INFORMATION TO USERS

This manuscript has been reproduced from the microfilm master. UMI films the text directly from the original or copy submitted. Thus, some thesis and dissertation copies are in typewriter face, while others may be from any type of computer printer.

The quality of this reproduction is dependent upon the quality of the copy submitted. Broken or indistinct print, colored or poor quality illustrations and photographs, print bleedthrough, substandard margins, and improper alignment can adversely affect reproduction.

In the unlikely event that the author did not send UMI a complete manuscript and there are missing pages, these will be noted. Also, if unauthorized copyright material had to be removed, a note will indicate the deletion.

Oversize materials (e.g., maps, drawings, charts) are reproduced by sectioning the original, beginning at the upper left-hand corner and continuing from left to right in equal sections with small overlaps. Each original is also photographed in one exposure and is included in reduced form at the back of the book.

Photographs included in the original manuscript have been reproduced xerographically in this copy. Higher quality 6" x 9" black and white photographic prints are available for any photographs or illustrations appearing in this copy for an additional charge. Contact UMI directly to order.
The association between adult literacy and patient education factors of non-insulin dependent diabetic patients at risk for lower extremity amputation

Emery, Alfred Wyatt, Jr., Ph.D.

The Ohio State University, 1991
THE ASSOCIATION BETWEEN ADULT LITERACY
AND PATIENT EDUCATION FACTORS
OF NON-INSULIN DEPENDENT DIABETIC PATIENTS
AT RISK FOR LOWER EXTREMITY AMPUTATION
DISSERTATION

Presented in Partial Fulfillment of the Requirements for
the Degree Doctor of Philosophy in the Graduate
School of The Ohio State University

By
Alfred Wyatt Emery, Jr., B.A., M.A.

* * * * *

The Ohio State University
1991

Dissertation Committee:
W.D. Dowling
D.L. Boggs
A.J. Miller

Approved by

William D. Dowling
Advisor

College of Education
ACKNOWLEDGEMENTS

First, I would like to thank my Dissertation Committee and my advisor, Dr. William D. Dowling, for his continuous, unfailing support and good humor during my graduate studies and particularly during the dissertation process. Many thanks to Dr. David L. Boggs for the many reflective conversations and help over the years. I am also grateful to Dr. Mary Beth Mathews for her hours of support and encouragement. To Dr. A.J. Miller my gratitude for being responsive to the need for additional consultation.

This project would not have been possible without the cooperation of the clinical staff of the Diabetes and Atherosclerosis Clinic at The Ohio State University Hospitals/Clinics. Sam Cataland, M.D. and Tom O'Dorisio, M.D. were most cooperative in giving me permission to work with their study population. Jill Magato and Pat Worthington were a tremendous help in scheduling interviews and other logistics. A particular thanks goes to Cecelia Casey, for without her assistance and interest it would not have been possible to implement this project. It has truly been a pleasure being involved with these dedicated individuals.
A great thanks goes to my "technical support" team: Susan Leonhart, Dr. Ajay Bhardwaj, and Karen Hartker. Their time and willingness to help have been much appreciated and made the job easier. In addition, I would like to acknowledge Leonard and Cecil Doak (Patient Learning Systems) for their technical advice and willingness to share their materials and ideas.

To my colleague, Joan Allen, goes my sincere gratitude for the many Saturdays and Sundays she spent helping to organize and implement the many tasks as well as "pushing and pulling" at just the right time. And to Seth Kantor, M.D., for facilitating my schedule to meet the multiple demands of a dissertation.

Lastly, two special groups must be recognized. I am obviously indebted to the patients with diabetes who volunteered to participate in this follow-up study. They retaught me some lessons I had unfortunately forgotten. Most importantly, through all the years my family has always been there--my wife, Bonnie, and our children, Todd and Andy. To them I owe it all.
VITA

1968 ........ B.A., College of Liberal Arts, Speech Pathology/Audiology, The University of New Hampshire, Durham, New Hampshire

1968-1970 .... Consultant, Speech Pathology/Audiology, Programs for Exceptional Children, Santa Cruz, California

1972 ......... M.A., Communicative Disorders, Graduate School of Speech, Northwestern University, Evanston, Illinois

1972-1975 .... Administrator, (Assistant Professor) National Technical Institute for the Deaf, Rochester Institute of Technology, Rochester, New York

1975-1978 .... White House Conferences, Washington, D.C. Associate to the Executive Director White House Conference on the Handicapped

Senior Consultant, White House Conference on Balanced National Growth and Economic Development


Fellow, National Training and Development Center, Washington, D.C.

1981-1987 .... Director, The Ohio State University Center for Health Professions, Columbus, Ohio

1987-1988 .... Director, East Central AIDS Education and Training Center, Department of Family Medicine, College of Medicine (part-time)
1987-Present . . . Program Director, Office of the Dean for Medical Education

FIELD OF STUDY

Major Field: Education

Adult Education. ................. William D. Dowling

PUBLICATIONS


Emery, A. W., Educational Editor (1985) Aging in Ohio (slides/audiotapes). A multimedia education resource distributed to community and educational organizations in Ohio. The Ohio State University, Columbus, Ohio.

TABLE OF CONTENTS

ACKNOWLEDGEMENTS ...................................... ii
VITA .................................................. iv
LIST OF TABLES ........................................ ix
LIST OF FIGURES .................................... xii

CHAPTER

I. THE PROBLEM ....................................... 1

   Introduction ........................................ 1
   Background of the problem .......................... 3
   Problem Statement ................................ 6
   Purpose of the study ................................ 6
   Research Questions ................................ 6
   Significance of the study ............................ 7
   Operational Definitions ............................. 10
   Scope and limitation ................................ 12
   Summary ............................................. 12

II. REVIEW OF THE LITERATURE ....................... 14

   Introduction ........................................ 14
   Diabetes ............................................ 15
      The Classification of the Disease ............... 15
      Types of Diabetes ................................ 16
      Type I Diabetes .................................. 16
      Possible Causes of Type I Diabetes ............. 16
      Type II Diabetes .................................. 17
      Possible Causes of Type II Diabetes ............. 17
   Management of Diabetes ............................. 18
   Demographics of Diabetes ........................... 18
   Patient Education and Diabetes .................... 20
   The Process of Diabetes Education ................. 22
   Diabetes and Foot Disease ......................... 27
      The Natural History of Diabetic Foot Problems 28
      Economics of Diabetes-Related Foot Disease .... 30
      Clinical Interventions and Programs ............. 32
   Dynamics of Adult Literacy ........................ 37

vi
APPENDICES ............................................. 134

A. Letter of Invitation ................................. 135
B. DAC Baseline Data Questions Utilized in
   Follow-up Study .................................. 137
C. Interview Questionnaire Utilized in the
   Follow-up Study .................................. 140
D. Text and Test Questions, Listening
   Comprehension, Grade 5 ......................... 143
E. Text and Test Questions, Listening
   Comprehension, Grade 10 ....................... 146
F. Text Used for the Cloze Test ....................... 149

