

A NUTRITION AND DIABETES EDUCATION PROGRAM IMPROVES
A1C KNOWLEDGE AND A1C BLOOD LEVELS

by

SARAH MCCLURE BURNETT

Under the Direction of Mary Ann Johnson

ABSTRACT

This study was designed to test the hypothesis that A1c knowledge would be associated with selected demographic and health characteristics, and that an educational intervention would increase A1c knowledge and decrease A1c blood levels in Older Americans Nutrition Program participants. Participants were a convenience sample from the OANP (n = 105, mean age = 73 years, 58% Caucasian, 42% African American, 70% women, 30% had < 8 years of education). In regression analyses, higher A1c knowledge at baseline was negatively associated with age ($P < 0.0001$) and A1c blood levels ($P < 0.07$). In the subset of participants that completed the intervention, the percent of participants who scored 40% or higher on A1c knowledge increased from 48% to 82% ($P < 0.0001$, n = 99). After the intervention, blood A1c decreased 0.66% in participants with initial A1c > 6.5% ($P < 0.01$, n = 43).

INDEX WORDS: A1c, Older Americans Nutrition Program, Elderly, Diabetes

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B.S. The University of Georgia, 2003

A Thesis Submitted to the Graduate Faculty of The University of Georgia in Partial
Fulfillment of the Requirements for the Degree

MASTER OF SCIENCE

ATHENS, GEORGIA

2003

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DEDICATION

I would like to dedicate this thesis to my parents and husband who have shown me unconditional love and support throughout my life. It was through their example that I learned to strive toward my goals, and I will be forever grateful.

ACKNOWLEDGEMENTS

I would like to acknowledge Dr. Mary Ann Johnson, my major professor, for her help and support in the completion of my thesis. Her kind manner and willingness to help made the process enjoyable and enlightening. In addition, I would also like to acknowledge my committee members Dr. Joan Fischer and Dr. Tommy Johnson for their irreplaceable assistance in completion of my thesis. I am grateful for their contribution to this work.

The completion of this project would have been very difficult if not for the help of Betsy Redmond, my partner throughout the project. Her help and advice was valuable. I am thankful to have been placed with such a wonderful partner.

The support of the faculty and staff in the Department of Foods and Nutrition, University of Georgia, is very appreciated. In particular, the staff and graduate students in the lab of Dr. Mary Ann Johnson were very helpful in the implementation of our program and in the analysis of the program. Their help is unparalleled and very much appreciated.

Lastly, but most importantly, I would like to acknowledge my parents and family for instilling within me faith in God, which was my strength throughout this endeavor.

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CHAPTER 1

INTRODUCTION

This study examines the effects of a nutrition and diabetes education program on the knowledge of hemoglobin A1c in older adults attending selected Georgia Senior Centers. Participants of Older Americans Nutrition Programs are a population at risk of developing diabetes or having complications related to diabetes due to risk factors such as increased age, lower socioeconomic status, lower education levels and BMI ≥ 25 kg/m² (ADA, 2002). Programs targeting diabetes and its control are vital to this population.

The CDC (2001) reported there were approximately 35 million people in the United States that are 65 and older, and the CDC (2002) estimated that the elderly population will increase to 70 million persons by 2030. Increased age is associated with increased chronic diseases and health complications. The National Institutes of Health (2000) found that more than 20.1% of the population over 65 years of age suffers from diabetes.

Diabetes is a chronic disease that results in the body's inability to properly control blood glucose levels due to complications in insulin production and release, insulin action, or a combination of the two. There are various types of diabetes. The most well known types are type 1 and type 2 diabetes. There are other less common forms of diabetes such as mitochondrial diabetes and gestational diabetes that comprise a small percent of the population with diabetes. Type 1 diabetes is characterized by an individual's inability to produce insulin. This type accounts for approximately 5% to 10% of the population with diabetes (ADA, 2000). The onset of type 2 diabetes usually

occurs later in life, although its prevalence is increasing in young children. Type 2 diabetes is characterized by insulin resistance or inadequate insulin production. Type 2 diabetes is the most common form of diabetes, comprising approximately 90% to 95% of the cases of diabetes in the United States (ADA, 2000).

In 1997 the American Diabetes Association (ADA) released new diagnostic criteria for diabetes mellitus. The occurrence of any of the following values on two separate occasions constitutes the diagnosis of an individual with diabetes, a fasting glucose levels of 126 mg/dl or higher, a casual blood glucose of 200 mg/dl or higher, or a blood glucose of 200 mg/dl or higher following an oral glucose tolerance test (ADA, 2002).

Various measures are used to assess diabetes control. Larson et al. (1990) noted the importance of monitoring glycosylated hemoglobin (A1c) in diabetes management. A1c measurements assess the amount of hemoglobin that is glycosylated. Since the life span of a red blood cell is approximately 3 months, the A1c percentage estimates the 3 month average of blood glucose levels. Currently many organizations, such as the American Diabetic Association, recommend an A1c target value for individuals with diabetes to be set at approximately $\leq 7.0\%$ (ADA, 2003). However, new research suggests that complications related to diabetes may still occur at this A1c level. The American College of Endocrinology supports a lower A1c level, and has recommended A1c levels be $\leq 6.5\%$ in individuals with diabetes (Cobin et al., 2002).

The purpose of this study was to increase A1c knowledge and decrease A1c levels in OANP participants attending selected Georgia Senior Centers. After the intervention there was a significant increase in A1c knowledge ($P < 0.0001$) and decrease in blood A1c ($P < 0.01$) in the subset of participants with initial A1c $> 6.5\%$. Therefore, this

intervention was successful in lowering the potential risk of complications related to diabetes.

CHAPTER 2

THE EFFECT OF EDUCATIONAL LESSONS ON A1C KNOWLEDGE

Epidemiology of Diabetes

Diabetes Prevalence in the United States

Chronic diseases in the United States are increasing dramatically because of various factors such as inappropriate dietary practices, lack of physical activity and obesity (CDC, 2002). It is hypothesized that nutrition and health education will decrease the risk and prevalence of chronic diseases. Therefore, it is important that nutrition and health education programs are developed to target at risk populations.

Diabetes is one of the fastest growing chronic disease states and its progression in this country is becoming an epidemic. The incidence rate of diabetes increased from 2.42 per 1,000 people in 1990-1992 (Kenny et al., 1995) to 2.79 in 1996 (Powell et al., 2000). It is estimated that there are approximately 17 million cases of diabetes, 11.1 million diagnosed cases and an additional 5.9 million cases that are undiagnosed (ADA, 2000). Although it is hard to discern the cause of the increase in incidence rate, it is obvious that steps need to be taken to address this issue.

The increased incidence of diabetes is of great concern to the health care system. Gu et al. (1998) conducted a meta-analysis and found that death rates are higher in individuals with diabetes, with median life expectancy being 8 years lower in individuals between the ages of 55-64 years and 4 years lower in individuals 65-74 years. In addition, Groeneveld et al. (1999) found that hyperglycemia led to increased mortality rate in individuals with type 2 diabetes. Diabetes is the seventh leading cause of death in the United States, the fifth leading cause of death in individuals 55-54 years of age, and

the sixth leading cause of death in individuals 65 and older (CDC, 2001). In addition, diabetes is the leading cause of nontraumatic amputations (approximately 57,000 cases per year), blindness among working age adults (approximately 20,000 cases per year) and end-stage renal disease in the United States (approximately 28,000 cases per year) (Healthy People 2010). The estimated cost of diabetes to the health care system is approximately 132 billion dollars annually (ADA, 2000).

Diabetes in Georgia

Concurrent with the accelerating older adult population in the United States, Georgia's older adult population is on the rise. Currently Georgia has the 10th fastest growing older adult population in the United States (Department of Natural Resources, 2003). According to 1999 State and County Statistics Prevention information, 217,000 adults in Georgia were reported to have diabetes in addition to an estimated 108,000 undiagnosed cases (Powell et al., 2000).

The most current vital statistics indicate that diabetes is the seventh leading cause of death in Georgia, and increases to the sixth leading cause of death in individuals aged 55 and older (CDC, 2001). It is projected that the number of deaths related to diabetes will continue to increase 1% per year (Powell et al., 2000).

Diabetes in Older Adults

A comparison of prevalence data in 1993 found that the percentage of diabetes cases increased from a rate of approximately 1.3% in individuals between the ages of 18 and 44 to approximately 10.4% in individuals 65 and older (Kenny et al., 1995). The National Institutes of Health (2000) reported that 20.1% of the older adult population suffered from diabetes. Additionally, Smith et al. (1999) found that greater than 80% of 502 participants age 65 and older were found to have poor blood glucose control.

The increased number of older adults in the United States with diabetes is alarming, and poor diabetes control within this population adds to concern. Nutrition and health education programs are essential to help in the prevention and management of diabetes and to improve quality of life for individuals with diabetes.

Diabetes Prevalence in Minority Groups

The increasing prevalence of minority elders in the total elderly population will most probably result in a dramatic rise in the incidence and prevalence of diabetes. Minority groups are at greater risk than Caucasians for developing diabetes. Diabetes affects approximately 2.8 million African Americans, at a rate twice as high as non-Hispanic Caucasians (NIH, 2000). In addition, one-fourth of African American women over the age of 55 have diabetes (ADA, 2003). The development of nutrition and health education programs that are culturally appropriate are essential in diabetes management.

Summary

The rate of diabetes is increasing in the United States as a whole and in the state of Georgia. The increased incidence of diabetes can be attributed to multiple factors. A factor that cannot be overlooked is the growing elderly population. The projected increase in elders, and in particular minority elders, is expected to markedly increase the prevalence of diabetes. Nutrition and health programs targeted toward increasing diabetes awareness and self-management of the disease are needed to prevent new cases and complications related to diabetes.

The Older Americans Nutrition Program

The Older Americans Nutrition Program (OANP), formerly known as the Elderly Nutrition Program, was established in 1972 (Ponza et al., 1996). Older adults who experience the greatest social and economic risk are a particular concern to the OANP.

Demographic Characteristics of Participants

OANP targets a high-risk population. The average age of congregate meal participants is 76 years, and the average age of the home delivered meal participant is 78 years (Ponza et al., 1996). Older adults participating in the OANP are at a poverty rate twice as high as the total older adult population in the United States, with 80 to 90% having income levels less than 200% of the Department of Health and Human Services poverty level (Ponza et al., 1996). Forty-two percent of congregate meal participants and 32% of home delivered meal participants had a BMI greater than 27 kg/m² (Ponza et al., 1996). In addition, minority groups represent 27% of congregate meal participants and 25% of home-delivered meal participants (Ponza et al., 1996).

Screening/Education Programs for OANP Participants

The OANP provides nutrition screening, assessment, education, and counseling to participants. Approximately 43% of congregate meal participants and 36% of home-delivered meal participants receive nutrition screening or assessment, and 68% of congregate meal participants are receiving nutrition education (Ponza et al., 1996). Screening and education are integral components in preventing and managing a chronic disease, such as diabetes.

Diabetes Prevalence in OANP Participants

Eighteen percent of the congregate meal participants and 25% of the home-delivered meal participants have diabetes (Ponza et al., 1996). These percentages are higher than the average percent of older adults with diabetes in the United States. A convenience sample from OANP participants in selected Georgia Senior Centers found that approximately 30% of the sample had diabetes (Cheong et al., 2003). These statistics support the importance of diabetes education, assessment, and screening in this population.

Due to the higher incidence of poverty, older age, increased BMI, and the percentage of minority group status in OANP participants, the OANP is positioned to serve a crucial role in prevention and management of chronic diseases to improve quality of life.

National Standards for Diabetes Self-Management Education

Many national groups and organizations have developed guidelines to assist in the implementation and evaluation of programs targeted toward diabetes management. The majority of guidelines recognized by these organizations are based on The National Standards for Diabetes Self-Management Education (DSME). The National Standards for Diabetes Self-Management Education were developed by a committee composed of individuals representing the American Diabetes Association, the American Association of Diabetes Educators, the American Dietetic Association, the Veteran's Health Administration, the Centers for Disease Control and Prevention, the Indian Health Service, the National Certification Board for Diabetes Educators, the Juvenile Diabetes Foundation International, and the Diabetes Research and Training Centers. The most recent standards for Diabetes Self-Management Education were published in the spring of 2000 (Mensing et al., 2002).

The committee determined ten standards that should be implemented when developing a program targeted toward diabetes management. The first standard recognizes the importance of documenting organizational structure, mission statements, and goals of the diabetes management program. The second standard discusses the importance of assessing the needs and resources of the target population. The third standard deals with establishing committee members to oversee the programs progress annually, and the fourth standard emphasizes the designation of a coordinator to oversee planning, implementation, and evaluation of the diabetes self-management program. The

fifth standard stresses the importance of a team approach in the management of diabetes. The sixth standard requires that instructors stay informed on new information regarding diabetes management. The seventh standard requires that an instructor define the desired outcome measures that represent improvement. The eighth standard involves individual's assessment. The ninth standard requires documentation of assessment, and the tenth standard requires evaluation of the diabetes self-management program (Mensing et al., 2002).

