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IMPACT OF A MULTIDISCIPLINARY EDUCATION CLASS  
ON KNOWLEDGE AND HEALTH-PROMOTING BEHAVIORS  
IN PERSONS WITH TYPE 2 DIABETES  
MELLITUS IN RURAL MISSISSIPPI

by

CARMEN LEIGH PARKS

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

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Impact of a Multidisciplinary Education Class  
on Knowledge and Health-Promoting Behaviors  
in Persons with Type 2 Diabetes  
Mellitus in Rural Mississippi

by

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## Abstract

Prevalence rates of known diabetes mellitus continue to increase in the United States. However, studies show that people can reduce their risks of long-term complications by maintaining adequate blood sugar control. Good metabolic control, however, can be very difficult for persons with diabetes because it requires knowledge, motivation, lifestyle adjustments, close monitoring, and ongoing support from a health care team. The purpose of this quasi-experimental pretest/posttest study was to determine the impact of a multidisciplinary education class on knowledge and health-promoting behaviors in persons with type 2 diabetes in rural Mississippi. Pender's Health Promotion Model was used as the theoretical framework. Hypotheses for this study included the following: (a) There will be no difference in knowledge of diabetes in persons with type 2 diabetes before and after a multidisciplinary diabetes education program and (b) there will be no difference in health-promoting behaviors of persons with type 2 diabetes before

and after a multidisciplinary diabetes education program. The convenience sample (N = 26) consisted of a majority of individuals who had been diagnosed with diabetes for less than one year (35%), were Caucasian (92%), and were married (73%). The mean age was 58 years. Diabetes education was provided by a multidisciplinary group of professionals, including a nurse, dietitian, and pharmacist. Data were collected using three instruments. A significant increase in knowledge scores after the educational intervention emerged ( $p = .038$ ), thus the researcher rejected the first hypothesis. No significant difference was discovered in health-promoting behaviors before and after education ( $p = .445$ ), thus the second null hypothesis failed to be rejected. Additional findings indicated a positive relationship ( $p = .02$ ) between the length of time since the diagnosis of diabetes and the amount of knowledge change over time. The longer individuals had been diabetic, the more knowledge change they tended to show as a result of the educational intervention. Findings from this study imply that diabetes education programs should incorporate behavior modification techniques and task-focused interventions aimed at enhancing self-efficacy. Recommendations included conduction of more research utilizing behavior

modification and task-focused education interventions to assess behavior change outcomes and implementation of qualitative research methods to investigate personal characteristics and health beliefs.

Dedication

To my grandmother,

Wilma R. Avery

Thank you for your love and concerns for  
me during a long year of many traveling  
hours. Your support motivated me  
to see this through.



## Acknowledgments

I would like to thank the MUW Graduate Faculty for their support and encouragement. Special thanks to my advisor and chair of my committee, Melinda Rush, and my committee members, Dr. Mary Pat Curtis and Dr. Lynn Chilton. Completion of this research would not have been possible without their unique individual contributions.

To Jimmy Bennett and Debra Hamlin, your support will not be forgotten. A sincere thanks for offering me your precious time. Without your participation, I would have never made it! Also, a thank you is in order to Marci Ann Glisson. Thank you for your endless efforts finding me the information I so badly needed. Also, to James Glisson, who helped me dearly with my research articles. Thank you for helping me budget my time!

To Tracey and Brenda, a special thanks for listening to my nonsense on our many rides back and forth to Columbus. The many hours of laughing and crying will not be forgotten but cherished. Thanks, too, for all your help

and encouragement, in spite of your own stressors. I wish you both all the luck and success in the future.

To my incredible parents who have always encouraged and believed in me. Thanks for your persistent guidance through life, for teaching me how to deal with stress early on, and for your many hours of babysitting.

And finally, for the opportunity and support of this research endeavor, I feel a deep sense of appreciation to my husband who deserves to be commended for his "motherly" as well as his "fatherly" accomplishments. I truly do not know of any man who could endure such a year with patience and support. Thank you, Bill. I know I am loved and blessed.

To my precious children, Casey and Avery, who had to give up so much of their time with me for a reason that they did not even understand. An "IOU" of many hours put on hold will not repay their lost time but will serve as a reminder of the many joyful times ahead.

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## Chapter I

### The Research Problem

Diabetes mellitus is one of the most common chronic diseases in developed countries today. In the United States diabetes is the leading cause of lower-extremity amputation, end-stage renal disease, and blindness among persons aged 18 to 65 years (Massachusetts Medical Society, 1997). An estimated 16 million people in the United States have diabetes, and there is approximately one undiagnosed case of diabetes for every diagnosed case. These statistics represent 1 in every 17 persons or about 6% of the total population in the United States (Buchanan & Davidson, 1997).

While only 10% of the diabetic cases are of the type 1 (insulin dependent) variety, 90% of the diabetic population is classified as having type 2 diabetes, also referred to as noninsulin-dependent diabetes mellitus (NDDM) (Buchanan & Davidson, 1997). The occurrence of type 2 diabetes increases with age as evidenced by the fact that 8% of persons with this condition are between the

ages of 45 and 54 years while 18% of diabetics ages 65 to 74 years are affected (Buchanan & Davidson, 1997). Type 2 diabetes is a complex disorder marked by three pathophysiologic abnormalities that lead to hyperglycemia: increased hepatic glucose production, peripheral insulin resistance, and impaired pancreatic insulin secretion (Olefsky, 1997).

The major health impact of this disease is observed by the vast number of associated chronic diabetic complications affecting the eyes, kidneys, peripheral nerves, and blood vessels. Chronic hyperglycemia has been clearly implicated as the most important cause of these neuropathic, microvascular, and macrovascular complications associated with both type 1 and type 2 diabetes (Garber, 1997). The economic impact related to care for diabetic health problems is tremendous, accounting for 15% of all U.S. health care dollars and 27% of all Medicare expenditures, which is out of proportion in comparison to the 6% diabetic occurrence rate (Buchanan & Davidson, 1997).

Data from the Centers for Disease Control's (CDC) National Health Interview Survey indicate that increases in both the incidence and prevalence of diabetes from 1980

to 1994 were attributable to factors other than the aging of the U.S. population (Massachusetts Medical Society, 1997). Although diabetes is associated with nonmodifiable risk factors, modifiable risk factors such as obesity and physical activity play a major role in the disease process. Variations in the patterns of some of the risk factors can affect the prevalence and incidence of diagnosed diabetes. Therefore, there is an urgent need for effective intervention strategies to prevent diabetes and its complications (Massachusetts Medical Society, 1997). The current study sought to examine the impact of a multidisciplinary education program on knowledge and health-promoting behaviors in persons with type 2 diabetes mellitus.

#### Establishment of the Problem

The prevalence of diabetes mellitus poses a heavy economic burden on the nation each year. In addition, those who suffer losses due to diabetes are people whose talents and wisdom are needed and whose problems deserve the unified efforts of health care providers. While serious long-term morbidity and high mortality rates associated with diabetes are revealed through statistics, recent research indicates that many of the long-term



complications can be prevented by good clinical care consisting of early detection and treatment of developing complications, tight control of blood glucose and blood pressure levels, and diabetes self-management education (Buchanan & Davidson, 1997).

The results of the Diabetes Control and Complications Trial (DCCT) were released in June 1993. This 10-year national study demonstrated clear evidence that intensive therapy in persons with type 1 diabetes, with the goal of achieving near-normal blood glucose levels, effectively delayed the onset and slowed the progression of diabetic eye, nerve, and kidney disease by 50% to 75%. Most researchers in the field believe that good blood sugar control in individuals with type 2 diabetes can have similar results (Garber, 1997). Even though it is evident that appropriate and timely interventions could result in prevention of many of the complications, many people with diabetes may not be receiving medical care that meets published American Diabetes Association (ADA) standards of continuing medical care (Penman, 1997). Uncovered deficiencies in preventative care have been discovered in diabetic patients. Of the more than 1,000 type 2 diabetic patients, only one third received education, nutrition

counseling, and an eye examination in their lifetime, and 15% never received any of these services (Buchanan & Davidson, 1997).

Implementation of appropriate diabetic treatment could be effected by barriers such as limited knowledge about diabetes and its complications among nonspecialist primary care providers, access of patients to knowledgeable primary care providers, and financial reimbursement issues (Johnson, 1996). Patients in the DCCT received care from a team of specialized diabetes professionals, including extensive and frequent instruction and counseling. A multidisciplinary team of health care professionals is recognized as the most effective vehicle for providing quality diabetes health care, particularly in outpatient settings. In addition, utilizing nonphysician providers of diabetes self-care education is considered essential by experts in the field (Johnson, 1996). Nurses and dietitians have primarily comprised these nonphysician providers. Given their extensive training, pharmacists could enhance the effects of the multidisciplinary care team by contributing to patients' understanding of the importance of following diabetes self-care behaviors (Johnson, 1996). Furthermore,

one of the goals of a multidisciplinary team approach to diabetes education is to deliver a common message to the client that promotes a uniform philosophy related to diabetes management. However, even with convincing results of the DCCT, national surveys indicated that only 24% to 59% of patients with diabetes had attended a patient education class (Johnson, 1996). According to Johnson (1996), limited access to formalized education programs had been cited as a reason for low participation rates, and the lack of an established reimbursement system had been suggested as a reason why there are relatively few diabetes education programs available.

The primary purpose of diabetes education is to empower individuals and give them the knowledge needed to be able to make informed decisions regarding self-care and health-promoting behaviors. Diabetes self-care is difficult, since it involves applying complex medical techniques and modifying deeply ingrained lifestyle behaviors (Peragallo-Dittko, 1997). Peragallo-Dittko (1997) maintained that effectiveness of diabetes education could be demonstrated by evaluating the patterns of self-monitoring of blood glucose in patients who had received education. In one study, patients who have been exposed to

an education class were three times more likely to test their blood sugar at least once per day and to demonstrate the ability to interpret and to apply the results (Peragallo-Dittko, 1997). Further, Brown and Hedges (1994) revealed that metabolic control was largely impacted by compliance or self-care behaviors.

Even with the increasing reference to the importance of diabetic education, few studies have attempted to address how knowledge and self-care behaviors could be influenced by a multidisciplinary team education approach. The goal of this current study was to assess the impact of a multidisciplinary education class on knowledge and health-promoting behaviors in persons with type 2 diabetes.

#### Implications for Nursing

Nurses and nurse practitioners play an integral role in the development and assimilation of positive health care habits of persons with type 2 diabetes. This is a chronic disease process requiring education, routine monitoring, and lifestyle adjustments in order to prevent long-term complications associated with the disease. According to Buchanan and Davidson (1997), the greatest opportunity to deliver such preventive care lies in the

hands of primary care providers who care for a large majority (> 90%) of people with type 2 diabetes in the United States. Therefore, nurses in primary care settings who have first contact with patients will have the greatest chance to investigate, educate, and influence health beliefs and practices (Buchanan & Davidson, 1997).

Giving diabetic patients the knowledge and skills necessary for effective management requires time, patience, and effective communication skills on the part of the educator. People who become actively involved in health prevention through compliance with recommended treatment can then advance to a higher level of self-care involving health-promoting behaviors with a wellness perspective. However, the boundaries of diabetes education should be expanded to encompass a holistic view of health from a wellness perspective to include physical, mental, social, emotional, and spiritual components. This approach to health is particularly applicable to Pender's Health Promotion Model. Education directed in this manner will result in self-efficacy and empowerment, hence health-promoting behaviors (Klepac, 1996).

As practitioners, it is vitally important to incorporate research findings about health promotion into

clinical practice and community partnerships and programs. Practitioners should use current knowledge about behavior change and determinants of particular health behaviors to develop counseling protocols and appropriate care strategies for diabetic patients.

#### Statement of the Problem

Education imparts knowledge and empowerment which gives a measure of self-determination to the learner. These attributes are necessary for diabetic individuals to manage the disease adequately and make needed lifestyle changes. As individuals assume responsibility for their health and well-being, their perceptions of self-efficacy and control over health may influence personal application of illness prevention and health promotion (Klepac, 1996). A lack of knowledge and health-promoting behaviors in persons with type 2 diabetes are related to insufficient educational programs (Johnson, 1996). Knowledge of health and health-promoting behaviors are interrelated, but the relationship has been unclear. Previous studies have shown that knowledge and compliance have an inverse relationship even though researchers have suggested that diabetes patient education is effective in producing positive patient outcomes. However, it is unclear as to what type

of educational modalities is most effective (Brown & Hedges, 1994).

