University of Cincinnati

Date: 7/6/2011

I, Candice N Jones, hereby submit this original work as part of the requirements for the degree of Master of Education in Health Education.

It is entitled:
Examining Racial Differences in Knowledge and Attitudes of Diabetes Management in Newly Diagnosed Type 2 Diabetes Patients

Student's name: Candice N Jones

This work and its defense approved by:

Committee chair: Manoj Sharma, MBBS, PhD
Committee member: Liliana Guyler, PhD
Committee member: Cynthia Stegeman, EdD
EXAMINING RACIAL DIFFERENCES IN KNOWLEDGE AND ATTITUDES OF
DIABETES MANAGEMENT IN NEWLY DIAGNOSED TYPE 2 DIABETES PATIENTS

A thesis submitted to the
Division of Graduate Studies and Research
of the University of Cincinnati

In partial fulfillment of the
requirements for the degree of

MASTER OF SCIENCE
In the School of Human Services
by the College of Education,
Criminal Justice, and Human Services

2011
by
Candice Noelle Jones, R.D., L.D., C.D.E.

B.S., University of Connecticut 2004

Committee Chair: Manoj Sharma, M.B., B.S., M.C.H.E.S., Ph.D.
Diabetes Mellitus was a disease that made its presence known in all races, ethnicities, ages, and genders, for it did not discriminate. African Americans were the second largest prevalence of diabetes following Alaskan Natives/Americans Indians. Through the implementation of the levels of disease prevention, African Americans were seen in the secondary or tertiary levels due to lack of access to resources located in the primary level. Thus, African Americans were at high risk for delayed diagnosis of type 2 diabetes when they were already experiencing complications of the disease.

The purpose of this study was to examine knowledge and attitude differences among African Americans and Caucasians prior to and after attending a diabetes education program considered a “best practice” in the field of diabetes. Racial differences in knowledge and attitudes were assessed specifically among newly diagnosed patients with type 2 diabetes. Through the use of a medical chart review, a quasi-experimental design, patients (n = 100, 50 African Americans, 50 Caucasians) completed pre-tests and post-tests assessing knowledge and attitudes about diabetes before and after completion of a diabetes education program. Some significant findings included lower knowledge levels among African American patients on pre-test (p = 0.012). Patients who attended individual education sessions had significantly higher knowledge levels on their post-tests (p = 0.022). Although 63% of the patients were female
(37% male), no significance was found when to sex was used as a variable in relation to knowledge and attitude scores among African Americans and Caucasians. Recommendations for further research would be to use the same pre-test, post-tests instrumentation for evaluation, however at another American Diabetes Association (ADA) recognized diabetes education program to assess these findings on a larger scale.
Acknowledgements

Although I am the author of this thesis, I would like to express my gratitude and acknowledge those who have helped me along my journey to the completion of this chapter in my life. This thesis took six years to complete, and although it was a timely process, every minute was worth it in the end. I would like to thank everyone for their patience during this process and that your support throughout the years allowed me never to give up on myself or my goals.

I would like to thank The Christ Hospital and the Christ Hospital Diabetes Center for their permission to complete this study at their site. I would also like to thank all of the diabetes educators for their assistance and for providing accommodations for the study. I would also like to thank the College of Education, Criminal Justice, and Human Services along with my chair Dr. Manoj Sharma and my committee members Dr. Liliana Rojas-Guyler and Dr. Cynthia Stegeman. Thank you for all of the wisdom and guidance that all of you have provided throughout process. I am a better dietitian, diabetes educator, and overall person for having each of you in my life.

I would also like to thank my sister, Heather for her assistance with data analysis, guidance and feedback. Lastly, I would like to thank my mother, family and friends for their ongoing support and love.
Table of Contents

Abstract .......................................................................................................................... i
Acknowledgements ........................................................................................................ iv
List of Tables .................................................................................................................. vii
List of Figures ................................................................................................................ viii

Chapter 1: The Problem ............................................................................................... 1
  Statement of the Problem ........................................................................................... 5
  Significance .................................................................................................................. 5
  Research Questions ..................................................................................................... 6
  Hypotheses .................................................................................................................. 6
  Delimitations ............................................................................................................... 9
  Limitations .................................................................................................................. 10
  Assumptions .............................................................................................................. 11
  Operational Definitions ............................................................................................. 12

Chapter 2: Review of Literature .................................................................................. 14
  Epidemiology ............................................................................................................. 15
    Mortality ..................................................................................................................... 16
    Morbidity ................................................................................................................... 16
    Cost of Diabetes ....................................................................................................... 17
  Determinants .............................................................................................................. 17
    Environmental Determinants .................................................................................. 18
    Behavioral Determinants ....................................................................................... 21
  Interventions for Diabetes Prevention ....................................................................... 21
    Primary Level of Diabetes Prevention ................................................................. 23
    Secondary Level of Diabetes Prevention ............................................................ 24
    Tertiary Level of Diabetes Prevention ................................................................... 26
  Knowledge and Attitudes of Diabetes ....................................................................... 28
  Racial Differences in Diabetes Management ........................................................... 30
  Areas for Improvement ............................................................................................... 34
  Summary ..................................................................................................................... 35

Chapter 3: Methods ...................................................................................................' 37
  Study Design and its Rationale .................................................................................... 37
  Target Location .......................................................................................................... 38
  Population and Sample of Population ....................................................................... 39
  Comprehensive Diabetes Education Sessions/Intervention .................................... 41
  Instrumentation .......................................................................................................... 42
  Procedures ................................................................................................................... 45
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Statistical Analysis</td>
<td>46</td>
</tr>
<tr>
<td>Chapter 4: Results</td>
<td>48</td>
</tr>
<tr>
<td>Chart Review Patients</td>
<td>49</td>
</tr>
<tr>
<td>Descriptive statistics</td>
<td>52</td>
</tr>
<tr>
<td>Inferential Statistics</td>
<td>61</td>
</tr>
<tr>
<td>Summary</td>
<td>68</td>
</tr>
<tr>
<td>Chapter 5: Conclusions and Recommendations</td>
<td>69</td>
</tr>
<tr>
<td>Research Hypotheses and Discussion</td>
<td>69</td>
</tr>
<tr>
<td>Limitations of the Study</td>
<td>74</td>
</tr>
<tr>
<td>Recommendations for Future Research</td>
<td>76</td>
</tr>
<tr>
<td>Summary</td>
<td>78</td>
</tr>
<tr>
<td>References</td>
<td>79</td>
</tr>
<tr>
<td>Appendixes</td>
<td>85</td>
</tr>
<tr>
<td>Appendix A: The Christ Hospital Diabetes Outpatient Self-Management</td>
<td>85</td>
</tr>
<tr>
<td>and Training Center Education Program Evaluations for Pre-test/Post-test.</td>
<td>85</td>
</tr>
<tr>
<td>Appendix B: Data collection sheet</td>
<td>88</td>
</tr>
<tr>
<td>Appendix C: The Christ Hospital Diabetes Center Study Approval Letter.</td>
<td>89</td>
</tr>
</tbody>
</table>
List of Tables

<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table 3.1</td>
<td>Demographics of Patients Completing Program between January 2009 - December 2010</td>
<td>41</td>
</tr>
<tr>
<td>Table 4.1</td>
<td>Demographic Profile of Patients</td>
<td>51</td>
</tr>
<tr>
<td>Table 4.2</td>
<td>Descriptive Statistics for Age</td>
<td>52</td>
</tr>
<tr>
<td>Table 4.3</td>
<td>Descriptive Statistics for Knowledge Levels Pertaining to Race/Ethnicity and Type of Session</td>
<td>53</td>
</tr>
<tr>
<td>Table 4.4</td>
<td>Descriptive Statistics for Attitude Levels Pertaining to Race and Type of Session</td>
<td>55</td>
</tr>
<tr>
<td>Table 4.5</td>
<td>Paired Samples Test for Overall Knowledge and Attitudes</td>
<td>62</td>
</tr>
<tr>
<td>Table 4.6</td>
<td>Analysis of Variance for Overall Knowledge and Attitudes in Relation to Race/Ethnicity</td>
<td>63</td>
</tr>
<tr>
<td>Table 4.7</td>
<td>Analysis of Variance for Overall Knowledge and Attitudes in Relation to Type of Session</td>
<td>65</td>
</tr>
<tr>
<td>Table 4.8</td>
<td>Repeated Measure Analysis of Covariance for Overall Knowledge and Attitudes in Relation to Race and Type of Education Session</td>
<td>67</td>
</tr>
</tbody>
</table>
## List of Figures

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Figure 2.1</td>
<td>Non-modifiable and modifiable determinants for diabetes mellitus…</td>
<td>20</td>
</tr>
<tr>
<td>Figure 2.2</td>
<td>Levels of Prevention</td>
<td>22</td>
</tr>
</tbody>
</table>
Chapter One

The Problem

Diabetes Mellitus was a disease that affected all races, ethnicities, ages and genders, for it came in many forms and defined in many ways. There were four types of diabetes; type 1, originally known as insulin dependent diabetes mellitus (IDDM), type 2 previously referred to as non-insulin dependent diabetes mellitus (NIDDM), gestational diabetes mellitus (GDM) and pre-diabetes. Type 1 diabetes, initially referred to as juvenile diabetes developed primarily in children or before age 30. Type 1 diabetes involved the autoimmune destruction of pancreatic beta-cells. On the other hand, type 2 diabetes primarily developed in those 30 years or older, thus explaining one of its old names “maturity-onset,” or “adult-onset” diabetes. Type 2 diabetes often entailed normal, high or low insulin levels, the presences of hyperglycemia, and/or insulin resistance. An increase in the number of individuals developing “maturity-onset” diabetes in adolescent and young adult years instead of the later years, helped redefine the two categories of diabetes, renaming them type 1 and type 2 diabetes (Mahan & Escott-Stump, 2007). Gestational diabetes mellitus pertained to the development of high blood glucose levels during pregnancy. Pre-diabetes, also known as Impaired Glucose Tolerance (IGT) or Impaired Fasting Glucose (IFG) identified someone with higher than normal blood glucose levels, however not high enough to be diagnosed with diabetes mellitus.

Type 1 diabetes, which represented 5-10% of all diabetes cases entailed total insulin deficiency and required subcutaneous intensive insulin injection therapy, medical nutrition therapy and exercise education. Type 2 diabetes accounted for 90-95% of all diabetes cases and primarily involved dietary modifications, exercise, and weight loss if needed. In some cases, the addition of medication and/or intensive insulin injection therapy was required. Since type 2
diabetes constituted for the majority of the diabetes population, many patients who attended out-patient diabetes education programs often found that those programs were primarily designed for people with type 2 diabetes.

In 2011, 25.8 million Americans had diabetes along with 1.9 million newly diagnosed cases over the age of 20 years old (Centers for Disease Control and Prevention [CDC], 2011). Within the state of Ohio, diabetes was the seventh leading cause of death. In 2009, about 900,000 (10.1%), Ohio residents had diabetes. When comparing Ohio’s demographic breakdown to the United States’, among residents with diabetes and of the adult population, 12.7% of those with diabetes in Ohio and 18.7% in the country were African American. Among Caucasians, 9.9% in Ohio and 10.2% in the country had diabetes (CDC). These statistics illustrated the high prevalence of diabetes among the African American population.

The population with the highest prevalence in the nation was the American Indians or Alaska Natives, however African Americans followed, a close second place. Although diabetes showed its presence among any race/ethnicity, minorities seemed to have higher prevalence. Many morbidity complications such as heart disease, retinopathy, neuropathy and nephropathy were most likely to develop in those patients who did not achieve and maintain optimal glycemic control. Thus, if one were noncompliant in managing their diabetes, most likely, their organs would cease production, causing the body to shut down.
There were both non-modifiable and modifiable determinants of diabetes mellitus. Mahan and Escott-Stump (2007) referred to the non-modifiable factors as genetics; ethnicity and gender which could not be amended to decrease risk for developing diabetes. Environmental factors such as communities and economic status or behavioral factors such as dietary habits or exercise practices were modifiable; they were altered to decrease the risk for diabetes (Mahan & Escott-Stump). Although it was hard to modify environmental factors, many viewed them as barriers to acquiring diabetes education resources, which were a necessity to adjust behavioral determinants. Ultimately, environmental and behavioral determinants of diabetes could affect each other.

In efforts to address the diabetes epidemic within the African American population, the application of a modified version of the “levels of disease prevention” occurred in this literature review. Three levels consisting of primary, secondary, and tertiary each addressed a particular phase of the disease depending on its state of the development and progression. The primary level solely focused on preventive measures such as diabetes prevention education, healthy eating and physical activity behaviors.

The secondary level concentrated on those who were showing signs of being at risk for developing diabetes, thus health and risk factor screenings were critical to assess one’s health status. Often, pre-diabetes diagnosis occurred in this level and often, disease-prevention education programs with primary focus on dietary and physical activity behavioral changes were provided. A pre-diabetes diagnosis entailed higher than normal blood glucose levels, however not high enough to meet the criteria for diagnosis of diabetes mellitus. The secondary level of prevention of diabetes often consisted of education resources to manage, decrease, and reverse the risks that were associated with disease. Lastly, the tertiary level focused on the treatment of
those newly diagnosed and/or had fully developed the disease. Often those in this level were already at risk or were experiencing acute or chronic complications associated with diabetes. Unfortunately, pertaining to diabetes, many African Americans found themselves in the secondary level of prevention due to poor access to health resources such as health screenings (Antony & Baaklini, 2004). African Americans also found themselves in the tertiary level due to poor quality and quantity of diabetes education provided in the primary level (Rhee, et al, 2005).

In order to understand why African Americans were found mostly in the tertiary level of disease prevention and already experiencing complications of poor glycemic control, it was important to identify the existence of racial disparities within diabetes self-management education. Many racial differences between African Americans and Caucasians in diabetes were present in self blood glucose monitoring practices, Hemoglobin A1c (HbA1c) measures, physical activity levels, and the prevalence of overweight and obesity. Racial differences within complications of diabetes have also been highlighted such as the presence of smoking, hypertension, dyslipidemia, and high cholesterol. However, to better understand the racial disparities that were present in diabetes, one had to examine whether racial differences were present within diabetes education that was being provided for patients.