Diabetes Management Programs

Various organizations such as The American Diabetes Association, the National Institute of Health, and the CDC fund diabetes programs and initiatives to reduce the prevalence, complications, and deaths associated with diabetes.

National Diabetes Education Program

The National Diabetes Education Program (NDEP) is jointly sponsored by NIH and CDC, in addition to multiple partner organizations (NDEP, 2003). The objectives of NDEP are “to increase public awareness of the seriousness of diabetes, its risk factors, and strategies for preventing diabetes and its complications; to improve understanding about diabetes and its control and to promote better self-management behaviors among people with diabetes; to improve health care providers understanding of diabetes and its control and to promote an integrated approach to care; and to promote health care policies that improve the quality of and access to diabetes care; and to reduce disparities in health in racial and ethnic populations disproportionately affected by diabetes” (NDEP, 2003).

The American Diabetes Association (ADA)

The ADA (2003) is a nonprofit health organization that targets diabetes and its management. The ADA (2003) has defined goals for individuals with diabetes, which are: “1) to attain and maintain optimal metabolic outcomes including blood glucose

levels, lipid and lipoprotein profiles, and blood pressure levels, 2) to prevent and treat chronic complications of diabetes by modification of life style factors, 3) to improve health through healthy food choices, and 4) to address individual nutritional needs.”

In 2002, ADA released principles and recommendations for diabetes treatment and prevention (Franz et al., 2002). The report stated that medical nutrition therapy is an essential component in diabetes management. Medical nutrition therapy uses two specific nutrition services that are assessment of nutrition status and treatment interventions. Treatment interventions include nutrition therapy, counseling, and provision of specialized nutrition supplements when necessary (Franz et al., 2002).

The importance of medical nutrition therapy in diabetes management has received support. Pastors et al. (2002) showed that individuals receiving medical nutrition therapy for diabetes at diagnosis had a 2% decrease in A1c levels, and individuals receiving medical nutrition therapy for diabetes 4 years after diagnosis had a 1% decrease in A1c levels.

Franz et al. (1995) conducted a study to assess the effectiveness of Medical Nutrition Therapy in the form of basic nutrition care and practice guideline nutrition care in the management of diabetes mellitus. The study was conducted with 203 participants and it was determined that both practice guideline nutrition care and basic care medical nutrition therapy resulted in decreased levels of A1c.

Therefore, it is reasonable to assume that programs developed that implement standards set for medical nutrition therapy, which includes assessment of nutrition status, medical information, history of dietary habits, and treatment, may result in improved diabetes management.

Interventions for Diabetes Management

A variety of studies have been conducted to assess the most effective and informative way to implement diabetes education programs. An overwhelming proportion of the literature supports the idea that diabetes management includes interventions targeting education, screening, and patient involvement.

Glasgow et al. (2001) found that the key characteristics of effective diabetes management programs include assessment of the target population's needs, implementation of programs which include screening, surveillance, and reminders; involvement of patients in the development of diabetes management programs; and evaluation of diabetes programs.

Muhlhauser and Berger (2000) used data obtained from the UKPDS (United Kingdom Prospective Diabetes Study) to identify strategies to increase patient's involvement in management of their diabetes. In order for individuals to participate in decision making, it is important that they have a good knowledge base concerning diabetes. The UK General Medical Council requires that prior to any medical intervention, patients must be given proper information regarding their condition (General Medical Council, 1999). Muhlhauser and Berger (2000) stress that patients should receive evidence-based information regarding their disease to assist them in making informed decisions regarding management of their diabetes.

Norris et al. (2001) conducted a meta-analysis to review the effect of self-management training in individuals with type 2 diabetes. They examined 84 studies, and found that knowledge, frequency and accuracy of self-monitoring blood glucose, dietary habits and glycemic control were positively affected after short-term follow-up. In addition, they found that education interventions that included patient collaboration might be more effective than didactic interventions. Thus, it seems an interactive environment

in which the participants partake in the development of their diabetes management program may have additional benefits to those already seen with didactic interventions.

Miller et al. (2002) found that older individuals with type 2 diabetes had significant improvements in diabetes knowledge ($P < 0.0001$), disease management skills ($P < 0.01$), and decision-making abilities ($P < 0.0001$) following a diabetes management education program, which was comprised of ten sessions. Thus, they concluded that diabetes education targeted toward older adults was successful in improving diabetes knowledge and disease management skills.

Mazucca et al. (1986) examined the effects of seven lessons concerning diabetes education on older African American women with type 2 diabetes ($n = 263$). They used techniques such as didactic instructions, skilled exercises, and behavioral modification, and found that the group receiving patient education had significantly larger reductions in fasting blood glucose ($P < 0.05$) and A1c ($P < 0.05$).

Based on the research provided, the following factors should be used when implementing diabetes program: population assessment, screening of A1c and fasting plasma glucose, patient involvement, and diabetes management programs, including provision of evidence-based information.

Educational Environment

Group Education

Controversy concerning the effectiveness of diabetes education in a group setting versus individual setting is a concern to health care providers. This issue is important to address because implementation of group education programs helps to decrease overall cost and allows more individuals to be reached at once.

Rickheim et al. (2002) conducted a study to assess the effectiveness of diabetes education programs when delivered in a group setting versus an individual setting. They

enrolled 170 participants from which they placed 87 in group education and 83 in individual education treatments (mean age = 51, 64% female, 89.5% Caucasian). Education material included information on carbohydrate counting, portion control, meal spacing, self-monitoring of blood glucose, physical activity, heart-healthy eating, foot care, sick day management, monitoring for diabetes complications, self-management problem solving, and information regarding the progression of type 2 diabetes. They found that knowledge scores increased significantly in both treatment groups. In addition, A1c decreased in both groups ($P < 0.01$), however the individuals receiving group education had an A1c reduction of 2.5% ($P < 0.01$) compared to the 1.7% ($P < 0.01$) reduction seen in the individuals receiving individual treatment. Therefore, Rickheim et al. (2002) concluded that group diabetes education was as effective as individual diabetes education.

Trento et al. (2002) assessed the effects of group care on the management of diabetes and the prevention of complications related to diabetes. The participants ($n = 104$) were divided into a control group receiving individual intervention, and an intervention group receiving group care. The participants receiving group care had a mean age of 62 years and 62% had six years of formal schooling or less. The group education program reviewed weight goals, food choices, meal planning, exercise, monitoring and improvement of metabolic control, smoking cessation, medication management and complications related to diabetes. The participants that received group education had significantly higher diabetes knowledge scores after adjusting for age, duration of diabetes, and schooling. A1c levels increased significantly in the control group ($P < 0.001$) over the four-year period, and decreased slightly in the group receiving group education, however this decrease was not significant. It is important to note that

the difference in A1c between the control group and intervention group was significant (mean A1c of the control being 8.6% and the intervention being 7.0% at four years).

Based on the evidence provided, it seems reasonable to conclude that diabetes education programs delivered in group settings are effective in the management of diabetes.

Vision and Hearing

Another important factor to assess in a target population is vision and hearing. The learning environment should be manipulated based on the communication status of the audience. A survey conducted by Tielsch et al. (1990) found that National Projections estimated that approximately three million individuals in the United States were visually impaired. The National Institute on Deafness and other Communication Disorders (1996) found that approximately 28 million individuals in the United States had hearing problems.

Insufficient steps to control for visual impairment could result in decreased effectiveness of diabetes management programs within this population. In the hopes of addressing this issue, Bernbaum et al. (2000) examined the importance of adapting diabetes education programs for individuals with visual impairments. They concluded that an education program adapted for visual impairment provided an acceptable learning environment for participants.

The prevalence of hearing impairment increases with age and hearing loss has been associated with numerous nutrition-related factors (Johnson et al., 2003) as well as diabetes (Fowler and Jones, 1998, Ishii et al., 1992). Therefore, health professionals need to create an appropriate learning environment for hearing impaired older adults (Johnson et al. 2003).

Glycosylated Hemoglobin (A1c)

A1c Definition

A1c is the percent of glycosylated hemoglobin found in the blood. Since the life span of a red blood cell is between 90 and 120 days, the A1c allows health professionals and people with diabetes to discern the average blood glucose level over the past three months. Currently many institutions, such as the American Dietetic Association, recommend an A1c target value for individuals with diabetes to be set at $\leq 7.0\%$ (ADA, 2002). However, new research suggests that complications related to diabetes may still occur at this A1c level (UKPDS, 1998). The American College of Endocrinology supports a lower A1c level, and has recommended A1c levels be ≤ 6.5 in individuals with diabetes (Cobin et al., 2002). A1c can be measured clinically in whole blood by four main techniques that are cation-exchange chromatography, gel electrophoresis, affinity chromatograph, and immunoassay (Wong, 1999).

A1c Glycemic Control

High levels of A1c are associated with complications related to diabetes. It has been shown that the bonding of glucose to the beta-chain of hemoglobin results in an increased affinity for oxygen and glycosylated end product formation. Krishnamurti et al. (2001) found A1c measures to be the best indicators of glycemic control, and therefore predictors for future complications in both type 1 and type 2 diabetes.

It has been shown that monitoring and interpreting A1c levels results in better control of glucose, compared to other blood glucose monitoring techniques. Larson et al. (1990) found a significant decrease in A1c levels in the group that used A1c as an indicator of blood glucose control, but the group that monitored blood glucose using blood and urine glucose measurements had no significant decrease in their A1c levels.

Lower levels of A1c are shown to decrease risk of complications related to diabetes. The Diabetes Control and Complications Trial found that the risk of microvascular complications in individuals with type 1 diabetes decreased 35-75% as A1c levels decreased (DCCT, 1993). The UK Prospective Diabetes Study (UKPDS, 1998) found that, in individuals with type 2 diabetes, the intervention group that experienced a significant reduction in A1c levels had reduction of retinopathy, proteinuria, and neuropathy by 76%, 54%, and 60% respectively, at a follow-up after 6.5 years. In addition, the UKPDS found that for every 1% reduction in A1c levels there was a 35% reduction in microvascular related complications and an 18% reduction in macrovascular events.

For those with type 2 diabetes, a 1% decrease in A1c can lower the risk of developing complications related to diabetes by as much as 35%, and this reduction is associated with a 25% decrease in diabetes-related deaths, a 7% decrease in all-cause mortality, and an 18% decline in combined fatal and nonfatal heart attack (DCCT, 1993; UKPDS, 1998).

Effect of Education on A1c Levels

Increased knowledge of diabetes management has been associated with better control of blood glucose concentrations. Currently, A1c knowledge in the population with diabetes is low. Harwell et al. (2002) conducted a telephone survey in a rural population group and found that the participants knew their last A1c value, but they could not interpret the value properly. Skeie et al. (2001) found that the high-knowledge group, that included individuals who had diabetes for a longer time period, had a better understanding of A1c compared to the low-knowledge group. Evidence shows that as an individual's knowledge of diabetes management increases the A1c values decrease.

Raji (2002) conducted a study to investigate the effectiveness of active and passive diabetes education on A1c values. The active education program was composed of six presentations related to diabetes management, which lasted approximately 3.5 days, and the passive education program consisted of mailed materials. Both interventions groups experienced a significant decrease in A1c levels ($n = 106$; $P < 0.001$). It was determined that educational intervention, passive or active, resulted in improved glycemic control based on A1c scores.

A meta-analysis conducted by Norris et al. (2002) reviewed 31 studies and they concluded that A1c levels are improved by diabetes self-management education, with participant contact time being identified as the only predictor of effect (23.6 hours of contact time needed for every 1% reduction in A1c levels).

Based on the evidence provided, it appears that the provision of nutrition and health programs targeted toward diabetes education are effective in the improvement of diabetes knowledge and A1c scores, and should therefore be an integral component of diabetes management programs.

Proposed Study

The high prevalence of diabetes in older adults, especially among low income elders receiving services from the OANP, served as the motivation for developing and implementing a nutrition and diabetes education intervention in selected Georgia Senior Centers. This nutrition and health education program involved a series of six to eight group lessons given over a three to five month period. The principles of the education program are based on the guidelines of the National Standards for Diabetes Self-Management Education, the American Diabetes Association, and the National Diabetes Education Program. As noted previously, group education lessons are effective for improvement of diabetes knowledge and lowering A1c levels (Rickheim et al., 2002;

Norris et al., 2002; Raji, 2002). This study focused on the two key outcome measures of A1c knowledge and A1c blood levels. It is hypothesized that participation in this program will significantly increase A1c knowledge and decrease blood concentrations of A1c in participants.

CHAPTER 3

A NUTRITION AND DIABETES EDUCATION PROGRAM IMPROVES A1C KNOWLEDGE AND A1C BLOOD LEVELS¹

¹Burnett, S.M., E. Redmond, J.G. Fischer, J.T. Johnson, M.A. Johnson. To be submitted to *Diabetes Care*.