BIBLIOGRAPHY ............................................. 151
<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1</td>
<td>Financial Statistics of Diabetes</td>
<td>20</td>
</tr>
<tr>
<td>2.2</td>
<td>Type of Intervention and Frequency</td>
<td>26</td>
</tr>
<tr>
<td>4.1</td>
<td>Demographic Profile of DAC Study Subjects</td>
<td>76</td>
</tr>
<tr>
<td>4.2</td>
<td>Demographic Profile of Follow-up Study Sample</td>
<td>77</td>
</tr>
<tr>
<td>4.3</td>
<td>Comparison of Unhealthy Versus Healthy Foot Status for Patient Factors Age,</td>
<td>81</td>
</tr>
<tr>
<td></td>
<td>Gender, and Race</td>
<td></td>
</tr>
<tr>
<td>4.4</td>
<td>Comparison of Unhealthy Versus Healthy Foot Status for the Patient Factors of</td>
<td>81</td>
</tr>
<tr>
<td></td>
<td>Visual and Hearing Acuity</td>
<td></td>
</tr>
<tr>
<td>4.5</td>
<td>Comparison of Unhealthy Versus Healthy Foot Status for the Patient Factor of</td>
<td>82</td>
</tr>
<tr>
<td></td>
<td>Income</td>
<td></td>
</tr>
<tr>
<td>4.6</td>
<td>Comparison of Unhealthy Versus Healthy Foot Status for the Patient Factor of</td>
<td>83</td>
</tr>
<tr>
<td></td>
<td>Self-Reported Grade Level Achievement and Reading Grade Level Equivalent</td>
<td></td>
</tr>
<tr>
<td>4.7</td>
<td>Comparison of Unhealthy Versus Healthy Foot Status for the Patient Factor of</td>
<td>84</td>
</tr>
<tr>
<td></td>
<td>Listening Comprehension</td>
<td></td>
</tr>
<tr>
<td>4.8</td>
<td>Comparison of Unhealthy Versus Healthy Foot Status for the Patient Factor of</td>
<td>85</td>
</tr>
<tr>
<td></td>
<td>Reading Comprehension (Cloze Technique)</td>
<td></td>
</tr>
<tr>
<td>4.9</td>
<td>Comparison of Unhealthy Versus Healthy Foot Status for the Patient Factor of</td>
<td>86</td>
</tr>
<tr>
<td></td>
<td>Primary Language</td>
<td></td>
</tr>
<tr>
<td>4.10</td>
<td>Comparison of Unhealthy Versus Healthy Foot Status for the Disease Factor of</td>
<td>87</td>
</tr>
<tr>
<td></td>
<td>Length of Time with Disease (Diabetes)</td>
<td></td>
</tr>
</tbody>
</table>
4.11 Comparison of Unhealthy Versus Healthy Foot Status for the Disease Factor of Perceived Risk for Diabetic Foot Problems ........................................ 87

4.12 Comparison of Unhealthy Versus Healthy Foot Status for the Disease Factor of Belief About Foot Problem Prevention (Self-Reported) ............................ 88

4.13 Comparison of Unhealthy Versus Healthy Foot Status for the Disease Factor of Foot Care Knowledge Before Foot Care Instruction (Self-Reported) .............. 89

4.14 Comparison of Unhealthy Versus Healthy Foot Status for the System Factor of Primary Care Source ................................................. 90

4.15 Comparison of Unhealthy Versus Healthy Foot Status for the System Factors of Previous Diabetes Education, Instructor, and Location of Instruction ............... 92

4.16 Comparison of Unhealthy Versus Healthy Foot Status for the System Factors of Method of Instruction (Diabetes Education) ..................................... 93

4.17 Comparison of Unhealthy Versus Healthy Foot Status for the System Factors of Previous Foot Care Education, Instructor, and Location of Instruction ....................... 95

4.18 Comparison of Unhealthy Versus Healthy Foot Status for the System Factor of Method of Instruction for Foot Care Education ........................................ 97

4.19 Relationship Between Healthy/Unhealthy Feet and the Patient Factor Age at Entry into Project ................................................................. 98

4.20 Relationship Between Healthy/Unhealthy Feet and the Patient Factor Gender ............................................................ 99

4.21 Relationship Between Healthy/Unhealthy Feet and the Patient Factor Race ............................................................. 100

4.22 Relationship Between Healthy/Unhealthy Feet and the Patient Factor Visual Acuity (Self-reported) ............................................................ 101
4.23 Relationship Between Healthy/Unhealthy Feet and the Patient Factor Hearing Acuity . . . .102
4.24 Relationship Between Healthy/Unhealthy Feet and the Patient Factor of Income . . . .103
4.25 Relationship Between Healthy/Unhealthy Feet and the Patient Factor Grade Level Achievement (Self-Reported) . . . . . . . .104
4.26 Relationship Between Healthy/Unhealthy Feet and the Patient Factor Reading Grade Equivalent (WRAT) Level . . . . . . . .105
4.27 Relationship Between Healthy/Unhealthy Feet and the Patient Factor Listening Comprehension Score (Doak & Doak) . . . . . . . .106
4.28 Relationship Between Healthy/Unhealthy Feet and the Patient Factor of Reading Comprehension (Cloze Technique) . . . . . . . .106
4.29 Relationship Between Healthy/Unhealthy Feet and the Disease Factor of Length of Time with Disease (Years) . . . . . . . .107
4.30 Relationship Between Healthy/Unhealthy Feet and the Disease Factor Perceived Risk for Diabetic Foot Problems. . . . . . . .108
4.31 Relationship Between Healthy/Unhealthy Feet and the System Factor Primary Care Source for Diabetes . . . . . . . .109
4.32 Relationship Between Healthy/Unhealthy Feet and the Disease Factor Belief About Foot Problem Prevention . . . . . . . .110
4.33 Relationship Between Healthy/Unhealthy Feet and the Disease Factor of Foot Care Knowledge Before Foot Care Instruction . . . .111
4.34 Relationship Between Healthy/Unhealthy Feet and the System Factor of Previous Diabetes Education . . . . . . . . . .112
4.35 Relationship Between Healthy/Unhealthy Feet and the System Factors of Previous Foot Care Education. . . . . . . . . .113
## LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figures</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1</td>
<td>Lane &amp; Evans patient education outcome conceptualization</td>
<td>23</td>
</tr>
<tr>
<td>2.2</td>
<td>Diabetes and foot care (epidemiology and prevention)</td>
<td>34</td>
</tr>
<tr>
<td>2.3</td>
<td>Years of Schooling and Word Recognition (WRAT)</td>
<td>47</td>
</tr>
<tr>
<td>2.4</td>
<td>Patient Comprehension Profile</td>
<td>48</td>
</tr>
<tr>
<td>2.5</td>
<td>Reading Levels of Written Instructions (100 Samples)</td>
<td>49</td>
</tr>
<tr>
<td>3.1</td>
<td>Subject selection</td>
<td>55</td>
</tr>
<tr>
<td>3.2</td>
<td>Variables and instrumentation used in the follow-up study</td>
<td>63</td>
</tr>
</tbody>
</table>
CHAPTER I
THE PROBLEM

Introduction

Diabetes Mellitus is a chronic disease affecting from five to six percent of the U.S. population. The seventh leading cause of death in this country, the disease is responsible for 1.7% of all deaths annually. Looking at the underlying causes of death in other illnesses, diabetes moves up to number three in the list of causes of death (Satiani, 1987).