By evaluating the existence of racial differences in a diabetes education program pertaining to knowledge levels and attitude prior to and following completion of that program, one could conclude whether the education being provided was a significant variable as to why racial disparities occurred in diabetes self-management. Furthermore, through the assessment of a diabetes education program that acted as an initial introduction to comprehensive diabetes education in newly diagnosed patients with type 2 diabetes, one could build a solid case as to
whether success in increasing diabetes self-management awareness was achieved for minority populations, specifically African Americans.

Statement of the Problem

The purpose of this study was to examine knowledge and attitude differences among African Americans and Caucasians prior to and after attending a diabetes education program. Furthermore, racial differences in knowledge and attitudes were assessed specifically among newly diagnosed patients with type 2 diabetes. The specific objective of this study was to examine whether racial differences were present in a program considered a best practice within the field of diabetes. Factors examined included diabetes knowledge and attitudes pertaining to complications of diabetes, foods that affect blood glucose levels, value of tight glycemic control, psychosocial impact of diabetes, and disease treatment.

Significance

Due to the many racial disparities that exist in diabetes management, it was imperative to examine the forms of diabetes education being taught and provided to the diabetes population. By examining the knowledge and attitude levels of populations, specifically, Caucasians and African Americans, one was able to identify whether disparities were occurring in diabetes education and then brainstorm revisions to teaching curriculums that would better address the needs of different cultures/ethnicities. The overall goal of diabetes self-management education was to teach patients how to apply self-management skills of diabetes to obtain glycemic control. However, modifications to the diabetes education program’s curriculum addressing cultural competence and cultural sensitivity were required to better meet the needs and requirements of these groups, in this case, African Americans. Through this study, one was able to evaluate a diabetes education program that had achieved American Diabetes Association (ADA)
recognition, a certification considered on a national level to contain a status of providing a high level of quality care. This high quality of diabetes education and care contained on a set of standards used across the nation in a wide variety of health care facilities to educate patients on proper diabetes self-management. This study was able to highlight the strengths of a diabetes self-management education program and possible areas of improved that needed to be revised to better address the African American diabetes population. The findings from this study were passed along to other programs in efforts to decrease the gap in racial differences and disparities in diabetes self-management.

Research Questions

Are there statistically significant group differences by race, type of education setting, and the interaction of race and type of education setting in diabetes knowledge following a diabetes education program?

Are there statistically significant group differences by race, type of education setting, and the interaction of race and type of education setting in diabetes attitudes following a diabetes education program?

Hypotheses

Hypothesis 1. Caucasian patients will have a higher knowledge level about diabetes than African American patients following a diabetes education program.

Null Hypothesis 1. Caucasian patients will have the same knowledge level about diabetes as African American patients following a diabetes education program.

Alternate Hypothesis 1. Caucasian patients will have a lower knowledge level about diabetes than African American patients following a diabetes education program.
Hypothesis 2. Caucasian patients will have more positive attitudes about diabetes than African American patients following a diabetes education program.

Null Hypothesis 2. Caucasian patients will have the same attitudes about diabetes than African American patients following a diabetes education program.

Alternate Hypothesis 2. Caucasian patients will have more negative attitudes about diabetes than African American patients following a diabetes education program.

Hypothesis 3. In a one-on-one setting, Caucasian patients will have a higher knowledge level about diabetes than African American patients following a diabetes education program.

Null Hypothesis 3. In a one-on-one setting, Caucasian patients will have the same knowledge level about diabetes as African American patients following a diabetes education program.

Alternate Hypothesis 3. In a one-on-one setting, Caucasian patients will have a lower knowledge level about diabetes than African American patients.

Hypothesis 4. In a one-on-one setting, Caucasian patients will have more positive attitudes about diabetes than African American patients following a diabetes education program.

Null Hypothesis 4. In a one-on-one setting, Caucasian patients will have the same attitudes about diabetes than African American patients following a diabetes education program.

Alternate Hypothesis 4. In a one-on-one setting, Caucasian patients will have more negative attitudes about diabetes than African American patients following a diabetes education program.

Hypothesis 5. In a Group setting, Caucasian patients will have a higher knowledge level about diabetes than African American patients following a diabetes education program.
Null Hypothesis 5. In a Group setting, Caucasian patients will have the same knowledge level about diabetes than African American patients following a diabetes education program.

Alternate Hypothesis 5. In a Group setting, Caucasian patients will have a lower knowledge level about diabetes than African American patients.

Hypothesis 6. In a Group setting, Caucasian patients will have more positive attitudes about diabetes than African American patients following a diabetes education program.

Null Hypothesis 6. In a Group setting, Caucasian patients will have the same attitudes about diabetes than African American patients following a diabetes education program.

Alternate Hypothesis 6. In a Group setting, Caucasian patients will have more negative attitudes about diabetes than African American patients following a diabetes education program.

Hypothesis 7. Overall, all patients in a one-on-one setting will have higher knowledge levels about diabetes than all patients in the group setting patients following a diabetes education program.

Null Hypothesis 7. Overall, all patients in a one-on-one setting will have the same knowledge levels about diabetes as all patients in the group setting patients following a diabetes education program.

Alternate Hypothesis 7. Overall, all patients in a one-on-one setting will have lower knowledge levels about diabetes than all patients in the group setting.

Hypothesis 8. Overall, all patients in a one-on-one setting will have more positive attitudes about diabetes than patients in the group setting patients following a diabetes education program.

Null Hypothesis 8. Overall, all patients in a one-on-one setting will have same attitudes about diabetes than patients in the group setting patients following a diabetes education program.
Alternate Hypothesis 8. Overall, all patients in a one-on-one setting will have more negative attitudes about diabetes than patients in the group setting patients following a diabetes education program.

Delimitations

The delimitations for this study included geographical location, study population and diagnosis status. The Christ Hospital Diabetes Self-Management Center in Cincinnati, Ohio was the location for this chart review. After contacting the local Cincinnati ADA branch for information about diabetes education centers in the area, The Christ Hospital Diabetes Center was among the local programs named. The Christ Hospital Diabetes Center was mentioned as to having a strong African American attendance due to the center’s acceptance of many different types of health insurances. This study also only used an ADA recognized diabetes education program due to their reputation of providing one of the best qualities of diabetes care and treatment through the utilization of the National Standards of Diabetes Self-Management Education. Patient charts from African American or Caucasian were specifically selected for this study. Other requirements included who spoke English and were between and including ages 18-80 years old.

The evaluation of patient’s occupation status was observed, although income level and whether patients lived with someone with diabetes were not assessed. Patients defined as newly diagnosed with type 2 diabetes had to have been diagnosed within the past 12 months and had not received any prior diabetes education in a classroom or one-on-one setting. The initial assessment process included a medical history form, a consent form for teaching the group classes or one-on-one sessions and a pre-test about diabetes which addressed knowledge and
attitudes about disease self-management. A post-tests identical to the pre-test was completed once patients had finished the comprehensive diabetes education program.

Only patients that had completed the diabetes comprehensive education program including the diabetes center’s pre-test and post-test were included for this study. The diabetes center’s staff consisting of one registered dietitian, three Certified Diabetes Educators (CDE’s) (two registered nurses, one registered dietitian) and two registered nurses designed a pre-test and post-test to be used as an instrument for evaluating their comprehensive diabetes self management education program. This pre-test post-test instrumentation was being used for the center’s Continuous Improvement Quality (CQI) annual report. A condensed version of the University of Michigan’s Diabetes Knowledge Test (DKT) combined with Diabetes Attitudes Scale (DAS) was used to design the pre-test post-tests for the CQI report. The diabetes center’s pre-test post-test was only 15 questions compared to the original length of the DKT and DAS of a total of 56 questions. Both of these surveys have been used in past studies and have already been tested for reliability and validity (Fitzgerald, Anderson, Funnell, Hiss, et al., 1998). This study was a quasi-experimental pre-test, post-test study that specifically examined racial differences in knowledge and attitudes.

Limitations

This study consisted of a medical chart review, therefore the variable of time completion of the comprehensive program was not controlled. Other limitations included measurement completion error or simply measurement error even though an expert panel containing CDE’s, nurses, and dietitians were used to review the face and content validity of the instrumentations. Patients making errors in completion of the instrument could also increase risk of error. The
literacy level of the patients also varied and could have affected the information gathered from the instrumentations.

Due to the shortened length of the survey, one could conclude that this could play a role in creating generalizations instead of specific associations or conclusions about racial differences in diabetes educations. The center’s instrumentation was created from the University of Michigan, the Diabetes Knowledge Test (DKT) and Diabetes Attitudes Scale (DAS). The DKT consists of 23 questions testing one’s general knowledge of diabetes. The DAS, contained 33 questions addressing one’s feelings about diabetes and used a five-point Likert scale ranging from, “Strongly Disagree,” to “Strongly Agree.” Since the original reliability and validity of the these tests were based on 56- questions, instead of the 15 question combined survey that the diabetes center designed, reliability and validity score was tested for the shortened version.

The level of honestly of the participants when completing the knowledge surveys was another limitation along with their ability to learn and apply the new information obtained. Some patients may answer questions quickly because they are in a hurry to finish the education session or want to leave. Lastly, the sample size used in this study was considered to be a convenience sample due to the short two-year time frame of the chart review and the small population of newly diagnosed type 2 patients that met all inclusion criteria for this study obtained in this period.

Assumptions

The assumption that patients and physicians accurately reported that they were newly diagnosed diabetes patients was made. It was assumed that participants gave one-hundred percent effort to complete the intervention and the pre-tests and post-test of the diabetes program. It was also believed that patients answered the questions on their own, thus no one
providing the correct answers to the surveys. It was also assumed that participants were able to read and understand the knowledge survey questions in order to respond in a truthful manner, however could receive assistance for those with visual or reading impairments.

**Operational Definitions**

1. Newly diagnosed – the patient has been diagnosed with type 2 diabetes within the last 0 to 12 months and has not received any form of diabetes management education.

2. African American- also known as Non-Hispanic Black who self-report as being African American.

3. Caucasian- also known as Non-Hispanic White who self-report as being Caucasian.


5. Special Needs Patient – a person requiring one-on-one diabetes education sessions due to request by their physician. Typically these are patients that have Medicare or Medicaid insurance however, due to medical conditions, the physical has decided that a group environment for diabetes education would not be beneficial for this patient.

6. Comprehensive Diabetes Education Program- thorough diabetes self-management program designed on the foundation of the National Standards of Diabetes Self-Management Education (DSME). DSME covered the core topics of disease process and treatment options, nutritional management, physical activity, using medications safely, monitoring blood glucose, preventing, detecting and treating acute and chronic
complications, addressing psychosocial issues and developing personal strategies to
promote health and behavior change.

7. Diabetes “Survival Skills”- were suggestions usually brief tips of how to eat healthy with
   basic carbohydrate gram counting, of ways to be physically active, monitoring blood
   glucose, and preventing, detecting and treating hypoglycemia and hyperglycemia.

8. Cultural Competence- one’s ability to interact effectively with people from a variety of
different cultures/ethnicities.

9. Cultural Sensitivity- one’s ability to assess the quality of being conscience and accepting
   of different cultures/ethnicities.

10. Optimal Glycemic Control- According to the American Diabetes Association, good blood
    glucose control is defined as a Hemoglobin A1c less than 7%, fasting blood glucose
    levels of less than 130mg/dl and two-hour post prandial blood glucose levels less than
    180mg/dl.
Chapter II

Review of Literature

The purpose of this study was to examine knowledge and attitude differences among African Americans and Caucasians prior to and after attending a diabetes education program. Furthermore, racial differences in knowledge and attitudes were only assessed among newly diagnosed patients with type 2 diabetes. This study examined whether racial differences were present within a program considered a best practice in the field of diabetes.

Diabetes Mellitus was a group of metabolic diseases that affected all races, ethnicities, ages and genders. Diabetes presented itself at every level of the economic hierarchy, from those financially affluent to the poverty stricken. The purpose of this literature review was to examine the epidemiology of diabetes mellitus along with environmental and behavioral determinants of the disease. Furthermore, this chapter explored racial differences found in diabetes self-management and prevention programs by examining the three levels of prevention model. An overview of nationally utilized diabetes programs also took place, identifying and assessing those considered “best practices” in diabetes self-management education. Areas for improvement for closing racial gaps in diabetes education, specifically for African Americans were also reviewed, concluding with a summary.

During the search for articles on diabetes, education programs, and targeted populations, databases; PUBMED and MEDLINE were used along with the University of Cincinnati online journal references. Nationally known health organization websites such as the Center for Control and Prevention, American Diabetes Association, and the National Institute of Health were used for collecting information. Key words that were used to obtain information included diabetes education, type 2 diabetes, racial differences, and African Americans. Combinations of terms
such as “racial disparities” and diabetes education were used together to narrow the
search to more specific articles or that topic. About 41 articles were found and used in this
literature review pertaining racial differences in diabetes management for African Americans.

**Epidemiology**

According to the National Institute of Diabetes and Digestive and Kidney Diseases of the
National Institute of Health (2011), diabetes is a syndrome in which one’s blood glucose levels
are higher than normal due to the body being unable to produce enough insulin. Insulin is
produced by the pancreas which is used to convert glucose into energy. High blood glucose
levels are also caused by insulin resistance, where muscle, liver and fat cells are unable to use the
insulin properly (National Institute of Diabetes and Digestive and Kidney Diseases [NIDDK] &
National Institute of Health [NIH], 2011). About 25.8 million Americans had this disease (CDC,
2011). In 2010, 1.9 million new cases were discovered alone, highlighting the growth of the
disease in those individuals 20 years or older. Although there were four types of diabetes
mellitus (type 1, type 2, gestational, and pre-diabetes), 90-95% of those with diabetes have Type
2 diabetes (CDC).