### Research Hypotheses

The following two null hypotheses were used to direct this study:

1. There will be no difference in knowledge of diabetes in persons with type 2 diabetes before and after a multidisciplinary diabetes education program.

2. There will be no difference in health-promoting behaviors of persons with type 2 diabetes before and after a multidisciplinary diabetes education program.

### Definition of Terms

The following terms were theoretically and operationally defined for the purposes of this study:

Knowledge: understanding gained by actual experience. Knowledge is a state of knowing or being well informed (Kidney, 1993). For the purposes of this study, knowledge will be measured by scores obtained on the Diabetes Knowledge Test (see Appendix A).

Health-promoting behaviors: those activities directed toward increasing the level of well-being and actualizing the health potential of individuals, families,

communities, and society (Pender, 1987). Health-promoting behaviors will be measured by scores obtained on the Self-Management Questionnaire (see Appendix B).

Multidisciplinary education: the acquisition of knowledge as a result of being taught. Multidisciplinary education is a comprehensive educational experience gained by the collaboration and integration of knowledge and skills by a team of health care professionals from different disciplines. The multidisciplinary education team can include health care professionals, such as the registered nurse, registered dietitian, physician, pharmacist, social worker, psychologist, exercise psychologist, and podiatrist (Pergallo-Dittko, 1993). For the purposes of this study, multidisciplinary education will be provided by the integration of knowledge and skills of the registered nurse, pharmacist, and registered dietitian since these disciplines are central to the management of diabetes.

Type 2 diabetes: a complex metabolic disorder beginning in adulthood, usually after the age of 30 to 40 years, in which loss of glycemic control results from the inability to make enough or properly use insulin. Individuals with this disorder are not dependent on



exogenous insulin for survival (Pergallo-Dittko, 1993). For the purposes of this study, type 2 diabetics included those persons who were greater than 30 years of age at diagnosis with the ability to control blood sugar levels without taking insulin, or those greater than 30 years of age at diagnosis who were on insulin during the study but did not require its use within the first 6 months after diagnosis.

### Assumptions

For the purpose of this research, the following assumptions were made:

1. Knowledge and health-promoting behaviors are variables that can be measured.
2. Persons with type 2 diabetes engage in behaviors that affect their health.
3. Perceived control of health, perceived self-efficacy, and perceived benefits of health-promoting behaviors are factors that can be positively modified by increased knowledge gained through education (Pender, 1987).

## Theoretical Framework

Pender's Health Promotion Model served as the theoretical framework for this study. The Health Promotion Model was derived from social learning theory which emphasizes the importance of cognitive mediating processes in the regulation of behavior. The determinants of health-promoting behaviors are categorized into cognitive-perceptual factors, modifying factors, and variables affecting the likelihood of action (Pender, 1987).

The cognitive-perceptual factors are identified as those variables which directly motivate individuals to behave or respond a particular way. These factors that influence health-promoting behavior include the importance of health, perceived control of health, perceived self-efficacy, definition of health, perceived health status, perceived benefits of health-promoting behaviors, and perceived barriers to health-promoting behaviors (Pender, 1987).

Modifying factors are those variables that indirectly sway health behaviors. According to this model, the likelihood of participating in health-promoting behaviors depends on the degree to which cognitive-perceptual factors are modified by personal, interpersonal, and

situational characteristics. The modifying characteristics specifically include age, gender, income, education, body weight, family patterns of health care behaviors, and expectations of significant others.

Pender (1987) maintained that certain additional variables can influence the likelihood of engaging in health-promoting behaviors. These factors are known as activating or motivation cues and are either of internal origin or emanating externally from the environment. Cues include mass media influence, health advice of others, or one's personal awareness of growth potential.

According to Pender's (1987) Health Promotion Model, the cognitive-perceptual and modifying factors directly affect whether one will choose to participate in healthy behaviors. Therefore, the individual's perceived control of health, perceived self-efficacy, and perceived benefits of health-promoting activities should be good indicators of one's potential involvement in health-promoting behaviors.

### Summary

Diabetes is a health problem of epidemic proportions, especially among older adults. Diabetes education is a major component in preventing many long-term complications

associated with uncontrolled blood glucose levels. Therefore, it is imperative that health care providers understand the factors that encourage or influence an individual to participate in health-promoting behaviors inherent to appropriate metabolic control. An understanding of how education can influence health beliefs and behaviors is important for the health care provider.

A multidisciplinary approach to diabetes education may be a factor in choosing an educational format that promotes healthy behaviors in this patient population, thus decreasing potential long-term complications. This study attempted to clarify the impact of a multidisciplinary education program on knowledge and health-promoting behaviors in persons with type 2 diabetes. Therefore, this chapter sought to establish a relevant research problem and present its significance to nursing. A theoretical framework strongly based on health promotion was used to guide the research. The purpose of this study, the problem statement, research hypotheses, assumptions, and definitions of relevant terms used in the study were provided to clarify key concepts in the study.

## Chapter II

### Review of Literature

The purpose of this review of the literature was to discover current research relevant to the impact of multidisciplinary education on knowledge of diabetes and health-promoting behaviors. The literature was abundant with data relating good metabolic control to decreased complications. This positive relationship was supported by the widely published results of the Diabetes Control and Complications Trial (Garber, 1997). The rationale for the efforts of health care professionals to assist patients in behavioral changes has been the belief that good self-care will lead to improved metabolic control and, in turn, to a reduction in long-term complications of diabetes and to a better quality of life (Peragallo-Dittko, 1993). However, the review of the literature yielded limited research regarding diabetes education and self-care behaviors. No empirical data were found regarding the impact of multidisciplinary education on knowledge or health-promoting behaviors.

Brown and Hedges (1994) sought to determine the feasibility of using data from replicated descriptive studies to test a model explaining metabolic control in diabetes. In turn, they sought to explain the causal relationships between three predictors, knowledge, health beliefs, and metabolic control (compliance). For this analysis, metabolic control was operationally defined as glycosylated hemoglobin levels. Knowledge was defined as an informal or formal process by which patients learn to manage their diabetes. Health beliefs result from an interaction of previously identified and measured concepts such as ability to control the effects of diabetes, commitment to benefits of therapy, and perceptions of the individual regarding their barriers to adherence, social support, disease severity, impact on diabetes lifestyle, and impact of job on diabetes therapy. Other concepts affecting health beliefs include prescribed self-management behaviors, cues to taking action to improve control, expectancies regarding the outcomes of compliance, and susceptibility to diabetes and its long-term complications. This model was based on a conceptual model whereby improved metabolic control was determined by patient knowledge of self-care principles and effective

application of this knowledge to activities of daily living (Brown & Hedges, 1994).

A complete review of the diabetes literature was done and inclusion criteria were established for selecting an appropriate sample and data to be analyzed from previous studies. Relevant data discovered were diabetes subjects, either type 1 or 2, with glycosylated hemoglobin measured as the criterion variable and with a measure of at least one of the three of the predictor variables. Data in the form of correlation matrices among predictor and criterion variables were accepted as well as data with a simple correlation between at least one predictor and the criterion variable. Seventeen studies met criteria which provided the study with 1,214 diabetes subjects. No study provided a complete correlation matrix of all the variables in the model under investigation. Therefore, segments of data were extracted from various studies. Homogeneity testing was conducted in this meta-analysis to determine if the fragmented data results were stable across studies. The testing suggested that results of the observed correlations were relatively stable. Therefore, correlations across studies were pooled and the dataset for five path models was created. Path coefficients were

estimated from the pooled correlation matrix using the weighted least squares procedure described in Becker (cited in Brown & Hedges, 1992).

Findings of the study by Brown and Hedges (1994) indicated that health beliefs have direct and indirect effects on diabetes metabolic control, depending on the individual health belief component. In general, a causal relationship was suggested in which composite health beliefs have a weak direct effect on control, and knowledge has a negative direct effect ( $-.154$ ,  $p = .05$ ), but both variables have indirect effects through compliance that were statistically reliable ( $0.204$ ,  $p = .05$ ). Throughout all five path models, an inverse direct effect of knowledge was noted on metabolic control, and a positive indirect effect was noted on metabolic control through compliance ( $p \leq .05$ ). The researchers concluded that their findings were inconclusive and should be further explored with other components of the full conceptual model so that important patient outcomes can be explained. Although Brown and Hedges (1994) set out to evaluate the relationship of knowledge, health beliefs, and compliance on metabolic control, this current researcher wished to analyze how education may influence



health beliefs and, therefore, alter healthy behaviors in persons with diabetes.

In a second study found in a review of the literature, Campbell, Moffitt, Redman, and Sanson-Fisher (1996) sought to evaluate the effectiveness of several diabetes education program formats on outcomes in persons with type 2 diabetes who had no previous education. Previous studies have not used adequate methods to determine which program formats are most effective in assisting patients to reach treatment goals. The researchers were interested in determining if educational programs positively affected knowledge, self-care, and metabolic outcomes. Further, Campbell et al. sought to determine which of four educational formats would be most effective in helping patients achieve identified outcomes. Previous studies indicated that those programs including behavioral strategies do positively affect outcomes in comparison with those that do not. Treatment goals were defined as those recommended to maintain near normal blood glucose levels, decrease cardiovascular risk factors and obesity, halt smoking, reduce hypertension, reduce high blood lipid levels, seek regular eye and foot exams, and implement appropriate foot care. Self-care elements were

defined as diet, exercise, glucose monitoring, medications, foot care, and visiting specialists. Outcomes were defined as variables that can be assessed and/or measured, such as glycosylated hemoglobin < 8.5, diabetes treatment, body mass index (BMI), blood lipid levels (cholesterol, HDL, cholesterol/HDL), blood pressure levels, smoking status, diabetes knowledge, patient satisfaction, seeing a podiatrist and ophthalmologist, and any other visits to health professionals (Campbell et al., 1996).

Campbell et al. (1996) used a randomized trial in which participants were placed in one of four educational formats. The minimal instruction program consisted of 59 participants. The individual education program consisted of 57 people. The group education program included 66, and the behavioral education program had 56. These newly diagnosed NIDDM patients were instructed on the same topics regarding self-care in all four groups including diet, exercise, urine testing, medications, and health checks. However, the four programs consisted of different amounts of contact time with patients. The way in which the information was presented was different as well as the instructional strategies used.

Participants (N = 238) were randomly chosen from those referred by their general practitioner to a Diabetes Education Service in New South Wales. Patients remained under the care of this general practitioner throughout the study. Patient inclusion criteria was 80 years of age or younger, able to read, speak, and understand English, no involvement in prior education program, diagnosis of NIDDM of less than 5 years, no terminal illness, and not on more than 75% of the maximum hypoglycemic medication dosage.

Outcome measures were assessed at baseline and 3, 6, and 12 months. Data that could not be directly measured, such as diabetes treatment with type and dosage of medication, smoking status, number of consultations of specialists, and number of health care visits, were collected by self-report. Knowledge was measured using a 15-item diabetes knowledge scale. Patient satisfaction with education was measured by using an 18-item scale. The authors used factor analysis to develop this scale which was found to be consistent and reliable. Educators used a checklist to record amount of contact time and audiotaped some of the visits (Campbell et al., 1996).

A one-way analysis of covariance (ANCOVA) was used to detect outcome changes by comparing baseline (pretest)

values to follow-up values for each item. When an outcome measure from one program differed significantly from another program, a t test was used for comparison between groups.

Campbell et al. (1996) found no significant differences in the variables between groups in the amount of variable change over time except that patients in the behavioral group showed lower cholesterol risk ratio ( $p = .011$ ) and a better likelihood of visiting a podiatrist at 3 months ( $p = .003$ ). Also, knowledge scores were better for the behavioral and group education participants at 3 months ( $p = .000$ ) and at 6 months ( $p = .000$ ). At 6 months, the behavioral group participants still had a better chance of going to the podiatrist and reporting greatest satisfaction with education received. Diastolic blood pressure was shown to be reduced for the behavioral group over the other groups at 12 months ( $p = .022$ ). However, all four groups did show reductions in hemoglobin A1c levels and body mass index (BMI) over time with no significant differences between instruction programs. Attrition rates were lower in the behavioral and minimal programs than the other two groups ( $p < .05$ ).