Diabetes and lower extremity problems, especially foot disease, go hand in hand as serious medical, social, and economic concerns for health care providers. In 1980, hospitalization costs for diabetic foot disease in the United States exceeded $200 million with 50% of the lower extremity amputations performed on diabetics (Kozak & Rowbotham, 1984).

With the population aging, the diabetic population continues to grow older and with that longer life span comes complications. Appropriate patient education and prevention care are believed to help reduce morbidity and amputations in susceptible diabetic groups. Thus, the education of patients and professionals to reduce risk factors and prevent limb loss as a result of foot disease is an
important strategy in diabetes management (Bild, et al., 1989).

A recent report, "The Literacy and Health Project - Making the World Healthier and Safer for People Who Can't Read" (Ontario Public Health Association, 1989), focused on the relationship between literacy and health. The researchers found that people with low literacy skills were more likely to be in worse health than people who were literate. The report further suggested that the impact of illiteracy on health was an association that was neither clearly understood nor its impact appreciated fully.

In 1989, the Center for Disease Control funded three national projects to study and evaluate impact strategies on improving prevention behaviors and reducing the risk for lower extremity amputations in persons with Non-Insulin Dependent Diabetes Mellitus (NIDDM). One of these projects was established at The Ohio State University, Columbus, Ohio under the auspices of the Department of Internal Medicine and the Division of Endocrinology and Metabolism. It is referenced throughout this document as the Diabetes-Atherosclerosis Clinic (DAC) foot study.

This exploratory study examined adult literacy and patient education-related factors associated with risk for lower extremity amputation using a sample of the patients from the DAC study. It is referenced throughout this document as the "follow-up foot study."
Background of the Problem

By estimates, 27 million American adults are functionally illiterate. One out of five adult Americans reads at the fifth-grade level or lower (Doak & Doak, 1990). Literacy skills, as taught and measured in the schools, generally are referred to as "reading achievement" while literacy skills that are practiced outside of the schools are termed "functional literacy" (Duffy, 1990; Stedman & Kaestle, 1987).

Duffy (1990) illustrates the impact of functional illiteracy and how the problem manifests itself: Typically,

- Functionally illiterate individuals are unable to use reference documents.
- These individuals have difficulty following instruction sheets.
- An individual needs an eighth-grade reading level to follow directions to prepare a frozen dinner.
- A 10th-grade reading level is required to follow the directions on a bottle of aspirin.
- A 12th-grade reading level is required to read most newspapers.
- A college degree is required to understand a surgical consent form.

Health professionals should be continuously aware of the relationship of literacy to patient education as well as the development of patient-oriented materials. This has
been validated by research on patient recall of spoken information and instructions as reported by Duffy (1990). In addition, published studies have pointed out that less than 20% of patients/clients are fully informed concerning their medication and that 50% cannot understand the prescription label or instructions given to them by health professionals (Conroy & Mulcahy, 1985). Duffy (1990) further suggests that, as a result, health professionals frequently supplement their verbal instructions with written materials as a means of improving patient understanding and subsequently adherence. This is fine as long as the patient is capable of reading and comprehending the written material.

The current shortage of nurses (who continue to do the majority of patient education, both formally and informally) and shortened hospital stays have forced the use of more and more printed patient education materials. This information surplants what in the past may have been done on a demonstration basis by nurses in an unhurried hospital environment.

According to Streiff (1986), approximately 50% of health care clients have serious difficulty with reading or are unable to read instructions at the fifth-grade level. In addition, the researcher noted that the majority of patient education materials are written at the eighth-grade level or above. To compound matters, he concluded that
medical terminology has been found to be frequently incomprehensible to both literate and illiterate patients. Perhaps nowhere has patient education played such an important role as in the management of diabetes. The nature and complexity of this chronic illness requires ongoing medical intervention strategies and self-care educational programs throughout the patient's life time. Major lifestyle changes are required as individuals move through the course of this disease. It is within the context of diabetes that understanding illiteracy becomes a critical component for successful health outcomes.

One important aspect of lifestyle change and medical management for persons with diabetes that has not received much attention is the care and prevention of foot disease and lower limb amputation. The outcomes of failure in this particular aspect of diabetes patient education leave many persons facing the amputation of one or both of their lower extremities because of neuropathy and vascular disease. Both can ultimately lead to ulceration and gangrene infection (Cataland, et al., 1989). Appropriate patient education and a sensitivity to literacy issues are also critical to teach persons with diabetes to reduce risks and care for themselves.

In summary, patient education is the primary vehicle for increasing self-management of chronic illnesses, such as diabetes, and promoting lifestyle changes/modifications
(Rae, 1990). The latter is a critical strategy for preventing complications and reducing risk factors for diabetes and possible foot disease, which can lead to lower extremity amputation. Self-care instruction and adherence to a prescribed diabetes regimen are pivotal to successfully managing the disease and the patient's quality of life.

Problem Statement

The nature of the association between literacy, patient education, and the ability of persons with Type II NIDDM at risk for foot disease to follow recommendations and to avoid foot pathology has not been studied as part of a comprehensive treatment strategy.

Purpose of the Study

The purpose of this exploratory study was (1) to examine the nature of the relationship between patient education factors; (2) to investigate educational interventions related to literacy and the absence or presence of certain risk factors for lower extremity amputation in persons with NIDDM; (3) to gain insight into the relationship between foot care and foot care education for diabetic patients; and (4) to identify the characteristics of diabetic patients who lack literacy skills to deal with important health care information about their life-threatening disease.
Research Questions

1. What are the similarities or differences among individuals with NIDDM and low literacy skills who are classified as having healthy versus nonhealthy feet?

2. What is the nature of the relationship of healthy/unhealthy feet with the following factors?
   a. Patient factors
   b. Disease factors
   c. System factors

3. What is the degree of agreement between functional grade level and the self-reported grade level of patients in the baseline study?

4. How do patients with NIDDM and limited literacy skills obtain patient education information about their risk for lower extremity amputation?

Significance of the Study

The importance of effectively instructing persons with diabetes about self-care generally and foot care specifically is highlighted by the following alarming statistics:

- The person with diabetes has a 15 times greater risk of lower extremity amputation than the person without diabetes.
- By age 65, approximately 3% of persons with diabetes will report the loss of at least one extremity,
finger, or toe.

- Fifty to 70% of all nontraumatic lower extremity amputations are performed on persons with diabetes.
- For those who have survived an initial amputation, over 56% have an amputation of the second leg within one to five years (Cataland, Casey, Sheldon, Smead & Stewart, 1988).

The estimated cost of treatment of diabetic foot lesions, amputations, and subsequent rehabilitation is more than $1.3 billion per year. Lost wages, disability, and the inestimable price of psychosocial agony combine to create a catastrophic waste of human resources (Kozak & Rowbotham, 1984).

The research findings of Delbridge, Appleberg & Reeve bring the importance of preventive education into perspective. The authors studied 80 patients with diabetes over the age of 50 years with the aim of determining which factors were important in the development of foot lesions. They found a significant relationship between the level of patient understanding of foot care and the development of foot lesions. Their conclusions emphasized the importance of educating both patients and doctors about the significance of foot care and the prevention of foot lesions (Delbridge, Appleberg & Reeve, 1983).