Abstract

This study examined the predictors of A1c knowledge and the effect of nutrition and diabetes education on A1c knowledge and A1c blood levels of Older Americans Nutrition Program participants. It was hypothesized that A1c knowledge would be associated with selected demographic and health characteristics, and that the educational intervention would increase A1c knowledge and decrease A1c blood levels.

Participants were a convenience sample from selected Georgia Senior Centers (n = 105, mean age = 73 years, 58% Caucasian, 42% African American, 70% women, 30% had <8 years of education). Participants provided blood samples for A1c assessment and completed questionnaires at baseline and after the education intervention.

At baseline, 57% of participants had blood A1c levels >6.5% and 53% scored \leq 30% on the A1c Knowledge Questionnaire. In regression analyses, higher A1c knowledge at baseline was negatively associated with age ($P < 0.05$) and blood A1c levels ($P < 0.07$), but not with gender ($P = 0.57$) or race ($P = 0.77$). Following the intervention, the percent of participants who scored 40% or higher on A1c knowledge increased from 48% to 82% ($P < 0.0001$). Blood A1c decreased by 0.66% (mean decrease from 8.46% to 7.80%) in those with initial A1c >6.5% (n = 43, $P < 0.01$) and by 1.46% (mean decrease from 9.92% to 8.46%) in those with initial A1c levels of >8.0% (n = 21, $P < 0.01$).

This education intervention significantly improved the A1c knowledge and A1c blood levels in these older adults. The curriculum was revised after the intervention based on responses from participants and educators and is available at Nutrition for Older Adults' Health (NOAHnet: www.arches.uga.edu/~noahnet).

Introduction

More than 20% of the population over 65 years of age suffers from diabetes (NIH, 2000). Major risk factors for diabetes include BMI ≥ 25 kg/m², minority group status, family history of diabetes, habitual physical inactivity, impaired fasting glucose or impaired glucose tolerance, hypertension, HDL cholesterol ≤ 35 mg/dl, history of gestational diabetes, and polycystic ovary syndrome (Franz et al., 2002). In addition, age >45 years and low socioeconomic status are also associated with increased risk of developing diabetes (ADA, 2002). Multiple risk factors result in an increased probability of developing diabetes (Lindstrom, 2003).

Participants of the OANP are at particularly high risk for diabetes because of advanced age, overweight and obesity, physical inactivity, minority group status, and low socioeconomic status. In a national evaluation of OANP participants, 18% of congregate meal participants and 25% of home delivered meal participants reported having diabetes in the early 1990s (Ponza et al., 1996). The OANP, also known as the Elderly Nutrition Program, is the largest community nutrition program for older adults in the United States, serving approximately 7% of the total older adult population, and 20% of the lower income older adult population (Ponza et al., 1996). The poverty rate of OANP participants is twice as high as the total older adult population in the United States, with 80 to 90% having income levels less than 200% of the DHHS poverty level (Ponza et al., 1996). The age of the average congregate meal participant is 76 years old, and the average age of the home delivered meal participant is 78 years (Ponza et al., 1996). Forty-two percent of congregate meal participants and 32% of home delivered meal participants have a BMI > 27 kg/m². Also, minority groups represent 27% of congregate meal participants and 25% of home-delivered meal participants (Ponza et al., 1996). Therefore, Senior Centers that receive Title III-C and Title III-F funds for OANP can

reach populations that would benefit from nutrition and health programs targeting diabetes.

The high prevalence of diabetes, and debilitating consequences of complications related to diabetes, led us to develop a group nutrition and health intervention that targeted Georgia OANPs. Previous studies found that group nutrition and health education lessons improved diabetes management among older adults with diabetes (Miller et al., 2002). However, there has been very little research conducted on health promotion programs designed for older adults with diabetes who receive nutrition services from Senior Centers.

The program consisted of eight lessons on these topics: 1) What is Diabetes all about, 2) In Check with your Diabetes, 3) Join the Portion Patrol, 4) Let's Plate it Out, 5) Meal Time, 6) Jump in Feet First, 7) Complicated Matters, and 8) Keeping Fit for Life (lessons may be obtained at <http://www.arches.uga.edu/~noahnet>). The curriculum for the this nutrition and diabetes intervention program was reviewed and revised by experts in nutrition, pharmacy, and gerontology at the University of Georgia prior to its implementation at Senior Centers. The program was designed to provide an overall understanding of diabetes, its control, and possible complications related to diabetes. The National Standards for Diabetes Self-Management Education (DSME) were used as guidelines during creation of the program (Mensing et al., 2002). The ten standards outlined by DSME relate to management, documentation, multi-profession approaches, provision of current information, and evaluation of the diabetes program. The educational messages reflected recommendations of DSME (Mensing et al., 2002) that emphasize carbohydrate counting, portion control, meal spacing, physical activity, foot care, diabetes complications, and blood glucose monitoring as integral components of diabetes management.

One of the primary educational messages was the importance of monitoring A1c levels. A1c levels are identified as optimal predictors of diabetes control, and many studies have shown that as A1c levels decrease the risk of complications related to diabetes decrease (DCCT, 1993; Reichard et al., 1993; Ohkubo et al., 1995; UKPDS, 1998).

Several investigators have demonstrated that diabetes education increases general knowledge of diabetes and decreases blood levels of A1c (Norris et al., 2001; Raji 2002), but little is known about the effects of diabetes education on increasing specific knowledge related to A1c. Also, we found no reports that evaluated nutrition and diabetes education targeted to multiethnic older adults attending Senior Centers that provide nutrition and health-related services with Title III-C and Title III-F funds through the Older Americans Nutrition Program. Therefore, the specific aims were to conduct a nutrition and diabetes education intervention for attendees of the Georgia Older Americans Nutrition Program in order to determine: 1) A1c knowledge at baseline, 2) predictors of A1c knowledge at baseline, and 3) the effects of a nutrition and diabetes education intervention on A1c knowledge and blood levels of A1c. It was hypothesized that participants would have low knowledge of A1c at baseline; characteristics such as initial blood A1c, demographics, duration of diabetes, and selected health conditions would be associated with knowledge of A1c; and the intervention developed specifically for this population would increase knowledge concerning A1c and decrease blood levels of A1c.

Research Design and Methods

Study Population

The participants of the program were a convenience sample of OANP participants attending selected Georgia Senior Centers in Franklin, Barrow, Jackson, Madison,

Loganville, Gilmer, Cherokee, Henry, Newton, and Fulton counties. Counties were selected based on their willingness to participate within our timeframe (in the year 2002). All older adults were eligible to participate in the program regardless of gender and ethnicity. Individuals with or without diabetes were encouraged to participate, however, only the data collected from individuals with a self-report of diabetes were used in this study to evaluate the outcomes of the intervention. The potential sample size was limited because the majority of centers were small and located in rural areas. Directors and other Senior Center staff assisted in the promotion of the program and recruitment of participants. Approval for the study was obtained from the Institutional Review Boards of the Georgia Department of Human Resources and The University of Georgia for all procedures. Prior to the collection of any data, all participants were required to sign a consent form that was read aloud to each participant.

Intervention

A total of 105 participants with diabetes provided complete baseline information. Two additional potential participants were excluded (one died and had provided incomplete baseline information; one was unable to answer the questions because of poor cognition). All questionnaires were read aloud to participants and filled out by trained staff and graduate students in the Department of Foods and Nutrition at the University of Georgia. Staff providing the lessons had training in diabetes management and care from local hospitals, and each lesson was outlined to assure consistency between instructors. Between six and eight of the lessons were offered at each Senior Center over a three to five month period based on the interest and available dates for scheduling at each Senior Center.

Education level varied among participants. Thus, lessons were created for a lower literacy audience while still being informative to all participants (sixth to eighth grade

level, assessed by Flesch-Kincaid Grade Level Score, available with Microsoft Word 2000, Microsoft Corporation). To further ensure that concepts were understood by all participants, a question and answer session followed all lessons and participants were encouraged to ask questions individually after the lessons if they desired. Because of the high prevalence of visual impairment generally found in older adults, all handouts were in large font, read aloud to participants, and given to participants to take home.

The National Standards for Diabetes Self-Management Education (DSME) were used as guidelines during creation of the program (Mensing et al., 2002). The curriculum covered carbohydrate counting, portion control, meal spacing, physical activity, foot care, diabetes complications, and monitoring of blood glucose and A1c. After the evaluation of this original program, lessons were added on sick day management and self-management problem solving as suggested in the DSME guidelines.

Lesson one was titled “What is Diabetes all about” and provided participants with an overall introduction to diabetes and its possible consequences. The second lesson was titled “In Check with your Diabetes” and discussed topics related to monitoring blood sugar values and target ranges for individuals with diabetes. When available, a contact associated with a local pharmacy discussed monitoring techniques with participants and provided them with a blood glucose monitor for their personal use. The third, fourth, and fifth lessons “Join the Portion Patrol,” “Lets Plate it out, and “Meal Time,” respectively, addressed topics related to meal planning, carbohydrate counting, and label reading. Lesson six “Jump in Feet First,” discussed proper foot care. Participants who were eligible were assisted in obtaining diabetic shoes from Medicare whenever possible. Lesson seven, “Complicated Matters,” covered complications related to diabetes and proper steps, such as screening, that should be taken to prevent these complications from

occurring. Lesson eight, “Keeping Fit for Life” emphasized the importance of physical activity for the control of diabetes and overall well-being.

Measurements

At baseline (pre-testing), demographics including age, years of school, gender, ethnicity, current health conditions, medications for diabetes, BMI, and use of vitamin and mineral supplements were assessed. Current health conditions were assessed from self-reports of weight loss, vision problems, retinopathy, kidney disease, hearing problems, neuropathy or nerve problems, numbness or tingling in their feet, and heart disease, a total of eight conditions. The A1c Knowledge Questionnaire developed by the National Diabetes Education Program was administered at baseline and after the intervention (available at NDEP, 2003).

The A1c Knowledge Questionnaire consists of ten questions, with possible answer choices of true, false, and don’t know. All questions are shown in Table 3. Question four, which is “The hemoglobin A1c goal for people with diabetes is less than seven percent,” was modified for the purpose of this program by replacing seven percent with 6.5 percent. The reduction of the A1c target levels to $\leq 6.5\%$ was based on recommendations made by the American College of Endocrinology (Cobin et al., 2002). When evaluating the program an error was found in the wording of question four “less than 6.5%,” and was corrected to say “less than or equal to 6.5%.” Of the ten questions, seven focused primarily on understanding of A1c and three examined general knowledge of diabetes. The majority of research available on diabetes knowledge examines the association of general diabetes knowledge with A1c levels.

Blood measures of glucose and A1c were obtained at baseline and after the intervention. Whole blood (3 ml) was obtained by venipuncture by a licensed phlebotomist. Blood samples were sent to Quest Diagnostic Laboratory for analysis

(Atlanta, GA). Individuals unable or unwilling to provide a blood sample at baseline or after the intervention were asked to provide blood work from their physician (n = 4). Each participant received a copy of his/her blood work, an explanation of their results, and recommendations to discuss their lab results with their physician. Throughout the program attendance records were kept to determine the number of lessons each participant attended.

Data Analysis

The Statistical Analysis System was used to analyze all data (SAS, Version 8.2, Cary, NC). Frequencies, means, and standard deviations were calculated. Differences at baseline and after the intervention were examined using chi-square and *t*-test analyses. Correlations and regression analyses were used to identify possible predictors of A1c knowledge and blood A1c levels at baseline and after the intervention. A *P*-value of <0.05 was considered statistically significant.

Results

The characteristics of the sample were mean age of 73, 70% female, 58% Caucasian, 41% African American, and a mean education of 10 years (Table 1). Most participants had diabetes for ≤ 10 years (42%), blood A1c levels $>6.5\%$ (55%), answered three or fewer questions correctly out of ten (54%), treated their diabetes with oral medications only (57%), had numbness or tingling in the feet (54%), BMI ≥ 30 kg/m² (which is indicative of obesity, 39%), and attended the lessons four to eight times (80%).

Of the 105 participants who completed all of the baseline assessments, 91 completed the questionnaires and 80 provided blood for A1c determinations following the intervention. Of the 14 participants who were unavailable to answer questions following intervention, their reasons were death or absence from the senior center for an extended period of time. Of the 20 participants who were unavailable to provide blood

samples for A1c measures following the, the reasons were death, absence from the senior center for extended period of time, or provision of insufficient blood for A1c analysis. There were no significant differences in the age, education level, duration of diabetes, and gender between those that completed the intervention and those who did not.

Blood A1c levels were significantly decreased following the intervention in those with initial A1c levels >6.5% (Table 2). The subset of participants who had baseline blood A1c >6.5% had a mean decrease in A1c of 0.66% (mean decrease from 8.46% to 7.80%, $P < 0.01$, $n = 43$) while those with initial blood A1c >8.0% had a mean decrease in blood A1c of 1.46% (mean decrease from 9.92% to 8.46%, $P < 0.01$, $n = 21$).