In conclusion, Campbell et al. (1996) determined that education programs do benefit patients with diabetes, but that the most appropriate and cost-effective format to use in bringing about positive outcomes for certain groups is still unclear. Campbell et al.'s findings reinforce previous studies regarding the effects of increased knowledge on actual metabolic outcomes, as no direct relationship emerged. Since more intensive programs may not produce greater improvements, examination of effects of minimal programs over a longer time may be needed. Furthermore, the value of outcomes indicating health status, wellness, and/or quality of life may be the focus of interest for study instead of knowledge and physiological outcomes. The implications of Campbell et al.'s study were very pertinent to the current study because both were focused on the effects of educational formats on different variables of diabetic outcomes.

In a related study, Bielałowicz, Elkins, Ladewig, and Miller (1995) sought to validate the usefulness of the diabetes self-management record in monitoring and documenting behaviors resulting from a diabetes education program. Since the main objective of education about diabetes should be to facilitate positive self-management

decisions and behaviors, the researchers also sought to understand the impact of monitoring behaviors on actual behavior changes. The idea of using this instrument as a behavior monitoring tool was influenced by the use and positive benefits of a similar scoring system called the Non-Diet Diet on reduction of body fat content and cardiovascular risk factors in obese individuals. Behaviors measured in this previous study were similar to behaviors encouraged on the Diabetes Self-Management Record.

In this descriptive study by Bielamowicz et al. (1995), seven county extension agents, who were previously trained in nutrition and diabetes education, were chosen to participate as diabetes education focus-group leaders. Each agent agreed to participate in 6 hours of additional diabetes education focusing on diabetes management and programming pertinent to the study. Each of the seven agents represented different geographic areas throughout the state. The additional training provided consistent delivery of diabetic education among these agents. Focus groups consisting of individuals with diabetes were recruited through local advertisements and invited to participate in the 6-week educational program. The sample

included 39 actual participants who returned completed data. The Diabetes Self-Management Record was checked for reliability before the start of the program by administering it to 32 diabetics on two occasions. The reliability coefficient was found to be .92.

Individual management problems were discussed during the educational program in weekly group sessions. The impact of the diabetes education programming effort on behavior change and behavior documentation was assessed by using the Diabetes Self-Monitoring Record. Participants monitored their behavior and used this record for one week on two different occasions, once before the program and again immediately after the course. Nineteen of the participants were monitored a third time 4 to 6 weeks after the program. Control was exerted by obtaining monitoring data prior to educating the subjects. The point value was determined beforehand for each behavior on the record. Forms given to subjects also did not include possible score ranges. Behavior changes within a group over time were evaluated by repeated measures using a one-way analysis of variance. Positive behavior changes measured included improvement in exercise frequency, glucose monitoring frequency, amount of fat consumption,

amount of carbohydrate consumption, amount of water consumption, and eating behaviors.

Bielamowicz et al. (1995) found that the self-management record was a way to effectively document positive behavioral changes related to diabetes behavioral goals. All areas defining behavior changes had significantly increased scores ( $p > .03$ ) on the posttest, with the exception of water consumption. The document was maintained for at least 4 to 6 weeks after the program. Therefore, the education programming had a positive effect on overall diabetes self-management ( $p = .000$ ).

The researchers concluded that strengthening a diabetic educational program's effectiveness on behavior change could be achieved by incorporating the Diabetes Self-Management Record. Behaviors most positively influenced with the educational program reflected dietary issues. This research by Bielamowicz et al. (1995) supported the current study through recognition of the need for better educational approaches to diabetic management. Recording positive behavior changes in this study had an actual direct effect on diabetes self-management. The current study set out to examine the effects of a multidisciplinary educational approach on



knowledge as well as health-promoting behaviors in persons with diabetes.

In another study relating knowledge with outcomes, Travis (1997) had the intention of determining how certain factors affected patients' adherence to their diabetes mellitus diet regimen. Whether or not demographics influenced these factors was also investigated. According to Travis (1997), adherence was defined as the extent to which a person's behavior coincides with medical advice. The study population consisted of 75 patients with type 2 diabetes mellitus being treated at an outpatient diabetes center. To be eligible for the study, the patient must have received nutrition information from a dietitian in the past 18 months and must possess printed material about a meal plan. In addition, inclusion criteria consisted of a previous diagnosis of type 2 diabetes, present involvement in diabetes treatment at this outpatient center, and age of 18 years or older.

To obtain the needed information, participants were asked to complete a three-part, multiple-choice questionnaire that had been critiqued by two review boards and pilot tested by two educators and two diabetic patients prior to use. Demographic data were ascertained

in the first section while the second part evaluated how listed factors influenced adherence to a prescribed meal plan. Possible answers included negatively affect, neutrally affect, or positively affected in response to how each of the factors influenced the patient's ability to follow the diet regimen. The final part of the survey addressed education and the ability of the patient to comprehend and utilize educational recommendations (Travis, 1997).

Demographic data revealed that the age of the population ranged from 35 years to greater than 64 years. Forty-four percent of these individuals were age 65 years and older. The majority of patients were female with 43% being male. Nearly half of the patients had been diagnosed with diabetes for 1 to 5 years, and slightly greater than half received insulin in addition to a diet plan to control their diabetes (Travis, 1997).

The second part of the questionnaire demonstrated that personal motivation had a positive influence on 63% of respondents in relation to the ability to control their diet. An important discovery by Travis (1997) was that 62% of patients felt that understanding the meal plan had a positive effect on their ability to follow the meal plan,

while 74% said that knowing what food to buy positively influenced their diet regimen. Negative influences reported by many of the participants included emotions, patients' hectic schedules, and holidays. Financial ability, ethnic cooking habits, family members and friends, and restaurant dining were considered to have no effect by a large number of responders.

The chi-square method of analysis was done on demographic data in regard to the patients' responses. Significant findings ( $p < .05$ ) were revealed for three factors. Younger patients were more often negatively affected by emotions and schedules, while a significant number of female patients reported that emotions could negatively affect their dietary adherence.

The last portion of the questionnaire addressed education and compliance with the diet plan. Chi-square analysis again exposed two significant findings ( $p < .05$ ). Only two patients reported never being told the importance of following a prescribed diet regimen as part of their treatment for diabetes, and it was these two patients who only followed the meal plan less than one day per week. Of the patients who followed their meal plan 4 or more days of the week, 77% had returned to the dietitian for

additional educational sessions after their initial session. Additional positive findings regarding education included that 75% felt they comprehended the meal plan after one session with a dietitian, and 100% of participants held the opinion that it was important to follow a diet plan. When asked how many days of the week the diet plan was followed, 39% said they followed the regimen 4 to 6 days per week, and 27% replied that they used it daily (Travis, 1997).

The researcher concluded that emotions may have a negative effect on diet adherence in younger patients and females while personal schedules affect the compliance of younger patients. These findings identify target areas that diabetes educators may need to address to enhance compliance. Explaining the role of diet in managing diabetes was discovered to promote adherence to diet regimens. Further, the uninformed patients reported following their meal plan less than one day a week (Travis, 1997).

Travis (1997) recommended that educators assess and understand patients' attitudes toward diabetes and its treatment and incorporate stress management skills into the diabetic educational plan to improve willpower to

follow a diet plan. According to Travis (1997), a patient's belief that the perceived health threat can be reduced by their actions directly promotes adherence. Therefore, this study was relevant for the current study by emphasizing the direct effects on the ability of education to alter perceptions associated with barriers and benefits of adherence.

The intent of Wooldridge, Wallston, Graber, Brown, and Davidson (1992) was to determine how certain health beliefs of patients with diabetes are connected to adherence and glycemic control. The investigators also wanted to find out if education and treatment could modify these health beliefs. The patient population consisted of 189 patients; 66% had type 2 diabetes mellitus. Exactly half of the patients were female, and the range of diabetes duration was 0 to 40 years. Participants were patients involved in a 2- to 3-month diabetes care program. In addition to treatment by physicians, the diabetes care program consisted of education from nurse practitioners and a dietitian. Most patients experienced three to four visits with each provider. Topics included in the education sessions were survival skills for patients with diabetes mellitus, self-blood glucose

monitoring, pathophysiology of diabetes mellitus, basic information about long-term complications, hygiene and foot care, and coping with diabetes. Patients were made aware of target blood glucose range, and the dietitian reviewed individual diet concerns with each patient.

Prior to beginning education, participants of the diabetes care program completed a 14-item health belief scale to determine their baseline health beliefs. Health beliefs analyzed included perceived severity of diabetes, perceived susceptibility to complications, perceived cost of treatment, perceived benefit of treatment, and perceived ability to follow recommendations by health care providers. After completing the Health Belief Scale, a nurse educator scored the questionnaire. The score then helped the educator to identify areas where the patient had negative health beliefs defined by a low score. High scores indicated positive health beliefs. In the following sessions with the patient, the nurse educator tried to change negative beliefs to more positive beliefs. The nurse educators had developed a schematic plan of teaching for each negative health belief (Wooldridge et al., 1992).

Another Health Belief Scale was mailed to the patient within 12 months of the initial visit. Also following

education, locus of diabetes control was analyzed to determine if control of diabetes was thought to be internal (believe health is determined by their actions) or external (believe health is controlled by fate, chance, powerful events, or others). The investigators also included a section on compliance in the survey which addressed frequency of self-exam of the feet, compliance with self-blood glucose monitoring, and adherence to exercise and diet regimen. Compliance was not measured until after the patient had been educated. Of 189 participants, the completed questionnaire was returned by 104 patients, but not all results could be analyzed due to one or more missing answers. Results were available for 92 health belief scales, 89 locus of diabetes control scales, and 72 compliance questionnaires (Woolridge et al., 1992).

Following education, the researchers determined from the participants' answers that statistically significant increases were evident in perceived severity of diabetes, perceived benefit of treatment, and perceived ability to carry out recommended activities. The pre-education score for perceived severity of diabetes was 4.6, and the score increased to 5.0 post-education. Prior to education, the score for perceived benefit of treatment was 7.0; this

value jumped to 7.5 post-education. The last statistically significant increase was for the perceived ability to carry out recommended activities ( $p = .018$ ). The value increased from 8.9 to 9.3 after education. Perceived benefits of treatment and perceived ability scores were positively associated with internal locus of diabetes control ( $p < .05$ , respectively). Perceived severity of diabetes and perceived barriers correlated negatively with external locus of diabetes control ( $p < .05$  and  $p < .001$ , respectively).

Other results gained from the trial by Wooldridge et al. (1992) included a statistically significant decrease in the HbA1c levels of the patients with type 2 diabetes ( $p = .00$ ). Prior to education the mean HbA1c was 8.5%, while the post-education mean dropped to 7.1%. Twenty percent of the patients with type 1 diabetes mellitus had hypoglycemia unawareness and were encouraged to maintain their blood glucose level somewhat higher than the type 2 patients. This encouragement possibly explains why the HbA1c level only dropped from 8.4 to 8.2% for these patients. No statistically significant relationship could be established between pre- or post-education health beliefs, HbA1c values, and self-reported compliance.



Adherence to the diabetes care plan was moderately high based on a mean compliance score of 70 out of 90 possible points.

Some health beliefs were modified positively through the education methods used in this study. To confirm that these positive findings were due to education by the diabetes care team alone, the researchers concluded that a study utilizing an uneducated control group is probably necessary. Also discovered was the fact that some health beliefs are related to the locus of diabetes control. Those patients with an internal locus of diabetes control felt that they were able to care for themselves and that by following their diabetes treatment regimen positive results could follow. Those patients with an external locus of diabetes control did not feel that diabetes was as severe as those with an internal locus. They believed that the costs of following their diabetes treatment regimen was too high and unnecessary. An improvement in metabolic control was noted in a majority of the patients in this study although no correlation to health beliefs or locus of diabetes control could be made. Also, compliance could not be related to locus of diabetes control or health beliefs. The researchers concluded that in future

studies a more valid measure of compliance other than self-report should be utilized, and compliance should be analyzed prior to education.

In summary, it is uncertain if altering health beliefs through intense education will improve compliance or diabetes control. However, certain beliefs, such as perceived severity of diabetes, perceived ability to carry out recommendations, and perceived benefits of treatment following education, can conceivably be modified in a positive direction through diabetes education (Wooldridge et al., 1992). This investigation supported the researcher's current study through evidence that education can positively alter perceptions of the ability to carry out recommended activities.