One factor beginning to receive both national and international recognition is the relationship of patient
literacy to health and health behavior. In the report "Literacy and Health-Phase One," issued last year by the Ontario Public Health Association (1989), three major questions were posed relative to literacy and health:

► "Are people who cannot read as healthy as people who can read? If not, why not? In what ways are they not healthy?
► Do health workers, such as doctors and public health nurses, know that many people can't read? Do they understand that not being able to read can cause problems?
► Is most health information hard to read? If it is, how do people who can't read well get health information?" (Ontario Public Health Association, 1989).

These questions are significant, and have been applied to the problems of diabetes education. Several researchers have studied the nature and magnitude of the relationship of illiteracy and patient education (Doak, Doak & Root, 1985; McNeal, Salisbury, Baumgardner & Wheeler, 1984; Traub, Baker & Sturr, 1986; and Dunn, Buckwalter, Weinstein & Palti, 1985). These authors draw attention to the role of literacy as a component of any patient education strategy.

This exploratory study intended to provide further information on the relationship between literacy and diabetes management. For the diabetes educator interested
in assisting patients to reduce their risk for diabetes generally and foot pathology specifically, it will extend the data base available for current practitioners as well as point toward research questions for further study.

Operational Definitions

Patient Education: A planned learning experience using a combination of methods such as teaching, counseling, and behavior modification techniques that influence patient knowledge and health behavior. . . (and) involves an interactive process which assists patients to participate actively in their health care (Bartlett, 1985).

Healthy Feet: Based on the initial baseline assessment and the results of medical testing, "healthy feet" had no evidence of neuropathy or peripheral vascular disease.

Unhealthy Feet: Based on the initial baseline assessment and the results of medical testing, "unhealthy feet" have evidence of neuropathy and/or peripheral vascular disease. The latter group was further divided into the following subgroups: Group 2A, peripheral vascular disease only with or without ≤ Stage 2 ulcer; Group 2B, neuropathy only, with or without ≤ Stage 2 ulcer; and Group 2C, peripheral vascular disease and neuropathy with or without ≤ Stage 2 ulcer.

Basic illiteracy: The total inability to read or write (Ontario Public Health Association, 1989).
Functional illiteracy: Less than a grade nine education with a lack of sufficient reading, writing, and numeric skills to get by in everyday life (Ontario Public Health Association, 1989).

The following operational definitions further clarify terms used in this study. They have been expanded from a conceptual model developed by Lane and Evans (1979).

**Disease Factors:** Differences in the expression of a disease in an individual patient. For purposes of this study, disease factors included length of disease, risk knowledge, foot care knowledge, beliefs about effects on feet, and beliefs about prevention.

**Patient Factors:** Demographic variables used to describe the epidemiology of the disease, such as age, gender, and race. Other factors included: visual acuity (self-reported); hearing acuity (self-reported); socioeconomic status; literacy characteristics: reading grade equivalent (WRAT); self-reported grade level achievement; listening comprehension (Doak & Doak); and reading comprehension (adapted cloze).

**System Factors:** Characteristics of patient education in the health care delivery system. These included previous diabetes education, previous foot care education, place of education/method(s) of instruction, instructor preference, and source of primary care for diabetes.
Scope and Limitations

The exploratory study was limited to a sample of 21 persons with the diagnosis of NIDDM from the rolls of The Ohio State University Diabetes Atherosclerosis Clinic (DAC) and currently enrolled in a prevention strategy foot care project. The findings from this study cannot be generalized.

This was a purposeful sample which because of its size affects generalizability of the results. Criteria of educational attainment of 10th grade or less was a major factor.

A second limitation is the disease nature and ratio of the patients who come to the DAC. Being part of a tertiary care center and university health sciences teaching center it tends to get individuals with more complicated and severe problems. The ratio nationally for Type II (NIDDM) versus Type I (IDDM) is 10:1 or 90% Type II. For the DAC study the ratio was 10:3 or 70% Type II.

Summary

The importance of patient education in the prevention of foot disease in patients with diabetes has been established.

Literacy is emerging as a critical variable if such education is to be a successful component in the management of diabetes. The purpose of this study was to examine the association between factors and educational interventions,
literacy, and the absence or presence of certain risk factors for lower extremity amputation in persons with NIDDM.
CHAPTER II
REVIEW OF THE LITERATURE

Introduction

This chapter will explore three general areas of interest and concern that relate to this study. Section one will present an overview diabetes generally—the classification, economics, and demographics of the disease as well as patient education research and the results of a meta-analysis. In addition, an outcome model for chronic disease (using diabetes as a prototype) by Lane and Evans (1979) which serves as the conceptual framework for this study will be introduced.

Section two will detail the relationship of diabetes and foot disease. Lastly, section three will explore adult literacy and health, including current research in literacy and diabetes. The summary will integrate these topics.

The terms "compliance," "adherence," and "concordance" will be used interchangeably in this review as they appear in the referenced articles. The term "compliance" has often been criticized because of its connotation of medical professional dominance (i.e., the physician/nurse decide what is best for the patient). Thus, words like "adherence" and "concordance" have been used at times, as they seem to
imply greater participation by the patient/client (Glanz, 1980). Changes in the diabetic patient's lifestyle and eating patterns do require voluntary patient behavior extending beyond the direct supervision of health professionals. Although the differences in meanings of these terms have not been clearly distinguished and consistently used by the professional community (Glanz, 1980), the term "adherence" will be used throughout the remaining chapters.

Diabetes

The Classification of the Disease

Diabetes is described in the medical literature as not a single disease, but a group of diseases that result in altered carbohydrate metabolism (Guthrie & Guthrie, 1982). In this chronic (lifelong) affliction, the body cannot either produce enough insulin or properly use the insulin it does produce. Insulin, a chemical produced by the pancreas, is released into the bloodstream when glucose (sugar) increases (as after a meal) and binds itself to cells at sites called receptors. Failure of the pancreas to produce insulin results in an individual having a high blood glucose level. Once bound to receptors, insulin allows glucose from food that is eaten to move from the bloodstream into cells where it is broken down for energy. Glucose is a carbohydrate and the body's main source of fuel (Barta, Betz, Dudley, Jones & Lauer, 1988).
When the body is unable to produce enough insulin or is unable to use the insulin it does produce, the cells cannot break down the glucose for the energy the body requires. When this happens, the amount of glucose in the bloodstream remains high (Chaney, 1985).

Types of Diabetes

Diabetes has been divided into two major categories—Type I: little or no insulin is produced; and Type II: insulin is produced but the body cannot use it properly.

Type I Diabetes

Type I diabetes or Insulin Dependent Diabetes Mellitus (IDDM) is used to describe people who produce little or no insulin. When the body does not make insulin, glucose cannot move into the muscle and fat cells. About 10% of all people with diabetes have Type I diabetes. Type I diabetes is usually discovered in younger people, but it may occur in older adults (Chaney, 1985).

Possible Causes of Type I Diabetes

Although no one knows exactly how Type I diabetes is caused, it is believed that the following are closely linked: heredity, stress, viruses that may have injured the pancreas, and autoimmune dysfunction when the body's defense system attacks the insulin-producing beta cells by mistake. Treatment for Type I diabetes uses five major approaches: (1) meal planning, (2) physical activity, (3) insulin injection, (4) self-monitoring, and (5) education to learn
about diabetes and diabetes management (Barta, et al., 1988).