By looking at the distribution of the disease by race/ethnicity, those who were at a greater
risk than others could be identified. In 2010, American Indians and Alaska Natives had the
highest rates of diabetes (16.1%). Second place was held by African Americans or Non-
Hispanic Blacks (12.6%). Since Caucasians or Non-Hispanic whites only accounted for 7.1% of
the population, blacks were almost 2 times more likely to develop diabetes than Caucasians or
Non-Hispanic whites (CDC, 2011).
**Mortality.** In 2007, diabetes was ranked as the seventh leading cause of death in the United States (CDC, 2011). Although diabetes contributed to 231,404 deaths, only 71,382 deaths recorded diabetes as being the primary cause. Diabetes was often underreported as the primary cause of death due to the many co-morbidities and complications that later develop due to this disease. In 2004, the CDC reported that 68% of deaths among those with diabetes were due to heart disease or a stroke, thus illustrating the underreporting of diabetes as a primary cause of death. Unfortunately, once a person developed diabetes, their risk of death doubled of that of a person without diabetes (CDC).

**Morbidity.** Whether diagnosed or undiagnosed with the diabetes, many other diseases or complications would develop later. Pertaining to a stroke, a diabetic person’s level of risk was 2-4 times higher than those without this disease. The risk for a stroke also increased due to the association of 67% of the diabetic population being hypertensive (CDC, 2011). For those patients with diabetes who were noncompliant to their diabetes management, retinopathy was just one of the diseases that could develop resulting in poor vision and ultimately blindness. According to new cases reported in 2008, diabetes was the leading cause of blindness among individuals ranging from age 20 to age 74 (CDC).

Neuropathy and nephropathy were also complications that could develop due to poor glycemic control in undiagnosed and diagnosed persons. In 2005, 60-70% of those with diabetes reported mild to severe types of neuropathy (CDC, 2011). Many reported loss or impaired ability to feel pain primarily in the hands and feet while others mentioned carpal tunnel syndrome or slowed digestion (CDC). In relation to nephropathy, diabetes was the leading cause for this disease, contributed to 44% of all new kidney failure cases. For that 44%, many were placed on chronic hemodialysis, peritoneal dialysis, or required a kidney transplant. Lastly,
diabetes resulted in 65,700 or 60% of non-traumatic, lower-limb amputations (CDC). Although diabetes was treatable and in most cases type 2 diabetes preventable, if diabetes went untreated, more complications developed; causing one’s body to slowly shut down.

**Cost of Diabetes.**

According to an annual financial report from the American Diabetes Association and CDC, (2011), in 2007, diabetes cost the nation around $174 billion. Direct medical expenditures were estimated at $116 billion which included costs for diabetes care itself, payments for chronic complications and the occurrence of general medical conditions. Indirect expenses that accounted for $58 billion which was calculated by evaluating lost workdays, death, permanent disability, and restricted activity days due to diabetes (CDC).

**Determinants**

There were non-modifiable determinants and modifiable determinants of diabetes. Non-modifiable determinants included genetics, age and ethnicity; factors that increase the risk for developing the disease that one could not change. Modifiable determinants or factors that could be changed included both behavioral and environmental categories. Behavioral factors were considered to be risk factors that one could control and change individually such as dietary and physical activity habits. Environmental determinants such as one’s economic status, family, community or cultural ideals were considered to be causes of increased risk for developing diabetes. Since type 2 diabetes held the majority of the diabetes mellitus population, when evaluating diabetes, type 2 diabetes was often the primary focal point. Thus, determinants of type 2 diabetes fell into two categories, behavioral and environmental. Environmental determinants such as family, community influences, and economic status were more difficult to change because in many cases, an individual could not modify these factors on their own. Behavioral
factors were more easily modified because the responsibility fell primarily on the individual with diabetes. Unfortunately, both types of determinants could affect the other, thus creating fluctuations in one’s risk of developing diabetes.

*Environmental Determinants.* Optimal body size, weight and body shape ideals were often determined within different cultures. While some cultures valued a small body size or a twig-like body shape as being healthy, other cultures treasured a larger body size and a round body shape. Patients with type 2 diabetes tended to have a middle-to-large body size and had either an apple-shaped or pear-shaped body (Liburd, Anderson, Edgar, & Jack, 1999). A study was conducted to examine one culture’s perceptions of body size and body shape. Among the African-Americans or Black community, women desired a middle-to-small body size, but actually believed that a middle-to large body size was an indicator of a healthy status. A pear-shaped body shape was also considered healthy (Liburd, et. al., 1999). Thus, one’s community or surroundings including family acted as an environmental determinant for diabetes.

In addition to one’s cultural background, one’s sex could also play a role in defining perceived healthy body images. One study examined how men and women’s perceptions of their own body images in relation to their Body Mass Indexes (BMI). In 2006, the Study to Help Improve Early evaluation and management of risk factors Leading to Diabetes (SHIELD) which assessed the occurrence of American Diabetes Association (ADA) symptoms of diabetes in their relation to a true diabetes diagnosis. Within this study, men and women participants were asked to describe how they viewed their body image and then correlate that perception to their actual BMI (Bays, Bazata, Fox, Grandy, and Gavin, 2009). Although men perceived their body image to be similar to their BMI value, women with type 2 diabetes were more likely to underestimate their true BMI values than women without diabetes. They were also more likely to state that
their overall health was good when their BMI stated that they were overweight or obese. This study demonstrated how one’s sex could play a role in how diabetes self-management is perceived or understood (Bays, Bazata, Fox, Grandy, & Gavin, 2009). Although genetics played a role in whether one would develop diabetes, one’s family structure also played a major role in one’s development and maintenance of the disease (Mahan & Escott-Stump, 2007). One study showed how support from the family could prevent or treat diabetes. If a family as a whole did not engage in healthy eating or daily physical activity behaviors, it would ultimately increase a family member’s risk for developing diabetes and associated chronic complications (Chesla, et al., 2004).

Economic status was also an environmental determinant for diabetes. Medical Nutrition Therapy (MNT) for diabetes education focused on healthy eating habits with the incorporation of fruits, vegetables and whole grains. Those who were of low income status such as many black families view the cost of foods as a barrier. Galasso, Amend, Melkus, & Nelson, (2005) illustrated that since low income families were often on a fixed budget, those families selected foods that are higher in fat, energy-dense, and are nutrient-poor due to low cost. Fresh produce and whole grains were considered to be expensive food items, but their consumption was necessary for preventing and treating diabetes. Although recommended for a healthy lifestyle, if these food items could not be made affordable for the second highest population at risk for diabetes, one could inquire as to how black communities were suppose to prevent diabetes in their families.
Figure 2.1: Non-modifiable and modifiable determinants for diabetes mellitus
Behavioral Determinants. A healthy diet, weight loss and daily physical activity were typically components of diabetes education and prevention programs. However, physical activity seemed to be a trouble area for many. Based on the notion that one should only consume as much food (energy) as one was able to use (burn) in a day, exercise was supposed to assist in an individual’s weight management. Unfortunately, both over-consumption of food and a sedentary lifestyle created more energy in one’s body than the body was able to use, thus resulting in weight gain.

Depending on the amount of weight gain, one study proved that the chronic pain, such as leg or knee pain could result as a barrier to exercise (Wanko, et al., 2004). The lack of “willpower,” motivation or desire to make dietary or physical activity changes in one’s lifestyle were other determinants of diabetes (Dutton, Johnson, Whitehead, Bodenlos, & Brantley, 2005). Excuses for the lack of exercise ranged from, “I have no one to exercise with,” to “there is nowhere safe to exercise,” (Wanko, et al). The more barriers or excuses mentioned by individuals in the study, the less the amount of value was placed on exercise to assist in the prevention or maintenance of diabetes (Dutton, Johnson, Whitehead, Bodenlos, & Brantley, 2005).

Interventions for Diabetes Prevention

When examining solutions to address the diabetes epidemic, there were three intervention classes or levels of disease prevention. The primary level of prevention contained programs to educate and increase awareness of risk factors of the disease before it occurred (Cottrell, Girvan, & Mckenzie, 2006). Often, education on the importance of health screenings, such as blood pressure, weight, glucose tolerance and cholesterol tests was provided along with information on the significance of exercise and healthy dietary behaviors to one’s lifestyle. The secondary level
of prevention focused more on proper health education to retard the progression of the
development of risk factors that could cause the disease. (Cottrell, Girvan, & Mckenzie, 2006).
Often, pre-diabetes, formerly known as borderline diabetes would be diagnosed at this level.
Health screenings for risk factors were conducted in this level along with disease prevention
education such as the reinforcement of a healthy diet and increasing the amount of physical
activity in one’s daily schedule. Finally, the tertiary level of prevention primarily involved
simply treating the disease and co-morbidities that had developed; trying to retard the
progression of diabetes and related complications (Cottrell et al., 2006).

For newly diagnosed patients with diabetes, the type of diabetes education was critical for
disease management. Particularly for patients with type 2 diabetes, ineffective diabetes
education, or the inability to obtain diabetes education often resulted in seeking assistance when
the disease had developed and progressed too far to reverse the effects. Those with diabetes,
along with complications such as retinopathy, had lower limb amputations or were on dialysis,
were often found in this level of prevention.

<table>
<thead>
<tr>
<th>Levels of Prevention For Diabetes</th>
<th>Health Promotion Education</th>
</tr>
</thead>
<tbody>
<tr>
<td>•Health screenings</td>
<td>Early Diagnosis of Pre-diabetes and Treatment with possible reversal of diagnosis</td>
</tr>
<tr>
<td>•Medical Nutrition therapy</td>
<td>Diabetes Diagnosis and Disease Management</td>
</tr>
<tr>
<td>•Physical Activity</td>
<td>Disability Limitation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Primary Prevention</th>
<th>Secondary Prevention</th>
<th>Tertiary Prevention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health Promotion Education</td>
<td>Health Promotion Education</td>
<td>Health Promotion Education</td>
</tr>
</tbody>
</table>

**Figure 2.2: Levels of Prevention adapted from Pickett and Hanlon**
Primary Level of Prevention. The best way to prevent a disease from occurring was by identifying the risk factors and taking the necessary steps to reduce the chance of those risk factors triggering the onset of the disease. By having access to health screens and disease awareness resources, individuals were able to identify what risk factors they may have had that could cause diabetes. However, one had to ponder as to whether all populations had access to the primary level of care. According to a study on populations with diabetes conducted in North Carolina, African Americans had fewer social, economic, health and educational resources available to them pertaining to diabetes (Antony & Baaklini, 2004). Thus, it was difficult to increase awareness and knowledge about the risk factors associated with diabetes if this population could not access these important resources. Unfortunately, this study illustrated why such a large percentage of African American with diabetes were often found in the secondary and tertiary levels of disease prevention.

Clark, Fox, and Grandy, (2007) completed the Study to Help Improve Early evaluation and management of risk factors Leading to Diabetes (SHIELD) which examined the occurrence of ADA symptoms of diabetes in their relation to a true diabetes diagnosis. Over a five year span, participants with type 1 or type 2 diabetes and participants diagnosed with risk factors for diabetes were surveyed based on the occurrences of ADA’s list of seven symptoms of diabetes; frequent urination, excessive thirst, extreme hunger, unusual weight loss, increased fatigue, irritability and blurry vision. All symptoms were found to be self-reported more often among those with type 2 diabetes than those who with risk factors (Clark, et al., 2007). Although frequent urination and increased fatigue was rarely reported among those with risk factors for diabetes, these two symptoms were widely acknowledged as being signs of diabetes. This study illustrated that although symptoms characteristic of diabetes may not be strong predicators for
diagnosing patients, the increase in overall diabetes knowledge and awareness could help in disease prevention.

*Secondary Level of Prevention.* The Diabetes Prevention Program (DPP) was a very important study that was conducted to determine if diet and exercise could prevent or slow the progress of type 2 diabetes (National Diabetes Information Clearinghouse [NDIC], 2004). By providing a diet and exercise intervention for a diverse sample group, researchers were able to observe favorable results. Participants had better blood glucose management, decreases in co-morbidities, and diabetic risk factors across the board (NDIC).

When taking another look at the Diabetes Prevention Program, one study examined body size and shape changes in relation to risk factors of diabetes. Participants that had a fasting blood glucose of 95-125 mg/dl, also known as Impaired Glucose Tolerance (IGT) or Pre-diabetes were selected for the study (Fujimoto, et al., 2007). Participants attended an intensive intervention focusing on weight reduction, healthy eating and exercise. Overall, men seen having decreases in central and overall body fat, which also lowered their risk for diabetes based on their fasting blood glucose levels. Among women, overall body fat loss was found to lower fasting blood glucose levels. Therefore, this study showed not only the importance of increasing knowledge, but also improving attitudes toward diabetes prevention in those with IGT or Pre-diabetes (Fujimoto, et. al.).

During the DEPLOY pilot study, efforts were made to implement the Diabetes Prevention Program of intensive lifestyle intervention into a widely known community organization such as the YMCA. At YMCA facilities, those participants found to have risk factors of diabetes such as a random blood glucose of 110-199 mg/dl and had a BMI equal greater than 24 were selected to attend the study (Ackermann, Finch, Brizendine, Zhou, &
A total of 16 group intervention sessions were held which focused on increasing diabetes knowledge, goal setting, self-monitoring, and problem-solving skills. Success of the intervention at the YMCA’s was illustrated by participants having a 6% decrease in body weight and decrease in total cholesterol of an average of 22 mg/dl (Ackermann, et al.,). Once again disease prevention programs can be successful if populations were able to access these programs easily.

Based on findings from the DPP, the National Diabetes Education Program (NDEP) was created for the secondary level of prevention for awareness (NDEP, 2005). The program was designed to increase awareness and understanding of diabetes. The program also promoted optimal self-management of diabetes and reduced complications that arose from the disease. Lastly, the NDEP attempted to decrease the disparities in health care pertaining to racial and ethnic populations with diabetes (NDEP). The NDEP acknowledged that racial and ethnic populations struggled to receive resources about diabetes and were often confronted with indifferent perspectives. Thus, the question presented itself as to whether diabetes education programs were effective to all cultures.

When taking a closer look at racial differences within the secondary level of disease prevention, the Missouri Behavioral Risk Factor Surveillance System which examined diabetes related screenings for African Americans and Whites. This study indicated that African Americans in Missouri were receiving adequate screenings for complications found, however were not receiving routine Hemoglobin A1c screenings. Thus, African Americans were more likely to have higher than ADA recommended HbA1c levels (≥ 7%) (LeMaster, Chanetsa, Kapp. & Waterman, 2006). African Americans with diabetes were also found to be less likely to
monitor their diet than Whites if preventive services and resources were not made available (Oster, et al., 2006).

