet soda, and fruit juice. However, potato chips, regular sodas and Cheetos were occasionally mentioned despite high fat, high salt, and high sugar content. Seventy percent denied eating sweets daily, while thirty percent reported eating sweets such as ice cream, donuts, candy bars, regular sodas, and cookies which could cause hyperglycemia and further potentiate obesity.

None of the population rated their health as excellent. The majority rated their health as fair or good, and fewer rated their health as poor. The overwhelming majority stated that they believed controlling dietary intake improves health status. This is directly related to Pender's cognitive-perceptual factor of perceived control of health and perceived benefits of behaviors. However, one participant verbally stated, "the damage (from diabetes) is already done. It just makes me feel better if I don't eat sugar and salt."



By assisting the participant with the demographic questionnaire before implementing the dietary education intervention, the researcher was able to identify specific knowledge deficits and provide appropriate teaching. The questionnaires were re-evaluated by the researcher after post-intervention hemoglobin A1c levels were collected to further explore differences between those participants who maintained or improved hemoglobin A1c levels and those participants whose hemoglobin A1c levels worsened after the dietary educational intervention.

Possibly, the most notable difference was the fact that no participants who controlled diabetes by diet alone improved their hemoglobin A1c levels. This could be due to the fact that although needed, proper pharmacological management was not implemented previously because of potential or actual noncompliance, currently or previously controlled hyperglycemia, or health care provider preference. The majority of participants who improved their hemoglobin A1c levels lived in a household in which only two to three persons ate meals. This may possibly be explained as changing or modifying dietary intake with a smaller number of individuals is more easily accomplished than a larger household where diet preferences are more variable. More subjects whose hemoglobin A1c levels worsened received some type of food assistance including welfare checks, food stamps, or commodities. This low socioeconomic status may be

explained by low educational level of the participant, inability of the participant to work, lack of money for food, a large number of dependents in the household, or lack of a significant or primary breadwinner in the home.

The majority of participants who personally prepared their own meals saw an improvement in hemoglobin A1c. This possibly allowed for a higher degree of control over meal preparation methods and meats were baked instead of fried, for example. This issue can further be evaluated utilizing Pender's Health Promotion Model's cognitive-perceptual factor of self-efficacy. Those participants may have perceived that the behavior of modifying food preparation methods was attainable and worthwhile in improving health status. Therefore, the positive behavior was attempted by those participants and their hemoglobin A1c levels improved after dietary instruction.

Interestingly, the vast majority of the population who initially stated they did not understand how to follow their diabetic diet improved hemoglobin A1c levels after the diet education intervention. Also fascinating was the fact that almost all participants whose hemoglobin A1c worsened admittedly ingested at least one "sweet" daily. While current ADA recommendations allow for a modest amount of sugar intake, quantity and quality of carbohydrate intake must be carefully monitored.

### Theoretical Framework

The current findings support Pender's Health Promotion Model (1987) as an appropriate framework for this study which examined the effect of personalized dietary education on hemoglobin A1c levels in adult diabetic patients. Concepts relevant to this theory created a framework with which to explore and explain primary motivational mechanisms and modifying factors which define the Health Promotion Model. All participants were unique and responded to cognitive-perceptual and modifying factors differently.

The Health Promotion Model postulates that participation in health promoting behaviors is the result of primary motivational mechanisms which are influenced by situational, interpersonal, demographic, behavioral, and biological characteristics. The current study supported the theory as participants demonstrated the concepts of importance of health and self-efficacy by participating in the study. Many participants adjusted dietary intake to more closely comply with ADA recommendations based on the participants' self report when further verbally questioned by the researcher at second visit or meeting. Many obviously perceived a degree of control over their health as they participated and became motivated for the sake of improving or maintaining glycemic control. No participant defined their health as excellent as most responded that their health was good or fair and a few defined their health as