**Type II Diabetes**

Persons with Type II diabetics (NIDDM) do produce insulin; however they are unable to use it properly. Type II diabetes is found in 90% of all patients with diabetes (Chaney, 1985).

Symptoms of Type II diabetes usually develop over a long period of time and may include: increased hunger, thirst, urination, blurred vision, feelings of fatigue, numbness or tingling in hands or feet, frequent infections, or slow healing cuts and sores (Barta, et al., 1988).

**Possible Causes for Type II Diabetes**

Many of the factors responsible for Type I diabetes are the same for Type II. Type II diabetes, however, is more likely to occur in people who are over 40, overweight, have poor eating habits, have had diabetes during pregnancy (gestational diabetes), or have a family history of diabetes (Pierotti, 1988).

Treatment strategies for Type II diabetes include meal planning, physical activity, medication, self-monitoring, and, again, education. Education is used primarily to give patients information, skills, and confidence to properly manage their disease (Barta, et al., 1988). Other classifications of diabetes are usually associated with impaired glucose tolerance resulting from trauma or surgery.
of the pancreas. This classification includes a very small percentage of diabetic patients (Pierotti, 1988).

Management of Diabetes

Diabetes management has as a major goal to improve the quality of a patient's life. The major objectives are: (1) to help patients live longer; (2) to avoid emergency problems that occur when blood glucose levels go out of control (either too high or too low); and (3) to avoid or reduce risks and many long-term problems associated with diabetes, such as heart attacks, strokes, limb amputation, and blindness (Rae, 1990).

Demographics of Diabetes

About one in 20 Americans is believed to be affected by Diabetes Mellitus. Six million people in the United States have been diagnosed with the condition, and an estimated five million more citizens have conditions that have not been diagnosed (ADA, 1986).

Prevalence of the disease among ethnic minorities in the United States is even higher, and the diagnosis of NIDDM among these populations is rising (Rae, 1990). In the Hispanic population, diabetes is three to five times more likely to develop than in non-Hispanic populations. Native Americans have the highest rate of diabetes of any population in the world. NIDDM has increased at a rate of nine percent between 1981 and 1984 for native Americans. In the same age group, African Americans between 45 and 65
years of age have a rate of diabetes twice that of the white population. This rate increase is three times that of the white population over 65. Increases of NIDDM are also increasing in Asian populations in the older age categories (Jeweler, 1988; Lipson & Kato-Palmer, 1988). It has been suggested that immigration and attending dietary and lifestyle changes and stresses have increased the risk of developing diabetes although the exact physiological mechanism is unclear (Rae, 1990).

According to the American Diabetes Association, Diabetes Mellitus is estimated to be responsible for at least seven percent of the deaths in the United States. It is a major cause of blindness in people 20 to 74 and a contributing factor in the development of kidney disease. Diabetes is also responsible for one half of all nontraumatic amputations of legs and feet each year. In addition, diabetes predisposes individuals to heart disease and stroke at the same ratio of two to six times greater than the general population (ADA, 1984).

The management of diabetes involves multiple factors and thus impacts on almost every area of an individual's personal and family life. The necessity for strict dietary patterns and meal times affects not only the diabetic patient, but also the family. In addition, severe hypoglycemic (low sugar) reactions resulting in loss of consciousness and possible seizures occur suddenly and
require immediate family response. The management during an illness, travel, and unusual exercises adds to the burden of families with a diabetic member (Hopper, 1981).

Diabetes represents a significant financial burden related to health care cost in the United States. Using 1980 figures, the costs shown in Table 2.1 serve to underscore this point.

Table 2.1

Financial Statistics of Diabetes

<table>
<thead>
<tr>
<th>Overall cost to the treasury</th>
<th>$9.7 billion/year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morbidity</td>
<td>$8.2 Billion/year</td>
</tr>
<tr>
<td>Direct costs</td>
<td>$1.7 Billion</td>
</tr>
<tr>
<td>hospital</td>
<td>220 M</td>
</tr>
<tr>
<td>physician</td>
<td>840 M</td>
</tr>
<tr>
<td>drugs</td>
<td>380 M</td>
</tr>
<tr>
<td>Nursing Homes</td>
<td>124 M</td>
</tr>
<tr>
<td>Other Professions</td>
<td>140 M</td>
</tr>
<tr>
<td>Indirect lost wages</td>
<td>$3.4 Billion</td>
</tr>
<tr>
<td>Indirect mortality cost</td>
<td>$1.46 billion</td>
</tr>
<tr>
<td>(lost work)</td>
<td></td>
</tr>
<tr>
<td>Total number of person years of work lost due to Diabetes</td>
<td>212,000 days</td>
</tr>
<tr>
<td>Mellitus in 1980</td>
<td></td>
</tr>
</tbody>
</table>

(Satiani, 1987)

Patient Education and Diabetes

Rae (1990) gives a historical overview of the process: Historically diabetes education was implemented in acute care settings such as a hospital with the patient
being admitted for management of blood glucose levels. The educational programs were built into the hospital stay and took place either on the floor or in a special classroom. Health insurance changes and cost control measures as well as a diminishing number of people being admitted to inpatient facilities accept for acutely ill diabetics, tend to shorten the duration that an individual is in the hospital. If a person with diabetes is admitted to the hospital for diabetic ketoacidosis, the stay is usually covered for a short period of critical care. The intensive care unit of the hospital is not the most conducive site for learning principles of self management with many people simply being too ill to be receptive to teaching at that time. Yet nonacute patients are very rarely admitted for the sole purpose of diabetes workup, diagnosis, or titration of insulin.

With the changing trend toward ambulatory care, outpatient education programs attempt to help patients obtain the tools necessary to control their blood glucose levels, reduce their diabetes-related hospitalizations, and improve their quality of life in a cost-effective manner (Alexander & Huang, 1982; Danowski, Ohlsen & Fisher, 1980; Johnson, 1982).

Diabetes management is composed of a number of interrelated psychological, physiologic, and environmental factors; it is a chronic illness and not curable. For the person with diabetes, the management of the disease is accomplished basically through self-care practices; therefore, diabetes education must provide understanding at a number of levels to be effective in supporting the patient's self-care practices. In addition, the educational needs of patients with diabetes change over the course of the illness. Educational programs need to be broad enough
to cover many areas of concern (Rae, 1990, Barta, et al., 1988).

The Process of Diabetes Education

How diabetes knowledge and skills are taught can have as much impact on the patient outcome as what is taught. "The instructional design of a patient education program can affect patient acquisition of knowledge and skills, their attitudes about diabetes, their motivation to practice appropriate diabetes self care, their willingness and ability to change behavior, and their degree of psychosocial adjustment to diabetes" (AADE, 1988).

Lane and Evans (1979) reported in Medical Care an article entitled "Measures and Methods in Evaluating Patient Education Programs for Chronic Illness." The researchers discussed the process of evaluating the impact of patient education programs and how it poses a number of methodological and technical challenges. They used diabetes as a prototype condition in which they identified a series of outcome measures of a patient education program geared towards the diabetic patient. Their model appears in the following figure and will serve as the conceptual model for this study.
The Lane and Evans model looks at indicators of program impact as a way of measuring the intervention effectiveness.
and the possible factors that may complicate the outcome of the program. Using this model, any disease-specific patient education program that has clear outcome objectives can be analyzed to help develop evaluation and/or research activities.