*Tertiary Level of Prevention.* Although many patients with diabetes fell into the secondary level of prevention, many also found themselves in the tertiary level. Studies have shown that due to education barriers, many people with diabetes find themselves trying to treat their co-morbidities in attempt to improve their diabetes management. One study conducted with African Americans, evaluated barriers they faced to when managing their diabetes. The most commonly stated barrier was that patients could not see to read the diabetes educational materials that were provided in the diabetes programs that they attended (Rhee, et al., 2005). Poor vision due to retinopathy could have been avoided if these patients had received resources on eye and vision examination screenings, which is often resource provided in the primary or secondary levels of prevention (Rhee, et al.). Also, in most cases, retinopathy was due to high blood glucose levels, thus by stabilizing and returning blood glucose levels to normal, retinopathy could go into regression.

Once diagnosed with diabetes, cultural background played a role in how a person perceived their disease. Caucasians that were placed on insulin were more likely to have negative attitudes about their disease and their health than those who were not on insulin. African Americans were more likely to have more positive attitudes about their disease treatments whether on or off of insulin. These positive attitudes found among African American with diabetes were associated with stronger support from family and friends in the treatment of their disease (Fitzgerald, et al., 2000).

At diagnosis, African Americans were also more likely to have higher Hemoglobin A1c levels than Caucasians (Adams, et al., 2008). One study not only found higher A1c levels among
newly diagnosed African Americans, but also a lower diabetes medication adherence. These disparities posed questions as to why African Americans were being diagnosed with higher average blood glucose levels and if there was an association to types of diabetes preventive resources available in the primary and secondary levels of disease prevention (Adams, et al., 2008). Pertaining to medication adherence, one could inquire as to whether African Americans attended diabetes education programs to learn about how specific diabetes medications help improve glycemic levels when first diagnosed.

Racial differences within the tertiary level of prevention also included long-term management and physical activity. Over a 4-8 year period, one study examined race differences in diabetes in a single Health Management Organization (HMO). During that period, African Americans with diabetes, particularly men had higher HbA1c than white participants (Adams, et al., 2005). African Americans with diabetes, particularly women were less likely to partake in leisure-time physical activity than Whites in relation to diabetes management (Edge & Poston, 2004). Barriers to physical activity for African Americans with diabetes must be examined in order to understand why optimal glycemic control cannot be achieved. One could ask the question as to whether African Americans with diabetes understood the relationship between glycemic control and physical activity.

The intent of the National Standards for Diabetes Self-Management Education (DSME) was to create a foundation of diabetes principles and objectives that could be used to help treat diabetes universally (Funnell, et al., 2009). These standards were created by a task force involving both the ADA and the AADE along with others in efforts to provide quality diabetes education in a mixture of settings such as out-patient clinics, hospitals and physician offices. The diabetes programs that follow the DSME have been acknowledged as providing the best
Based on the DSME, the ADA created a recognition certification for diabetes education programs that strive to be acknowledged as best practices. There were many requirements for recognition including individualized patient assessments, program curriculum, continuing education hours for providers of diabetes management, and patient care plans (Maryniuk, Bronzini, & Lorenzi, 2004). Once programs have achieved ADA recognition, they must re-apply every two years for that recognition. When examining the tertiary level of prevention with diabetes, patients deserved a program with ADA recognition to insure that they were receiving a high quality of care. However, the question still remained as to whether racial differences could still exist within a best practice (Maryniuk, Bronzini, & Lorenzi, 2004).

**Knowledge and Attitudes of Diabetes**

Knowledge and attitudes toward diabetes have been thought to be predictive of diabetes self-management compliance. Thus, many have hypothesized that an increase in diabetes awareness and knowledge will alter negative attitudes about self care behaviors to more positive outlooks. Due to the fact that there are many different diabetes education programs available throughout the country, one must wonder the accessibility and quality of education that patients receive and whether that education actually improved diabetes knowledge and attitudes.

Based on knowledge about healthy behaviors including diabetes management, an association has been made to patients with diabetes’ perception of what a “healthy” body weight can be considered. One study found that patients with diabetes who were also diagnosed as being overweight or obese based on the BMI did acknowledge their current body weight as being unhealthy (McTigue, et al., 2006). However, when asked to provide a healthy body weight for
themselves, the association was found that those who had a better understanding of diabetes and disease self-management were able to identify a healthy weight in the normal BMI range. Those with little knowledge background of diabetes and treatment were found to select what they deemed as a “healthy” weight as being located in the overweight BMI range (McTigue, et al.).

Once diagnosed with diabetes, knowledge of optimal Hemoglobin A1c levels was imperative for self-management. According to the American Diabetes Association (ADA), patients were told to aim for an HbA1c of less than 7%. However, if patients were unaware of this target, or whether they even had knowledge of HbA1c levels, also played a major role in their overall diabetes management compliance and glycemic control (Berikai, et al., 2007). A study assessed knowledge of diabetes management in relation to glycemic control found that those with a higher knowledge of not only diabetes and HbA1c, but also blood pressure and cholesterol target levels had better glycemic control and HbA1c levels than those who did not have a strong diabetes education (Berikai, et al.). This study illustrated the importance of quality and intensive diabetes education such as provided by an ADA recognized program that used the DSME standards to increase knowledge levels and overall attitudes of diabetes with the prospect of achieving optimal glycemic control.

Montague, Nichols, & Dutta, (2005) conducted a study with African American women who had type 2 diabetes to assess how an increase in diabetes knowledge and awareness affected their self-management. A self-efficacy outcomes expectancy questionnaire was used to evaluate their mental, emotional, self-management and social health levels. Although their increase in diabetes knowledge improved their self-management of the disease, the mean HA1c was still higher than the recommended value provided by the American Diabetes Association.
When specifically looking at attitudes towards diabetes management, self efficacy was found to have an influence. If a diabetes education program could increase self efficacy in relation to diabetes management, specifically diet, exercise, blood glucose monitoring and foot care, then patients were more likely to have positive attitudes about diabetes and better glycemic control. In other words Safkar, Fisher, and Schillinger, (2006) found that patients that attended diabetes interventions that focused on a structure similar to the DSME standards were more knowledgeable, had improved attitudes about diabetes management and overall had more confidence in being able to achieve optimal glycemic control.

Another well known study in the field of diabetes that focused on attitudes about the disease was the Diabetes Attitudes, Wishes, and Needs (DAWN) study in which both patients with diabetes and health care providers were surveyed in attempts to improve diabetes care through the country and on an international spectrum. This study showed that when surveying newly diagnosed patients, many had negative attitudes about diabetes and felt emotions such as anger, depression and helplessness (Rubin, Peyrot, & Siminerio, 2006). Self-blame was also a noted cause of patients having negative attitudes about diabetes management. However, an encouraging note was that those patients that had received a comprehensive diabetes education involving a health care team collaborative had improved attitudes about their diabetes management. Therefore, those who had access to a diabetes education program of good quality involving a strong health care team and patient interaction were more likely to have better attitudes, increased confidence in managing their diabetes (Rubin, Peyrot, & Siminerio, 2006).

**Racial Differences in Diabetes Management**

When examining racial differences in diabetes self-management, there were many factors that must be given attention such as blood glucose monitoring and Hemoglobin A1c (HbA1c).
With or without receiving diabetes education, patients were often provided with blood glucose meters for self-monitoring and requested to visit their primary physician once every three months in efforts to evaluate their HbA1c. If patients attended diabetes education sessions, the importance of self-monitoring and the HbA1c was discussed thoroughly in hopes patients would practice tight control over their blood glucose. Racial differences where very noticeable when assessing these two main factors in diabetes management.

When specifically looking at self-monitoring among African Americans and Whites, there were some highlighted disparities. One study examined the impact of providing blood glucose meters, lancets and test strips to African American and White diabetes patients to assess the practice of self-monitoring. Within this study containing 2,275 participants, restricting to those only on oral diabetes medication, participants were provided with blood glucose meters, test strips and lancets, the necessary tools for self-monitoring (Mah, Soumerai, Adams, & Ross-Degnan, 2006). This 18 month studies produced results such as African American diabetes patients had a higher rate of initially self-monitoring after receiving the meters than Whites. Thus, African Americans were more likely to begin self-monitoring, however at the end of the 18 months, a follow-up of the participants proved that the self monitoring of African Americans was short-lived. African American participants had of discontinuation rate of 78% from self-monitoring while Whites only had a 64% discontinuation rate (Mah, et al., 2006).

One of the main questions that arose from this study was as to why self-monitoring practices were short-lived, especially among African Americans. This study did not discuss whether participants had received diabetes education prior to the partaking in the study or were simply told by their physician that they had diabetes and given an oral agent for management.
Knowing whether participants had attended diabetes education sessions prior to the study could have positively impacted self-monitoring among both races.

Specifically, when taking a look at diabetes one cannot help but assess racial differences in relation to disease management. Even during an evaluation of patients with Impaired Glucose Tolerance (IGT), racial differences within Hemoglobin A1c (HbA1c) levels can be found (Herman, et al, 2007). One study which implemented the DPP found that HbA1c levels were higher among racial and ethnic groups in relation to Caucasians. Normal HbA1c levels fell between 4-6% with the diagnosis of diabetes being 6.5% or greater. Caucasians fell at around 5.78%, for Hispanics, 6.00%, for Asian Americans, 6.12% and for African Americans, 6.18% (Herman, et al.). Although HbA1c may not be a strong indicator for properly assessing racial disparities within risk factors of diabetes, this study did trigger concern as to knowledge and attitude levels of diabetes within different racial and ethnic groups.

Similar to the study above, another was conducted using participants with diabetes and once again HbA1c levels were evaluated in relation to racial background, specifically, African Americans and Caucasians. Once more, African Americans were found to have higher HbA1c levels than Caucasians which the study hypothesized may explain the higher risk for African Americans developing microvascular complications (Kirk, et al., 2006). The study also discussed interventions for the African American population in efforts to reduce the racial disparities found with diabetes. Access to diabetes education to increase knowledge and attitudes within this community could improve HbA1c levels and overall disease self-management (Kirk, et al.).

Many prior studies examining racial disparities have primarily found blacks to be less likely to be compliant to diabetes self-management practices, however a recent study has found
the complete opposite. Williams, Oladele & Barnett (2006) assessed racial differences in diabetes preventive care behaviors and found that within their study that blacks were more likely to attend annual check-ups and have foot exams. Whites were actually more likely to smoke and less likely to partake in a smoking cessation program (Williams, Oladele & Barnett). Thus, this study concluded that it was not race, but social class that played a major role in poor diabetes self-management, however there as a major limitation to this study. In order to collect data, a telephone survey was used, therefore only those with telephones would have been able to participate. With that said, many who do not have telephones who could have been candidates for this study were more likely to be poor and minority (Williams, Oladele & Barnett).

Another study which focused on looking at the relationship between race and socioeconomic status in diabetes patients had come across similar findings as the study mentioned above. This study examined age, health insurance, body mass index, physical activity, hypertension and socioeconomic status (Signorello, et al., 2007). The following was discovered; those that had less than nine years of education, and had an annual income of less than $15,000 had a higher prevalence of diabetes than those that finished high school, attended college, or made more than $15,000 a year. There was also a higher prevalence of being overweight or obese following this same trend. Women were more likely to be overweight then men and pertaining to race, African American women were more likely to be overweight than White women (Signorello, et al.). This study showed that racial disparities within diabetes were more educational and socioeconomic related than simply race. However, a majority of those poverty-stricken or with low socioeconomic status were minorities, thus race/ethnicity remained a determinant for diabetes.
Areas for improvement

When discussing areas for improvement, the largest issues at hand that must be examined was whether diabetes patients who participated in studies received diabetes education and if so, what type of diabetes education was received? The term, “diabetes education” has been used to discuss may forms such as a patient receiving handouts about diabetes while being a in-patient, their physician simply telling the patient that they have diabetes and prescribe medication, to patients attending an American Diabetes Association recognized out-patient program. Thus, the assumption that all patients have received diabetes education and know proper self-management behaviors was often present. With that stated, it was important to assess one’s knowledge and attitudes about diabetes and self-management in order to better examine racial disparities in diabetes management by using the same baseline criteria about diabetes education. A study examining knowledge and attitude levels following the completion of a diabetes education program would be very informative as to how patients feel about the disease and whether there was an increase in diabetes knowledge. Knowledge was the foundation for many decision making moments in one’s life.

When examining racial differences in health care access and health outcomes for diabetes patients; one study looked at self-monitoring of blood glucose, cholesterol, lipid profiles, blood pressure, HbA1, and body mass index. African Americans were found to have higher blood pressure, cholesterol and HbA1c (Harris, 2001). They were also more likely to be diagnosed with dislipidema, overweight and less likely to self-monitor their blood glucose (Harris). However, based on these findings it was unclear as to what type of diabetes education participants has previously received if any which is necessary to fully understand why racial disparities were occurring in diabetes.
Proper diabetes self-management contained many lifestyle behavioral modifications such as physical activity, an increase in fruit and vegetable intake, blood glucose monitoring, and foot examinations (Nwasuruba, Khan, & Egede, 2007). The 2003 Behavioral Risk Factor Surveillance survey evaluated these self-care behaviors among African Americans, Hispanics and Caucasians. African Americans were found least likely to exercise, but most like to conduct home foot examinations. Unfortunately, African Americans were also found less likely to partake in all four of the self care behaviors (Nwasuruba, Khan, & Egede). Although this study highlighted some troubling racial differences, it did not examine possible rationale for the occurrence of these differences. Again concern began with whether study participants received diabetes education and if so, the quality of the education. Many of the studies previously discussed focused on patients with who have had diabetes for years. Those who were newly diagnosed with diabetes must be examined to better understand initial knowledge and attitudes toward diabetes and if any changes occurred after receiving consistent diabetes education. Therefore, a study that targeted newly diagnosed patients with diabetes, whom have never received diabetes self-management education could be enlightening, particularly among different racial backgrounds.