Tildesley, Mair, Sharpe, and Piaseczny (1996) presented data on 5,823 patients who participated in a diabetes treatment and teaching center located at St. Paul's Hospital. The purpose of this descriptive correlational study was to determine the impact of a comprehensive diabetes teaching and treatment program on diabetes control and outcomes. Measurable outcomes, including A1c values, percent ideal body weight, frequency of home blood glucose monitoring per week, and frequency

of experienced hypoglycemia, composed the dependent variables in this study. Hemoglobin A1c levels were measured using two different methods during the course of the study. These methods were compared by pilot testing 226 patient samples. For the purpose of the study, it was found necessary to adjust one of the method's results according to a linear regression model. Therefore, hemoglobin A1c measures were statistically comparable throughout the study. Metropolitan Life Insurance values for desirable adult weights were used to calculate percent ideal body weights. The number of times reported per month that the patient experienced or another observed hypoglycemic symptoms was used to figure frequency of hypoglycemic episodes. Patient's reports of the number of times home blood glucose monitorings were done per week was used to calculate weekly frequency of the home blood glucose monitoring.

The patients were divided into four groups as follows: insulin dependent diabetes mellitus (IDDM, n = 1,067), diet-treated noninsulin-dependent diabetes mellitus (NIDDM, n = 1,192), oral agent-treated NIDDM (n = 2,269), and insulin-treated NIDDM (n = 1,295).

The Diabetes Teaching and Treatment Center (DTTC) utilized a multidisciplinary approach to manage patients with diabetes. The team consisted of nurses, dietitians, physicians, social workers, clerical staff, and dining room staff. Each patient received individual counseling by a dietitian and participated in a core program over 4 consecutive days. Patients in the core program were asked to eat their meals at the center in order to facilitate an active learning process. Members of the multidisciplinary team observed the patients as they chose their meals; therefore, they could offer suggestions to each individual based on their personal meal choices. Patients received additional dietary information concerning specific circumstances in a group setting. Issues covered in these meetings were dining out, alcohol use, traveling, and how to handle illness.

Nurse educators taught patients attending the center how to perform self-blood glucose monitoring. Each patient performed these tests before meals and before departure each evening. Nurses also taught patients general information about diabetes, how to recognize and treat hypoglycemia, the importance of proper timing of medications and the effects of these medications, and

daily coping skills. Patient education materials were equivalent to a fourth-grade reading level. Patients who completed the 4-day core program were given prescriptions and appointments for follow-up, if necessary, and contact telephone numbers. Newly diagnosed diabetics were asked to return in 3 months after completing the core program for a follow-up course. Patients were then seen for follow-up at 3-month, 6-month, or 1-year intervals. The one-day course was a review of the core program and the patients saw a dietitian, nurse educator, and a physician. Patients were again asked to perform self-blood glucose monitoring and eat their meals at the center; therefore, they could receive feedback from health practitioners regarding skills (Tildesley et al., 1996).

All patients were then evaluated based upon the previously described outcomes: glycosylated hemoglobin (A1c) values, percent ideal body weight, and home glucose monitoring per week; furthermore, the IDDM group was evaluated for the number of hypoglycemic episodes per month. Patient information was collected from the database at the DTTC for the years of 1984 to 1995. The accuracy of this database was validated prior to data collection using

the t test for paired samples to determine statistical significance of changes from initial assessment.

According to the data analyzed in this study, patients who attended the DTTC programs and follow-up demonstrated long-term improvements in diabetes control. Patients with IDDM had improvements in A1c values and the number of home blood glucose monitoring per week increased from 12.7 to 15.4 over 6 years. Hemoglobin A1c values declined from 9.2% at baseline to an average of 6.8% over 7 years. Significant improvements in A1c values were also noticed in the oral agent and insulin-treated groups with NIDDM. The number of home blood glucose monitoring per week also increased in these two groups (Tildesley et al., 1996).

The data presented by Tildesley et al. (1996) in this outcome analysis demonstrated that diabetic patients who receive formal education regarding diabetes management will overall show improvements in metabolic control. Furthermore, diabetics who participate in a supportive and supervised educational program, such as the one at the DTTC, may show positive correlation between knowledge and outcomes as has been interpreted from the data in this analysis. Unfortunately, information was not included on

patients who did not return for follow-up; however, the follow-up rate for IDDM and NIDDM patients was about 70% and 85%, respectively. Data presented in this study were collected in a retrospective manner, and no control group was present to compare with the 5,823 patients in the DTTC.

In conclusion, the data presented in this analysis by Tildesley et al. (1996) demonstrated that long-term complications of diabetes can be minimized by improving metabolic values as the result of patient education. This study was relevant for the current study by emphasizing the positive impact of education by a multidisciplinary team on knowledge and the ability of clients to implement what they have been taught and make appropriate behavior changes. This current study investigated the impact of multidisciplinary education on knowledge and health-promoting behaviors.

Another study demonstrated the benefits of education on older adults. Funnell, Arnold, Fogler, Merritt, and Anderson (1997) gathered data from the Diabetes Care for Older Adults Project with the purpose of documenting patient attendance at educational and support programs, discovering factors that influenced patient attendance,

and determining specific reasons why patients joined these programs. The main objective of the Diabetes Care for Older Adults Project was to compare glycosylated hemoglobin values of two treatment groups. One group received intensive insulin therapy and was allowed to participate in patient education seminars that were led by a multidisciplinary team. Members of the other group (conventional therapy) were seen by a physician of their choice. The goals of both groups were to achieve an A1c value of less than 9%.

A total of 103 diabetics qualified to participate in the Diabetes Care for Older Adults Project. The inclusion criteria for the Diabetes Care for Older Adults Project were as follows: age over 64 years, diagnosis of diabetes for at least 6 months, stable health, and an A1c value of greater than 9%. Participants in the intensive therapy group were given insulin, asked to perform self-blood glucose monitoring at least twice daily, and were invited to attend diabetic education seminars. Patients were evaluated every 6 months by using the Diabetes Knowledge Test and A1c value for a period of 18 months. The mean baseline A1c value for the 53 patients in the intensive treatment groups was 12.5% (Funnell et al., 1997).



The interdisciplinary team consisted of dietitians, nurses, and social workers. Both the nurse educators and dietitians were Certified Diabetes Educators. The purpose of these educational sessions were to facilitate the goals of the Diabetes Care for Older Adults Project instead of providing patients with general information on diabetes. The sessions focused on intensive insulin management and what benefits or problems could occur with this regimen. The sessions were informal, and patients were encouraged to discuss issues or ask questions instead of having a member of the team simply lecture to the participants. These sessions covered a variety of topics, such as, but not limited to, how to inject insulin, monitoring of blood glucose, exercise, stress, intensive insulin therapy, hypoglycemia, long-term complications, and problem solving. All materials were written at a sixth- to eighth-grade level. Initial classes were held weekly for 3 weeks and focused on the basic issues of balancing diet with insulin, insulin injection techniques, hypoglycemia, and self-blood glucose monitoring. For the next 6 months patients met once a month, and the final three sessions were held every other month. Patients were not charged any

fees or given any compensation for participating in the educational sessions or the intensive therapy group.

Patient knowledge was evaluated using the Diabetes Knowledge Test at baseline and at 6, 12, and 18 months. The average Diabetes Knowledge Test score was 70% at baseline, and the averages at 6, 12, and 18 months were 7.5%. Hemoglobin A1c values declined in the intensive therapy group from 12.5% at baseline to 9.9% at 6 months and 9.2% at 18 months. A high attendance rate was observed for the educational sessions. Approximately 68% completed the 18-month study, and 72% attended the first 6 months. Patients who had been on insulin for the shortest time were most likely to attend (Funnell et al., 1997).

Unfortunately, the Diabetes Knowledge Test scores only showed modest improvement above baseline. According to the authors, the impact of patient education in this study could have been more readily determined had the testing instrument been separate for the information covered in these sessions. The Diabetes Knowledge Test is a general test and was not specific to intensive insulin-treated type 2 diabetics. Scores may have been higher if the test reflected knowledge about their specific condition and treatment regimen.

Furthermore, the patients included in this study by Funnell et al. (1997) were from a large urban area, well-educated, independent, and could provide their own transportation. The baseline scores may have been higher than expected from older diabetics in general. Even though the information obtained in this study was limited due to lack of a true control group and by the sample population, the results suggested that older patients can play an active role in managing their diabetes and can benefit from patient support groups and educational sessions. The baseline Diabetes Knowledge Test scores reported in this study may have been higher than the average Diabetes Knowledge Test score for diabetics in general because of these previous factors (Tildesley et al., 1996).

As other studies found in the literature have mainly emphasized the effects of education on outcomes, this study by Funnell et al. (1997) mainly observed the ability of education to influence knowledge levels in older adults. Therefore, this research more closely paralleled the objectives of this researcher although population characteristics may have varied.

## Summary

In summary, a review of the literature was conducted for the purpose of studying the impact of multidisciplinary diabetes education on knowledge and health-promoting behaviors. Studies were abundant with data relating intensive diabetes treatment to increased metabolic control and decreased complication rates. However, even though several of the studies included some form of education as part of the intensive therapy, the education component was not the focus. The most relevant studies found for the purpose of this study investigated the phenomena of adherence and/or specific outcomes after receiving education. Although behavior changes as a result of education were not a major focus of these research studies, some of the measured outcomes, such as the frequency of blood glucose monitoring and weight loss, were of interest to the researcher because they indicate behavioral changes.

A study by Wooldridge et al. (1992) was relevant to the current study as it set out to determine how specific health beliefs were related to adherence and metabolic control and the impact of education and treatment on these beliefs. This study enhanced the importance of

understanding how attitudes toward health care behaviors can be influenced positively through education.

Two studies, one by Funnell et al. (1997) and the other by Tildesley et al. (1996), examined specific outcomes such as glycemic control and weight loss after being involved in education programs. Brown and Hedges (1994) attempted to explain the relationship between knowledge, health beliefs, and compliance. Certain demographic factors and education issues that affect adherence to the diabetic diet regimen was the focus of a study by Travis (1997). Bielamowicz et al. (1995) focused on the impact of monitoring behaviors during an educational program on actual behavior changes. A final research study by Campbell et al. (1996) contributed information on the relationship of different educational formats on knowledge, self-care, and metabolic outcomes in diabetes. Unfortunately, a multidisciplinary approach was not discussed in this study nor was it explored in any of the studies reviewed despite the strong implications in the literature stressing the importance of this approach to diabetes management. Therefore, in the current study, the impact of multidisciplinary education on knowledge and

health-promoting behaviors in persons with type 2 diabetes mellitus was investigated.

## Chapter III

### The Method

The researcher sought to determine the impact of a multidisciplinary education program on knowledge and health-promoting behaviors. The population included individuals with type 2 diabetes who voluntarily sought education. The intervention was an educational program on diabetes management with content taught by a nurse, a dietitian, and a pharmacist. Diabetes knowledge and self-management tests were conducted as baselines. In Chapter III a complete discussion of the methodology is presented.

#### Design of the Study

The purpose of this study was to determine the impact of a multidisciplinary diabetes education program in persons with type 2 diabetes. A quasi-experimental pretest/posttest design was chosen since subjects could not be randomly assigned to treatment conditions, although the researcher did manipulate the independent variable and exercised certain controls to enhance the internal validity of the results (Polit & Hungler, 1995).

### Variables

The dependent variables were knowledge and health-promoting behaviors. The independent variable, education, was manipulated by a collaborative team of disciplines. Controlled variables included age and type of diabetes. Intervening variables may have included the client's physical and mental status, socioeconomic status, family support, ability to learn, and motivation to make lifestyle changes.

### Setting, Population, and Sample

According to Penman (1997), diabetes has rapidly become an important health problem in Mississippi. Diabetes is a major cause of morbidity, disability, and mortality and a major source of health care costs in the state. More than 150,000 Mississippi residents have diabetes with only half being diagnosed. The estimated death rate is 1,600 residents yearly, and approximately 1,000 Mississippians suffer significant diabetes-related complications yearly including an estimated 650 lower extremity amputations, 150 new cases of end-stage renal disease, and over 200 new cases of blindness (Penman, 1997).



This study took place in a hospital outpatient classroom in a rural county in Mississippi. This 156-bed hospital serves five counties in addition to the county in which the study was conducted, which has a population of 34,000. This rural hospital is county-owned and serves a community comprised of all socioeconomic and cultural groups. The population in this study included individuals who had a diagnosis of type 2 diabetes, were either older than 30 years of age at diagnosis and not dependent on insulin for blood sugar control, or those older than 30 years of age at diagnosis who were using insulin at the time of the study but did not require its use within the first 6 months after diagnosis. The sample of convenience consisted of subjects who met the criteria and voluntarily participated in the education program. A final sample of 26 eligible participating clients included 17 women and 9 men.