At baseline, the A1c knowledge score was dichotomized into $\leq 30\%$ and $\geq 40\%$, which was approximately the mid-point of the sample. Lower knowledge scores ($\leq 30\%$) were significantly associated ($P < 0.05$) with higher age, lower education, current vision problems and hearing problems, but not with any of the other variables examined (Table 3).

Following the intervention there was a significant increase in overall knowledge score to an average of approximately eight of ten questions correctly answered ($P < 0.0001$), and there were significant improvements in knowledge about all questions ($P < 0.05$) except for knowing the general definition of A1c (question #1, $P < 0.08$) and knowing the appropriate goal for A1c (question #4, $P < 0.06$) (Table 4).

Spearman correlation analyses were used to identify factors associated with A1c knowledge at baseline and after the intervention, as well as changes in A1c knowledge following the intervention (Table 5). All three measures of A1c knowledge (baseline A1c knowledge, post intervention A1c knowledge, change in A1c knowledge) were correlated with each other. At baseline and after the intervention higher A1c knowledge

was significantly correlated ($P < 0.05$) with younger age, higher education, not having a hearing problem, and not having numbness or tingling in the feet, but not with any of the other variables examined ($P > 0.05$). Following the intervention, changes in A1c knowledge were positively correlated with hearing problems ($P < 0.05$).

Spearman correlation analyses were also used to identify factors associated with A1c blood levels at baseline and changes in A1c blood levels following the intervention (Table 6). Baseline A1c blood levels were significantly ($P < 0.05$) correlated with race and BMI but not any of the other variables examined ($P > 0.05$). Following the intervention, A1c blood levels were positively correlated with A1c blood levels at baseline, race, and duration of diabetes ($P < 0.05$), and negatively correlated with age ($P < 0.05$). Following the intervention, changes in A1c blood levels were not significantly correlated with any of the other demographic or health related variables examined except baseline A1c knowledge, race (blacks had larger decreases in blood A1c than whites, -0.00 vs. -0.56 , $P < 0.05$), and having kidney disease (self-report of kidney disease was associated with larger decreases in blood A1c, -0.11 vs. -2.2 , $P < 0.05$).

In addition to the correlation analyses, regression analyses also were used to identify possible predictors of A1c knowledge at baseline, and changes in A1c knowledge and blood levels of A1c after the intervention. Two regression analyses were conducted to identify possible predictors of A1c knowledge at baseline. In the first regression analysis, A1c knowledge at baseline was negatively associated with age ($P < 0.0001$) and there was a trend for a negative association with blood A1c at baseline ($P < 0.07$), but there were no associations with gender ($P = 0.77$) or race ($P = 0.57$) (Model F = 5.56, $P < 0.0005$, $n = 99$). In the second analyses, a forward stepwise regression

analyses identified associations of higher A1c knowledge at baseline with lower age ($P < 0.0001$), not having a hearing problem ($P < 0.0007$), and shorter duration of diabetes ($P < 0.09$, trend), but none of the other factors examined entered into this model ($P > 0.10$: gender, race, education, blood A1c, vision problems, heart problems, kidney problems, numbness or tingling in the feet, or BMI) (Model F = 12.1, $P < 0.0001$, n = 91).

Forward stepwise regression analyses were used to identify possible predictors of changes in A1c knowledge and A1c blood levels following the intervention. Increases in A1c knowledge following the intervention were negatively associated with baseline A1c knowledge ($P < 0.0001$), not having numbness or tingling in the feet ($P < 0.02$), and younger age ($P < 0.06$, trend), but none of the other factors examined entered into this model ($P > 0.10$: gender, race, education, blood A1c, duration of diabetes, hearing problems, vision problems, heart problems, kidney problems, BMI, or number of lessons attended (Model F = 16.5, $P < 0.0001$, n = 80). Decreases in A1c blood levels following the intervention were associated with higher levels of blood A1c at baseline ($P < 0.0001$), having kidney problems ($P < 0.01$), and longer duration of having diabetes ($P < 0.09$, trend), but none of the other factors examined entered into this model ($P > 0.10$: gender, race, education, A1c knowledge at baseline, change in A1c knowledge, hearing problems, vision problems, heart problems, kidney problems, numbness or tingling in the feet, BMI, or number of lessons attended) (Model F = 28.3, $P < 0.0001$, n = 70).

Discussion

The major findings of this study were that knowledge of A1c was low at baseline with average scores of only 40% correct; low baseline knowledge of A1c was significantly associated with several demographic and health-related indices; and the nutrition and diabetes education program significantly and favorably improved both

knowledge of A1c and blood levels of A1c. These findings suggest that nutrition and diabetes education programs delivered in group settings at Senior Centers with Title III-C and Title III-F funds from the Older Americans Nutrition Program may be effective in assisting older adults in improving management of their diabetes.

Similar to our findings, Harwell et al. (2002) assessed A1c knowledge in a rural population of older adults and found that 75% reported having an A1c test, of which 24% knew their last A1c level. Fifty-three percent of participants felt their blood glucose was well controlled. However, only half of those that reported their blood sugar was well controlled actually had A1c levels <7.0% (n = 200, mean age = 64.9, telephone survey). Additionally, Grodstein et al. (2001) reevaluated data obtained from the Nurses Health Study (Colditz, 1997) to assess cognitive function in community-dwelling elderly women and found they had low scores in overall diabetes knowledge (n = 82, mean age = 74, telephone survey). Lower knowledge of diabetes in older adults may be related to low levels of contact with nutrition and health education. For example, Bruce et al. (2003) found that older age was inversely related to diabetes knowledge scores ($P < 0.0001$) and older adults were 32% less likely than younger adults to have previously received diabetes education or seen a dietitian ($P < 0.01$, n = 2277, mean age = 64). From a review of the literature, Ryan (2000) concluded that as older adults with type 2 diabetes increase in age their verbal and memory skills decrease. They proposed that the combination of diabetes with declines in cognitive skills associated with aging results in an exacerbated decline in memory and visual learning skills.

Our findings support previous research that shows that lower educational attainment is associated with lower knowledge of diabetes at baseline (Bruce et al., 2003). This nutrition and diabetes education intervention has a low literacy level to accommodate the lower levels of education that are often seen in OANP participants

(Ponza et al., 1996). After the intervention there was no significant association between gain in A1c knowledge scores and education level, which suggests that this intervention was effective in reaching a range of education levels.

Hearing problems and numbness and tingling in feet were significantly correlated with low A1c knowledge at baseline and after the intervention. Hearing loss may negatively influence communication with health care providers (Johnson et al., 2003), so perhaps hearing problems decreased the ability of participants to hear education messages and to communicate with health care providers prior to the intervention. The negative correlation of hearing loss with A1c knowledge did persist after the intervention and there was evidence that those with hearing loss had somewhat higher gains in A1c knowledge, suggesting that this intervention program did positively influence those with hearing loss as they made gains in A1c knowledge. It is not entirely clear why numbness and tingling in feet, a sign of possible peripheral neuropathy, were associated with low A1c knowledge at baseline and after the intervention, but not with A1c blood levels.

Possible limitations of this study include the use of a convenience sample, not having a non-intervention or usual care control group, delivering the intervention at several different Senior Centers with several different educators, differences in the responsiveness of each Senior Center to facilitating the intervention, and lack of information about long term control of A1c levels following the intervention. Therefore, our findings may not apply to all older adults at all Senior Centers, or in other settings, because individuals that participated may have been more highly motivated to change their behaviors than non-participants. Also, participating Senior Centers may have been more highly conducive to facilitating behavioral changes than non-participating centers. To minimize differences among the sites and educators, all educators were provided with the same scripts for each lesson and the educators met weekly to discuss their progress at

each site. Also, a variety of educational programs targeted toward diabetes that use similar standards and goals as defined by the ADA, NDEP, and DSME, have been effective in varying population groups (Rickheim et al., 2002; Pastors et al., 2002; Norris et al., 2002; Franz et al., 1995). Lastly, the effectiveness of this curriculum in maintaining long term improvements in knowledge of A1c and blood levels of A1c needs further investigation.

After the intervention was completed, the curriculum and evaluation instruments were revised in several ways including a new title for the curriculum, increased focus on cardiovascular risk factors, revisions to the A1c Knowledge Questionnaire, procedures for obtaining A1c blood levels from participants' physicians, and revisions to the consent forms. The revised curriculum is called "Eat Well, Live Well" and is available at NOAHnet: Nutrition for Older Adults' Health (www.arches.uga.edu/~noahnet).

Acknowledgements: This study was supported with Title III-C and Title III-F funds from the Northeast Georgia Regional Development Center and Area Agency on Aging; Georgia Department of Human Resources-USDA Food Stamp Nutrition Education Contracts (#427-93-11903 and #427-93-26056), Georgia Agricultural Experiment Station (Hatch # GE0 00916), and Georgia Gerontology Consortium Seed Grant Program.

Table 1-Baseline Characteristics of Participants

Characteristics	<i>n</i>	
Age (years, range 47-93)	105	73 ± 8
≤69 (%)		31
70-79 (%)		47
≥80 (%)		22
Race	105	
Caucasian (%)		58
African American (%)		42
Gender	105	
Male (%)		30
Female (%)		70
Education (years of school, range 0-19)	105	10 ± 5
0-8 (%)		30
9-11 (%)		22
12 (%)		22
13-19 (%)		27
Duration of diabetes (years, range 0-57)	101	10 ± 10
0-10 (%)		64
≥11 (%)		36
A1c blood levels (range 5.1-15.8)	100	7.3 ± 1.9
≤6.5 (%)		43
6.6-8 (%)		32
>8.0 (%)		25
A1c knowledge (% correct, range 0-100)	105	40 ± 31
<10 (%)		11
10 (%)		14
20 (%)		13
30 (%)		15
40 (%)		7
50 (%)		5
60 (%)		8
70 (%)		7
80 (%)		10
90 (%)		3
100 (%)		7
Treatment	105	
Diet only (%)		21
Oral medication (%)		57
Insulin and oral medication (%)		7
Insulin only (%)		15
Health conditions	105	2.1 ± 1.6
Weight loss (% yes)		24
Vision problems (% yes)		54
Retinopathy (% yes)		7
Kidney disease (% yes)		7

Hearing problems (% yes)		28
Neuropathy or nerve problems (% yes)		21
Numbness or tingling in feet (% yes)		50
Heart disease (% yes)		25
BMI (kg/m ² , range 19-51)	97	29.6 ± 6.5
<25 (%)		24
25-29.9 (%)		37
≥30 (%)		39
Smoking (% yes)	8	8
Multivitamin/mineral (% yes)	105	60
Attendance (number of lessons attended, range 0-8)	105	3.5 ± 2.5

Data are means ± SD or % as indicated. Percentages may not add up to 100% because of rounding.

Table 2-Changes in Blood A1c Following the Intervention

Baseline A1c (%)	Baseline A1c means (%)	After Intervention A1c means (%)	Change in Blood A1c (%)	<i>P</i>
All participants (n = 77)	7.26 ± 2.11	7.02 ± 1.44	-0.24 ± 1.35	0.11
Initial A1c ≤6.5 (n = 35)	5.83 ± 0.43	6.10 ± 0.80	+0.27 ± 0.72	0.05*
Initial A1c >6.5 (n = 42)	8.46 ± 2.21	7.80 ± 1.41	-0.66 ± 1.58	0.01*
Initial A1c ≤8.0 (n = 56)	6.27 ± 0.70	6.49 ± 0.89	+0.21 ± 0.67	0.03*
Initial A1c >8.0 (n = 21)	9.92 ± 2.33	8.46 ± 1.66	-1.46 ± 1.90	0.01*

Data are means ± SD. *P* values are from paired *t* test and **P* < 0.05 is considered a statistically significant difference between baseline and after the intervention.

Table 3-Associations of Demographic and Health Characteristics with A1c Knowledge Scores at Baseline

Variable	N	A1c Knowledge Scores (%)		P
		≤30 n = 57	≥40+ n = 48	
Age (years)		75.1 ± 7.5	70.9 ± 9.0	
Age (years, %)	105			0.02*
≤69		19	46	
70-79		54	38	
≥80		26	17	0.02*
Sex (%)	105			
Male		32	27	
Female		68	73	0.61
Race (%)	105			
Caucasian		61	54	
African American		39	46	0.45
Education (%)	105	9.0 ± 4.8	11.5 ± 4.1	0.01*
≤10 years		58	25	
≥11 years		42	75	0.002*
Duration of diabetes (%)	101	9.4 ± 8.0	11.7 ± 11.2	0.25
<10 years		70	57	
≥10 years		30	42	0.18
A1c (%)	100	7.4 ± 2.2	7.1 ± 1.6	0.43
≤6.5		44	41	
>6.5-8.0		30	35	
>8.0		26	24	0.86
Treatment (%)	105			
Diet only		23	19	
Oral medication		54	60	
Insulin and oral medication		5	8	
Insulin only		18	12	0.76

Weight loss (% yes)	104	23	25	0.83
Vision problems (% yes)	105	63	44	0.05*
Retinopathy (% yes)	103	5	8	0.56
Kidney disease (% yes)	104	7	6	0.86
Hearing problems (% yes)	105	40	15	0.004*
Neuropathy or nerve problems (% yes)	104	23	19	0.58
Numbness or tingling in feet (% yes)	105	53	40	0.18
Heart Problems (% yes)	105	26	23	0.69
BMI (kg/m ² , %)	95	29.3 ± 6.3	30.0 ± 6.9	0.60
<25		22	26	
≥25-<30		44	32	
≥30		34	42	0.47
Smoking (%)	105	7	8	0.80

Data are means ± SD or % as indicated. *P* values are from chi-square or *t*-tests. *P* < 0.05 is considered statistically significant.