Padgett, Mumford, Hynes & Carter (1988) published "Meta-Analysis of the Effects of Educational and Psychological Interventions on the Management of Diabetes." In this most current and comprehensive project, a group of 93 controlled studies of 7,451 patients was analyzed.

Meta-analysis involves converting study findings into a common metric unit—the effect size (ES)—which can be quantitatively combined for analyses of effect. This statistical procedure, usually employed to synthesize the results of clinical studies, does not replace epidemiological measures of effect, such as relative risk or etiological fraction (Padgett, et al., 1988).

The ES measures both the direction and magnitude of these effects. Meta-analytic reviews allow quantitative examination of aspects of study design, sample characteristics, and other moderating factors that may affect study findings.

Most importantly, it allows definitive statements about the relative efficacy of interventions as they affect different types of patients under varying conditions (Mullen, Green & Persinger, 1985).
In the report's introduction the researchers discuss the rationale for broadening the concept of effects of interventions:

Recent technological advances in the treatment of diabetes mellitus, including self-monitoring of blood glucose and insulin administration have raised hopes that patients can attain greater levels of independence and self-care. However, the day-to-day control of diabetes depends upon the individual's own behavior. Vital decisions regarding diet, exercise, and medications must be made under changing, and occasionally stressful, circumstances.

Clinicians, diabetic patients, and their families are increasingly aware of the importance of behavior in maintaining metabolic control. Inattention to self-care can lead to immediate life-threatening crises as well as long term debilitating complications (Mullen, et al., 1985).

Of interest to literacy is that many diabetes educators have urged the inclusion of a "behavioral" component in treatment programs. This would supplement traditional didactic instruction aimed at the pathophysiology and medical treatment of diabetes. Included would be individualized attention to diabetic self-care such as oral medications, insulin administration, and diet. Proponents of various psychosocial approaches—relaxation, counseling, social learning—argue that their methods are more effective in producing social change (Padgett, Mumford, Hynes & Carter, 1988). It became apparent that there was no real understanding as to which type of intervention was most effective in bringing about improvements in the management of diabetes.
Table 2.2

<table>
<thead>
<tr>
<th>Type of Intervention</th>
<th>Number of Studies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient education (didactic emphasis)</td>
<td>13</td>
</tr>
<tr>
<td>Enhanced patient education (behavioral emphasis, using a combination of techniques)</td>
<td>22</td>
</tr>
<tr>
<td>Diet instruction</td>
<td>14</td>
</tr>
<tr>
<td>Exercise instruction</td>
<td>5</td>
</tr>
<tr>
<td>Self-monitoring instruction</td>
<td>13</td>
</tr>
<tr>
<td>Social learning/behavior modification</td>
<td>11</td>
</tr>
<tr>
<td>Relaxation training--biofeedback, yoga, meditation</td>
<td>9</td>
</tr>
<tr>
<td>Counseling--by peer support, mental health professional, or clinician</td>
<td>7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>94</strong></td>
</tr>
</tbody>
</table>

The outcome of the studies is as follows:

An overall mean effect size (ES) of +0.51 ± 0.11 was found indicating moderate but significant (P<0.05) improvements for all intervention subjects. Physical outcome and knowledge gain were most affected, followed by psychological status and compliance. Diet instruction and social learning interventions showed the strongest (ES = +0.68 ± 0.58 and ES = +0.57 ± 0.42, respectively) and relaxation training the weakest (ES = +0.30 ± 0.74) effects. Associations between study and sample characteristics and mean ES values were explored with type of setting and methodological weaknesses such as single group design and non-random assignment achieving statistical significance. Neither intervention type, number of visits, sex, age, nor type of diabetes were significantly correlated with mean ES values. Implications of these findings for clinical treatment and future research are discussed (Padgett, et al., 1988).

It appeared that some interventions yielded greater benefits than others.

The findings from this meta-analysis of 93 studies added to the viewpoint that educational and psychosocial
intervention can be effective components of patient care programs that go beyond short-term control of the disease to long-term improvements in the overall quality of patient lives. "The recommendations, as outlined at educational levels, may be an important variable to assess when looking at ways to develop patient education programs with positive outcomes" (Padgett, et al., 1988).

Mazzuca (1982) synthesized the literature based on 27 quasi-experimental and experimental studies, all with patients who had chronic conditions. He restricted the outcomes to adherence to a medical regimen and health effects. He then contrasted the effectiveness of two broad categories of educational approach—didactic and behavioral modification—and concluded that the latter intervention was more powerful.

Diabetes and Foot Disease

In persons with Diabetes Mellitus, foot lesions (ulcers, gangrene, and infection) frequently result in lower extremity amputations (Most & Sinnock, 1983). These lesions are both common and troublesome; the question of their etiology and management remains a major challenge for clinical practice (Faris, 1977). Both neuropathy and peripheral vascular disease (PVD) have been considered key contributors to the development of foot ulcers. Recent evidence, however, suggests that peripheral neuropathy may
be more important (Boulton, Kubously & Bowher, 1988; Nelson, Gohder & Everhart, 1988).

A great deal of emphasis has been placed upon the importance of diabetic management, including the prevention of complications such as foot disease. The relationship, though, to the development of foot lesions in the diabetic is still unclear (Hopper, 1981). Risk factors for the development of neuropathy and peripheral vascular disease include hyperglycemia, hypertension, hyperlipidemia, and smoking. It is believed that appropriate preventive patient education and care may lead to the reduction in amputations in susceptible groups (Delbridge, et al., 1983). This implication for the educational aspect of foot care becomes important to this study and will be discussed later.

The Natural History of Diabetic Foot Problems

As pointed out earlier, diabetic foot lesions result from both peripheral neuropathy and peripheral vascular disease. Their presence makes the diabetic foot highly susceptible to ulceration, infection, gangrene, and, ultimately amputation. The preface to the Curriculum Manual for Diabetes Education makes this susceptibility clear:

To humankind, the Four Horsemen of the Apocalypse--War, Conquest, Famine and Death--signify the evils of the world that threaten its survival. To the patient with diabetes whose survival may depend on healthy feet, the Four Horsemen have different names--Angiopathy, Neuropathy, Infection, and Amputation. Angiopathy and Neuropathy attack the diabetic foot, destroying blood supply and sensation. Opportunistic Infection then lays waste to the weakened tissue,
and Amputation results as a lifesaving effort." (AADE, 1988).

In the majority of cases, the underlying cause is peripheral neuropathy (Levin & O'Neil, 1983). The etiology of diabetic neuropathy remains unclear. Pain and temperature loss are often the initial demonstrable sensory defects. These represent small nerve damage; eventually, large fiber damage results in vibration and loss of light touch sensation (Guy, Clark & Malcom, 1985). Sympathetic denervation also has been documented (Watkins & Edmonds, 1983) and may be important in raised blood flow, medial arterial calcification, and loss of sweating in the foot.

Although symptoms of peripheral neuropathy are predominantly sensory, motor involvement manifested by wasting and weakness of the intrinsic foot muscles may also occur. As a result, structural deformity leads to a redistribution of foot pressure (particularly on the metatarsal heads). The increased local pressure (compounded by calluses) and loss of sensation allow for repetitive mechanical trauma resulting in ulceration. The latter may go undetected until infection or gangrene develops (Cataland et al., 1989).