poor. This perceived health status influenced behavior changes and thereby partially determined level of dietary compliance. The researcher attempted to encourage and promote a feeling of wellness in all participants by utilizing positive reinforcement and encouragement as this desire for wellness often perpetuates health promoting behaviors. Benefits and complications of behaviors were known to most participants before the educational intervention. However, some subjects viewed these complications as occurring in the distant future; thereby, lacking a sense of urgency for daily diabetic dietary compliance. Numerous barriers to health promoting behaviors existed and were identified by the researcher and participant. Most barriers were surmountable including misconceptions of proper diabetic dietary intake. Modifying factors were also examined by the researcher and subjects. Although age, gender, educational level, income and body weight were notable components, the researcher found that previous family patterns for health care behaviors, expectations of significant others, and past health care experiences played a primary role in the patient's current health beliefs, health behaviors, and health status. Pender predicted that many diverse cognitive-perceptual concepts which are influenced by situational, personal, and interpersonal characteristics result in participation in health promoting behaviors in the presence of cues to

action. The current research substantiated the value of Pender's theory and provided a stimulus for conducting future research.

### Conclusions

The researcher determined that although personalized diabetic dietary education did not result in a statistically significant reduction in glycosylated hemoglobin levels, other factors may have contributed to the results.

Demographic factors such as type of diabetic treatment, low socioeconomic status, number of individuals eating meals in the home, and the person preparing the meals may have impacted the results of the study. Another influencing factor possibly was the types and amounts of foods ingested including concentrated sweets.

The researcher concluded that hemoglobin A1c levels were suggestive of dietary compliance over the preceding two to three months. However, appropriate pharmacological management could also account for acceptable or improved hemoglobin A1c levels as medications rather than diet may have affected changes in the levels.

### Implications for Nursing

This study has implications for nursing practice, nursing education, nursing theory, and nursing research.

#### Nursing Practice.

The results of this study indicate a relationship between certain dietary behaviors and demographic variables

as compared to long-term glycemic control. The FNP could act as a change agent in fostering the diabetic patient's development of self-efficacy, self-control, and self-evaluation. By providing continuous, comprehensive diabetic dietary education, FNPs could assist the patient to enhance knowledge and possibly comply with dietary regimens. The FNP must also be aware of barriers to dietary compliance in order to appropriately educate those patients. Long-term goals could be set by the patient with the FNPs' guidance including weight, glycemic control, exercise and other factors related to diabetic management.

#### Nursing Education.

Findings from the current study could be utilized to stimulate nurse educators to stress the need for thorough individualized diabetic teaching plans. By integrating appropriate socioeconomic factors, appropriate educational levels, and appropriate cultural aspects into a nursing curriculum, nursing students at all levels could recognize the individual needs of patients and the necessity of personalizing diabetic dietary education. Nurse educators could utilize this data to demonstrate the ineffectiveness of a one-time dietary educational intervention and reinforce the need for continuous, comprehensive diabetic dietary education.

#### Nursing Theory.

The current study added validity to the use of Pender's

Health Promotion Model through recognition of how numerous cognitive-perceptual aspects are impacted by modifying factors and cues to action resulting in the degree of participation in health promoting behaviors. Additionally, this study may stimulate further utilization of the theory in research concerning multiple dietary educational intervention's affects on long-term glycemic control, health, and care.

#### Nursing Research.

Since minimal research was found on the implementation of one-on-one personalized dietary education in adult diabetic patients, the findings of the current study provided a baseline for future nursing research endeavors. With the unique presence of advanced practice nurses in rural areas isolated from traditional support services, nursing research concerning diabetic nutritional counseling should be further explored.

#### Recommendations for Further Study

The following recommendations were based on the results of the current study and the limitations identified:

##### Research

1. Replication of the study with a larger sample utilizing different geographical areas and different health care providers.
2. Replication of the study over a longer period of time utilizing multiple dietary educational interventions

and several glycosylated hemoglobin measurements as determinants of long-term dietary compliance.