### Procedures

Approval to conduct the research was granted from the Mississippi University for Women Committee on Use of Human Subjects in Experimentation (see Appendix C). Permission to conduct the research in the proposed outpatient setting was sought from administration of the hospital. The

purpose and instruments for the study were explained, and questions were answered. Written permission was then obtained to use the hospital outpatient classroom (see Appendix D). The subjects were recruited through advertisements of the diabetes education program in the local newspapers, radio stations, physicians' offices, and pharmacies.

The researcher presented the study to all attendees of the education program. A consent form explaining the purpose and instrumentation of the study and providing an invitation to participate was provided to each program participant. At this time a consent form was signed and dated by the participants indicating their decision to participate in the research study (see Appendix E). The researcher then administered the Demographic Data Survey, Diabetes Knowledge Test, and Self-Management Questionnaire to each participant. The time required to answer the questions was approximately 25 minutes. After completion, the answer sheets were collected and placed in an envelope.

The participants received diabetic education from a panel of disciplines involving nursing, dietary, and pharmacy. The lesson plan and educational objectives were

jointly formulated (see Appendix F). The program lasted 2 hours. The first half hour included an explanation of basic pathophysiology of diabetes by the researcher using diabetes management booklets, computerized slides, and discussion. During the second half hour, a registered dietitian conducted a presentation on nutrition and dietary adjustment for the diabetic. In the remaining half hour, a pharmacist discussed diabetic medications and their interactions with diet, over-the-counter medications, and herbal products. A 10-minute break was allowed between each half-hour session. At the end of the program, 10 minutes were given for questions and answers.

Six weeks after the educational intervention, the Diabetes Knowledge Test and Self-Management Questionnaires were mailed to the participants as the posttest. Thirty-two were mailed in a self-addressed, stamped envelope. Twenty-six completed questionnaires were returned via mail, which represented a return rate of 81%. Data were collected during a 16-week period of time from February to June 1998.

### Instrumentation

Data were collected using three instruments, the Demographic Data Survey, Diabetes Knowledge Test, and the

Self-Management Questionnaire. Written permission was granted to utilize the Diabetes Knowledge Test (Fitz-Patrick, 1997) (see Appendix G). In addition, permission for E-mail for the use of the second tool, the Self-Management Questionnaire, was granted by Mary Wierenga, RN, PhD (see Appendix H). The Demographic Data Survey was a self-administered instrument developed by the researcher to collect pertinent data pertaining to the characteristics of the participants (see Appendix I). The following information was elicited: (a) age, (b) gender, (c) race, (d) marital status, (e) educational level, (f) number of persons in the home, (g) number of persons who eat in the home, (h) who purchases the food, (i) who prepares the food, (j) money spent on food, (k) length of time with diabetes, (l) type of medication used, (m) previous diabetic teaching sessions, and (n) health care benefits. Although there was no established reliability, face validity was established by a panel of experts.

The Diabetes Knowledge Test measured the level of knowledge about various aspects of diabetes and had three parts. The first and second parts tested knowledge regarding diabetes pathophysiology, diet, exercise, and medications. Part I consisted of 10 multiple-choice

questions, and Part II consisted of 15 true/false questions. Part III of the knowledge test sought to examine participants' understanding of the proper administration of insulin as well as its effects on the body. The third section was originally developed for diabetic persons using insulin. However, since insulin instruction was included in the 2-hour program, all participants were administered Parts I, II, and III regardless of their medication regimen. Two questions from Part II of the test were eliminated by the researcher due to ambiguity bringing the total to 30 questions. The test was scored as a percentage, according to the number of questions answered correctly. The number of items answered correctly was divided by 30 and rounded to the nearest 10th to determine the exact score.

The second instrument, the Self-Management Questionnaire, was formulated to measure stated compliance with the prescribed diabetes management regimen as perceived by the patient. The alpha reliability for 50 research participants with newly diagnosed diabetes was 0.85 (Wierenga, 1997). This questionnaire's format consisted of a 5-point Likert scale and 29 questions which measured four areas of diabetes self-management. Questions

1, 2, 3, 4, 5, 22, and 24 addressed exercise. Questions 7, 8, 11, 15, 18, 20, and 21 referred to personal hygiene. Diet was explored in questions 6, 9, 10, 12, 13, 16, 17, and 23. Questions 25 to 29 dealt with medications. Questions 14 and 19 addressed compliance. The Likert scale ranged from 1 (never) to 5 (always). This scale included the following answer choices: never, occasionally, sometimes, frequently, and always. Questions 6, 7, 9, 10, 11, 12, 16, 21, 22, 23, 25, 26, 27, and 28 had "never" as the desirable answer and were scored 5 points for "never" and 1 point for "always." The remaining questions numbered 1, 2, 4, 5, 8, 13, 14, 15, 17, 18, 19, 20, 24, and 29 were scored 1 point for "never" and 5 points for "always." Items unanswered received no points. Each question was given the appropriate number of points. All points were added together to obtain one final score for the Self-Management Questionnaire. Since the most desirable answers were given the most points, higher point scores indicated better compliance in terms of self-management behavior. Participants could score anywhere between 29, indicating no positive self-management actions perceived, and 145, representing perfect compliance with recommended self-management behaviors.

### Data Analysis

Analysis of collected data involved the performance of the dependent  $t$  test. A level of significance of .05 was established. Utilization of this type of analysis was appropriate for the study in order to compare pretest and posttest scores to determine effects of the educational intervention on knowledge and self-management behaviors in the same group of individuals. The Pearson product-moment correlation was also used to determine the relationship between variables. The demographic data surveys were analyzed to lend supporting data to the findings using descriptive statistical methods, including measures of central tendency and variability, such as frequency, mean, and standard deviation.

### Summary

This chapter sought to describe the method used to assess diabetes management knowledge and healthy behaviors in type 2 diabetic individuals before and after a multidisciplinary diabetes education program. The quasi-experimental research study included a total of 26 participants (9 men and 17 women) over the age of 30 years with type 2 diabetes. Measures were obtained for these variables with the research instruments, the Diabetes

Knowledge Test, the Self-Management Questionnaire, and the Demographic Data Survey. Data were collected by administering a pretest in the hospital classroom before the education program and a posttest by mail 6 weeks post-education. Data were analyzed using the dependent  $t$  test and descriptive statistics.



## Chapter IV

### The Findings

The purpose of this quasi-experimental study was to investigate the impact of multidisciplinary education on knowledge and health-promoting behaviors in persons with type 2 diabetes. The goal of the study was to determine if 6-week post-education scores regarding knowledge and health-promoting behaviors would improve after clients learned about diabetes and its management from a multidisciplinary team of professionals: registered nurse, pharmacist, and registered dietitian. Demographic information collected included age, gender, race, marital status, educational level, number of persons in the home, number of persons who eat in the home, who purchases the food, who prepares the food, amount of money spent on food/month, length of time with diabetes, type of medication used, previous diabetic education, and health care benefits. Demographic data assisted with verification of those individuals meeting criteria for the study and were analyzed using descriptive statistics. The Knowledge

Test was designed to measure overall knowledge regarding the disease process and its management, while the Self-Management Questionnaire measures stated compliance with the recommended management regimen. In this chapter, the sample for the research will be described. Also included are the results of the data analysis and additional findings of interest.

#### Description of the Sample

A hospital outpatient classroom in a rural county in Mississippi served as the setting for the diabetes education program. The sample included individuals with a diagnosis of type 2 diabetes, who were either older than 30 years of age at diagnosis and not dependent on insulin for blood sugar control or were older than 30 years of age at diagnosis and using insulin at the time of the study but did not require insulin use within the first 6 months after diagnosis. Thirty-two people responded to the advertisement and attended the diabetic education program. The final sample of convenience consisted of subjects (N = 26) who voluntarily participated in the education program, met the criteria, and returned the posttest questionnaires by mail. The subjects ranged in age from 37 to 79 years.

The mean age of the sample was 58 years. Distribution of the sample by age can be found in Table 1.

Table 1

Age Distribution of the Sample

Age	f	%
30-40	4	15.0
41-50	5	19.0
51-60	4	15.0
61-70	8	31.0
71-80	5	19.0

All participants were either Caucasian or African American. Additionally, gender, marital status, person purchasing the food, and person preparing the food were assessed. Of those persons attending the education program, 65% were female. A majority (73%) of the individuals indicated that they were married and that they prepared their own food (73%). Specific distribution of these variables is included in Table 2.

Table 2

Demographics by Ethnicity, Gender, Marital Status, and Who Purchases and Prepares the Food

Variable	f	%
Ethnicity		
Caucasian	24	92.0
African American	2	8.0
Gender		
Female	17	65.0
Male	9	35.0
Marital status		
Married	19	73.0
Separated	0	0.0
Divorced	2	8.0
Widowed	4	15.0
Single	1	4.0
Other	0	0.0
Who purchases food		
Self	23	88.0
Family member	3	12.0
Friend	0	0.0
Who prepares food		
Self	19	73.0
Family	7	27.0
Neighbor	0	0.0
Other	0	0.0

Note. N = 26.

Other variables examined on the demographic data survey reflected the participants' socioeconomic status. These included the number of persons eating meals in the

home, amount of money spent on food/month, and health care benefits. Only 12% of individuals responded that they lived alone, and 88% indicated that 2 to 3 people ate meals in the home on a regular basis. Interestingly, 42% of individuals implied that they only spent \$100-\$200 per month on food. However, 85% of program attendees revealed that they had private health insurance. Refer to Table 3 for these data.

Table 3

Financial Demographics Examined by Number of Persons Living in the Home, Number of Persons Eating in the Home, Money Spent on Food/Month, and Health Care Benefits

Variable	f	%
Lives alone		
Yes	3	12.0
No	23	88.0
Number of persons who eat meals in the home		
One	3	11.0
2-3	21	81.0
4-5	2	8.0
> 5	0	0.0

(table continues)

TABLE 3. (continued)

Variable	f	%
Money spent on food/month		
< \$100	2	8.0
\$100-\$200	11	42.0
\$200-\$300	7	27.0
\$300-\$400	3	11.0
> \$400	3	11.0
Health care benefits		
Private insurance only	12	46.0
Medicare, Part A only	0	0.0
Medicare, Part B only	1	4.0
Medicare, Part A and B only	2	7.0
Medicaid	0	0.0
Both private and Medicare A only	4	15.0
Both private and Medicare B only	1	5.0
Both private and Medicare A and B	5	19.0
Other	1	4.0

Note. N = 26.

Finally, items 10, 11, 12, and 13 of the demographic data survey form were employed to gather data regarding length of time with diabetes, types of diabetes medications utilized, and previous diabetes diet instruction. Of the 26 participants attending the education program, most (35%) reported that they had been diagnosed with diabetes for less than one year. In addition, only 27% of participants were currently using

insulin in their diabetic management regimen. Of the individuals using insulin, 3 (43%) indicated that the management of their diabetes did not require the use of insulin within 6 months of the diagnosis. The other 4 (57%) participants using insulin stated that insulin usage started within 6 months of the diagnosis. Prior diabetic diet education was indicated to have been received by 65% of individuals. Specific responses to these variables are presented in Table 4.

Table 4

Diabetic Variables Addressing Length of Time with Diabetes, Medications Utilized for Diabetes Management, and Previous Diabetes Diet Instruction

Variable	f	%
Length of time with diabetes		
< 1 year	9	35.0
1-3 years	6	23.0
4-6 years	3	11.0
7-9 years	2	8.0
10 years or more	6	23.0
Diabetes medications utilized		
None	10	38.0
Oral agents only	9	35.0
Insulin only	5	19.0
Both oral agents and insulin	2	8.0

(table continues)

TABLE 4 (continued)

Variable	f	%
Previous exposure to diabetes diet education		
No	9	35.0
Yes	17	65.0
Who taught you about the diet?		
Dietitian only	10	59.0
Nurse only	2	12.0
Doctor only	1	6.0
Dietitian and nurse	2	12.0
Dietitian and doctor	1	6.0
Nurse and doctor	0	0.0
Dietitian and doctor	0	0.0
All 3: dietitian, nurse, doctor	1	4.0
Family member	0	0.0
Friend	0	0.0

### Results of Data Analysis

Using the Diabetes Knowledge Test and the Self-Management Questionnaire, data were collected to test the research hypotheses. Knowledge and behavior scores were analyzed by using inferential statistical methods. A dependent  $t$  test was conducted to determine the differences in mean for baseline and post-education knowledge and behavior scores in the same group of individuals.