Atherosclerosis of the large leg arteries is the major factor responsible for reduced blood supply to the foot. The earliest symptom of peripheral vascular disease is calf pain induced by exercise and relieved by rest. Other risk
factors for atherosclerosis include hypertension, hypercholesterolemia, and smoking (Stemmer, 1983).

Atherosclerosis has a higher incidence in patients with Diabetes Mellitus, occurs at an earlier age, is more rapidly progressive, and has a more serious prognosis than in the nondiabetic (Bell, 1950; Hamimovici, 1970). The combination of neuropathy and vascular disease is particularly difficult to manage because large painless ulcers can form that are resistant to treatment (Cataland et al., 1989). It appears there is consensus that whether ulcers occur may be dependent upon other factors such as psychological attitude or level of education and the person's subsequent ability to care for their feet (Bild et al., 1989; Malone, Snyder, Anderson, Bernhard & Holloway, 1989; Delbridge, 1989).

Economics of Diabetes-Related Foot Disease

Within the context of diabetes, the gravity of the problems related to instructing patients about self-care generally and foot care specifically is further highlighted by these alarming statistics:

- Persons aged 65 and older are at highest risk of lower extremity amputation.
- Blacks have approximately 2.5 times the amputation rate of caucasians.
- Males have a higher amputation rate than females.
- In-hospital mortality for patients undergoing amputation ranges from 10 to 20%.
The mortality rate among patients with diabetes in the first three years following amputation is 30%; at the end of five years, 60%. Strokes and heart attacks are the major contributing factors (Cataland et al., 1989).

Individuals with diabetes experience an age-adjusted rate of lower extremity amputation (~15 times that of people without diabetes. In the United States, this rate has been estimated at 59.7/10,000 people with diabetes per year. In 1985, 104,488 nontraumatic lower extremity amputations were performed in private hospitals and ~8000 lower extremity amputations were performed in Veterans Administration hospitals. Approximately half of these amputations occurred in individuals with diabetes (Most & Sinnok, 1983).

Destruction of the physiological functions of the foot accounts for one-fifth of all diabetic hospitalizations and 50% to 70% of all nontraumatic amputations in the United States. The treatment of diabetic foot lesions, ulcers, gangrene, amputations, and rehabilitation costs more than $1.3 billion per year (Levin, 1986). Lost wages, disability, and the inestimable price of the accompanying psychosocial agony combine to create a catastrophic waste of human resources. Preventative foot care must be practiced at every opportunity and begins with a simple request by health care professionals: "Please remove your shoes and stockings" (ADA, 1987). It is estimated that >50% of the
amputations within the diabetic population could be prevented by reducing risk factors for amputation and improving foot care (Lapointe, 1984).

**Clinical Interventions and Programs**

Interventions to prevent lower extremity amputation should be aimed at the prevention of peripheral neuropathy and peripheral vascular disease as well as early detection and treatment of foot lesions that occur with these conditions. "Patient education and prophylactic treatment, the cornerstone of preventive foot care, may have a more immediate impact on the amputation rate of a population than those strategies aimed at preventing peripheral vascular disease and peripheral neuropathy" (Bild, et al., 1989).

Edmonds, et al. (1986) report that several studies of clinical interventions have demonstrated improved foot care may reduce the frequency of amputation to those persons with diabetes. This was accomplished by the development of a unit that integrated both inpatient and outpatient services, including extensive education programs, comprehensive podiatry services, and clinical nurse specialists. The number of amputations decreased by almost 50% from 1972 to 1973, to an average of 92 per year from 1974 to 1982 among the 8,000 clinic patients (Hobgood, 1986).

Bild reviewed a study where 800 patients with diabetes were transferred from a city hospital outpatient clinic to a decentralized city neighborhood closer to patient homes.
Trained nurse practitioners provided care. Frequency of patient/client contacts in home visits increased substantially. A 68% reduction in hospital days for peripheral vascular disease-related illness and amputation was noted in the two-year follow-up, compared to a 13% reduction in those who continued to use the city hospital (Bild, et al., 1989).

In a similar study, Assal et al. (1985) reported an 85% reduction in below-the-knee amputations for four years after patient education and foot care training were initiated for those with diabetes. Although uncontrolled, the results suggest that comprehensive foot care, including education, podiatric foot care, and specially fitted shoes, can substantially reduce amputations in individuals with foot diabetes. "In addition, patients with diabetes, and especially those at high risk, should learn principles of self-foot examination and care as part of a regular clinic visit" (Levin, 1987).

Bild addressed the major epidemiological and prevention issues relative to lower extremity amputation in people with diabetes. She reviewed the epidemiologic evidence regarding causes and prevention detailed on the following graphic. Of particular note is her discussion of foot care and risk factors (Bild, et al., 1989).
Causal pathways leading to lower extremity amputations in individuals with diabetes (Bild, 1989)

Figure 2.2
Diabetes and Foot Care (Epidemiology and Prevention)

Because diabetes predisposes to foot ulcers and other lesions, proper foot care plays an important role in the "early detection of disease and prevention of amputation. Preventable minor trauma, poorly fitting shoes, and failure to detect and treat injuries early can allow the development of infection and gangrene that may lead to amputation."
Although it is recommended that clinicians examine the feet of those with diabetes who are at high risk for foot problems at each clinic visit (NDAB, 1983; ADA, 1984), one study found that such examinations occur in only 12.3% of visits at a diabetes specialty clinic (Bailey, Yu & Rayfield, 1985). Several studies (discussed later) have suggested that programs of proper foot care can significantly reduce the rate of amputation (Edmonds, et al., 1986).

Minor trauma due to friction from poorly fitting shoes is a common initiator of foot ulcers and calluses, especially in individuals lacking protective sensation (Hall & Brand, 1979). Shoe modification or footwear designed to fit the foot, especially when the foot is deformed, is strongly recommended. Specially made shoes, can cost from $100 to $400/pair (Coleman, 1987).

The health care provider and nurse educator must remember that, for the diabetic foot, pain is not the reliable harbinger of a problem that it is for the nondiabetic foot. As a result, the potential for damage is increased without the protection of the body's early warning system—pain. Prompt evaluation and treatment, coupled with no weight bearing, are required at the first indication of a problem (Donavan & Rowbotham, 1985).

Levin outlined six major approaches necessary to save the limbs of the person with diabetes. These were:
a) Recognize the existence and degree of peripheral vascular disease and neuropathy.

b) Remove vascular risk factors, i.e., smoking, hypertension, hypercholesterolemia, hypertriglyceridemia, hyperglycemia, inotropic drugs, and beta blockers.

c) Improve circulation whenever possible.

d) Manage foot ulcers with aggressive, multifaceted treatment.

e) Incorporate teamwork among the various disciplines in the treatment of complicated problems.

f) Prevent foot problems through patient education in foot care (Levin, 1986).

He summarized with "until a cure for diabetes is found, the best tools to save the diabetic's foot are patient education directed at foot care, special shoes when indicated, and regular evaluation" (Levin, 1986).