Table 4-Comparison of A1c Knowledge and A1c Levels at Baseline and Following Intervention

Variables	Answer Choices	Baseline <i>n</i> = 91	After Intervention <i>n</i> = 91	<i>P</i>
A1c Knowledge Score $\geq 40\%$ (%)		48	82	0.0001*
Questions: (%)				
1. A hemoglobin A1c test measures the average amount of sugar in your blood over the last three months.				0.08
	False	0	1	
	True†	46	60	
	DK	54	38	
2. It's important to know your hemoglobin A1c number.				0.0002*
	False	2	0	
	True†	49	78	
	DK	48	22	
3. All people with diabetes need to have a hemoglobin A1c test done.				0.0001*
	False	0	1	
	True†	53	84	
	DK	47	15	
4. The hemoglobin A1c goal for people with diabetes is less than 6.5%.				0.06
	False	3	3	
	True†	25	42	
	DK	71	55	
5. Most people can tell what their blood sugar levels are simply by how they feel.				0.0001*
	False†	31	63	
	True	56	32	
	DK	13	5	

6. You can have a “touch of sugar” but don’t have to do anything about it.				0.05*
	False†	52	69	
	True	28	21	
	DK	20	10	
7. You can do something about high blood sugar.				0.05*
	False	1	0	
	True†	88	99	
	DK	11	2	
8. A hemoglobin A1c number over 8 percent is a sign that one or more parts of your treatment plan needs to be changed.				0.0001*
	False	3	2	
	True†	31	65	
	DK	66	33	
9. A hemoglobin A1c test should be done about once a year.				0.0001*
	False†	21	33	
	True	25	46	
	DK	54	21	
10. There’s no proof that lowering your hemoglobin A1c number can reduce your chances of getting serious eye, kidney, or nerve disease.				0.0001*
	False†	24	55	
	True	14	23	
	DK	65	22	

Data are %. †Indicates correct answer. *P* values are from chi-square analyses and **P* < 0.05 is considered a statistically significant difference between baseline and after the intervention.

Table 5-Correlations of A1c Knowledge with Attendance, Demographic and Health Characteristics at Baseline and Following Intervention

Variables	A1c Knowledge Questionnaire Scores (% , range 0-100)								
	Baseline			After intervention			Change		
	<i>n</i>	<i>r</i>	<i>P</i>	<i>n</i>	<i>r</i>	<i>P</i>	<i>n</i>	<i>r</i>	<i>P</i>
A1c knowledge score at baseline (% correct)	-	-	-	92	0.53	0.0001*	92	-0.57	0.0001*
A1c knowledge score after the intervention (% correct)	-	-	-	-	-	-	92	0.33	0.001
Change in A1c knowledge score after the intervention (% correct)	-	-	-	92	0.33	0.001	-	-	-
Blood A1c at baseline (%)	100	-0.03	0.75	88	0.04	0.71	88	0.08	0.44
Change in A1c blood levels (%)	77	0.11	0.34	77	-0.06	0.61	77	-0.14	0.23
Attendance, number of lessons attended (%)	91	-	-	91	-0.20	0.05	91	0.07	0.52
Age (years)	105	-0.36	0.0001*	92	-0.42	0.0001*	92	0.02	0.85
Gender (0 = male, 1 = female)	105	0.04	0.70	92	-0.11	0.30	92	-0.04	0.74
Race (1 = Caucasian, 2 = African American)	105	0.06	0.53	92	0.05	0.62	92	-0.01	0.89
Education (years)	105	0.29	0.003*	92	0.39	0.0001*	92	-0.04	0.69
Duration of diabetes (years)	102	0.15	0.14	89	-0.13	0.21	89	-0.16	0.12
BMI (kg/m ²)	97	0.11	0.30	84	-0.06	0.62	84	-0.09	0.46
Vision problems (0 = no, 1 = yes)	105	-0.16	0.10	92	-0.10	0.36	92	0.05	0.60
Hearing problems (0 = no, 1 = yes)	105	-0.30	0.002*	92	-0.20	0.05*	92	0.20	0.05*
Numbness or tingling in feet (0 = no, 1 = yes)	105	-0.20	0.04*	92	-0.23	0.03*	92	-0.06	0.56
Heart disease (0 = no, 1 = yes)	105	-0.10	0.33	92	-0.08	0.41	92	-0.04	0.70
Kidney disease (0 = no, 1 = yes)	104	-0.08	0.44	91	-0.07	0.54	91	-0.0008	0.99

r is Spearman correlation coefficient. **P* < 0.05 considered statistically significant.

Table 6-Correlations of A1c Blood Levels with Attendance, Demographic and Health Characteristics at Baseline and Following Intervention

Variables	A1c Blood Levels (% range 5.1-15.8)								
	Baseline			After intervention			Change		
	<i>n</i>	<i>r</i>	<i>P</i>	<i>n</i>	<i>r</i>	<i>P</i>	<i>n</i>	<i>r</i>	<i>P</i>
A1c blood level at baseline (%)	100	1.0	-	77	0.78	0.0001*	77	-0.51	0.0001*
A1c blood level after the intervention (%)	-	-	-	-	-	-	77	0.02	0.87
A1c blood level change after the intervention (%)	-	-	-	77	0.02	0.87	-	-	-
A1c knowledge at baseline (% correct)	100	-0.03	0.75	80	-0.05	0.68	77	0.11	0.34
A1c knowledge after the intervention (% correct)	-	-	-	80	-0.07	0.50	77	-0.05	0.61
A1c knowledge change (% correct)	88	0.08	0.42	80	-0.0005	0.1	77	-0.14	0.23
Attendance (number of lessons attended)	-	-	-	80	-0.15	0.20	77	0.10	0.40
Age (years)	100	-0.18	0.06	80	-0.21	0.05*	77	0.03	0.77
Gender (0 = male, 1 = female)	100	0.05	0.62	80	0.08	0.50	77	-0.02	0.83
Race (1 = Caucasian, 2 = African American)	100	0.27	0.007*	80	0.23	0.04*	77	-0.25	0.02*
Education (years)	100	0.29	0.78	80	0.07	0.51	77	0.04	0.97
Duration of diabetes (years)	97	0.16	0.10	77	0.31	0.01*	74	0.09	0.46
BMI (kg/m ²)	95	0.21	0.04*	74	0.18	0.12	73	-0.09	0.47
Vision problems (0 = no, 1 = yes)	100	-0.01	0.89	80	0.01	0.94	77	-0.06	0.60
Hearing problems (0 = no, 1 = yes)	100	0.06	0.52	80	0.01	0.90	77	-0.13	0.24
Numbness or tingling in feet (0 = no, 1 = yes)	100	0.10	0.34	80	0.13	0.24	77	-0.04	0.75
Heart disease (0 = no, 1 = yes)	100	0.08	0.41	80	0.15	0.19	77	-0.04	0.7
Kidney disease (0 = no, 1 = yes)	99	0.19	0.06	80	0.05	0.66	77	-0.23	0.04*

r is Spearman correlation coefficient. **P* < 0.05 considered statistically significant.

CHAPTER 4

SUMMARY AND CONCLUSION

This is the first study to demonstrate that older adults who participated in a nutrition and diabetes education intervention offered at their community Senior Centers through the Older Americans Nutrition Program had statistically and clinically significant decreases in blood A1c levels and increases in A1c knowledge. This evaluation was conducted in a convenience sample of older people in selected Senior Centers in Georgia, so the results would not apply to all people with diabetes. However, this sample had two ethnic groups (Caucasian and African American) and a wide range of education (30% \leq 8 years and 27% \geq 13 years) and age (47-93), so success would be expected in other samples of adults.

After the intervention was completed, the curriculum and evaluation instruments were revised in several ways including a new title for the curriculum, increased focus on cardiovascular risk factors, revisions to the A1c Knowledge Questionnaire, procedures for obtaining A1c blood levels from participants' physicians, and revisions to the consent forms. Each of these revisions will be discussed briefly.

The title was changed from "Diabetes and You" to "Eat Well, Live Well" to reflect the recommendations from one of the funding agencies, USDA Food Stamp Nutrition Education Program, to make this curriculum have a "health" focus rather than a "disease" focus. Individuals with diabetes are two to four times more likely to have heart disease, approximately 65% of individuals with diabetes will die of heart disease or stroke, and it is recommended that diabetes management programs address these concerns (ADA, 2000). Therefore, the curriculum was revised to increase the emphasis

on the National Diabetes Education Program's recommendations to monitor blood cholesterol and blood pressure, as well as blood sugar and A1c levels. Also, in our revised assessment procedures, we also monitor blood cholesterol as well as blood A1c and glucose concentrations (DCA 2000+, Bayer Corporation, Elkhart, IN).

The A1c Knowledge Questionnaire was revised following suggestions from the program staff and graduate students who administered the questionnaire to the participants. The wording of some questions was complex or confusing to participants, and therefore has been adapted. Participants were confused by the use of the word hemoglobin, because they associated this with iron levels. Therefore, the revised lessons and questionnaires use A1c instead of hemoglobin A1c. Fewer questions that assess the general knowledge of A1c might be more effective in these participants. The recommended questions are "Have you heard of A1c," "How many times in the last year have you had your A1c measured," "How many times a year should you have your A1c tested if it is in the normal range," "What was your last A1c value," "Was it within normal range," "What is the recommended level for A1c in individuals with diabetes," and "At what A1c level should you adjust your diabetes management program?"

Assessment of blood A1c levels can be difficult in a community setting such as at Senior Centers. Some individuals did not want to provide a blood sample or it was difficult to obtain blood because of rolling or small veins. Individuals who did not want us to draw their blood were asked to obtain their blood A1c levels from their own physician, but this task was arduous for the participants and resulted in missing A1c values for some individuals. We now address these issues by obtaining A1c blood levels from a "finger stick" and/or by obtaining participants' blood A1c from their physician. A consent form that incorporates new (HIPAA, 2002) standards allows our staff to request participants' blood work from their physician. This consent form can be signed at

baseline, will be convenient for participants, and will potentially reduce the number of missing A1c blood values that are needed to evaluate the success of this nutrition and diabetes intervention.

Nationally and in Georgia the Older Americans Nutrition Program serves older people with low socioeconomic status and who have a high prevalence of diabetes (Ponza et al., 1996). Older Americans Nutrition Programs can provide community settings in which numerous services can be provided, which emphasize preventive intervention programs, as well as other health-related and social support services (Millen et al., 2002). Therefore, this nutrition and diabetes education intervention should be further evaluated in other settings that serve older adults with diabetes. The revised curriculum is available at NOAHnet: Nutrition for Older Adults' Health (www.arches.uga.edu/~noahnet).

The high prevalence of diabetes in older adults, especially among low income elders receiving services from the Older Americans Nutrition Program, served as the motivation for developing and implementing this nutrition and diabetes education intervention in selected Georgia Senior Centers. Critical evaluation of the program has led to some enhancements that will hopefully improve the already effective curriculum. The continuation of this program is essential because it increases knowledge and diabetes management within this high-risk population group.

APPENDIX A
EAT WELL, LIVE WELL CONSENT FORMS

Authorization to Use and Disclose Protected Health Information for Research Purposes

Date: _____

To: (Physician) _____

From: Dr. Mary Ann Johnson, Professor of Foods and Nutrition

Re: Release of blood glucose and hemoglobin A1c of (patient's name)

The University of Georgia is conducting a nutrition education program, "Diabetes in Older Adults," at the Senior Center in your area. Your patient has agreed to participate in the program, but would prefer to have his/her blood glucose and hemoglobin A1c values provided by your office instead of our phlebotomist and laboratory. If you could provide the most recent blood glucose and hemoglobin A1c value for the named patient above, we would greatly appreciate it. We have provided the signed consent from the patient. After completing the following information, please fax or mail this form using the provided contact information.

Please complete:

Patient Name _____

Lab Values:

Blood Glucose _____ **Date** _____

Hemoglobin A1c _____ **Date** _____

Printed Name of Physician

Phone Number of Physician's Office

Signature of Physician

Date

Signature of Investigator

Dr. Mary Ann Johnson

Printed Name of Investigator Date

Please return complete and fax this form to: **Attention: Dr. Mary Ann Johnson**
706-542-5059

If preferred, you may mail this form to: **Dr. Mary Ann Johnson**
Dept. of Foods and Nutrition
Dawson Hall, The University of Georgia
Athens, GA 30602

If you have any further questions about the study, now or during the course of the project, you may call [staff name] at 706-542-4838 or Dr. Mary Ann Johnson 706-542-2292.