The first hypothesis was the following: There will be no difference in knowledge of diabetes in persons with



type 2 diabetes before and after a multidisciplinary diabetes education program. Scores on the Diabetes Knowledge tests prior to the educational intervention ranged from 40% to 97%. Diabetes knowledge post-education scores ranged from 53% to 93%. Since  $t(25) = -2.20$ ,  $p = .038$ , the researcher rejected the first null hypothesis as knowledge scores in persons with type 2 diabetes improved after attendance at a multidisciplinary diabetes education program. Interestingly, prior to education 56% of individuals thought that foods high in saturated fats and cholesterol affected blood sugar levels and not heart disease risks. Forty percent of participants thought that the best choice of food on sick days for a person taking insulin was diet soda and hot tea, although soup and applesauce were the preferred choices. A fairly significant number of individuals (20%) were not aware that many people with type 2 diabetes can maintain good blood sugar control by following a proper meal plan without medication. Additionally, 64% of class attendees answered that the hemoglobin A1c test showed the average level of fat, not sugar, in the blood during the past 8 to 12 weeks.

The second hypothesis was as follows: There will be no difference in health-promoting behaviors of persons with type 2 diabetes before and after a multidisciplinary diabetes education program. Pre-education health-promoting behavior scores ranged from 73 points to 117 points, while post-education behavior points were between 61 and 126. Since  $t(24) = -.776$ ,  $p = .445$ , the researcher failed to reject the second null hypothesis. These data are presented in Table 5.

Table 5

Comparison of Mean Differences in Scores for Diabetes Knowledge and Health-Promoting Behaviors Before and After Diabetes Education Intervention Using the Dependent t Test

	n	M	SD	t
Knowledge				
Pre	26	77.04	13.57	
Post	26	81.42	12.00	-2.196*
Behavior				
Pre	25	95.00	12.83	
Post	25	97.00	16.28	-.776

Note. Behavior scores were based on 25 individuals because one person returned the Knowledge test but not the Self-Management Questionnaire.

\* $p < .05$ .

### Additional Findings

Because only 35% of participants were male, an independent  $t$  test was calculated to determine the correlation of males to females in relation to knowledge and behavior changes. Findings revealed that there was no significant difference ( $p = .274$ ) in pre- and post-knowledge scores or pre- and post-behavior change scores ( $p = .644$ ) between males and females. However, with calculation of the Pearson product-moment correlation, a positive relationship was discovered between the length of time since the diagnosis of diabetes and the amount of knowledge change over time. This correlation was significant,  $r(26) = .407$ ,  $p = .02$ , and revealed that the longer the individuals had been diabetic, the more knowledge change they tended to show as a result of the educational intervention. No significant relationship emerged between the length of time with diabetes and behavior changes over time,  $r(25) = .081$ ,  $p = .35$ .

### Summary

This chapter sought to describe the sample of participants used in the current study and to present the results of data analysis using descriptive statistics, the dependent  $t$  test, and the Pearson product-moment

correlation. Results of the data collection were described in narrative and table format to enhance clarity of discussion. The first research hypothesis, there will be no difference in knowledge of diabetes in persons with type 2 diabetes before and after a multidisciplinary diabetes education program, was opposed by the data analysis and was, therefore, rejected. The second research hypothesis, there will be no difference in health-promoting behaviors of persons with type 2 diabetes before and after a multidisciplinary diabetes education program, was supported by the data analysis; therefore, the researcher failed to reject the second hypothesis.

## Chapter V

### The Outcomes

Type 2 diabetes is not only a serious public health problem but also a personal health issue to those who have the disease. To prevent complications associated with diabetes, individuals must maintain good metabolic control through complex diet, exercise, and medication regimens requiring potentially difficult lifestyle changes. Preventing and slowing the progress of complications are goals of paramount importance to those professionals who work in the field of diabetes treatment and care. Therefore, it is important for health care providers to understand factors that influence persons with diabetes to engage in health prevention and promotion practices. A quasi-experimental study was conducted to determine the impact of a multidisciplinary education class on knowledge and health-promoting behaviors in persons with type 2 diabetes. The study was guided by Pender's Health Promotion Model which identifies specific variables that influence individuals to engage in healthy behaviors. The

researcher sought to explore the following null hypotheses:

1. There will be no difference in knowledge of diabetes in persons with type 2 diabetes before and after a multidisciplinary diabetes education program.

2. There will be no difference in health-promoting behaviors of persons with type 2 diabetes before and after a multidisciplinary diabetes education program.

A group of type 2 diabetic individuals meeting criteria for the study attended a 2-hour diabetes education class taught by a nurse, dietitian, and pharmacist. The Diabetes Knowledge Test and Self-Management Questionnaire were used to collect data before and 6 weeks after the educational intervention. Data were analyzed using descriptive statistics, a dependent  $t$  test, and the Pearson product-moment correlation.

#### Summary of Significant Findings

The sample ( $N = 26$ ) included primarily Caucasian participants (92%) between the ages of 37 and 79 years, with a mean age of 58. The majority of individuals were married (73%), had been diabetics for less than 1 year (35%), and were not currently using insulin for their diabetes management (75%). A large number of participants

(65%) had been educated regarding the diabetic diet by either a dietitian (59%), a nurse (12%), or both (12%).

The first hypothesis tested was there will be no difference in knowledge of diabetes in persons with type 2 diabetes before and after a multidisciplinary diabetes education program. The dependent  $t$  test was used to measure differences in mean baseline and post-education knowledge scores. A statistically significant increase in posttest knowledge scores ( $p = .038$ ) emerged. Therefore, the null hypothesis was rejected. The second hypothesis tested was there will be no difference in health-promoting behaviors of persons with type 2 diabetes before and after a multidisciplinary diabetes education program.

Performance of a subsequent  $t$  test verified that no significant increase in diabetes health-promoting behaviors occurred 6 weeks after the educational program ( $p = .445$ ). Therefore, the second hypothesis failed to be rejected. Additional findings included a significant correlation between length of time with diabetes and knowledge scores. Individuals having diabetes for a longer period of time tended to have the greatest improvement in post-education knowledge ( $p = .02$ ). No significant

relationship emerged between the length of time with diabetes and behavior changes over time ( $p = .35$ ).

### Discussion

Statistical findings revealed a significant improvement in post knowledge scores of type 2 diabetic individuals after participating in a 2-hour multidisciplinary education program. This result might have been attributed to the fact that these individuals volunteered to attend and were, therefore, motivated to learn. On the other hand, the result may have reflected an increase in knowledge due to the multidisciplinary education approach. Although the literature supports a multidisciplinary approach to diabetes education, no research could support or refute this finding. In a study by Tildesley et al. (1996), formal education consisted of instruction by a team of professionals including nurses, dietitians, physicians, social workers, and clerical staff. In that study the researchers concluded that patients who receive formal education will show improvements in overall glycemic control. Further, knowledge and outcomes were significantly correlated. Interestingly, after studying the demographic profile of the sample in the current study, a discovery was made



linking those individuals having diabetes longer with higher post-education knowledge scores. This finding might have been a reflection of the health status of these individuals. A motivating factor may have been the desire to halt progression of existing diabetes related physical disabilities that inhibit activities of daily living.

Although post-education behavior scores reflected an increase in health-promoting behaviors, results of the study did not demonstrate a statistically meaningful improvement. Specific areas of the Self-Management Questionnaire that did not elicit improved behaviors were sections addressing behavior changes that require motivation such as diet. Participants continued to alter the number of food exchanges allowed, to modify the diet when out with friends, and to eat between-meal snacks not on their diet plan. In addition, after the education program many individuals still did not eat meals at approximately the same time every day.

The belief of this researcher is that other variables may have influenced these individuals' responses to recommended health care measures. Cultural factors may have been one of these variables. A large percentage of the participants in this study were Caucasian, married

southern women. Family members of diabetic individuals may have continued to request traditional southern home-cooked meals. Therefore, individuals may not have seen an advantage in making meal preparation changes in the home. Other individuals may not have been motivated due to altered perceptions of the ability to follow a recommended meal plan. Some individuals may have chosen not to take time for appropriate meal planning due to busy schedules. The desire to conform when out with friends or with family members could have been another barrier to behavior change with the diet regimen.

These propositions are supported in the literature. Travis (1997) sought to determine how certain factors affected diabetes diet adherence and whether or not demographics influenced these factors. Of the participants in the study by Travis (1997), 100% said that they knew that a meal plan was important to follow. In addition, 75% said that they understood the meal plan after one session with a dietitian. However, only 39% reported following the plan regularly 4 to 6 days per week. Interestingly, the patients who were uninformed about the role of diet followed the meal plan less than one day a week. This nonadherence emphasized the fact that adherence is

promoted when patients believe that an action taken will be beneficial for reducing a perceived threat. Travis (1997) concluded that factors other than knowledge influence adherence to the diet regimen. In that study, perceived barriers reported by younger participants were emotions and hectic schedules. Pender (1987) defines specific cognitive-perceptual factors, such as perceived barriers and benefits of health behaviors, that directly influence health promotion and disease prevention which further supports the above explanation of insignificant behavior changes.

Advantages to the current study may have been class participants' involvement in active meal planning during the class to assess their understanding of food exchanges. Task-oriented participation may have reinforced knowledge and positively altered their perception of the ability to understand and follow the diet. Furthermore, if patients had received educator feedback regarding an improvement in food choices, they may have been more motivated to continue positive behavior modification. In turn, the opinion of this researcher is that consistent positive behavior modification is more likely to result in observation of improved blood glucose levels, a perceived

self-efficacy, and a perceived benefit of participating in recommended behaviors. One could surmise that beliefs affect behaviors and behaviors alter beliefs.

Selected health beliefs of patients with diabetes were modified during the process of treatment and education in a study by Wooldridge et al. (1992). By completing the Health Belief Scale before the 2- to 3-month education program, negative health beliefs of patients were identified by the nurse practitioner and dietitian. Education sessions were then targeted to change negative beliefs to more positive beliefs. Perceived ability to carry out recommended activities and benefits of treatment, along with perceived severity of diabetes, were increased after the education.

Based on the current study in which participants only listened and did not demonstrate an increase in post-education behavior scores, the researcher believes that active participation with behavior modification strategies may have been more beneficial. Bielamowicz et al. (1995) discovered that by using a diabetes self-management record to document positive behavioral changes, patients significantly increased scores in all areas of defining

behavior changes, including exercise, glucose monitoring, fat consumption, and eating behavior.

Although quality diabetes education was provided by a team of health professionals, the current study may have failed to bring about behavior change as it did not focus on implementation of behavior modification techniques. Research by Tildesley et al. (1996) primarily focused on observing behavior change over a 4-day period. In this study, the researchers found that patients attending a 4-day multidisciplinary diabetes teaching and treatment program and follow-up class did demonstrate improvements in diabetes control with significant weight reduction, increased episodes of home blood glucose monitoring per week, and lowered A1c values.

A comparison of four educational programs that differed in the amount of patient contact and delivery format was done by Campbell et al. (1996) to evaluate effectiveness on self-care behaviors including diet, exercise, glucose monitoring, foot care, and visiting specialists. The conclusion of those researchers was that more intensive education programs in terms of patient time and resources may not produce greater improvement in behavior change as all four programs produced reductions

in HbA1 and BMI with no significant differences between them.

### Limitations

Three limitations existed for this study. The smallness of the sample size (N = 26) limited the generalization of the findings beyond the sample. In addition, the study's sample was not randomized and involved a homogenous group of participants who were seeking education prior to the study. Furthermore, participants were primarily Caucasian (92%). Although this was representative of a group of individuals desiring knowledge, a more diverse group may have yielded more discriminate findings.

A pilot study to determine clarity and understanding of the Demographic Data Survey, Diabetes Knowledge Test, and Self-Management Questionnaire was not conducted due to time constraints. The Self-Management Questionnaire, in particular, has established reliability but may not have produced completely accurate results in this specific population. The pretest questions for knowledge and self-management were read aloud to participants prior to education to assist individuals with vision problems resulting from diabetes. General instructions were given

prior to the program regarding the importance of vision-impaired individuals getting assistance with reading and/or interpreting posttest questions. However, it cannot be determined as to who accommodated these persons with the post-education tests in the home setting. Furthermore, the number of illiterate individuals was not known. In addition, the Self-Management Questionnaire included 29 questions and a Likert scale with five answer choices per question. The total number of questions to be answered was 59. With 50% of the study's participants over the age of 60 years, the testing format may not have been reliable. It is possible that individuals could have lost interest or become tired due to the lengthy number of questions and answer choices. Perhaps issues related to behavior may be better understood using a qualitative research approach.