3. Replication of the study utilizing only Type 1 diabetic patients or Type 2 diabetic patients not managed by insulin.

### Summary

Presented in Chapter V was a discussion of the effect of personalized diabetic dietary education on long-term glycemic control as measured by glycosylated hemoglobin levels in adult diabetic patients in rural Mississippi. A summary of findings followed by a discussion inclusive of demographical characteristics and relevant studies was also presented. The discussion provided support for Pender's Health Promotion Theory as an appropriate framework for conducting the study. Conclusions of the researcher regarding the findings, implications for nursing practice and research, and recommendations for further study concluded the chapter.



## References

American Diabetes Association. (1997). Sweeping changes in policy give fighting chance to millions with diabetes. Mediatel Fax Service: Minnesota. Alexandria, VA; 3-6.

Anderson, R. M., Fitzgerald, J. T., Oh, M. S. (1993). The relationship between diabetes-related attitudes and patient's self-reported adherence. The Diabetes Educator, 19 (4), 287-292.

Ary, D. V., Toobert, D., Wilson, W., Glasgow, R. E. (1986). Patient perspective on factors contributing to non-adherence to diabetes regimen. Diabetes Care, (9), 168-172.

Boehm, S., Schlenk, E. A., Funnell, M. M., Powers, H., Ronis, D. L. (1997). Predictors of adherence to nutrition recommendations in people with non-insulin dependent diabetes mellitus. The Diabetes Educator, 23 (2), 157-165.

Burrell, L. O. (Ed.) (1992). Adult Nursing in Hospital and Community Settings. Norwalk, Connecticut: Appleton and Lange.

Defronzo, R. A. (1992). Insulin resistance, hyperinsulinemia, and coronary artery disease: a complex metabolic web. Journal of Cardiovascular Pharmacology, 20 (Supplement 11), S1-S16.

Delahanty, L. M., Halford, B. N. (1993). The role of diet behaviors in achieving improved glycemic control in intensively treated patients in the Diabetic Control and Complications Trials. Diabetes Care, (16), 1453-1458.

Drash, A. L. (ed.) (1996). The Journal of Clinical and Applied Research and Education. Diabetes Care, 19 (1), 10-16.

Franz, M. J., Splett, P. L., Monk, A., Barry, B., McClain, K., Weaver, T., Upham, P., Bergenstall, R., Mazze, R. S. (1995). Cost effectiveness of medical nutritional therapy for persons with non-insulin dependent diabetes mellitus. Journal of the American Diabetic Association, 95 (9), 1018-1023.

Glasgow, R. E., Toobert, D. J., Hampson, S. E. (1996). Effects of brief office intervention to facilitate diabetes dietary self management. Diabetes Care, 9 (8), 835-842.

Johnson, E., Valera, S. (1995). Medical nutrition therapy in non-insulin dependent diabetes mellitus improves clinical outcome. Journal of the American Diabetic Association, 95 (6), 700-701.

Koehler, A. N., O'Leary, J. A., Kramer, M. K., Dorman, J. S. (1995). Dietary Intake of patients with insulin-dependent diabetes mellitus compared with nutritional guidelines. Journal of the American Dietetic Association, 95 (11), 1317-1319.

McCance, D. R., Hanson, R. L., Charles, M., Jacobsson, L., Pettiett, D. J., Bennett, P. H., Knowler, W. C. (1994). Comparison of test for glycated haemoglobin and fasting and two hour plasma glucose concentrations as diagnostic methods for diabetes. British Medical Journal, 308, 1323-1329.

Pender, N. J. (1987). Health promotion in nursing practice (2nd ed.). New York: Appleton and Lange.

Tildesly, H. D., Mair, K., Sharpe, J., Piaseczny, M. (1996). Diabetes teaching-outcome analysis. Patient Education and Counseling, 29, 59-65.

Travis, T. (1997). Patient perceptions of factors that affect adherence to dietary regimens for diabetes mellitus. The Diabetes Educator, 23 (2), 152-156.

VanSon, A. R. (1982). Diabetes and patient education: A daily nursing challenge. New York: Appleton-Century-Crofts.