**Summary**

As stated in the literature review, diabetes mellitus is a syndrome that affects all races, ethnicities, ages and genders along with being present at every level of the economic hierarchy. Although there are three levels of disease prevention, many minority populations found themselves in the secondary or tertiary levels due to barriers prevention then from obtaining disease preventive resources. Many differences can be observed between African Americans and Caucasians with diabetes. Unfortunately, many of those differences illustrate African
Americans with poor diabetes management. The main concern that must be addressed pertained to whether patients with diabetes participating in the studies mentioned above received diabetes education and what type. Since ADA recognized diabetes education programs were viewed as “best practices” for teaching disease self-management throughout the country, it would be pertinent to assess knowledge and attitude levels about diabetes among newly diagnosed African Americans and Caucasians with type 2 diabetes in order to better understand where racial disparities occur.

Simply by surveying an ADA recognized program currently running could reveal as to how well newly diagnosed participants were able to understand diabetes and self-management behaviors necessary for tight blood glucose control. One would also be able to better understand the relationship between attitudes about diabetes in relation to their perspective on self-management. Lastly, it would be interesting to examine only newly diagnosed type 2 diabetes patients to better assess knowledge and attitude levels of African Americans and Caucasians for racial differences. Using an already implemented best practice diabetes program as a baseline for diabetes education would give much needed insight to how to modify diabetes education programs to decrease racial disparities in overall diabetes management.
Chapter Three

Methods

The purpose of this study was to examine knowledge and attitude differences among African Americans and Caucasians following completion of a diabetes education program. Furthermore, racial differences in knowledge and attitudes were only assessed among newly diagnosed patients with type 2 diabetes. The specific objective of this study was to examine whether racial differences were present in a program considered a best practice within the field of diabetes. Factors examined included diabetes knowledge and attitudes pertaining to; complications of diabetes, foods that affect blood glucose levels, value of tight glycemic control, psychosocial impact of diabetes and disease treatment. Chapter one focused on the research questions, hypotheses, delimitations, limitations, assumptions and operational definitions, a literature review was provided in chapter two. This chapter presented a description of the design of the study, targeted population and selection process of patient charts to review, instrumentation, data collection and data analysis procedures to conclude.

Study design and its rationale

A medical chart review consisting of a quasi-experimental pre-test post-tests evaluation was the design of this study. The evaluation of patients’ knowledge and attitudes prior to and after completing a comprehensive diabetes program was an effective tool in assessing whether racial differences existed in an intervention provided to two groups. The post-test only design would have also evaluated differences in knowledge and attitudes, however would not have addressed pre-intervention knowledge and attitudes. Without identifying pre-intervention knowledge and attitude levels of both groups, there would have been an increased risk of threats to the internal validity of the study (Cottrell, Girvan, & Mckenzie, 2006).
The chart review also selected participants from both individual and group comprehensive diabetes education sessions to also examine grasp of knowledge and change in attitudes of diabetes based not only race, but also learning environment. Although the education setting may have been different, consistency within the curriculum remained. The National Standards of Diabetes Self-Management Education (DSME) were the foundation for the development of the program. Diabetes educators taught the same curriculum, covering the core topics of DSME; disease process and treatment options; nutritional management; physical activity; using medications safely; monitoring blood glucose levels; preventing, detecting and treating acute and chronic complications, addressing psychosocial issues and developing personal strategies to promote health and behavior change. Patients had the same access to handouts and diabetes education videos to maintain consistency among teaching resources within the program.

**Target Location**

In Ohio, there were 126 American Diabetes Association (ADA) recognized diabetes education programs, with 14 of those programs being located in Cincinnati. According to the local ADA branch of Cincinnati, the Christ Hospital’s Diabetes Management Center had one of the largest African American enrollments among local ADA recognized programs. These ADA recognized programs currently attempt to meet the need of the African American with diabetes by conducting 6-8 hours of comprehensive diabetes education. An ADA recognized program was selected as the target location due to its status as being a best practice in the field of diabetes. ADA created such a recognition program in efforts for varieties of health care facilities and programs to be able to provide a high level quality of diabetes care by using the National Standards of DSME. Since The Christ Hospital Diabetes Center accepted a wide variety of
medical insurances, one was more likely to find greater racial/ethnic diversity among its clientele, therefore making it a valuable location for this study.

Population and Sample of Population

This study targeted newly diagnosed African Americans and Caucasians with type 2 diabetes in the Greater Cincinnati area. Newly diagnosed patients included those who had been diagnosed within the past 12 months and had not received or attended any diabetes education classes or individual sessions. Therefore, any education provided by physicians during diagnosis or in an in-patient hospital setting was identified as education of “disease survival skills” and disregarded as comprehensive diabetes education. Patients attending an ADA recognized diabetes self-management program were only included for this study due to the reputation of an ADA recognition program providing a high quality of care and treatment.

A total of 100 patient charts (n = 50 African Americans, n = 50 Caucasians) were selected for this study. In a meta analysis, the effect size of 0.65 was found when assessing racial differences in diabetes, specifically between African Americans and Caucasians (Kirk, et al., 2006). Thus, for this study the estimated effect size of 0.60 was used and the sample size was estimated using alpha = 0.05 along with power = 0.80. The calculation yielded about 44 patients per racial group. An additional 14% was added for any possible attrition or patients not completing the program, however leaving either pre-test or post-test incomplete. The final sample size was calculated at 100 patients (n = 50 African Americans, n = 50 Caucasians) (Polit & Hungler, 1999).

The ages of patients ranged from 18 to 80 years old. This age group was selected because primarily type 2 diabetes was discovered at this age range. Adults were also more likely to have control over their environmental barriers that could be preventing proper diabetes
management (Mahan, et al., 2000). Newly diagnosed patients were desired in ensure that patients had not received education from other programs, therefore affecting the ability to assess initial knowledge and attitudes of diabetes self management (Skinner, Carey, Cradock, Daly, et al., 2006). All charts reviewed for this study were from patients who had attended the ADA recognized Christ Hospital Diabetes Self-Management Center located in Cincinnati, Ohio for comprehensive diabetes self-management education, (DSME). Patient charts that were selected for this study had completed the DSME program within the timeframe January 2009- December 2010.

In order to confirm that the desired sample size was met, a convenience sample within a two-year period (January 2009 - December 2010) was selected. From 2009-2010, a total of 305 patients completed the comprehensive program with 201 (65.9%) Caucasian, 103 (33.8%) African American, and one (0.3%) Asian American. Of the 305 patients who completed the program, only 162 had been patients newly diagnosed with type 2 diabetes, had never received diabetes education prior to completing the program, were within the 18-80 age range and completed both the program’s pre-test and post-test, a necessity for the center’s CQI annual report. Of the 162 patient charts that met all of the inclusion criteria, 107 (66.0%) were Caucasian and 55 (34.0%) were African American. Since type of education session was also being evaluated, of the 162 patient charts, 59 (n=22 African American, n=37 Caucasian) attended group sessions and 103 (n=33 African American, n=70 Caucasian) attended individual sessions.

Although a convenience sample was used to ensure a sample size of 100 patient charts (n = 50 African Americans, n = 50 Caucasians), randomization was used for the actual selection of patients for this study. Since there were only 55 African American patients who met all of
the inclusion criteria for this chart review, using a computer program, patients were given a number and 50 patients were randomly selected. Based on the 50 out of 55 African American charts randomly selected, the group and individual education setting sample size was also determined. Out of the 50 African American charts selected, 19 were of patients who attended group sessions and 31 were of patients that attended individual sessions. With the type of education session sample sizes determined, the 107 Caucasian patient charts were divided into two groups based on their education session type (group or individual). The computer program for randomized sampling was used once again to determine the 19 group session and 31 individual session Caucasian charts. Randomization was used in both races to provide equal opportunity for all charts of the 162 sample population to be selected.

Table 3.1

_Demographics of Patients Completing Program between January 2009-December 2010._

<table>
<thead>
<tr>
<th>Patients Completing Program 2009-2010</th>
<th>Race/Ethnicity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
</tr>
<tr>
<td></td>
<td>n</td>
</tr>
<tr>
<td></td>
<td>305</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Patients Newly Diagnosed Diabetes Type 2</th>
<th>Race/Ethnicity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
</tr>
<tr>
<td></td>
<td>n</td>
</tr>
<tr>
<td></td>
<td>162</td>
</tr>
</tbody>
</table>

_Comprehensive Diabetes Education Sessions/Intervention_

Based on the type of health insurance a patient had, they could choose between one-on-one or group sessions. Those patients with private health insurance had the option of individual
or group sessions whereas those with Medicare and/or Medicaid health insurance only had the option of group sessions unless they were diagnosed with having “special needs.” Those with Medicare and/or Medicaid could still attended individual session without the diagnosis of “special needs” with the risk of having to pay out-of-pocket expenses since their insurance’s coverage may decline to cover that type of session. Whether attending individual or group sessions, the diabetes education contained the full 30 minute to one hour initial assessment and three two-hour follow up sessions. Sessions were taught by both a registered nurse (RN) and a registered dietitian (RD). The same diabetes education core curriculum was provided according to the requirements for maintaining an ADA diabetes program recognition. A fourth two-hour diabetes group session was added in 2010 to the original three group sessions to allow those with Medicare and/or Medicaid the ability to use their full nine hours of diabetes education. The nine hour diabetes education allotment must be used within the first 12 months of ever receiving comprehensive diabetes education.

Instrumentation

The instrumentation used for this study included a pre-test, post-test designed to evaluate each participant’s diabetes knowledge and attitudes (Appendix A). The Christ Hospital Diabetes Self-Management Center designed the pre-test post-test evaluation for their CQI annual report. The CQI annual report was a type of evaluation used to assess the center’s ability to maintain the quality of provision of optimal patient education. An expert panel of the center’s staff consisting of one registered dietitian, three CDE’s (two registered nurses, one registered dietitian) and two registered nurses designed and reviewed the pre-test post-tests. This pre-test post-test served as the instrumentation for assessing each patient’s diabetes knowledge and attitudes prior to and after completion of the comprehensive diabetes education program. Based on the findings from
the pre-tests and post-tests, the center would evaluate the program’s strengths and areas of improvement for their CQI report. The center’s instrumentation was created from the University of Michigan, the Diabetes Knowledge Test (DKT) and Diabetes Attitudes Scale (DAS). The DKT consists of 23 questions testing one’s general knowledge of diabetes. All of the questions on the survey address material that is covered in an ADA recognized diabetes education program. Within the DKT, 14 of the questions tested general knowledge while the last 9 questions tested knowledge of insulin use. The DAS, on the other hand contained 33 questions addressing one’s feelings about diabetes and used a five-point Likert scale ranging from, “Strongly Disagree,” to “Strongly Agree.” The Christ Hospital Diabetes Center staff constructed a combination pre-test post-tests of these surveys, however shortened the survey from 56 to only 15 questions. The center’s staff decided upon the 15 questions that best addressed the content of the comprehensive program.

The pre-test post-test contained 12 knowledge based questions and only three questions assessing attitudes about diabetes. The pre-test post-test’s knowledge questions were in the form of multiple-choice. The pre-test post-tests contained 12 knowledge based questions and only three questions assessing attitudes about diabetes. Two questions addressed identifying the best method of monitoring blood glucose and the time frame for which a Hemoglobin A1c test should be completed. Two questions focused on nutrition influence on blood glucose management by examining identifying carbohydrates and the importance of a low fat dietary intake. Another two questions examined the effects of infection and/or illnesses have on glycemic control. Three questions examined knowledge of acute complications of diabetes such as causes of hypoglycemia (low blood glucose levels) and hyperglycemia (high blood glucose levels) and methods of treatment. Detection of chronic complications of diabetes was depicted in two
additional questions. Lastly, one question focused on the importance of foot care when discussing diabetes.

Three attitude questions pertaining to perception of diabetes management were based on a Likert scale (1= Strongly Disagree, 2= Disagree, 3= Neutral, 4= Agree, 5= Strongly Agree). The first attitude questions asked one’s perception of taking insulin in relation to the severity of one’s diabetes. The second questions asked one’s take on whether glycemic control was correlated with the prevention the development of chronic complications. The last attitude question posed whether those who are managing diabetes without medications and/or insulin injections need to be concerned with chronic complications.

The decision of only asking only three attitude questions was based on the staff’s full agreement of the three diabetes attitudes most often seen in their extensive diabetes education career, with three of the expert panelists being in the diabetes field for over 25 years. The expert panel convened twice to decide on which questions from the DKT and DAS best fit the diabetes program curriculum mainly addressing type 2 diabetes management. The pre-tests post-tests took about fifteen minutes to complete and the pre-test was given to patients during their initial assessment and at the end of the program, during the third session for all patients completing individual sessions in 2009-2010 and only third group session completion in 2009. Those who completed group sessions in 2010 received their post-test during the fourth session.

Although validity and reliability had already been assessed with the DKT and DAS, the shortened and combined version created by the panel of experts from the diabetes center needed to be assessed. The panel of experts assessed the pre-test post-test for content and face validity, making sure that the core topics DSME such as disease process and treatment options, nutritional management, physical activity, medications safely, monitoring blood glucose, preventing,
detecting and treating acute and chronic complications, and psychosocial issues were covered. The panel read through the University of Michigan’s DKT and DAS as a group and discussed which questions to use for the program’s 15 question pre-test, post-test.

In order to determine reliability, differences between the two groups were examined with the hypothesis that those with type 2 diabetes, who had a higher education level and/or those with more diabetes education would score higher. Reliability for the pre-test post-test was determined using the Cronbach’s coefficient in which scored 0.60 for the knowledge (DKT) section and 0.54 for the attitude section (DAS). Although, according to Pickett & Hanlon (1998) a score of $\geq 0.80$ is reliable, it is important to note that a score between 0.40-0.60 does not mean that the pre-test post-test. The Cronbach’s alpha may be deflated due to the 15 question instrumentation assessing many core concepts of diabetes self management instead of a single concept. Lastly, the readability level of the shortened pre-test post-test was 4.4, thus a fourth grade reading level.