The current study measured behavior changes 6 weeks after the educational intervention, which may not have been long enough to detect evolving behavior changes. Due to time constraints, no follow-up data at 3- to 4-month intervals were analyzed to determine if behavior changes had been established. Previous studies, such as Tildesley et al. (1996), used longer time intervals to detect if behavior changes had been established.

## Conclusions

In spite of the limitations of this study, several important results were obtained. This research contributed important information on the impact of an educational program on diabetes knowledge. The researcher determined that while patient knowledge may be necessary for behavioral change, knowledge alone is not sufficient to stimulate the necessary behavioral changes expected of persons with diabetes. Other variables, such as health beliefs and demographic characteristics of individuals, may be more important determinants of health-promoting behaviors. Furthermore, some researchers have suggested that health beliefs can be altered through education to enhance motivation for behavioral change. Supportive findings were demonstrated in studies by Brown and Hedges (1994), Travis (1997), and Wooldridge et al. (1992). Therefore, the Health Promotion Model was an effective theoretical framework for this study.

The researcher concluded that an educational program can positively affect the knowledge levels of persons with type 2 diabetes but must emphasize behavior modification strategies to bring about recommended lifestyle changes required to improve metabolic control and decrease long-



term complications. Different teaching methods may be used to bring about positive behavior change, but important self-care behaviors should be presented in a task-oriented manner. Health beliefs, such as perceived ability to perform a behavior, is an important link between knowing what to do and actually doing it. However, believing one can perform a task and knowing what to do are not the only determinants of behavior. To succeed, the individual must know how to do the behavior and possess a desire to make a change. As data from this study did not support behavior changes after the educational program, other studies emphasizing behavior modification techniques did demonstrate improved behavior changes as a result of education. Studies by Bielamowicz et al. (1995) and Tildesley et al. (1996) contributed important information regarding behavior change for this research.

#### Implications for Nursing Practice

This study has implications for nursing practice, nursing education, nursing theory, and nursing research. The results of the study indicate that a multidisciplinary education approach is effective in increasing diabetes knowledge levels. Health education programs are developed for the purpose of assisting patients and families to

understand their conditions and the self-care activities required for managing those conditions. Since patient adherence may be one of the most serious obstacles to effectively managing diabetes, health educators must understand what determinants predict important self-management behaviors, such as blood glucose testing, diet, and exercise. By understanding predictive variables of adherence, health educators may be able to modify those predictors through educational programs that include knowledge of what to do, skills to do it, and incentives for doing it. By determining how diabetic individuals perceive their ability to perform a behavior, health educators can predict the likelihood of them actually performing it. Interventions aimed at enhancing a person's self-efficacy should be incorporated into the overall management program. With this in mind, programs can be structured in a manner that facilitates task-oriented behavior and provides sources of self-efficacy for all necessary self-management behaviors. Diabetes education could be expanded to encompass a holistic view of health to include physical, mental, social, emotional, and spiritual components. This approach to encouraging healthy behaviors is particularly applicable to Pender's Health

Promotion Model and may well be enhanced by a multidisciplinary group of professionals. The current study added validity to the use of this theoretical framework through recognition of how knowledge and perceptions impact specific health needs.

Diabetes is a chronic disease process requiring education, routine monitoring, and lifestyle adjustments. In the realms of nursing practice, assessment of health beliefs and behaviors will be particularly relevant to the identification of clients with diabetes that may benefit from task-focused education interventions. Nurse practitioners in primary care settings who have first contact with patients will have the greatest chance to investigate, educate, and influence health beliefs and practices.

As primary health care providers, practitioners must incorporate research findings about health promotion into the clinical setting. Counseling protocols and appropriate management strategies for individuals with diabetes can be developed from knowledge obtained about behavior change and predictors of health behaviors. The findings of the current study provided a baseline for future research attempts. Research will be required to assess

effectiveness of task-focused behavior modification education programs on health outcomes of patients with diabetes. Cost-effectiveness of implementing such programs will be of interest due to the economic and personal impact that diabetes has on our nation.

### Recommendations

The following recommendations are made for future research and nursing based on the results of the current study and the limitations identified:

1. Replication of this study with a larger sample, more culturally diverse subjects, a longer data collection time line, and a control group receiving education by a single discipline.
2. Development of an instrument with a less complicated format.
3. Replication of a similar study utilizing a task-oriented education approach and behavior modification focus to enhance patient empowerment.
4. Replication of a similar study using a behavioral monitoring record to document self-care behaviors that are measurable.

5. Conduction of more research using Pender's Health Promotion Model to examine health behaviors in a diabetic population.

6. Implementation of qualitative research methods to investigate personal characteristics and health beliefs in relation to health-promoting behaviors.

7. Recognition and assessment of health behaviors and beliefs to be incorporated into the basic education of all health care providers.

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APPENDIX A  
DIABETES KNOWLEDGE TEST

### Diabetes Knowledge Test

The following quiz will assess your level of knowledge about various aspects of diabetes.

#### I. Please indicate the best answer.

1. Diabetes mellitus
  - \_\_\_\_\_ is caused by eating too much sugar and sweet foods.
  - \_\_\_\_\_ is a condition in which the body cannot use food properly.
  - \_\_\_\_\_ results when the kidney cannot control sugar in the urine.
  - \_\_\_\_\_ is caused by liver failure.
  
2. The most common symptom(s) of diabetes mellitus is (are)
  - \_\_\_\_\_ headache, chest pain.
  - \_\_\_\_\_ frequent urination, hunger, thirst.
  - \_\_\_\_\_ craving for sweets.
  - \_\_\_\_\_ sweaty, nervous.
  
3. The normal fasting blood sugar level is about
  - \_\_\_\_\_ 50-70 mg/dl
  - \_\_\_\_\_ 65-110 mg/dl
  - \_\_\_\_\_ 115-160 mg/dl
  - \_\_\_\_\_ 160-240 mg/dl
  
4. Pills for diabetes (oral diabetes medication)
  - \_\_\_\_\_ are insulin taken in pill form.
  - \_\_\_\_\_ can lower blood sugar.
  - \_\_\_\_\_ are given to anyone with diabetes.
  - \_\_\_\_\_ can be taken any time of the day.
  
5. Insulin
  - \_\_\_\_\_ keeps the blood sugar level constant all day.
  - \_\_\_\_\_ can be taken any time of the day.
  - \_\_\_\_\_ helps the body use food properly by letting sugar enter the cells.
  - \_\_\_\_\_ raises the blood sugar level by keeping sugar in the blood vessels.

6. A regular exercise program
- can help control blood sugar.
  - can lower blood pressure and cholesterol level.
  - does not affect the blood sugar level.
  - can help control blood sugar AND can lower blood pressure and cholesterol level.
  - can help control blood sugar AND does not affect the blood sugar level.
7. A diabetes meal plan
- must be individualized to meet your needs.
  - is a diet that requires many special foods.
  - does not allow you to have any starches.
  - allows you to have sweets anytime you want.
8. Foods high in saturated fats and cholesterol should be limited in order to
- lower your blood sugar level.
  - cut down your chance of getting heart disease.
  - lower your heart rate.
  - I don't know.
9. Which is the best choice of food to have for sick days for a person with diabetes who takes daily insulin?
- Diet soda and hot tea
  - Soup and applesauce
  - Milkshake
  - Don't eat or drink anything except water
10. Which of the following statements is correct for people with diabetes?
- Everyone with diabetes should have between-meal snacks.
  - All active sports or heavy exercises should be avoided if you are taking insulin.
  - Changes in lifestyle (meal planning, exercise, medication, stress control) can help manage diabetes successfully.
  - Traveling should be avoided if taking insulin.

**II. Please indicate "True" or "False" below each statement.**

11. It is not necessary to control the amount of food when taking diabetes pills (oral diabetes medication).  
 True  False
12. Certain diabetes pills can help you lose weight.  
 True  False
13. In most cases, exercise will lower blood sugar level.  
 True  False
14. The effects of exercise can last a long time after exercise.  
 True  False
15. Meals should be evenly spaced throughout the day (example: 4-5 hours apart).  
 True  False
16. The diabetes meal plan needs to be modified with changes in lifestyle from time to time.  
 True  False
17. People with diabetes are allowed to use as much sugar substitutes as they want.  
 True  False
18. Many people with type 2 diabetes can maintain good blood sugar control by following a proper meal plan without the medication.  
 True  False
19. Food, exercise, diabetes medication, and stress can affect blood sugar level.  
 True  False
20. Glycosylated hemoglobin (hemoglobin A1c) is a blood test that shows average level of fat in the blood during the past 8-12 weeks.  
 True  False

21. The chances of getting type 2 diabetes is greater if a blood relative has had diabetes.  
\_\_\_\_\_ True \_\_\_\_\_ False
22. A person with diabetes may often have feelings of fear, anxiety, denial, frustration, resentment or anger.  
\_\_\_\_\_ True \_\_\_\_\_ False
23. A person with diabetes has a greater chance of having a heart attack, stroke, blindness, or kidney disease than a person who does not have diabetes.  
\_\_\_\_\_ True \_\_\_\_\_ False
24. Taking good care of your feet (protection, cleanliness, and support) will guard against infection, injury, and other foot problems related to poor circulation and nerve damage.  
\_\_\_\_\_ True \_\_\_\_\_ False
25. When a person's blood sugar is out of control (high), there is a greater chance of infection and illness.  
\_\_\_\_\_ True \_\_\_\_\_ False

**III. Please indicate the best answer.**

1. Fast acting insulin  
\_\_\_\_\_ is NPH or Lente insulin.  
\_\_\_\_\_ is Regular and can peak in 2-4 hours after taking it.  
\_\_\_\_\_ lasts up to 24 hours in the body.  
\_\_\_\_\_ I don't know.
2. You are instructed to take NPH insulin 20 units once a day. When should you take it?  
\_\_\_\_\_ After breakfast  
\_\_\_\_\_ Anytime of the day or evening  
\_\_\_\_\_ About 30 minutes before breakfast  
\_\_\_\_\_ I don't know.

3. Which of the following are the symptom(s) of low blood sugar reaction?
- Trembling or shaking
  - Sweating
  - Sudden weakness
  - All of the above
  - None of the above
4. Hypoglycemia (low blood sugar) can occur
- during heavy exercise.
  - just before lunch or dinner.
  - in the middle of the night.
  - Any of the above
  - None of the above
5. When you feel like a low blood sugar reaction is coming on, you should
- ignore it and it will go away.
  - call your doctor immediately.
  - eat some food that has sugar.
  - lie down to see whether it will pass.
6. You are on a mixture of NPH and Regular insulin. The proper way of mixing insulin is
- draw up Regular insulin first.
  - draw up NPH insulin first.
  - It doesn't matter which insulin is drawn up first.
  - I don't know.
7. When you have a minor illness, such as cold and flu, you should
- skip insulin.
  - never skip insulin.
  - check urine for ketones.
  - drink water only.
  - skip insulin AND check urine for ketones.
  - never skip insulin AND check urine for ketones.

APPENDIX B  
SELF-MANAGEMENT QUESTIONNAIRE



### Self-Management Questionnaire

For each question, circle the answer choice that most closely represents what you do. There is no right answer.