APPENDIX A

APPROVAL OF MISSISSIPPI UNIVERSITY FOR  
WOMEN'S COMMITTEE ON USE OF HUMAN  
SUBJECTS IN EXPERIMENTATION



MISSISSIPPI  
UNIVERSITY  
FOR WOMEN

Columbus, MS 39701

Office of the Vice President for Academic Affairs  
Eudora Welty Hall  
P.O. Box W-1603  
(601) 329-7142

February 23, 1998

Ms. Lacey T. Gentry  
c/o Graduate Program in Nursing  
Campus

Dear Ms. Gentry:

I am pleased to inform you that the members of the Committee on Human Subjects in Experimentation have approved your proposed research with the additional requirement that facility permission be secured, if necessary.

I wish you much success in your research.

Sincerely,

Susan Kupisch, Ph.D.  
Vice President  
for Academic Affairs

SK:wr

cc: Mr. Jim Davidson  
Dr. Mary Pat Curtis

**APPENDIX B**

**DEMOGRAPHIC DATA/DIET HISTORY QUESTIONNAIRE**

APPENDIX B

Demographic Data/Diet History Questionnaire

1. How old are you? \_\_\_\_\_
2. What is your weight? \_\_\_\_\_
3. What is your height? \_\_\_\_\_

Please circle the letter by the one answer that applies to you.

4. What is your gender?
  - A. Male
  - B. Female
5. What is your race?
  - A. Caucasian
  - B. African American
  - C. Hispanic
  - D. Asian
  - E. Other; Please list \_\_\_\_\_
6. What was the last grade of school you completed?
  - A. Elementary School; Please list grade completed \_\_\_\_\_
  - B. Junior High School; Please list grade completed \_\_\_\_\_
  - C. High School; Please list grade completed \_\_\_\_\_
  - D. Technical School; Please list years completed \_\_\_\_\_
  - E. College; Please list years completed \_\_\_\_\_
7. Which treatments do you use for your diabetes?
  - A. Diet only
  - B. Diabetes pills and diet
  - C. Insulin shots, diabetes pills and diet
  - D. Insulin shots and diet
8. How long have you had diabetes?
  - A. Less than one year
  - B. 1 - 5 years
  - C. 6 - 10 years
  - D. Over 10 years

9. How much money do you spend on food in a month?
- A. Less than \$50
  - B. \$50 to \$100
  - C. \$100 to \$150
  - D. \$150 to \$200
  - E. More than \$200
10. How many people eat meals in your home?
- A. One
  - B. 2 - 3
  - C. 4 - 5
  - D. More than five; Please list number \_\_\_\_\_
11. Do you receive Welfare checks, food stamps or commodities?
- A. Yes; Please list \_\_\_\_\_
  - B. No
12. Who shops for your food?
- A. Self
  - B. A family member
  - C. Friend or neighbor
  - D. Other; Please specify \_\_\_\_\_
13. Who prepares your meals?
- A. Self
  - B. Family member
  - C. Friend of neighbor
  - D. Meal on Wheels
  - E. Home Health
  - F. Other; Please list
14. What is your current living arrangement?
- A. Live alone
  - B. Live with others; Please specify \_\_\_\_\_
15. Have you ever been taught before about your diet?
- A. Yes
  - B. No
16. Who taught you about your diet?
- A. Dietitian
  - B. Doctor
  - C. Nurse

17. How long ago was the diet explained to you?
- A. Never explained
  - B. Less than one year
  - C. Between one and two years ago
  - D. More than two years; Please specify \_\_\_\_\_
18. Were you ever told why you should control your diet to manage diabetes?
- A. Yes
  - B. No
19. Do you understand how to follow your Diabetic diet?
- A. Yes
  - B. No
20. Do you think it is important to follow a diet to control your Diabetes?
- A. Yes
  - B. No
21. How often do you follow your Diabetic diet?
- A. Less than 1 day a week
  - B. 1 - 3 days a week
  - C. 4 - 6 days a week
  - D. 7 days a week
22. Do you or anyone in your home have other dietary restrictions?
- A. Yes; Please explain \_\_\_\_\_
  - B. No
23. What other chronic disease do you have?
- A. Hypertension
  - B. Kidney disease
  - C. Heart disease
  - D. Other; Please specify \_\_\_\_\_
24. How many times do you eat a day?
- A. 1
  - B. 2
  - C. 3
  - D. 4
  - E. More than four; Please list \_\_\_\_\_