Consent Form DY STAFF

“DIABETES AND YOU” CONSENT FORM FOR OLDER ADULTS

I, _____, agree to participate in the study titled "Diabetes and You" conducted by Dr. Mary Ann Johnson in the Department of Foods and Nutrition at the University of Georgia. I understand that I do not have to take part if I do not want to. I can stop taking part without giving any reason and without penalty.

The benefit is that I will receive instant results of my lipids, hemoglobin A1c, and glucose.

If I volunteer to take part, I will be asked to do the following things:

- 1) Provide blood samples for hemoglobin A_{1c}, and/or glucose with lipid panel. A medical technologist will obtain 2-3 drops (about 35 microliters) of whole blood via finger stick for glucose and/or hemoglobin A1c with lipid panel measures on two occasions at least three months apart.

My blood will not be tested for HIV-AIDS. I understand that these questions and blood tests are not for diagnostic purposes. I should see a physician if I have questions about my test results. In the event that I have any health problems associated with the blood sample, my insurance or I will be responsible for any related medical expenses.

The risks of drawing blood from my finger include the unlikely possibilities of a small bruise or localized infection, bleeding and fainting. These risks will be reduced in the following ways: my blood will be drawn only by a qualified and experienced person who will follow standard sterile techniques, who will observe me after the finger stick, and who will apply a Band-Aid to the finger stick site. No information concerning myself or provided by myself during this study will be shared with others without my written permission, unless law requires it or I am found to have diabetes, as defined by the study, in which case my physician will be notified of my elevated glucose level only. I will be assigned an identifying number and this number will be used on all of the information. The data will be destroyed by January 1, 2012.

I give my permission for you to release my blood analysis information to my health care providers. Circle one: YES / NO. Initial _____.

If I have any further questions about the study, now or during the course of the project I can call Ms. Susan Stone 706-542-4838 or Dr. Mary Ann Johnson 706-542-2292.

I will sign two copies of this form. I understand that I am agreeing by my signature on this form to take part in this project. I will receive a signed copy of this consent form for my records.

Signature of Participant Participants' Printed Name Date

Participant Address and Phone

Signature of Investigator Dr. Mary Ann Johnson
Printed Name of Investigator Date

Questions or problems regarding your rights as a participant should be addressed to Dr. Christina Joseph; Institutional Review Board; Office of V.P. for Research; The University of Georgia; 604A Graduate Studies Research Center; Athens, GA 30602-7411; Telephone 706-542-6514.

*UGA project number: H2002-10285-1
9/30/02 ss/nah*

DHR project number: 011102

Consent Form DY

“DIABETES AND YOU” CONSENT FORM FOR OLDER ADULTS

I, _____, agree to participate in the study titled "Diabetes and You" conducted by Dr. Mary Ann Johnson in the Department of Foods and Nutrition at the University of Georgia. I understand that I do not have to take part if I do not want to. I can stop taking part without giving any reason and without penalty. I can ask to have all information concerning me removed from the research records, returned to me, or destroyed. My decision to participate will not effect the services that I receive at the Senior Center.

The benefits of this study are to help me learn more about preventing diabetes in myself and other older adults, and how to better manage diabetes if I already have it. This study will also help the investigators learn more about helping older adults prevent and manage diabetes. This study will be conducted at my local Senior Center. If I volunteer to take part in this study, I will be asked to do the following things:

1. Answer questions about my health, food intake, and nutrition status.
2. Provide blood samples for hemoglobin A_{1c}, and/or glucose with lipid panel. A medical technologist will obtain 2-3 drops (about 35 microliters) of whole blood via finger stick for glucose and/or hemoglobin A_{1c} with lipid panel measures on two occasions at least three months apart for those with self-report of diabetes, and one measure for those without diabetes.
3. Attend up to 8 nutrition, health, and fitness programs that will last about 30 to 60 minutes each.
4. Take part in a physical activity program to improve my strength and balance.
5. Attend two sessions for collecting information about my health, fitness, food, and nutrition habits. Each session will last up to 60 minutes.
6. Someone from the study may contact me to clarify my information.

My blood will not be tested for HIV-AIDS. I understand that these questions and blood tests are not for diagnostic purposes. I should see a physician if I have questions about my test results. In the event that I have any health problems associated with the blood sample, my insurance or I will be responsible for any related medical expenses.

The instructor may provide food to taste. Mild to no risk is expected by tasting food. However, I will not taste foods that I should not eat because of swallowing difficulties, allergic reactions, dietary restrictions, or other food-related problems.

No risk is expected, but I may experience some discomfort or stress when the researchers ask me questions about my food intake, nutrition status, and health. The risks of drawing blood from my finger include the unlikely possibilities of a small bruise or localized infection, bleeding and fainting. These risks will be reduced in the following ways: my blood will be drawn only by a qualified and experienced person who will follow standard sterile techniques, who will observe me after the finger stick, and who will apply a Band-Aid to the finger stick site. The leaders will advise me to stop exercising if I experience

APPENDIX B

ORIGINAL EAT WELL, LIVE WELL QUESTIONNAIRE

Demographic Information – Pre-Test - For Older Adult Participants
This questionnaire should be administered by a UGA staff person.

Date: _____

UGA Staff administering the questionnaire: _____

Read the questions to the participant and circle the answer given.

Read to the participant: "Now I am going to ask you a few questions about yourself."

	Demographics		Line 1
	Questions	Answers	
Demo1	Participant ID		1-3
Demo2	County		4-5
Demo3	Date of birth?	_____ / _____ / _____ Month/Day/Year	6-11
Demo4	How old are you?	Age: _____	12-14
Demo5	How long have you had diabetes?	Number of years: ____	15-16
Demo6	Ethnicity?	1) White 2) Black 3) Hispanic 4) Asian 5) other	17
Demo7	Gender?	0)Male 1)Female	18
Demo8	Years completed in school?	Years: _____	19-20
Demo9	Name of Healthcare Provider? 0 = no 1 = yes	Name: _____ Address: _____ Phone: _____	21
Demo 10	Name of Pharmacists? 0 = no 1 = yes	Name: _____ Address: _____ Phone: _____	22

	Current Health Conditions and Illnesses				Line 1
	Ask the client if their doctor has told them they have any of the following conditions.	No (0)	Yes (1)	Don't know (2)	(.)
Demo11	Weight loss				23
Demo12	Vision problems				24
Demo13	Retinopathy				25
Demo14	Kidney Disease				26
Demo15	Hearing problems				27
Demo16	Neuropathy or nerve problems				28
Demo17	Numbness or tingling in their feet				29
Demo18	Heart disease				30
Demo19	Diabetes				31
Demo20	If yes to Diabetes, what type?	I = (0)	II = (1)	DK = (3)	32

	Prescription Medication		line 1
	Do you take the following medications? <i>(list the diabetes or HTN medication if available)</i>		
Demo21	Oral diabetes medication?	(0) = no (1) = yes	33
Demo22	Oral diabetes medication?	(0) = no (1) = yes	35
Demo23	Oral diabetes medication?	(0) = no (1) = yes	37
Demo24	Insulin?	(0) = no (1) = yes	39
Demo25	Insulin?	(0) = no (1) = yes	41
Demo26	HTN	(0) = no (1) = yes	43

	Vitamins and Minerals		Dosage?	How long they have been taking it?	Line 1
	Do you take vitamins or minerals? <i>(List the multivitamin, vitamin or mineral if available.)</i>				
Demo27	Multivitamin?	(0) = no (1) = yes			44
Demo28	Vitamin?	(0) = no (1) = yes			45
Demo29	Vitamin?	(0) = no (1) = yes			46
Demo30	Vitamin?	(0) = no (1) = yes			47
Demo31	Mineral?	(0) = no (1) = yes			48
Demo32	Mineral?	(0) = no (1) = yes			49

Demo33	Weight in pounds:	_____ pounds	50-52
Demo34	Height in feet and inches:	_____ feet _____ inches	53-55
Demo35	BMI (see chart on next page to calculate):	_____ kg/m ²	55-56
	If your BMI is:		
	18 or less: You are at risk of <u>being</u> underweight. See your health care provider to help you find out why you are losing weight and to help you gain weight.		
	19 to 24: This is the normal healthy range.		
	25 or higher: You are overweight. See your health care provider to help you find out why you are gaining weight and to help you lose or stop gaining weight.		

Summary of Diabetes Self-Care Activities (SDSCA)-For Older Adult Participants

This questionnaire should be administered by a UGA staff person.

Pre-Test

Date: _____

UGA Staff administering the questionnaire: _____

Read the questions to the participant, and circle the answer given.

If 'other' is given as an answer, then fill in the space provided.

Read to the participant: "Now I am going to ask you a few questions about yourself."

"The questions below ask you about your diabetes self-care activities during the past 7 days. If you were sick during the past 7 days, please think back to the last 7 days that you were not sick. "

	<i>Questions</i>	Answers	code
	Diet	Circle answer	line 2
SELF1	Participant ID		1-3
SELF2	County		4-5
SELF3	How many of the last SEVEN DAYS have you followed a healthful eating plan?	0 1 2 3 4 5 6 7	6
SELF4	On average, over the past month, how many DAYS PER WEEK have you followed your eating plan?	0 1 2 3 4 5 6 7	7
SELF5	On how many of the last SEVEN DAYS did you eat five or more servings of fruits and vegetables?	0 1 2 3 4 5 6 7	8
SELF6	On how many of the last SEVEN DAYS did you eat high fat foods such as red meat or full-fat dairy products?	0 1 2 3 4 5 6 7	9
	<i>Exercise</i>		line 2
SELF7	On how many of the last SEVEN DAYS did you participate in at least 30 minutes of physical activity? (Total minutes of continuous activity, including walking).	0 1 2 3 4 5 6 7	10
SELF8	On how many of the last SEVEN DAYS did you participate in a specific exercise session (such as walking, swimming, biking) other than what you do around the house or as part of your daily activities?	0 1 2 3 4 5 6 7	11
	<i>Blood Sugar Testing</i>		line 2
SELF9	On how many of the last SEVEN DAYS did you test your blood sugar?	0 1 2 3 4 5 6 7	12
SELF10	On how many of the last SEVEN DAYS did you test your blood sugar the number of times recommended by your health care provider?	0 1 2 3 4 5 6 7	13
	<i>Foot Care</i>		line 2
SELF11	On how many of the last SEVEN DAYS did you check your feet?	0 1 2 3 4 5 6 7	14
SELF12	On how many of the last SEVEN DAYS did you inspect the inside of your shoes?	0 1 2 3 4 5 6 7	15

	<i>Smoking</i>		line 2
SELF13	Have you smoked cigarettes - even one puff - over the last seven days?	(0) No (1) Yes	16
SELF14	If yes, how many cigarettes did you smoke on an average day?	Number of cigarettes _____	17-19 (...)
	<i>Self-Care Recommendations</i>		line 2
SELF15	In which of the following has your healthcare team (doctors, nurse, dietitian, or diabetes educator) advised you to do? Please read to client and check all that apply.	(1) Follow a low fat eating plan? (2) Follow a complex carbohydrate diet? (3) Reduce the number of calories you eat to lose weight? (4) Eat lots of foods high in dietary fiber? (5) Eat lots (at least 5 servings per day) of fruits and vegetables? (6) Eat very few sweets (for example desserts, non-diet sodas, candy)? (7) Other(specify) _____ (8) I have not been given any advice about diet by my health care team.	20-27 (8)
SELF16	Which of the following has your health care team (doctor, nurse, dietitian, or diabetes educator) advised you to do? Please read to client and check all that apply.	(1) Get <u>mild</u> level of exercise (such as walking) on a daily basis. (2) Exercise continuously for a least 20 minutes at least 3 times a week (3) Fit exercise into your daily routine (for example, take stairs instead of elevators, park a block away and walk etc.) (4) Engage in a specific amount, type, duration and level of exercise. (5) Other (specify) _____ (6) I have not been given any advice about exercise by my health care team.	28-33 (6)
SELF17	Which of the following has your health care team (doctor, nurse, dietitian, or diabetes educator) advised you to do? Please read to client and check all that apply.	(1) Test your blood sugar using a drop of blood from your finger and a color chart. (2) Test your blood sugar using a machine to read the results. (3) Test your urine for sugar. (4) Other (specify) _____ (5) I have not been given any advice about testing my blood, or urine, for sugar by my health care team.	34-38 (5)

SELF18	Which of the following medications for your diabetes has your doctor prescribed? Please read to client and circle all that apply.	(1) An insulin shot 1 or 2 times a day. (2) An insulin shot 3 or more times a day. (3) Diabetes pills to control my blood sugar level. (4) Other (specify): _____ (5) I have not been prescribed either insulin or pills for my diabetes.	39--43 (5)
	<i>Diet</i>		line 2
SELF19	On how many of the last SEVEN DAYS did you space carbohydrates evenly through the day?	0 1 2 3 4 5 6 7	44
	<i>Medications</i>		line 2
SELF20	On how many of the last SEVEN DAYS, did you take your diabetes medication?	0 1 2 3 4 5 6 7 9	45
SELF21	On how many of the last SEVEN DAYS did you take your recommended number of insulin injections?	0 1 2 3 4 5 6 7 9	46
SELF22	On how many of the last SEVEN DAYS did you take your recommended number of diabetes pills?	0 1 2 3 4 5 6 7 9	47
	<i>Foot Care</i>		line 2
SELF23	On how many of the last SEVEN DAYS did you wash your feet?	0 1 2 3 4 5 6 7	48
SELF24	On how many of the last SEVEN DAYS did you soak your feet?	0 1 2 3 4 5 6 7	49
SELF25	On how many of the last SEVEN DAYS did you dry between your toes after washing?	0 1 2 3 4 5 6 7	50
	<i>Smoking</i>		line 2
SELF26	At your last doctor's visit, did anyone ask you about your smoking status?	(0) no (1) yes (2) don't know	51
SELF27	If you smoke, at your last doctor's visit, did anyone counsel you about stopping smoking or offer to refer you to a stop-smoking program?	(0) no (1) yes (2) don't smoke	52
SELF28	When did you last smoke a cigarette?	(1) More than two years ago, or never. (2) One to two years ago. (3) Four to twelve months ago. (4) One to three months ago. (5) Within the last month. (6) Today.	53

Scoring

Step 1: For items 1 -10, use the number of days per week on a scale of 0-7.