- 1 = Never  
2 = Occasionally  
3 = Sometimes  
4 = Frequently  
5 = always

- |  |   |   |   |   |   |
|--|---|---|---|---|---|
| 1. I get the amount of exercise the doctor/nurse recommended.                  | 1 | 2 | 3 | 4 | 5 |
| 2. I have a daily exercise program which lasts at least 15 minutes.            | 1 | 2 | 3 | 4 | 5 |
| 3. I exercise at least 3 times a week.   | 1 | 2 | 3 | 4 | 5 |
| 4. I do foot and leg exercises every day.                                      | 1 | 2 | 3 | 4 | 5 |
| 5. I eat extra protein before excessive exercise.                              | 1 | 2 | 3 | 4 | 5 |
| 6. I eat less calories than I am allowed on my diet.                           | 1 | 2 | 3 | 4 | 5 |
| 7. I treat my own blisters, cuts, and corns.                                   | 1 | 2 | 3 | 4 | 5 |
| 8. I wash my feet daily with gentle soap.                                      | 1 | 2 | 3 | 4 | 5 |
| 9. I eat foods that are not included in my diet.                               | 1 | 2 | 3 | 4 | 5 |
| 10. I modify my diet when I am out with friends.                               | 1 | 2 | 3 | 4 | 5 |
| 11. I smoke cigarettes.  | 1 | 2 | 3 | 4 | 5 |
| 12. I change the number of food exchanges given to me by the dietitian/doctor. | 1 | 2 | 3 | 4 | 5 |
| 13. I eat my meals at approximately the same time every day.                   | 1 | 2 | 3 | 4 | 5 |

1 = Never  
 2 = Occasionally  
 3 = Sometimes  
 4 = Frequently  
 5 = always

14. I watch for symptoms of too much insulin.	1	2	3	4	5
15. I use bath oils or lotions on my skin.	1	2	3	4	5
16. I eat more calories than I am allowed on my diet.	1	2	3	4	5
17. I follow my prescribed diet completely.	1	2	3	4	5
18. I wear clean socks or stockings daily.	1	2	3	4	5
19. I watch for symptoms of too little insulin.	1	2	3	4	5
20. I wear well-fitted shoes.	1	2	3	4	5
21. I go barefoot.	1	2	3	4	5
22. I only exercise 2 to 3 times a week.	1	2	3	4	5
23. I eat between meal snacks that are not on my diet.	1	2	3	4	5
24. I exercise in addition to my usual physical activity on the job and at home.	1	2	3	4	5
25. I take more insulin or oral medication than is ordered.	1	2	3	4	5
26. I take less insulin or oral medication than is ordered.	1	2	3	4	5
27. I modify my insulin dose or amount of oral medication depending on how I feel.	1	2	3	4	5
28. I forget to take my insulin or oral medication.	1	2	3	4	5
29. I take my insulin or oral medication at the same time every day.	1	2	3	4	5

APPENDIX C

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



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. Carmen Parks  
c/o Graduate Program in Nursing  
Campus

Dear Ms. Parks:

I am pleased to inform you that the members of the Committee on Human Subjects in Experimentation have approved your proposed research as submitted.

I wish you much success in your research.

Sincerely,

A handwritten signature in cursive script that reads "Susan Kupisch".

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

SK:wr

cc: Mr. Jim Davidson  
Dr. Mary Pat Curtis

APPENDIX D  
AGENCY CONSENT FOR PARTICIPATION  
IN A RESEARCH STUDY

## Consent for Participation in a Research Study

### "The Impact of Multidisciplinary Education on Knowledge and Health-promoting Behaviors in Persons with Type 2 Diabetes"

The nature and purpose of this research study have been explained. I understand that persons enrolling in a diabetic class at this facility will be taught about the nature of the disease, long-term complications of uncontrolled diabetes, and how to properly manage the disease. I understand that each class member will be asked to participate in this research study to determine the impact of this education class on knowledge and health-promoting behaviors. The choice to participate will be left up to the class member. In no way will their willingness to participate in the study affect their participation in the class or services they receive at this facility. I also understand that participation in the study will include their filling out a set of questionnaires on two occasions, once before this class and again in six weeks. The second set of questionnaires will be mailed to the participant with a self addressed stamped envelope and should not take more than 20-25 minutes to fill out. I understand that the questionnaires will be anonymous and their names will not be used in the study. Any information obtained will be kept confidential.

With the above explanation of the research study, I agree to allow Carmen Parks to collect data from consenting diabetic class members at this facility.

Magnolia Regional Health Center

By: Linda Whitenton, RN, CP  
Director's Signature

Date: 3/2/98

By: Carmen Parks  
Researcher's Signature

Date: 3/2/98

APPENDIX E  
PARTICIPANT CONSENT FORM

## Participant Consent Form

Dear Class Member,

My name is Carmen Parks, and I am a registered nurse certified in diabetes education. As a graduate student of Mississippi University for Women, I am conducting a research study to identify the impact of diabetic education on management of the disease. Today's diabetic class will last approximately 2 hours and will include information about the nature of the disease and its management through diet, exercise, and medication. Hopefully, this information will be useful in the management of your diabetes. The class will be taught by a team, including myself, a registered dietitian, and a pharmacist certified in diabetes education. Furthermore, this class will be free of charge.

I am requesting your permission to include you in my research study. Participation will include filling out a set of questionnaires on two occasions, once before this class and again in 6 weeks. The second set of questionnaires will come with a self-addressed, stamped envelope to you in the mail and should not take more than 20 to 25 minutes to complete. The questionnaires will be anonymous, and your name will not be used in the study. All answers will remain confidential and will be reported as a group. They will be used for this study only.

There will be no risks involved in this study. Your choice to participate is left up to you. Your participation in today's class will in no way be affected by your choice not to participate in the study. You may withdraw at any time prior to data interpretation. The information collected will be used to assist health care workers in developing teaching plans and providing education to other diabetics in an effort to increase their understanding of the disease and prevent its complications.



Participant Consent Form  
Page 2

I would appreciate your help in this matter.

Sincerely,

Carmen Parks

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I have read, or been read, the nature and purpose of this study. I understand that measures will be taken to ensure confidentiality. I agree to participate in this study.

Signed: \_\_\_\_\_ Date: \_\_\_\_\_

Address (for mailing of questionnaire):

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APPENDIX F  
LESSON PLAN AND OBJECTIVES  
FOR TEACHING PROGRAM

## Lesson Plan: Diabetes Management

### Objectives

Following the class, participants will be able to

1. Verbalize basic understanding of the physiology of diabetes and predisposing factors.
2. Describe the signs and symptoms of hyperglycemia, causes, prevention, and action to be taken.
3. Describe the signs and symptoms of hypoglycemia, causes, prevention, and treatment.
4. Describe long-term complications associated with uncontrolled diabetes.
5. Describe management regimen necessary for prevention of complications.
6. Distinguish between "diet related myths" and "diet truths."
7. Understand the role of individualized meal planning.
8. Discuss the basics of the food pyramid, food exchanges, and role of carbohydrates.
9. Discuss the action of specific oral medications and their role in the management of diabetes.
10. Discuss the action, side effects, and appropriate use of insulin.
11. Discuss over-the-counter medications to avoid with diabetes.
12. Identify appropriate herbal products that can be used with a diabetes management plan.

## Outline of Teaching Program

- I. Introduction to Basic Pathophysiology of Diabetes
  - A. Insulin Deficiency
  - B. Insulin Resistance
  - C. Role of Weight Loss and Diet Control/Nutrition
- II. Long-Term Complications
  - A. DCCT Studies
  - B. Goals for Prevention
- III. Introduction to Good Nutrition
  - A. "Old Diabetic Diets"--Fads, Myths
  - B. Role of Individualized Meal Planning
  - C. Carbohydrates in the Diet
- IV. Diabetic Medications
  - A. Role of Sulfonylureas (for Insulin Deficiency)
  - B. Role of Insulin--Sparing Meds
    - 1. Glucophage
    - 2. Precose
    - 3. Rezulin
  - C. Role of Insulin
  - D. Medications to Avoid with Diabetes
- V. Role of Herbal Products (Truths, Myths)

## Teaching Methods and Materials

1. Discussion and demonstration
2. Visual aids

- a. "Managing Your Diabetes."

Source: Eli Lilly and Company. (1997). Managing Your Diabetes: Basic facts about diabetes. Indianapolis, IN: Author.

- b. Overhead slides
  - c. Handout: "Daily Meal Plan"

APPENDIX G

PERMISSION TO USE KNOWLEDGE TEST

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From: David Fitz-Patrick, M.D. <dfitz@endocrinologist.com>  
To: <tcoln@avsia.com>  
Subject: Re:  
Date: Sunday, November 30, 1997 12:24 PM

>  
> To whom it may concern,  
> My name is Carmen Parks, and I am a graduate nursing student doing  
> research on Diabetes. The name of my study is "The Impact of  
> Multidisciplinary Education on Knowledge and Health-promoting Behaviors in  
> Person with Type 2 Diabetes." I am searching for a tool to use in  
> determining knowledge levels before and after an educational program . I  
> found your "Knowledge tests" on the internet and most of the questions are  
> relevant to my study. What must I do to get consent to use the test  
> modified to fit my study? How would this test be scored? Thanks in advance  
> for your attention to this request and your willingness to help. You may  
> contact me using the information below.  
>  
> Sincerely,  
>  
> Carmen Parks  
> e-mail: parksb@tsixroads.com  
> home phone: (601)287-4502 (tues.-sun, after 5:30pm)  
> work phone (601)293-1117 (wed.-fri., 8:00-4:30pm)  
> Address: Rt.1, Box 332-B  
> Corinth, Ms 38834

Carmen: You have my permission to use this test and modify it as you wish as long as you acknowledge it's source. If you take the test on my website, the answers will appear together with a score.  
David Fitz-Patrick, M.D.

APPENDIX H  
PERMISSION TO USE SELF-MANAGEMENT  
QUESTIONNAIRE



UNIVERSITY  
OF WISCONSIN **MILWAUKEE**

School of Nursing



January 9, 1998

Carmen Parks  
Route 1, Box 332-B  
Corinth, MS 38834

Dear Ms. Parks,

Thank you for your interest in the Self-Management Questionnaire. You may use the Self-Management Questionnaire and to make any modifications if you need to do so. You will need to cite me in the reference. I have enclosed some additional materials on scoring for you.

Eventually, I would like to gather data from researchers who use the instrument to further the psychometric testing. I may ask you to share your new raw data for psychometric testing after you have published your results. I wish you well with your project. At this time, I have no new psychometric data on the tool.

Best wishes with your scholarly activities.

A handwritten signature in cursive script that reads 'Mary Wierenga'.

Mary Wierenga, R.N., Ph.D.  
Professor

enc

MEW/tig

APPENDIX I  
DEMOGRAPHIC DATA SURVEY

## Demographic Data Survey

Please do not put your name on this worksheet. Answer each question by checking the blank that best describes you.

1. Age: \_\_\_\_\_
2. Gender  
 Male  
 Female
3. Race  
 Caucasian or White  
 African American or Black  
 Asian or Pacific Islander  
 Native American or Alaskan American  
 Other (please specify): \_\_\_\_\_
4. Marital status  
 Married  
 Separated  
 Divorced  
 Widowed  
 Single  
 Other (please specify): \_\_\_\_\_
5. Do you live alone?  
 Yes  
 No
6. How many people eat meals in the home?  
 1  
 2-3  
 4-5  
 > 5
7. Do you purchase your own food?  
 Yes  
 No

If no, who does?

\_\_\_\_\_ Family member

\_\_\_\_\_ Friend

8. Do you prepare your own food?

\_\_\_\_\_ Yes

\_\_\_\_\_ No

If no, who does?

\_\_\_\_\_ Family member

\_\_\_\_\_ Neighbor

\_\_\_\_\_ Other

9. How much do you spend each month on food?

\_\_\_\_\_ < \$100

\_\_\_\_\_ \$100-\$200

\_\_\_\_\_ \$200-\$300

\_\_\_\_\_ \$300-\$400

\_\_\_\_\_ > \$400

10. How long have you had diabetes?

\_\_\_\_\_ < 1 year

\_\_\_\_\_ 1-3 years

\_\_\_\_\_ 4-6 years

\_\_\_\_\_ 7-9 years

\_\_\_\_\_ 10 years or more

11. Are you receiving insulin shots?

\_\_\_\_\_ Yes

\_\_\_\_\_ No

If yes, were you placed on insulin within 6 months of finding out that you had diabetes?

\_\_\_\_\_ No

\_\_\_\_\_ Yes

12. Do you take oral hypoglycemic agents?

\_\_\_\_\_ Yes

\_\_\_\_\_ No

13. Has anyone ever explained the diabetic diet to you?

\_\_\_\_\_ Yes

\_\_\_\_\_ No

If yes, who explained the diet?

\_\_\_\_\_ Dietitian

\_\_\_\_\_ Nurse

\_\_\_\_\_ Doctor

\_\_\_\_\_ Family

\_\_\_\_\_ Friend

\_\_\_\_\_ I don't remember who.

14. Health care benefits (please check all that apply)

\_\_\_\_\_ Private health insurance

\_\_\_\_\_ Medicare, Part A

\_\_\_\_\_ Medicare, Part B

\_\_\_\_\_ Medicare, Part A and B