25. What kind of meat do you eat most?
- A. Chicken
  - B. Fish
  - C. Beef
  - D. Pork
  - E. Turkey
  - F. Processed meat (hot dogs, Spam, bologna, etc.)
26. How are your meats usually prepared?
- A. Fried
  - B. Baked
  - C. Broiled
  - D. Boiled
  - E. Grilled
27. How are your vegetables usually seasoned?
- A. Butter/margarine
  - B. Oil/Shortening
  - C. Ham hocks
  - D. Fat back
  - E. Spices
  - F. Salt
28. How many snacks do you eat a day?
- A. None
  - B. 1 - 2; Please list snacks \_\_\_\_\_
  - C. 3 - 4; Please list snacks \_\_\_\_\_
  - D. More than 5; Please list snacks \_\_\_\_\_
29. How many sweets do you eat a day?
- A. None
  - B. 1 - 2; Please list snacks \_\_\_\_\_
  - C. 3 - 4; Please list snacks \_\_\_\_\_
30. How would you rate your health?
- A. Excellent
  - B. Good
  - C. Fair
  - D. Poor
31. Do you believe that if you control your dietary intake your health will improve?
- A. Yes
  - B. No

**APPENDIX C**

**PHYSICIAN/NURSE PRACTITIONER'S MEMORANDUM OF AGREEMENT  
CONCERNING RESEARCH STUDY**

Appendix C

Physician/Nurse Practitioner's Memorandum of Agreement  
Concerning Research Study

Title of Study:

The Effects of Personalized Dietary Instruction on  
Glycosylated Hemoglobin Levels in Adult Diabetic Patients

Name of Agency:

Study Discussed with and explained to:

Involvement in the study will consist of:

1. Consent to review charts of patients who meet eligibility criteria.
2. Communication regarding patients as indicated.

The purpose of this study has been explained. I understand that all information will be kept confidential.

---

Date

---

Attending Physician/Nurse Practitioner

---

Researcher

**APPENDIX D**  
**STATEMENT OF INFORMED CONSENT**

APPENDIX D

Statement of Informed Consent

I, \_\_\_\_\_, have been given information regarding the research study conducted by Lacey Gentry, RN, a graduate nursing student at Mississippi University for Women. I voluntarily agree to participate in this study which examines the effect of dietary teaching on hemoglobin Alc levels. I have been informed that this study will assist medical personnel in understanding the effect of diet on diabetes. I understand that I will not be identified by name or description. I am aware that my participation in this study will not affect my health care services at this clinic. I understand that after I assist the researcher in completing a demographic questionnaire today, a blood test (finger stick) will be collected to analyze my hemoglobin Alc level at no cost to the participant. I will then be instructed on dietary recommendations based on my ideal body weight. I am aware the first visit should last no longer than one hour. I agree to return to the clinic in three months for a follow up visit in which a second blood test (finger stick) will be collected. I give my permission for the researcher to notify me of my clinic visits by phone. I am aware the second visit should last no longer than fifteen minutes. If I am unable to present to the clinic for the second visit, the researcher has permission to come to my home to collect the specimen. I further understand I may withdraw from the study at any time.