Step 2: Scoring Scales:

*General Diet = Mean number of days for items 3 and 4.

*Specific Diet = Mean number of days for items 5, and 6, reversing item 6 (0=7, 1=6, 2=5, 3=4, 4=3, 5=2, 6=1, 7=0). Using the individual items is recommended.

*Exercise = Mean number of days for items 7 and 8.

*Blood-Glucose Testing = Mean number of days for items 7 and 8.

*Foot care = Mean number of days for items for 9 and 10.

*Smoking status = Items 13 (2=nonsmoker, 1=smoker), and number of cigarettes smoked per day.

*Recommended regimen = Items 15 - 18.

*Diet = Use total number of days for item 19.

*Medications = Use item 20 or 21 AND 22, use total number of days for item 20, use mean number of days if both 21 and 22 are applicable.

*Foot care = Mean number of days for items 23 - 25, after reversing 24 and including items 23 and 24 from the brief version.

Adapted from: Toolbert, D.J., Hampton, S.E., Glasgor, R.E. The summary of diabetes self-care activities measure: results from 7 studies and a revised scale. Diabetes Care, 23: 943-50, 2000.

Health Belief / Questionnaire on Stages of Change

UGA Staff administering the questionnaire: _____

This questionnaire should be administered by a UGA staff person

	Questions	Answers (circle answer, fill in 'other')	Line 3
SOC1	Do you check your blood sugar yourself?	(0) no (1) yes (2) don't know	1
SOC2	If you don't check your blood sugar yourself, why not?	(1) do not know how (2) do not want to (3) do not find it helpful (4) painful (5) expensive (6) time consuming (7) scared (8)other	2

For questions 3 - 5, read to the participant: "Now I am going to ask you a few questions about yourself. When you think about the changes you have tried to make or have made, please rate them as, easy, difficult, or impossible. Easy means you have made the changes and have maintained them for more than six months. Difficult means you have tried to make these changes at least once, but have been unable to maintain them and have reverted back to your old ways. Impossible means you have not ever tried to change and do not think about changing." Show the client the appropriate page, "Easy, Difficult, Impossible".

	<i>Easy</i>	Which changes were easy? (Fill in answer below)	Line 3
SOC3	When you think about changes you have been asked to make because of your diabetes, which type of change was the easiest for you to make?	(1) Diet (2) Exercise (3) Self-Testing Glucose (4) Foot Care (5) Medications (6) Other	3-8 (6)
	<i>Difficult</i>	Which changes were difficult? (Fill in answer below)	Line 3
SOC4	When you think about changes you have been asked to make because of your diabetes, which type of change was difficult for you to make?	(1) Diet (2) Exercise (3) Self-Testing Glucose (4) Foot Care (5) Medications (6) Other	9-14 (6)
	<i>Impossible</i>	Which changes are impossible? (Fill in answer below)	Line 3
SOC5	When you think about changes you have been asked to make because of your diabetes, which type of change was impossible for you to make?	(1) Diet (2) Exercise (3) Self-Testing Glucose (4) Foot Care (5) Medications (6) Other	15-20 (6)

For questions 6 - 14, read the following, "Please rate, on a scale of 1 - 4, how much you agree with the following statements '.

		Strongly Disagree (1)	Disagree (2)	Agree (3)	Strongly Agree (4)	Line 3
SOC6	I believe that my diet and medications will prevent complications related to diabetes.					21
SOC7	My diabetes is not a problem as long as I feel all right.					22
SOC8	My diabetes will have a bad effect on my future health.					23
SOC9	My diabetes will cause me to be sick a lot.					24
SOC10	I believe I can control my diabetes.					25
SOC11	I believe my diet and medication will control my diabetes.					26
SOC12	I cannot understand everything I've been told about my diet.					27
SOC13	I believe I will always need my diabetes diet and medication.					28
SOC14	I have more serious health concerns than diabetes.					29

For questions 15- 26, read the following, “Please rate, on a scale of 1 - 4, how much you believe the following are **barriers to you**”. Check the box that applies.

		Strongly Disagree (1)	Disagree (2)	Agree (3)	Strongly Agree (4)	line 3
SOC15	My ability to follow diet recommendations?					30
SOC16	My ability to follow exercise recommendations?					31
SOC17	My ability to do home glucose monitoring?					32
SOC18	Home glucose monitoring is too painful?					33
SOC19	Affordability of following diet recommendations?					34
SOC20	Affordability of following exercise recommendations?					35
SOC21	Affordability of home glucose monitoring?					36
SOC22	Affordability of hemoglobin A _{1c} ?					37
SOC23	Affordability of dilated eye exam?					38
SOC24	<i>Availability</i> of laboratory facilities for glycosolated hemoglobin?					39
SOC25	<i>Availability</i> of ophthalmology services?					40
SOC26	<i>Availability</i> of nutritional counseling?					41

Adapted from: Sullivan, E.D., Joseph, D.H. Struggling with behavioral changes: a special case for clients with diabetes. The Diabetes Educator, 24: 72-76, 1998. The preparation stage was included with the contemplation stage.

Chin, M.H., Cook, S., Jin, L., Drum, M.L., Harrison, J. F., Koppert, J., Thiel, F., Herrand, A.G., Schaefer, C.T., Takaachima, H.T., Chin, S.C. Barriers to providing diabetes care in community health center, Diabetes Care, 24 (2): 274-86, 2001.

Questionnaire on Hemoglobin A_{1c} Blood Test

This questionnaire should be administered by a UGA staff person.

Date: _____

UGA Staff administering the questionnaire: _____

Read the questions to the participant and circle the answer given. Read to the participant:

"Next, we are going to talk about the hemoglobin A_{1c} test (also called H-b-A-1-c). I'll read a statement to you and then ask you to tell me if you think it is "true" or "false," then we'll discuss the statement."

HT1	Participant ID	_____	Line 1 1-3
HT2	County	_____	4-5
	Questions	Circle answer 0 1 2	
HT3	1. A hemoglobin A _{1c} test measures the average amount of sugar in your blood over the last 3 months.	False True Don't Know	6
HT4	2. It's important to know your hemoglobin A _{1c} number.	False True Don't Know	7
HT5	3. All people with diabetes need to have a hemoglobin A _{1c} test.	False True Don't Know	8
HT6	4. The hemoglobin A _{1c} goal for people with diabetes is less than 6.5 percent.	False True Don't Know	9
HT7	5. Most people can tell what their blood sugar levels are simply by how they feel.	False True Don't Know	10
HT8	6. You can have a "touch of sugar" but don't have to do anything about it.	False True Don't Know	11
HT9	7. You can do something about high blood sugar.	False True Don't Know	12
HT10	8. A hemoglobin A _{1c} number over 8 percent is a sign that one or more parts of your treatment plan needs to be changed.	False True Don't Know	13
HT11	9. A hemoglobin A _{1c} test should be done about once a year.	False True Don't Know	14
HT12	10. There's no proof that lowering your hemoglobin A _{1c} number can reduce your chances of getting serious eye, kidney, or nerve disease.	False True Don't Know	15
HT13	Percent correct:	%	16-18
HT14	A1c lab. value	_____	19-22

Educator: Review the correct answers with the client in an individual session or in a group session (see next page).

National Diabetes Education Program, <http://ndep.nih.gov/materials/pubs/HbA1c/HbA1c-checkIQ.h>

Post - Tests

Diabetes Self-Report

Older Adult Participant Satisfaction Questionnaire

This questionnaire should be administered by a UGA staff person.

Date: _____

UGA Staff administering the questionnaire: _____

Read the questions to the participant and circle the answer given.

Read to the participant: "Now I am going to ask you a few questions about yourself."

	Demographics		Line 1
	Questions	Answers	
PSAT1	Participant ID	____ _	1-3
PSAT2	County	____	4-5

PSAT3	How would you rate your overall satisfaction with the "Diabetes and You" program that we have offered in your senior center during the past several months?	1) Poor 2) Fair 3) Good 4) Very Good 5) Excellent	6
PSAT4	Have you changed the way you were taking your medication, stopped taking your medication, or started taking any new medication since the program started?	0) no 1) yes 9) DK	7
PSAT5	If yes, then what changes have been made to your medication?	1) I started taking a new medication. 2) I changed how I was taking my medication. 3) I stopped taking my medication. 4) DK	8

Summary of Diabetes Self-Care Activities (SDSCA)-For Older Adult Participants

This questionnaire should be administered by a UGA staff person. Pre-Test

Date: _____

UGA Staff administering the questionnaire: _____

Read the questions to the participant, and circle the answer given.

If 'other' is given as an answer, then fill in the space provided.

Read to the participant: "Now I am going to ask you a few questions about yourself."

"The questions below ask you about your diabetes self-care activities during the past 7 days. If you were sick during the past 7 days, please think back to the last 7 days that you were not sick. "

	<i>Questions</i>	Answers	code
	Diet	Circle answer	line 2
SELF1	Participant ID	_____	1-3
SELF2	County	_____	4-5
SELF3	How many of the last SEVEN DAYS have you followed a healthful eating plan?	0 1 2 3 4 5 6 7	6
SELF4	On average, over the past month, how many DAYS PER WEEK have you followed your eating plan?	0 1 2 3 4 5 6 7	7
SELF5	On how many of the last SEVEN DAYS did you eat five or more servings of fruits and vegetables?	0 1 2 3 4 5 6 7	8
SELF6	On how many of the last SEVEN DAYS did you eat high fat foods such as red meat or full-fat dairy products?	0 1 2 3 4 5 6 7	9
	<i>Exercise</i>		line 2
SELF7	On how many of the last SEVEN DAYS did you participate in at least 30 minutes of physical activity? (Total minutes of continuous activity, including walking).	0 1 2 3 4 5 6 7	10
SELF8	On how many of the last SEVEN DAYS did you participate in a specific exercise session (such as walking, swimming, biking) other than what you do around the house or as part of your daily activities?	0 1 2 3 4 5 6 7	11
	<i>Blood Sugar Testing</i>		line 2
SELF9	On how many of the last SEVEN DAYS did you test your blood sugar?	0 1 2 3 4 5 6 7	12
SELF10	On how many of the last SEVEN DAYS did you test your blood sugar the number of times recommended by your health care provider?	0 1 2 3 4 5 6 7	13
	<i>Foot Care</i>		line 2
SELF11	On how many of the last SEVEN DAYS did you check your feet?	0 1 2 3 4 5 6 7	14
SELF12	On how many of the last SEVEN DAYS did you inspect the inside of your shoes?	0 1 2 3 4 5 6 7	15