**Procedures**

This study was a medical chart review of data already collected. This study involved no human contact or interaction. Since a waiver of consent was obtained from The Christ Hospital Institutional Review Board, it was best to keep all identifiable information confidential since patients of charts reviewed could not be accessed for permission to make their findings public. After receiving approval from the Christ Hospital’s Institutional Review Board and University of Cincinnati Institutional Review Board, medical charts from the Christ Hospital Diabetes Self-Management Center from the time period of 2009-2010 were pulled for this study. A letter of consent from the diabetes center had also been obtained for this chart review (Appendix C). Using the diabetes center’s data collection computer program “Harbor,” charts from 2009-2010
were selected based on completion of the center’s comprehensive diabetes program. Once selected, each patient chart’s initial assessment form was used to determine if that patient met the study’s inclusion criteria. Once age, race, new diagnosis, documentation patient never received diabetes education prior to attending the program, and completion of both pre-tests and post-test were confirmed, the selected patient charts meeting inclusion criteria were divided into two groups based on race.

Selected charts were given a number/letter (1a) code which was written on a sticker and placed onto the chart. Charts were coded in the event that if additional information were needed, the chart could be easily located. Identical codes were written on a data collection sheet to match data collection with the correct chart (Appendix B). The data collection sheet was used to abstract information needed (age, race/ethnicity, job occupation, group or individual session, gender, and whether they are newly diagnosed with type 2 diabetes and have not received any previous diabetes education) for the study. Copies of the selected chart’s pre-tests and post-tests were be made and names were blackened out and replaced with a matching code as found on the chart and data collection sheet.

A computer program was applied for random selection to acquire the 50 African American and 50 Caucasian patient charts needed for this study. Furthermore, of the random selection was also used to select proportionate groupings of African Americans and Caucasians who attended group sessions and individual session. The objective was to not only evaluate a proportionate number of patients based on race, but also based on type of education session attended. All charts that were collected and reviewed for this study remained at The Christ Hospital Diabetes Center in a locked file cabinet.
**Statistical Analysis**

In order to complete statistical analysis of the information collected, Statistical Package for Social Sciences (SPSS) 12.0 software was used to calculate frequencies, means, and standard deviations of the information collected from the pre-tests and post-tests. T-tests such as independent sample, paired t-tests, and analyses of variance (ANOVA’s) were used in efforts to reject the null hypotheses while chi square was used to assess differences among possible differences among independent variables (race/ethnicity, type of education session) to dependent variables (attitudes and knowledge levels). A repeated measure analysis of covariance (ANCOVA) test was also used to compare race/ethnicity and type of education session attitudes and knowledge levels, using the variable sex as a covariate. In order to determine significance, p value was set at 0.05.
Chapter Four

Results

Diabetes Mellitus was a disease that influenced a variety of populations for it has been found in many forms and defined in many ways. Within both the nation and specifically, state of Ohio, diabetes was the seventh leading cause of death in 2011 (CDC, 2011). Type 2 diabetes accounted for 90-95% of all diabetes cases. Since this type constituted for the majority of the diabetes population, many out-patient diabetes education programs often found that those programs were primarily designed for people with type 2 diabetes.

When assessing the levels of disease prevention and racial differences, African Americans were more likely to be found in the secondary level of prevention due to poor access to health resources such as health screenings (Antony & Baaklini, 2004). African Americans also found themselves in the tertiary level due to poor quality and quantity of diabetes education provided in the primary level (Rhee, et al, 2005). The overall goal of diabetes education programs was to empower and teach patients how to apply self management behaviors of diabetes to obtain glycemic control.

The purpose of this study was to examine knowledge and attitude differences among African Americans and Caucasians prior to and after attending a diabetes education program. Furthermore, racial differences in knowledge and attitudes were only assessed among newly diagnosed patients with type 2 diabetes. The specific objective of this study was to examine whether racial differences were present in a program considered a best practice within the field of diabetes. Factors examined included diabetes knowledge and attitudes pertaining to; complications of diabetes, foods that
affect blood glucose levels, value of tight glycemic control, psychosocial impact of diabetes and disease treatment.

This study was of great importance for it involved assessing a program considered a “best practice” within the field of diabetes. If racial differences existed within a program where national standards for diabetes education were being used, one could then investigate further if this was a possible reason why racial differences exist within adherence to self-management behaviors. If racial differences were not identified, knowledge and attitudes could be excluded as possible variables as to why African Americans are least likely to maintain self management behaviors for better glycemic control (Mah, Soumerai, Adams, & Ross-Degnan, 2006). Chapter one of this thesis focused on the research questions, hypotheses, delimitations, limitations, assumptions and operational definitions. A literature review was provided in chapter two. Chapter three presented the methods of the study while this chapter will address the results of the chart review. This chapter will present demographics and descriptive statistics of the patients along with the inferential statistical findings.

*Chart Review of Patients*

The chart review for this study took place at The Christ Hospital Diabetes Center in Cincinnati, Ohio. The out-patient center was selected on the basis that the location accepted a wide variety of medical insurances, therefore increasing the potential to have greater racial diversity among its clientele and making it a prime location for this study. Only charts from 2009 and 2010 of patients who completed the center’s comprehensive diabetes education program were reviewed based due to the consistency of the program during that time period. Of the 305 patients who completed the program in 2009-2010,
only 162 of those patients were newly diagnosed within the past 12 months, had not reviewed any form of comprehensive diabetes education prior to attending the center’s program, were within the ages of 18-80 years old and had completed the center’s instrumentations for their CQI report, (pre-tests post-tests).

Among the 162 patient charts, 107 of the charts were from Caucasian patients while only 55 were from African Americans. After applying simple random selection, the sample size of 100 patients, 50 African Americans and 50 Caucasians were selected. Random selection was also applied when selecting equal groups of African Americans and Caucasians in relation to type of education session (individual or group).

A synopsis of the demographics of the patients was presented in Tables 4.1. Table 4.1 reviewed patient characteristics such as sex, type of education session attended and occupation. When looking at the demographical breakdown of the patients, 63% were female while 37% were male. Since there were more female patients than male in the sample, a chi square was conducted to determine whether there were sex differences by racial group. The chi square test determined that there were statistically significant sex differences ($\chi^2 = 15.49, p < .00$), which resulted in using sex as a covariate later in this chapter for inferential statistics. When looking at occupations, the majority of the patients had a professional job (34%), retired patients followed (31%), manual jobs (19%) came in third in line, patients not employed fourth (11%), and patients that were disabled came in last (6%).
Table 4.1

Demographic Profile of Patients

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Race</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Caucasian</td>
<td></td>
<td>African American</td>
<td></td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>N</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>28</td>
<td>9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>22</td>
<td>41</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type of Session</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Individual</td>
<td>31</td>
<td>31</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group</td>
<td>19</td>
<td>19</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Occupation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td>12</td>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Professional</td>
<td>14</td>
<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retired</td>
<td>18</td>
<td>12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not Employed</td>
<td>5</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disabled</td>
<td>1</td>
<td>5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

N =100, % = Valid Percentage, Missing values excluded from analysis
Descriptive Statistics

Tables 4.2 though 4.6 summarize the minimum, maximum, mean, and standard deviation of ages of patients and the results of the pre-tests and post tests pertaining to knowledge and attitude levels, type of education session and race/ethnicity. The mean age of Caucasian patients was 58.78, while African Americans were 55.44. An independent t-test was conducted comparing race/ethnicity to age and did not contain a significant result (p =.081). Pertaining to the type of education session, the mean age for those who participated in individual sessions was 54.64 while those who attended group sessions, 60.82.

Table 4.2

Descriptive Statistics for Age (N)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Minimum</th>
<th>Maximum</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (Overall)</td>
<td>38</td>
<td>79</td>
<td>57.11</td>
<td>9.57</td>
</tr>
<tr>
<td>Caucasian</td>
<td>38</td>
<td>79</td>
<td>58.78</td>
<td>10.20</td>
</tr>
<tr>
<td>African American</td>
<td>39</td>
<td>72</td>
<td>55.44</td>
<td>8.69</td>
</tr>
</tbody>
</table>

Table 4.3, showed Caucasians (m = 8.26) having a mean pre-test knowledge score higher than African Americans (m = 7.16). Pertaining to post-tests, Caucasians (m = 10.06) had a mean knowledge slightly score higher than African Americans (m = 9.64). The overall pre-test mean was 7.71, while the post-test was 9.85. Table 4.4 followed with illustration of attitude mean scores for pre-tests and post-test all patients and racial groups.
Table 4.3

*Descriptive Statistics for Knowledge Levels Pertaining to Race/Ethnicity and Type of Session*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Race/Ethnicity</th>
<th>Type of Education Session</th>
<th>M</th>
<th>SD</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge levels at pre-test</td>
<td>Caucasian</td>
<td>Individual</td>
<td>8.55</td>
<td>2.53</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Group</td>
<td>7.88</td>
<td>1.96</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td>8.26</td>
<td>2.33</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>African American</td>
<td>Individual</td>
<td>7.35</td>
<td>2.06</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Group</td>
<td>6.84</td>
<td>1.77</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td>7.16</td>
<td>1.95</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>Individual</td>
<td>7.95</td>
<td>2.36</td>
<td>62</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Group</td>
<td>7.31</td>
<td>1.90</td>
<td>38</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td>7.71</td>
<td>2.21</td>
<td>100</td>
</tr>
</tbody>
</table>
Table 4.3 (continued)

Descriptive Statistics for Knowledge Levels pertaining to Race/Ethnicity and Type of Session

<table>
<thead>
<tr>
<th>Variable</th>
<th>Race/Ethnicity</th>
<th>Type of Education Session</th>
<th>M</th>
<th>SD</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge levels at post-test</td>
<td>Caucasian</td>
<td>Individual</td>
<td>10.13</td>
<td>1.54</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Group</td>
<td>9.95</td>
<td>1.96</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td>10.06</td>
<td>1.65</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>African American</td>
<td>Individual</td>
<td>10.23</td>
<td>1.68</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Group</td>
<td>8.68</td>
<td>2.19</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td>9.64</td>
<td>2.01</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>Individual</td>
<td>10.18</td>
<td>1.55</td>
<td>62</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Group</td>
<td>9.32</td>
<td>2.14</td>
<td>38</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td>9.85</td>
<td>1.84</td>
<td>100</td>
</tr>
</tbody>
</table>
Table 4.4

*Descriptive Statistics for Attitude Levels Pertaining to Race/Ethnicity and Type of Session*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Race/Ethnicity</th>
<th>Type of Education Session</th>
<th>M</th>
<th>SD</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Caucasian</td>
<td>Individual</td>
<td>2.84</td>
<td>1.04</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Group</td>
<td>2.79</td>
<td>.98</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td>2.82</td>
<td>1.00</td>
<td>50</td>
</tr>
<tr>
<td>Attitudes levels at pre-test about in general, believing that people who do not need to take insulin to treat their diabetes have a pretty mild disease</td>
<td>African American</td>
<td>Individual</td>
<td>2.70</td>
<td>1.30</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Group</td>
<td>2.74</td>
<td>1.33</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td>2.72</td>
<td>1.29</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>Individual</td>
<td>2.77</td>
<td>1.17</td>
<td>62</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Group</td>
<td>2.76</td>
<td>1.15</td>
<td>38</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td>2.77</td>
<td>1.15</td>
<td>100</td>
</tr>
</tbody>
</table>
Table 4.4 (continued)

*Descriptive Statistics for Attitude Levels Pertaining to Race/Ethnicity and Type of Session*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Race/Ethnicity</th>
<th>Type of Education Session</th>
<th>M</th>
<th>SD</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attitudes levels at post-test about in general, believing that people who do not need to take insulin to treat their diabetes have a pretty mild disease</td>
<td>Caucasian</td>
<td>Individual</td>
<td>2.52</td>
<td>1.18</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Group</td>
<td>2.32</td>
<td>1.20</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td>2.44</td>
<td>1.18</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>African American</td>
<td>Individual</td>
<td>2.19</td>
<td>1.10</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Group</td>
<td>2.32</td>
<td>1.29</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td>2.24</td>
<td>1.17</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>Individual</td>
<td>2.35</td>
<td>1.15</td>
<td>62</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Group</td>
<td>2.32</td>
<td>1.23</td>
<td>38</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td>2.34</td>
<td>1.17</td>
<td>100</td>
</tr>
</tbody>
</table>
Table 4.4 (continued)

Descriptive Statistics for Attitude Levels Pertaining to Race/Ethnicity and Type of Session

<table>
<thead>
<tr>
<th>Variable</th>
<th>Race/Ethnicity</th>
<th>Type of Education Session</th>
<th>M</th>
<th>SD</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Caucasian</td>
<td>Individual</td>
<td>4.45</td>
<td>.57</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Group</td>
<td>4.74</td>
<td>.56</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td>4.56</td>
<td>.58</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>African American</td>
<td>Individual</td>
<td>4.39</td>
<td>.72</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Group</td>
<td>4.56</td>
<td>.51</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td>4.46</td>
<td>.65</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>Individual</td>
<td>4.42</td>
<td>.64</td>
<td>62</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Group</td>
<td>4.66</td>
<td>.53</td>
<td>38</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td>4.51</td>
<td>.61</td>
<td>100</td>
</tr>
</tbody>
</table>
Table 4.4 (continued)

Descriptive Statistics for Attitude Levels Pertaining to Race/Ethnicity and Type of Session

<table>
<thead>
<tr>
<th>Variable</th>
<th>Race/Ethnicity</th>
<th>Type of Education Session</th>
<th>M</th>
<th>SD</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attitudes levels at post-test</td>
<td>Caucasian</td>
<td>Individual</td>
<td>4.74</td>
<td>.77</td>
<td>31</td>
</tr>
<tr>
<td>about in general, believing that</td>
<td></td>
<td>Group</td>
<td>4.58</td>
<td>.96</td>
<td>19</td>
</tr>
<tr>
<td>keeping the blood sugar close to</td>
<td></td>
<td>Total</td>
<td>4.68</td>
<td>.84</td>
<td>50</td>
</tr>
<tr>
<td>normal can help to prevent</td>
<td>African American</td>
<td>Individual</td>
<td>4.48</td>
<td>.93</td>
<td>31</td>
</tr>
<tr>
<td>complications of diabetes</td>
<td></td>
<td>Group</td>
<td>4.21</td>
<td>.84</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td>4.46</td>
<td>.89</td>
<td>50</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>Individual</td>
<td>4.61</td>
<td>.86</td>
<td>62</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Group</td>
<td>4.50</td>
<td>.89</td>
<td>38</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td>4.57</td>
<td>.87</td>
<td>100</td>
</tr>
</tbody>
</table>
Table 4.4 (continued)