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Researcher

**APPENDIX E**

**VISUAL AIDS**

**Eat less FAT!**  
**Before cooking meats:**



Trim off FAT



Remove SKIN

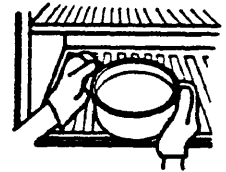
**What I can eat**



**Before eating soups, chili, stews:**



Cook



Chill

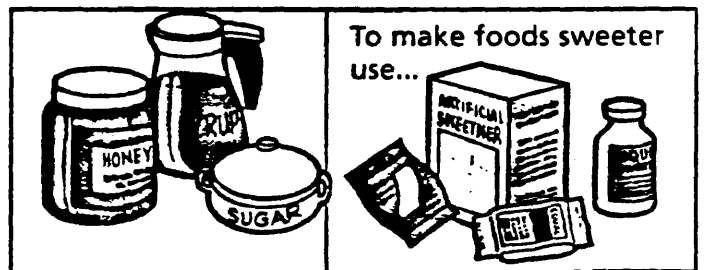


Skim FAT

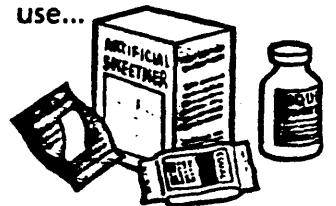


Reheat

**Watch out for SUGAR!**

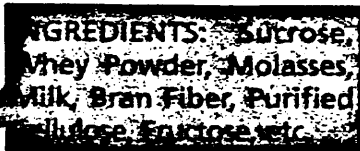


To make foods sweeter use...



**Read LABELS carefully!**

Check first 3 contents on label...



Avoid honey, molasses, words that end in "...ose" (sucrose, fructose)

**Drink plenty of LIQUIDS!**

(nonalcoholic, sugar free)



**If you have HIGH Blood Pressure**

(Hypertension)

*Stay away from SALT!*



Shaker



Chips/Nuts



Lunch Meats



Most canned foods



Most **FAST FOODS**



Pickles/Olives

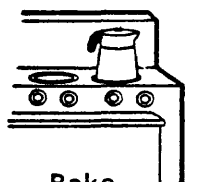
**Put some TASTE in!**

- Lemon Juice
- Mustard
- Pepper
- Chili Powder
- Garlic
- Onion Powder
- Extracts (Vanilla, Almond, etc.)
- Vinegar
- Hot Pepper Sauce
- Fresh Salsa
- Noncaloric sweeteners
- Spices & Herbs

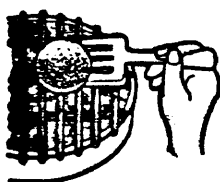
**Use Very Little: Sugar, Salt, Butter, Margarine**

OILS	FATS
<b>Unsaturated</b> "Liquid" oils canola olive safflower corn	<b>Saturated</b> butter lard

**Cook without added fat**



Bake



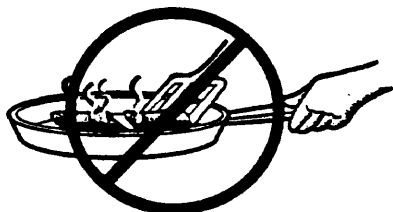
Grill



Broil

Boil...Drain liquids off meats

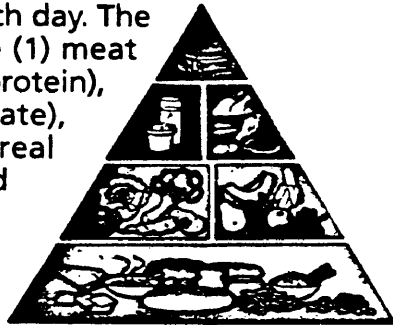
**DON'T FRY**





## What I Can Eat

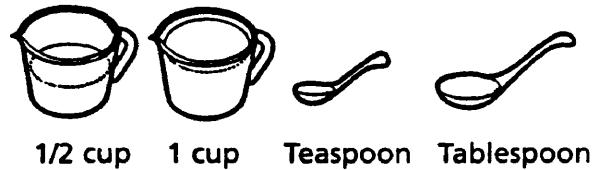
A balanced diet means you eat a combination of carbohydrates, protein and fat at each meal each day. The six food groups are (1) meat (protein), (2) milk (protein), (3) fruit (carbohydrate), (5) bread, pasta, cereal (carbohydrate), and (6) fat.