	<i>Smoking</i>		line 2
SELF13	Have you smoked cigarettes - even one puff - over the last seven days?	(0) No (1) Yes	16
SELF14	If yes, how many cigarettes did you smoke on an average day?	Number of cigarettes _____	17-19 (...)
	<i>Self-Care Recommendations</i>		line 2
SELF15	In which of the following has your healthcare team (doctors, nurse, dietitian, or diabetes educator) advised you to do? Please read to client and check all that apply.	(1) Follow a low fat eating plan? (2) Follow a complex carbohydrate diet? (3) Reduce the number of calories you eat to lose weight? (4) Eat lots of foods high in dietary fiber? (5) Eat lots (at least 5 servings per day) of fruits and vegetables? (6) Eat very few sweets (for example desserts, non-diet sodas, candy)? (7) Other(specify) _____ (8) I have not been given any advice about diet by my health care team.	20-27 (8)
SELF16	Which of the following has your health care team (doctor, nurse, dietitian, or diabetes educator) advised you to do? Please read to client and check all that apply.	(1) Get <u>mild</u> level of exercise (such as walking) on a daily basis. (2) Exercise continuously for a least 20 minutes at least 3 times a week (3) Fit exercise into your daily routine (for example, take stairs instead of elevators, park a block away and walk etc.) (4) Engage in a specific amount, type, duration and level of exercise. (5) Other (specify) _____ (6) I have not been given any advice about exercise by my health care team.	28-33 (6)
SELF17	Which of the following has your health care team (doctor, nurse, dietitian, or diabetes educator) advised you to do? Please read to client and check all that apply.	(1) Test your blood sugar using a drop of blood from your finger and a color chart. (2) Test your blood sugar using a machine to read the results. (3) Test your urine for sugar. (4) Other (specify) _____ (5) I have not been given any advice about testing my blood, or urine, for sugar by my health care team.	34-38 (5)

SELF18	Which of the following medications for your diabetes has your doctor prescribed? Please read to client and circle all that apply.	(1) An insulin shot 1 or 2 times a day. (2) An insulin shot 3 or more times a day. (3) Diabetes pills to control my blood sugar level. (4) Other (specify): _____ (5) I have not been prescribed either insulin or pills for my diabetes.	39--43 (5)
	<i>Diet</i>		line 2
SELF19	On how many of the last SEVEN DAYS did you space carbohydrates evenly through the day?	0 1 2 3 4 5 6 7	44
	<i>Medications</i>		line 2
SELF20	On how many of the last SEVEN DAYS, did you take your diabetes medication?	0 1 2 3 4 5 6 7 9	45
SELF21	On how many of the last SEVEN DAYS did you take your recommended number of insulin injections?	0 1 2 3 4 5 6 7 9	46
SELF22	On how many of the last SEVEN DAYS did you take your recommended number of diabetes pills?	0 1 2 3 4 5 6 7 9	47
	<i>Foot Care</i>		line 2
SELF23	On how many of the last SEVEN DAYS did you wash your feet?	0 1 2 3 4 5 6 7	48
SELF24	On how many of the last SEVEN DAYS did you soak your feet?	0 1 2 3 4 5 6 7	49
SELF25	On how many of the last SEVEN DAYS did you dry between your toes after washing?	0 1 2 3 4 5 6 7	50
	<i>Smoking</i>		line 2
SELF26	At your last doctor's visit, did anyone ask you about your smoking status?	(0) no (1) yes (2) don't know	51
SELF27	If you smoke, at your last doctor's visit, did anyone counsel you about stopping smoking or offer to refer you to a stop-smoking program?	(0) no (1) yes (2) don't smoke	52
SELF28	When did you last smoke a cigarette?	(1) More than two years ago, or never. (2) One to two years ago. (3) Four to twelve months ago. (4) One to three months ago. (5) Within the last month. (6) Today.	53

Scoring

Step 1: For items 1 -10, use the number of days per week on a scale of 0-7.

Step 2: Scoring Scales:

*General Diet = Mean number of days for items 3 and 4.

*Specific Diet = Mean number of days for items 5, and 6, reversing item 6 (0=7, 1=6, 2=5, 3=4, 4=3, 5=2, 6=1, 7=0). Using the individual items is recommended.

*Exercise = Mean number of days for items 7 and 8.

*Blood-Glucose Testing = Mean number of days for items 7 and 8.

*Foot care = Mean number of days for items for 9 and 10.

*Smoking status = Items 13 (2=nonsmoker, 1=smoker), and number of cigarettes smoked per day.

*Recommended regimen = Items 15 - 18.

*Diet = Use total number of days for item 19.

*Medications = Use item 20 or 21 AND 22, use total number of days for item 20, use mean number of days if both 21 and 22 are applicable.

*Foot care = Mean number of days for items 23 - 25, after reversing 24 and including items 23 and 24 from the brief version.

Adapted from: Toolbert, D.J., Hampton, S.E., Glasgor, R.E. The summary of diabetes self-care activities measure: results from 7 studies and a revised scale. Diabetes Care, 23: 943-50, 2000.

Questionnaire on Hemoglobin A_{1c} Blood Test

This questionnaire should be administered by a UGA staff person.

Date: _____

UGA Staff administering the questionnaire: _____

Read the questions to the participant and circle the answer given. Read to the participant:

"Next, we are going to talk about the hemoglobin A_{1c} test (also called H-b-A-1-c). I'll read a statement to you and then ask you to tell me if you think it is "true" or "false," then we'll discuss the statement."

HT1	Participant ID	_____	Line 1 1-3
HT2	County	_____	4-5
	Questions	Circle answer 0 1 2	
HT3	1. A hemoglobin A _{1c} test measures the average amount of sugar in your blood over the last 3 months.	False True Don't Know	6
HT4	2. It's important to know your hemoglobin A _{1c} number.	False True Don't Know	7
HT5	3. All people with diabetes need to have a hemoglobin A _{1c} test.	False True Don't Know	8
HT6	4. The hemoglobin A _{1c} goal for people with diabetes is less than 6.5 percent.	False True Don't Know	9
HT7	5. Most people can tell what their blood sugar levels are simply by how they feel.	False True Don't Know	10
HT8	6. You can have a "touch of sugar" but don't have to do anything about it.	False True Don't Know	11
HT9	7. You can do something about high blood sugar.	False True Don't Know	12
HT10	8. A hemoglobin A _{1c} number over 8 percent is a sign that one or more parts of your treatment plan needs to be changed.	False True Don't Know	13
HT11	9. A hemoglobin A _{1c} test should be done about once a year.	False True Don't Know	14
HT12	10. There's no proof that lowering your hemoglobin A _{1c} number can reduce your chances of getting serious eye, kidney, or nerve disease.	False True Don't Know	15
HT13	Percent correct:	%	16-18
HT14	A1c lab. value		19-22

Educator: Review the correct answers with the client in an individual session or in a group session (see next page).

National Diabetes Education Program, <http://ndep.nih.gov/materials/pubs/HbA1c/HbA1c-checkIQ.h>

APPENDIX C

REVISED EAT WELL, LIVE WELL QUESTIONNAIRE

Questionnaire DY

“Diabetes and You”

Circle one: Pre-Test or Post-test Questionnaire

Date: _____

UGA Staff administering questionnaire: _____

Demo1	Participant ID		Code
Demo2	County		
Demo3	Date of Birth	____/____/____ Month/Day/Year	
Demo4	How old are you?	Age: _____	Line 1-3
Demo5	How long have you had diabetes?	Number of years: ____	4-5
Demo6	Ethnicity?	1) Caucasian 2) African American 3) Hispanic 4) Asian 5) other	6
Demo7	Gender?	0)Male 1)Female	7
Demo8	Years Completed in school?	Years: _____	8-9
Demo9	Healthcare Provider?	Name: _____ Address: _____ Phone: _____	
<i>Hemoglobin A1c</i>			
SDSCA1/A1c20	Have you heard of (hemoglobin)A1c?	(0) N (1) Yes	Line 1
SDSCA2/A1c21	If yes, what should your level be?		
<i>The questions are for activities during the past 7 days. If you were sick think of the 7 days before.</i>		Days	code
<i>Diet</i>			line 2
SDSCA3/SELF3	How many of the last SEVEN DAYS have you followed a healthful eating plan?		6
SDSCA4/SELF4	On average, over the past month, how many DAYS PER WEEK have you followed your eating plan?		7
SDSCA5/SELF5	On how many of the last SEVEN DAYS did you eat five or more servings of fruits and vegetables?		8
SDSCA6/SELF6	On how many of the last SEVEN DAYS did you eat high fat foods such as red meat or full-fat dairy?		9
<i>Exercise</i>			line 2
SDSCA7/SELF7	On how many of the last SEVEN DAYS did you participate in at least 30 minutes of physical activity		10
SDSCA8/SELF8	On how many of the last SEVEN DAYS did you participate in a specific exercise session other than what you do around the house or as a part of a your daily activities?		11

	<i>Blood Sugar Testing</i>		line 2
SDSCA9/SELF9	On how many of the last SEVEN DAYS did you test your blood sugar?		12
SDSCA10/SELF10	On how many of the last SEVEN DAYS did you test your blood sugar as recommended by your Doctor?		13
	<i>Foot Care</i>		line 2
SDSCA11/SELF11	On how many of the last SEVEN DAYS did you check your feet?		14
SDSCA12/SELF12	On how many of the last SEVEN DAYS did you inspect the inside of your shoes?		15
	<i>Smoking</i>		line 2
SDSCA13/SELF13	Have you smoked cigarettes - even one puff - over the last seven days?	(0) No (1) Yes	16
SDSCA14/SELF14	If yes, how many cigarettes did you smoke on an average day?	Number of cigarettes	17-19
	<i>Self-Care Recommendations</i>		line 2
SDSCA15/SELF18	Which medication has your Doctor prescribed for your diabetes? 1). An insulin shot 1 or 2 times a day. 2) An insulin shot 3 or more times a day 3) Diabetes pills to control my blood sugar 4) Other _____ 5) I have not been prescribed either insulin or pills for my diabetes.		39—43
	<i>Diet</i>		line 2
SDSCA16/SELF19	On how many of the last SEVEN DAYS did you space carbohydrates evenly?		44
	<i>Medications</i>		line 2
SDSCA17/SELF20	On how many of the last SEVEN DAYS, did you take your diabetes medication?		45
	<i>Foot Care</i>		line 2
SDSCA18/SELF23	On how many of the last SEVEN DAYS did you wash your feet?		48
SDSCA19/SELF24	On how many of the last SEVEN DAYS did you soak your feet?		49
SDSCA20/SELF25	On how many of the last SEVEN DAYS did you dry between your toes after washing?		50

“Diabetes and You” Pre/Post-test Questionnaire

Questionnaire on Hemoglobin A_{1c} Blood Test

Date: _____

UGA Staff administering the questionnaire: _____

Read the questions to the participant and circle the answer given. Read to the participant:

"Next, we are going to talk about the hemoglobin A_{1c} test (also called H-b-A-1-c). I'll read a statement to you and then ask you to tell me if you think it is "true" or "false," then we'll discuss the statement."

HT1	Participant ID	_____	Line 1 1-3
HT2	County		4-5
	Questions	Circle 0 1 2	
HT3	1. An A _{1c} test measures the average amount of sugar in your blood over the last 3 months.	F T DK	6
HT4	2. It's important to know your A _{1c} number.	F T DK	7
HT5	3. All people with diabetes need to have an A _{1c} test.	F T DK	8
HT6	4. The A _{1c} goal for people with diabetes is less than or equal to 6.5 percent.	F T DK	9
HT7	5. Most people can tell what their blood sugar levels are simply by how they feel.	F T DK	10
HT8	6. You can have a "touch of sugar" but don't have to do anything about it.	F T DK	11
HT9	7. You can do something about high blood sugar.	F T DK	12
HT10	8. An A _{1c} number over 8 percent is a sign that one or more parts of your treatment plan needs to be changed.	F T DK	13
HT11	9. A A _{1c} test should be done about once a year.	F T DK	14
HT12	10. There's no proof that lowering your A _{1c} number can reduce your chances of getting serious eye, kidney, <u>or</u> nerve disease.	F T DK	15
HT13	Percent correct	%	16-18
HT14	A _{1c} lab value	%	19-22
HT15	Post-Test only: How would you rate this program? 1=Excellent, 2=Good, 3= Fair, or 4=Poor		23

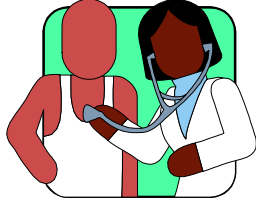
Educator: Review the correct answers with the client in an individual session or in a group session

From: **National Diabetes Education Program**, <http://ndep.nih.gov/materials/pubs/HbA1c/HbA1c-checkIQ.h>

Adapted from: Toolbert, D.J., Hampton, S.E., Glasgor, R.E. The summary of diabetes self-care activities measure: results from 7 studies and a revised scale. *Diabetes Care*, 23: 943-50, 2000. **Updated S. Stone- 4/02/03**

APPENDIX D

EAT WELL, LIVE WELL FLYER



Diabetes and You **Program**

Volunteers, with and without Diabetes, needed from Senior Nutrition Centers for a study to help discover ways to control diabetes and its complications.

BENEFITS ARE FREE:

- Classes where you will learn about diabetes, diabetes monitoring, proper foot care techniques, meal planning, and complications associated with diabetes.
- Glucose and Hemoglobin A_{1C} monitoring tests.

For more information, please contact:

Ms. Susan Stone, RD, LD Project Coordinator, Department of
Foods and Nutrition, University of Georgia, Athens, Georgia
30602

Phone: (706) 542-4838

-Or-

Ms. _____, _____ County Senior Center

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