*Descriptive Statistics for Attitude Levels Pertaining to Race/Ethnicity and Type of Session*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Race/Ethnicity</th>
<th>Type of Education Session</th>
<th>( M )</th>
<th>( SD )</th>
<th>( N )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attitudes levels at pre-test about in general, believing that people whose diabetes is treated by just a diet do not have to worry about many long-term complications.</td>
<td>Caucasian</td>
<td>Individual</td>
<td>2.32</td>
<td>.91</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Group</td>
<td>2.16</td>
<td>1.12</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td>2.26</td>
<td>.97</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>African American</td>
<td>Individual</td>
<td>2.32</td>
<td>1.05</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Group</td>
<td>2.47</td>
<td>1.12</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td>2.38</td>
<td>1.07</td>
<td>50</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>Individual</td>
<td>2.32</td>
<td>.97</td>
<td>62</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Group</td>
<td>2.32</td>
<td>1.12</td>
<td>38</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td>2.32</td>
<td>1.02</td>
<td>100</td>
</tr>
</tbody>
</table>
Table 4.4 (continued)

*Descriptive Statistics for Attitude Levels Pertaining to Race/Ethnicity and Type of Session*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Race/Ethnicity</th>
<th>Type of Education Session</th>
<th>M</th>
<th>SD</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attitudes levels at post-test about in general, believing that people whose diabetes is treated by just a diet do not have to worry about many long-term complications.</td>
<td>Caucasian</td>
<td>Individual</td>
<td>2.22</td>
<td>1.33</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Group</td>
<td>1.89</td>
<td>.94</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td>2.10</td>
<td>1.20</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>African American</td>
<td>Individual</td>
<td>1.87</td>
<td>.96</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Group</td>
<td>2.32</td>
<td>1.38</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td>2.04</td>
<td>1.14</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>Individual</td>
<td>2.05</td>
<td>1.17</td>
<td>62</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Group</td>
<td>2.11</td>
<td>1.18</td>
<td>38</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td>2.07</td>
<td>1.17</td>
<td>100</td>
</tr>
</tbody>
</table>
Inferential Statistics

Tables 4.5 through 4.8 illustrated findings of paired t-tests, Analysis of Variances (ANOVAs) and a repeated measure Analysis of Covariance (ANCOVA) to establish significant findings for this study. Race and type of education sessions were used to examine possible influences on knowledge and attitude levels pertaining to diabetes. Statistical significance was determined based on findings with a p-value of < 0.05. As seen in table 4.5 a t-test showed significant ($p < 0.001$) overall patient improvements in knowledge after completion of the education program. Furthermore, a t-test revealed significant improvements in two attitudes: a) believing that people who do not need to take insulin to treat their diabetes have a pretty mild disease ($p < 0.001$) and b) believing people whose diabetes is treated by just a diet do not have to worry about many long-term complications ($p = 0.041$) were recognized.

An ANOVA test which was conducted, illustrated in Table 4.6 that only one significant factor was found in relation to knowledge and attitude levels pre and post completion of the diabetes program. African Americans tended to have a lower knowledge level on the pre-tests in than Caucasians ($p = 0.012$). Another ANOVA was used to assess the relationship between knowledge and attitude levels and type of education session and one significant factor was identified as seen in Table 4.7. Patients that attended individual session achieved a higher knowledge level on the post-test than those who attended group sessions ($p = 0.022$). Lastly, a repeated measure ANCOVA was applied and identified whether there were any statistically significant findings when using sex as a covariate. Table 4.8 showed that the repeated measure ANCOVA did not generate any statistically significant results.
Table 4.5

*Paired samples Test for Overall Knowledge and Attitudes*

<table>
<thead>
<tr>
<th>Variable</th>
<th>$M$</th>
<th>$SD$</th>
<th>$t$</th>
<th>$df$</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge levels at pre-test and knowledge levels at post-test</td>
<td>-2.14</td>
<td>2.08</td>
<td>-10.29</td>
<td>99</td>
<td>.00**</td>
</tr>
<tr>
<td>Attitudes levels at pre-test and post-test about in general, believing that people who do not need to take insulin to treat their diabetes have a pretty mild disease</td>
<td>.43</td>
<td>1.15</td>
<td>3.75</td>
<td>99</td>
<td>.00**</td>
</tr>
<tr>
<td>Attitudes levels at pre-test and post-test about in general, believing that keeping the blood sugar close to normal can help to prevent the complications of diabetes.</td>
<td>-.06</td>
<td>.908</td>
<td>-.66</td>
<td>99</td>
<td>.51</td>
</tr>
<tr>
<td>Attitudes levels at pre-test and post-test about in general, believing people whose diabetes is treated by just a diet do not have to worry about many long-term complications.</td>
<td>.25</td>
<td>1.21</td>
<td>2.07</td>
<td>99</td>
<td>.04*</td>
</tr>
</tbody>
</table>

* $p < .05$, ** $p < .01$. 
Table 4.6

*Analysis of Variance for Overall Knowledge and Attitudes in Relation to Race*

<table>
<thead>
<tr>
<th>Variable</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge levels at pre-test</td>
<td>30.25</td>
<td>1</td>
<td>30.25</td>
<td>6.53</td>
<td>.01*</td>
</tr>
<tr>
<td>Knowledge levels at post-test</td>
<td>4.41</td>
<td>1</td>
<td>4.41</td>
<td>1.31</td>
<td>.26</td>
</tr>
<tr>
<td>Attitudes levels at pre-test about in general, believing that people who do not need to take insulin to treat their diabetes have a pretty mild disease</td>
<td>.25</td>
<td>1</td>
<td>.25</td>
<td>.19</td>
<td>.67</td>
</tr>
<tr>
<td>Attitudes levels at post-test about in general, believing that people who do not need to take insulin to treat their diabetes have a pretty mild disease</td>
<td>1.00</td>
<td>1</td>
<td>1.00</td>
<td>.72</td>
<td>.40</td>
</tr>
</tbody>
</table>
Table 4.6 (continued)

*Analysis of Variance for Overall Knowledge and Attitudes in Relation to Race*

<table>
<thead>
<tr>
<th>Variable</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attitudes levels at pre-test about in general, believing that keeping</td>
<td>.25</td>
<td>1</td>
<td>.25</td>
<td>.67</td>
<td>.42</td>
</tr>
<tr>
<td>the blood sugar close to normal can help to prevent the complications of</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>diabetes.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attitudes levels at post-test about in general, believing that keeping</td>
<td>1.21</td>
<td>1</td>
<td>1.21</td>
<td>1.62</td>
<td>.21</td>
</tr>
<tr>
<td>the blood sugar close to normal can help to prevent the complications</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>of diabetes.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attitudes levels at pre-test about in general, believing people whose</td>
<td>.36</td>
<td>1</td>
<td>.36</td>
<td>.34</td>
<td>.56</td>
</tr>
<tr>
<td>diabetes is treated by just a diet do not have to worry about many</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>long-term complications.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attitudes levels at post-test about in general, believing people whose</td>
<td>.09</td>
<td>1</td>
<td>.09</td>
<td>.07</td>
<td>.80</td>
</tr>
<tr>
<td>diabetes is treated by just a diet do not have to worry about many</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>long-term complications.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* *p < .05, **p < .01.*
Table 4.7

Analysis of Variance for Overall Knowledge and Attitudes in Relation to Type of Session

<table>
<thead>
<tr>
<th>Variable</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge levels at pre-test</td>
<td>9.53</td>
<td>1</td>
<td>9.53</td>
<td>1.97</td>
<td>.16</td>
</tr>
<tr>
<td>Knowledge levels at post-test</td>
<td>17.49</td>
<td>1</td>
<td>17.49</td>
<td>5.40</td>
<td>.02*</td>
</tr>
<tr>
<td>Attitudes levels at pre-test about in general, believing that people who do not need to take insulin to treat their diabetes have a pretty mild disease</td>
<td>.00</td>
<td>1</td>
<td>.00</td>
<td>.00</td>
<td>.96</td>
</tr>
<tr>
<td>Attitudes levels at post-test about in general, believing that people who do not need to take insulin to treat their diabetes have a pretty mild disease</td>
<td>.04</td>
<td>1</td>
<td>.04</td>
<td>.03</td>
<td>.87</td>
</tr>
</tbody>
</table>
### Analysis of Variance for Overall Knowledge and Attitudes in Relation to Type of Session

<table>
<thead>
<tr>
<th>Variable</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attitudes levels at pre-test about in general, believing that keeping</td>
<td>1.34</td>
<td>1</td>
<td>1.34</td>
<td>3.69</td>
<td>.06</td>
</tr>
<tr>
<td>the blood sugar close to normal can help to prevent the complications of diabetes.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attitudes levels at post-test about in general, believing that keeping</td>
<td>.30</td>
<td>1</td>
<td>.30</td>
<td>.40</td>
<td>.53</td>
</tr>
<tr>
<td>the blood sugar close to normal can help to prevent the complications of diabetes.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attitudes levels at pre-test about in general, believing people whose diabetes is treated by just a diet do not have to worry about many long-term complications.</td>
<td>.00</td>
<td>1</td>
<td>.00</td>
<td>.00</td>
<td>.98</td>
</tr>
<tr>
<td>Attitudes levels at post-test about in general, believing people whose diabetes is treated by just a diet do not have to worry about many long-term complications.</td>
<td>.08</td>
<td>1</td>
<td>.08</td>
<td>.06</td>
<td>.81</td>
</tr>
</tbody>
</table>
### Table 4.8

*Repeated Measure Analysis of Covariance for Overall Knowledge and Attitudes in Relation to Race/Ethnicity and Type of Education Session*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Type III SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge levels pre-test post-test</td>
<td>2.54</td>
<td>1</td>
<td>2.54</td>
<td>.43</td>
<td>.51</td>
</tr>
<tr>
<td>Attitudes levels pre-test post-test about in general, believing that people who do not need to take insulin to treat their diabetes have a pretty mild disease</td>
<td>.53</td>
<td>1</td>
<td>.53</td>
<td>.25</td>
<td>.62</td>
</tr>
<tr>
<td>Attitudes levels pre-test post-test about in general, believing that keeping the blood sugar close to normal can help to prevent the complications of diabetes.</td>
<td>.00</td>
<td>1</td>
<td>.00</td>
<td>.00</td>
<td>.96</td>
</tr>
<tr>
<td>Attitudes levels at pre-test and post-test about in general, believing people whose diabetes is treated by just a diet do not have to worry about many long-term complications.</td>
<td>3.62</td>
<td>1</td>
<td>3.62</td>
<td>2.13</td>
<td>.15</td>
</tr>
</tbody>
</table>
Summary

Overall, results from the data analysis showed that there were no statistically significant racial differences identified following completion of a diabetes education program. Whether in an individual or group education setting, there were no statistically significant racial differences present after completing the program. Furthermore, although the sex of patients was identified a potentially statistically significant factor in the study, sex differences were not present in relation to the other independent (race, type of education class) and dependent (pre-test, post-test) variables. There were significant overall knowledge increases that occurred after completion of the program and attitudes significantly improved showing that patients disagreed that those who do not need to take insulin to treat their diabetes have a pretty mild disease. Attitudes also significantly improved in that patients disagreed that those whose diabetes was treated by just a diet did not have to worry about many long-term complications. Lastly, those who attended individual sessions had significantly higher knowledge scores on their post-test than those who attended group sessions.
Chapter Five

Conclusions and Recommendations

Chapter one of this thesis discussed the research questions, hypotheses, delimitations, limitations, assumptions and operational definitions. A literature review was provided in chapter two which addressed racial differences in diabetes self management. Chapter three presented the methods which included identifying the selection process of patient charts, instrumentation, procedures and data analysis performed in this study. Chapter four provided an overview of the results of the demographics of patient charts selected for the study, and the results found through data analysis. A report of the results from the hypotheses that were tested will be presented in this chapter along with a discussion of the results, limitations of the chart review, recommendations for future research and an overall summary of the study.

Research Hypotheses and Discussion

The first hypothesis examined, stated that overall, Caucasian patients would have a higher knowledge level about diabetes than African American patients. There was a statistically significant racial difference in the knowledge levels in the pre-tests with African Americans having a lower knowledge level prior to attending the diabetes education program \( (p = 0.012) \). However, the results for the post-tests showed that there was not a significant difference \( (p = 0.255) \), the results were greater than 0.05. Based on these findings, the null hypothesis which addressed that, overall, Caucasian patients would have the same knowledge level about diabetes as African American patients following a diabetes program was not rejected.

Racial differences illustrated in the pre-tests could be supported by the findings of Antony & Baaklini (2004). Their study illustrated that African Americans tended to have less access to “health and educational resources,” which could improve overall health and
knowledge, attitudes, and awareness of diabetes. This study demonstrated that when African Americans had access to a comprehensive DSME program, knowledge and awareness of diabetes could improve. The question of why African Americans presented with a lower knowledge level prior to attending a DSME program was highlighted by statistically significant results and created an option for future research. The post-test demonstrated the success of a best practice diabetes education program as providing information that both Caucasians and African Americans could attain.

The second hypothesis stated that overall, Caucasian patients would have more positive attitudes about diabetes than African American patients following a diabetes program. There were no statistically significant racial differences found in either the pre-tests and post-test. Pre-test \( p = 0.667 \) and post-test \( p = 0.397 \) questions pertaining to believing that people who do not need to take insulin to treat their diabetes have a pretty mild disease had results greater than 0.05. Pre-test \( p = .416 \) and post-test \( p = 0.206 \) questions pertaining to believing that keeping the blood sugar close to normal can help to prevent the complications of diabetes also had results greater than 0.05. The last question on the pre-test \( p = 0.560 \) and post-test \( p = 0.798 \) also contained results that were not statistically significant pertaining to believing people whose diabetes is treated by just a diet do not have to worry about many long-term complications. These findings could be due to the patients becoming more aware of the different types of diabetes and treatment options.