Your blood glucose level will go up when you eat, but if you keep your meals balanced with the right food combinations, and you wait about 4-5 hours between meals, your body will be

able to get the glucose into your cells at a steady rate, so the blood glucose level won't get too high. Your healthcare team will help you with a meal plan that will work for you. They will tell you if you should have snacks in your plan, and how you can time your insulin injections to match the glucose rise.

### Serving sizes:



## Sample meals

### Breakfast

- 1/2 cup orange juice
- 2 slices whole wheat toast
- 1 tsp. margarine
- 1/4 cup cottage cheese
- 1 cup 1% milk
- coffee or tea

### Lunch

- 1/2 cup tuna
- 1 tsp. mayonnaise
- 1/4 cup chopped celery
- 2 slices rye bread
- 1 tomato, sliced
- 1/2 banana
- 8 oz. club soda

### Dinner

- 3 oz. chicken
- 1 small potato
- 1 tbs. sour cream
- 1 cup green beans
- 1 tsp. margarine
- 1 cup 1% milk
- mixed green salad
- 2 tbsp. low-calorie salad dressing
- 1 cup strawberries

### Snacks

(if recommended)

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## Bread

(starch)

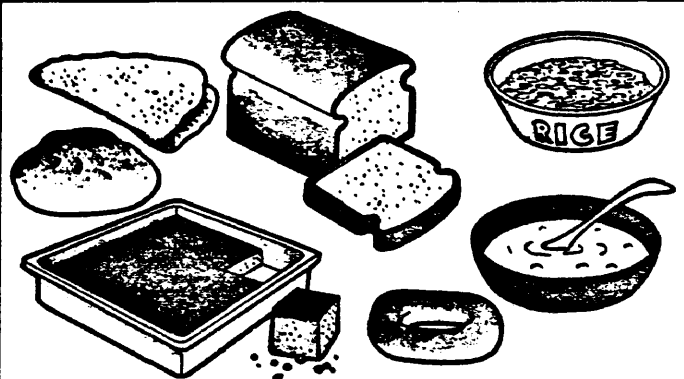
Serving size:

about 80 calories



Slice

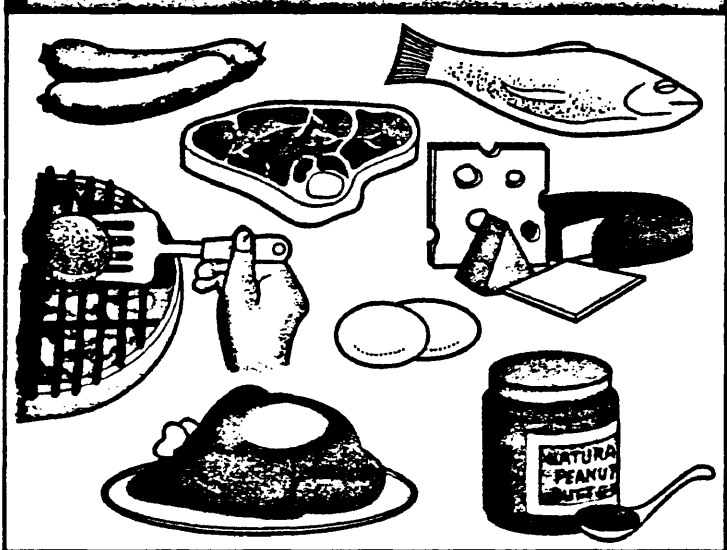
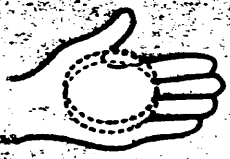
1/2 cup cooked



Also these vegetables...