With these findings, the null hypothesis stating that overall, Caucasian patients would have the same attitudes about diabetes than African American patients was not rejected. As reported by Montague, Nichols, & Dutta, (2005), African American patients may have positive attitudes about diabetes self management skills and high self-efficacy scores, however may not
adopt and routinely practice those skills. The study conducted by Montague, Nichols, & Dutta, only focused on African American women with no comparison to Caucasian women and therefore did not assess racial and attitude differences within the same study. In this study, racial and attitude differences were examined and although attitude scores on the pre-tests and post-tests did not yield significant results among, significant racial differences could still exist among adherence to diabetes self management skills (Nwasuruba, Khan, & Egede, 2007).

In relation to knowledge levels, two hypotheses examined whether racial differences could be found based on the type of session patients attended. One hypothesis stated that in a one-on-one setting, Caucasian patients would have a higher knowledge level about diabetes than African American patients following completion of a diabetes program. Another hypothesis stated that in a group setting, Caucasian patients would have a higher knowledge level about diabetes than African American patients following a diabetes program. Through the usage of a repeated measure ANCOVA along with the application of sex as a covariate, no statistical significance was found to support either hypothesis. Thus, whether in a one-on-one or group setting, the null hypotheses pertaining to Caucasian patients having the same knowledge level about diabetes as African American patients following a diabetes program could not be rejected.

Since the null hypotheses were not rejected, one could consider the fact that both Caucasians and African Americans may have been receiving a comprehensive diabetes program as their introduction to diabetes education. Consistency in teaching methods within the program allowed both groups to overall increase their knowledge levels. The findings of this study compared to findings found in another study that examined diabetes education for those with type 2 diabetes in a group or individual setting (Rickheim, Flader, Weaver, Kendall, 2002). A notable difference between the studies was that Rickheim, Flader, Weaver & Kendall’s study had
a very low African American sample size, for the primary focus of the study was to examine equal proportions of patients attending group and individual diabetes education sessions. Although knowledge and race/ethnicity differences were not found in relation to the type of session, 92% of the patients that participated in the study were Caucasian, making it difficult in determining whether racial differences exist (Rickheim, Flader, Weaver & Kendall, 2002).

The findings of Rickheim, Flader, Weaver & Kendall (2002) could also be compared to the results of the following hypotheses. In relation to attitude levels, another two hypotheses examined whether racial differences could be found based on the type of session patients attended. One hypothesis referred to when in a one-on-one setting, Caucasian patients would have more positive attitudes about diabetes than African American patients following a diabetes program. Another hypothesis addressed when in a group setting, Caucasian patients would have more positive attitudes about diabetes than African American patients after the completion of a diabetes program. The repeated measure ANCOVA, illustrated that there were no statistical significance results found in any of the three questions; a) believing that people who do not need to take insulin to treat their diabetes have a pretty mild disease ($p = 0.602$), b) believing people whose diabetes is treated by just a diet do not have to worry about many long-term complications ($p = 0.959$), and c) believing people whose diabetes is treated by just a diet do not have to worry about many long-term complications ($p = 0.147$).

Whether in a one-on-one or group setting, the null hypotheses pertaining to Caucasian patients having the same attitudes about diabetes as African American patients following a diabetes program could not be rejected. Since the null hypotheses could not be rejected, these findings may show the strength of an ADA recognized program in helping initiate the process of providing patients with self-empowerment to manage their diabetes. If a comprehensive diabetes
education program’s core concepts were consistently taught, the type of session was not a significant variable (Rickheim, Flader, Weaver & Kendall (2002). Once again it is important to mention that there may not have been enough race/ethnicity sub groups to properly assess for racial difference in the study highlighted above.

One hypothesis addressed overall knowledge in relation to the type of session stating that all patients in a one-on-one setting would have higher knowledge levels about diabetes than patients in the group setting. The results showed that there was a statistically significant difference in the increase of knowledge levels in a one-on-one setting than a group education setting the post-test ($p = .022$). Patients were more likely to achieve higher knowledge scores on their post-test which could be due to individual attention being provided in those sessions.

Although consistency in diabetes teaching curriculum may have been met, educators may have been able to tailor the teaching material to better meet the needs of the patient. Whereas, in a group setting, although patients may attend the sessions, they may not participate in the session, such as asking questions. Due to these findings, the null hypothesis stating that overall, patients in a one-on-one setting will have the same knowledge levels about diabetes as all patients in the group setting was rejected. Although these findings contradict the results of Rickheim, Flader, Weaver & Kendall (2002), one must look at the purposes of each study. Sample size for the study of Rickhiem et al. focused on equal distribution pertaining to type of session patients attended whereas this study’s sample size was dependent on equal distribution of racial groups.

The last hypothesis examined all patients’ attitudes with the idea that all patients in a one-on-one setting would have more positive attitudes about diabetes than patients in the group setting. There were no statistically significant differences in type of education session when both
Recommendations and Conclusions

Pre-test and post test attitudes were assessed. Pre-test ($p = 0.963$) and post-test ($p = 0.873$) questions pertaining to believing that people who do not need to take insulin to treat their diabetes have a pretty mild disease had results greater than 0.05. A similar result occurred with the pre-test ($p = 0.058$) and post-test ($p = 0.530$) questions pertaining to believing that keeping the blood sugar close to normal can help to prevent the complications of diabetes had results greater than 0.05.

The last question on the pre-test ($p = 0.975$) and post-test ($p = 0.814$) also contained results that were not statistically significant pertaining to believing people whose diabetes is treated by just a diet do not have to worry about many long-term complications. Once again, these findings were similar to those found in Rickheim, Flader, Weaver & Kendall’s (2002) study, illustrating that the type of session may not influence attitudes about diabetes. With these findings, the null hypothesis that overall, patients in a one-on-one setting will have the same attitudes about diabetes than patients in the group setting was not rejected.

**Limitations of the Study**

This study consisted of a medical chart review, therefore the variable of time completion of the comprehensive program was not controlled. Some patients completed the comprehensive program over a month time span while others could have taken as long as six months. It was very difficult to assess environmental influences or factors that could have affected one’s knowledge and attitudes about diabetes self-management. Other limitations included measurement completion error or simply measurement error even though an expert panel containing CDE’s, nurses, and dietitians were used to review the pre-test post-test for face and content validity. Variation among diabetes educators teaching the different types of sessions also occurred. Each
concepts of the curriculum could be taught consistently, however teaching methods could vary.

Further assessment of the instrument such as investigating questions on the pre-test post-test that were commonly answered incorrectly could have affected test outcomes. Patients making errors in completion of the instrument could have also increased risk for error, such as those who may have answered too quickly without reading the questions thoroughly. The literacy level of patients also varied and although the pre-test post-test had a readability level at a fourth grade level, patients’ interpretation of the questions could have resulted in some patients guessing at answers that “sounded” correct.

Due to the shortened length of the pre-test post-tests, one could conclude that this could play a role in creating generalizations instead of specific associations or conclusions about racial differences in diabetes educations. When using the Cronbach alpha as a test an instrument for reliability, a score ≥ 0.80 was deemed reliable primarily if one entity was being assessed (Pickett & Hanlon, 1998). The pre-test post-test for this study was used to assess multiple entities of diabetes self management, thus the lower scores of the knowledge and attitude sections of the pre-test post-test may be reliable within a range as low as 0.4-0.6.

The imbalance of knowledge questions to attitude questions could be interpreted as not a true assessment of patients about attitudes. The panel of experts specifically selected the attitude questions for the pre-test post-test based on questions asked on the initial diabetes education assessment form that patients fill out. These questions best addressed the attitudes of the clientele of patients that were being seen at the center.

The size of the sub groups, pertaining to type of session (group or individual) were small, (individual = 31, group = 19), therefore sub group analyses were not run since the primary focus
entailed racial differences in a diabetes self management education program. Although Rickheim, Flader, Weaver & Kendall’s (2002) study did not run sub group analyses for racial differences, their study did have an adequate sample size pertaining to type of session since that was their main focus. Lastly, the sample size used in this study was considered to be a convenience sample due to the short two-year time frame of the chart review and the small population of newly diagnosed type 2 patients that met all inclusion criteria for this study obtained in this period. The study did not assess knowledge and attitudes in a three month follow-up, although the Christ Hospital Diabetes Center had a three month follow-up form that they mailed to patients assessing their diabetes self management progress.

**Implications for Future Research**

The findings of this study suggested that there were no significant racial differences in knowledge and attitudes for Caucasian and African American patients newly diagnosed with type 2 diabetes. Future research should entail testing this same pre-test post-test in another ADA recognized program to see if similar results can be generated. Although there were contradicting studies pertaining to the evaluation of group sessions or individual sessions, this study showed a statistically significant increase in knowledge for those who attended individual sessions. Since the sub groups pertaining to the type of session did not entail randomization of patients and were small in size, further research should involve a large enough sample size to successfully assess a diabetes program for both racial and type of education session differences. This study should also include a three month follow-up of knowledge and attitudes to assess if these variables were further improved upon outside a comprehensive diabetes education program.

The National Standards of Diabetes Self-Management Education (DSME) can be taught in different ways with success, however an assessment of consistency among teaching methods
in relation to type of session (individual or group) and race/ethnicity need to be completed. An
evaluation of the subgroups of type 2 diabetes should be examined, meaning patients insulin
dependent and those non-insulin dependent. The literacy level of those who are insulin
dependent verses those who are not, may play a role in knowledge and attitudes about diabetes
management.

Lastly, future research should be conducted to assess why African Americans had lower
knowledge levels about diabetes prior to attending comprehensive diabetes education. This study
demonstrated the success of increasing awareness, knowledge and attitudes about diabetes which
are foundation for disease self-management. One must inquire as to why African American
possess less knowledge once diagnosed, which involves evaluating pre-diabetes, health
screenings, and resources that should be available in the primary and secondary levels of disease
prevention for this population. Further research is needed to examine reasons why African
Americans possess the knowledge and attitudes to achieve glycemic control, however maintain
higher Hemoglobin A1c levels and are less likely to engage in self-management behaviors such
as medication adherence and/or blood glucose monitoring.

Within the practice of diabetes, further research pertaining to type of education session
should be conducted. A combination of both types of sessions may provide the most amount of
benefit for all patients, initially providing the core concepts of diabetes self-management in a
group setting, however offer follow-up individual sessions to show patients how to personalize
their diabetes self-management skills. Knowledge can increase self-empowerment and promote
making healthy behavior changes for disease self-management only if one can relate that
collected knowledge to their own life.
Summary

This study demonstrated the need to assess awareness of diabetes preventive resources within the African American community. This study also brought to light the need to examine why self-management behaviors needed to achieve optimal glycemic control are not consistently practiced among African Americans when there was an increase in knowledge and attitudes about diabetes. This study was conducted to assess whether a diabetes education program considered nationally as a “best practice” had racial differences in knowledge and attitudes pertaining to diabetes management among those where were newly diagnosed with type 2 diabetes. The chart review study used a pre-test post-test quasi experimental design. The center’s diabetes self-management education program proved to be successful in improving knowledge and attitudes among its patients without racial differences. Although racial differences were not present, when compared to type of education session, patients overall had higher knowledge levels on the post-test if seen one-on-one. Further research is needed to assess this program’s accomplishment in diminishing racial disparities in diabetes on a larger scale to see if consistency in results can be achieved.
References


Appendix A

The Christ Hospital Diabetes Outpatient Self-Management and Training Center Education Program Evaluations for Pre-test/Post-test

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

2. Glycosylated hemoglobin (hemoglobin A1c) is a test that is a measure of your average blood glucose level for the past:
   a. day
   b. week
   c. 6-10 weeks
   d. 6 months

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

4. Which should not be used to treat low blood glucose?
   a. 3 hard candies
   b. 1/2 cup orange juice
   c. 1 cup diet soft drink
   d. 1 cup skim milk

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

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

7. Eating foods lower in fat decreases your risk for:
   a. nerve disease
   b. kidney disease
   c. heart disease
   d. eye disease
8. Numbness and tingling may be symptoms of:
   a. kidney disease
   b. nerve disease
   c. eye disease
   d. liver disease

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

10. If you are sick with the flu, which of the following changes should you make?
    a. Take less insulin
    b. Drink less liquids
    c. Eat more proteins
    d. Test for glucose and ketones more often

11. Low blood glucose may be caused by:
    a. too much insulin
    b. too little insulin
    c. too much food
    d. too little exercise

12. High blood glucose may be caused by:
    a. not enough insulin
    b. skipping meals
    c. delaying your snack
    d. large ketones in your urine

In general, I believe that:

13. ...people who do not need to take insulin to treat their diabetes have a pretty mild disease.

14. ...keeping the blood sugar close to normal can help to prevent the complications of diabetes.
15. ...people whose diabetes is treated by just a diet do not have to worry about getting many long-term complications.
Appendix B

Data Collection Sheet

Code #____________

Age______________

African American______, Caucasian______________

Gender: Male____  Female_____

Newly Diagnosed w/ no previous comprehensive education? Yes___ No____

Occupation_______________

Group class_________ Individual class_________
Appendix C

The Christ Hospital Diabetes Center Study Approval Letter

Diabetes Center
The Christ Hospital
2123 Auburn Ave. Suite #332
Cincinnati, OH 45219

University of Cincinnati
Institutional Board- Social & Behavioral Science
University Hall, Suite 300
51 Goodman Drive
Cincinnati, Oh. 45221

Dear Sir or Madame,
This letter is to inform you that The Christ Hospital, Cincinnati, Ohio is willing to partner with the University of Cincinnati College of Education, Criminal Justice and Human Services, Division of Human Services, Health Promotion and Education Program to allow the opportunity to perform research at our institution through our Diabetes Center. Our institution is a strong site for this research with regard to our large African American population and we look forward to the research to improve education of our customers.
If you have any questions or need further information, please call me at (513) 585-2619.

Sincerely,

Kathy Blessinger, R.D., L.D., C.D.E
Clinical Coordinator, Out-patient Diabetes Center

Linda Turpin, R.N., M.S.N.
Clinical Manager of Staff Development and the Diabetes Center