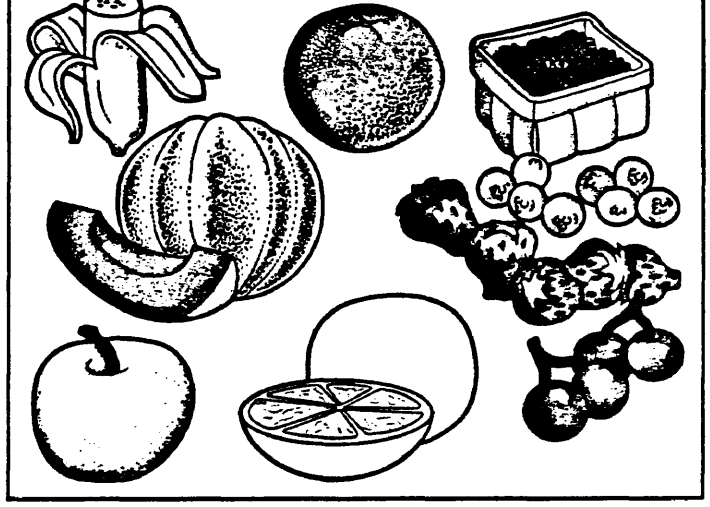
**Meat**  
 Palm size  
 Serving size: 1/2" thick  
 about 150 calories (2-3 oz.)



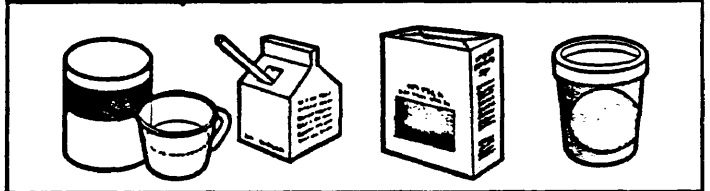
**Vegetable**  
 Serving sizes:  
 about 25 calories  
 1/2 cup cooked 1 cup raw



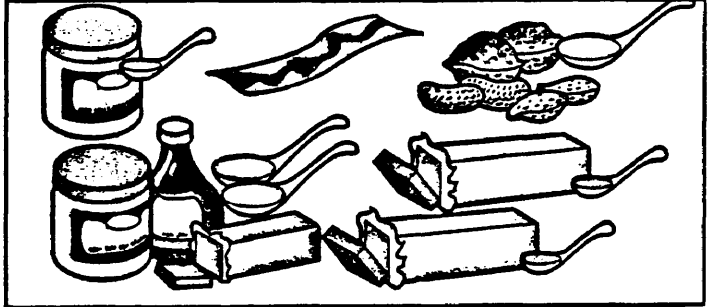
**Fruit**  
 Serving size:  
 about 80 calories  
 1/2 cup juice 1 cup cut



**Milk** Fat free (low fat)  
 Serving size:  
 about 80 calories 1 cup



**Fat** Serving size about 45 calories



**APPENDIX F**

**INDIVIDUALIZED DIABETIC DIET LESSON PLAN**

## APPENDIX F

### Individualized Diabetic Diet Lesson Plan

#### Objectives:

The client will be able to:

1. Discuss in simple terms the purpose of a meal plan based on exchanges related to glycosylated hemoglobin levels.
2. Demonstrate planning sample menus based on exchange list with visual aids, food cards and identify portion sizes.
3. Verbalize foods to be avoided/limited.
4. Verbalize appropriate food preparation methods.
5. Verbalize food likes and dislikes to be included in or excluded from personalized diabetic diet plan.

#### Content:

1. Discuss the effect of diet on glycosylated hemoglobin levels.
2. Demonstrate portion sized by using measuring cups, spoons, food models, plates and pictures.
3. Discuss foods to be avoided/limited.
4. Demonstrate sample menu planning with food replicas and food cards.
5. Discuss appropriate food preparation methods for individualized diabetic diet.
6. Discuss personal food likes and dislikes to guide the individualization of the dietary education session.

#### Teaching Methods and Materials.

1. Discussion and demonstration
2. Visual aids
  - A. Food exchange groups
  - B. Measuring cups, spoons, proportioned plates
  - C. Food replicas
  - D. Food cards

\* Adapted from Van Son, A. R. (1982). Diabetes and patient education: A daily nursing challenge. Appleton-Century-Crofts: New York.