The most succinct summary of the importance of patient education for foot disease appeared in the conclusion of an article by Bild, "Lower Extremity Amputation In People With Diabetes":

The age-adjusted rate of lower-extremity amputation (LEA) in the diabetic population is approximately 15 times that of the nondiabetic population. Over 50,000 LEAs were performed on individuals with diabetes in the United States in 1985. Among individuals with diabetes, peripheral neuropathy and peripheral vascular disease (PVD) are major predisposing factors for LEA. Lack of adequate foot care and infection are additional risk factors. Several large clinical centers have experienced a 44-85% reduction in the rate of
amputations among individuals with diabetes after the implementation of improved foot care programs. Programs to reduce amputations among people with diabetes in primary-care settings should identify those at high risk; clinically evaluate individuals to determine specific risk status; ensure appropriate preventive therapy, treatment for foot problems, and follow-up; provide patient education; and when necessary, refer patients to specialists, including health-care professionals for diagnostic and therapeutic interventions and shoe fitters for proper footwear. Program should monitor and evaluate their activities and outcomes. Many issues related to the etiology and prevention of LEAs require further research (Bild, et al., 1989).

Dynamics of Adult Literacy

"PRECAUTIONS. READ BEFORE USING.
Poison: Contains sodium hydroxide (caustic soda-lye).
Corrosive: Causes severe eye and skin damage, may cause blindness.
Harmful or fatal if swallowed.
If swallowed, give large quantities of milk or water.
Do not induce vomiting.
Important: Keep water out of can at all times to prevent contents from violently erupting..." (Warning on a can on Drano.)

Under the stress of finding a young child ingesting the contents of a can of Drano, how successful at reading these directions can an individual be? This example may illustrate the multiple dynamics of literacy and how complicated it is to describe.

There is a tendency to oversimplify the nature of literacy and to divide the U.S. population into neat categories of "illiterate," "functionally illiterate," and "literate." This is less challenging than recognizing that people develop a variety of literacy abilities that reflect the social settings in which they interact with printed
materials, whether this be the home, community, school, or work place (Kirsch & Jungeblut, 1986).

"In 1886, when signing one's name was proof of literacy, counting illiterates was a simple task. Today, the challenge is more complex. A literate person in today's America is one who can take advantage of society's opportunities and contribute to its improvement. Therefore, arriving at a precise definition is difficult" (Lapointe, 1986).

In 1985 the Office of Educational Research and Improvement (Department of Education), Washington D.C., funded a project, "Literacy Profiles of American Young Adults" for the National Assessment of Education Progress (NAEP). The survey stressed the "complexity and diversity of literacy tasks in American society rather than using a simplistic single standard." The NAEP convened expert panels to develop a working definition of literacy: "Using printed and written information to function in society to achieve one's goals and to develop one's knowledge and potential" (NAEP, 1986).

The study suggested that the performance of literacy tasks involves difficult information processing, such as locating the correct information in complex displays of print, holding information in "working memory" while finding additional information, transforming these fragments of information into new knowledge, and then writing or
otherwise communicating the results of these complex, cognitive activities. "This task is comprised of not only the reading of material, but also the study of tables and graphs and the performance of computations to complete a literacy task."

The study further pointed out that adults with low literacy skills tend to be low in oral language competence. This finding is presented for speaking in the present study, but it has been confirmed for listening comprehension in numerous other studies (LaPointe, 1986). Further the implication was made that "much longer periods of intervention are needed to make significant improvements in both the language and the literacy skills of the least literate."

There is considerable confusion as to the exact extent of the problem of literacy. One of the prime examples is the contradiction in government reports concerning the subject. Consider a 1983 U.S. Department of Education report that stated "23 million American adults are totally or functionally illiterate with an additional 23 million functioning at a level that is marginal at best." In addition, Kozol identified in a separate study, the Office of Vocational and Adult Education stated "74 million . . . function at a marginal level or less" (Kozol, 1985).

A third release distributed in September 1983 from the White House stated "26 million Americans are functionally
illiterate . . . an additional 46 million Americans are considered marginally functional for a total of 72 million Americans who are functionally at a marginal level or below." In January 1984, the then-Director of the National Institute of Education released an additional statement that estimated 23 million adults are functionally illiterate; six months later Newsweek magazine reported 26 million are functionally illiterate (Kozol, 1985).

In 1973 the adult performance level (APL) study was carried out by Dr. Norvell Northcutt from the University of Texas. It employed a list of 65 objectives--areas of competence associated with what Northcutt defined as "adult success"--to identify how many adults were unable to cope with the responsibilities of everyday life. According to Northcutt, previous efforts had done little more than establish "simple literacy" and did so purely on the basis of the number of school years a person had completed. Literacy by previous standards indicated little more than the capacity to sign one's name and perhaps understand a handful of three letter words (Northcutt, 1975).

In an address to the National Conference on Adult Literacy in 1984, Harvard Professor Jeanne Chall stated that total estimates of 75 to 78 million seemed to be more realistic. Using a reformulation of the APL study, she concluded that 30 million men and women are now "functionally incompetent" and another 54 million "just get
This total of 84 million far exceeds all estimates stated previously.

In spite of the contradiction in terms of the extent of literacy, the fact remains that serious consequences are associated with illiteracy:

- Low literacy is widespread. A problem in every community, it is not limited to any single region, ethnic group, or socioeconomic class (Ross Laboratories, 1989).
- Of all adults classified by the Department of Labor as "low literate," 37% speak a language other than English at home and 44% are older than 50 years of age (Ross Laboratories, 1989).
- Presently, three of four jobs will require some education or technical training beyond high school (Kozol, 1985).

Demographics and Economics of Adult Illiteracy

The largest numbers of illiterate adults are white, native-born Americans. In population to population, however, the figures are higher for blacks and Hispanics than for whites. Sixteen percent of white adults, 44 percent of blacks, and 56 percent of Hispanic citizens are functionally or marginally illiterate. Figures for the younger generation of black adults are also increasing. Forty-seven percent of all black seventeen-year-olds are
functionally illiterate. That figure is expected to climb to 50 percent by 1990 (Prawl, Medlin & Gross, 1984).

- Adult illiteracy costs society an estimated $250 billion annually in lost industrial productivity, unrealized tax revenues, welfare costs, crime, poverty, and related social ills (Pollak, 1989).

- Of the millions of adults who are functionally illiterate:
  --26% cannot determine if their paychecks are correct.
  --36% cannot enter properly the correct number of exemptions on an Internal Revenue Service form.
  --More than 20% cannot write a check that will be processed by their bank for the right amount (Kozol, 1985).

- Although health expenditures resulting from the inability of illiterate adults to use preventive health care measures are not documented, they may include:
  --Costs of mental health care and rehabilitation programs for drug users and alcoholics.
  --Costs of obstetric care and abortions for women who cannot read directions and warnings relative to contraception information.

Richard Munro, chairman of Time-Warner Executive Committee, recently summarized the controversy over the
number of illiterates. In a speech to corporate and community leaders interested in developing strategies to meet the challenge of eradicating illiteracy, he said, "Although some dispute the figures, it's a little bit like arguing whether the hole in the Titanic was 40 feet or 60 feet wide. The fact is, the ship still sank." At a minimum, one-tenth of the population and one-fourth of the work force suffer from what amounts to a disenfranchisement of the American dream" (Columbus Dispatch, October 11, 1990).

Literacy and Health

The Problem

Patient education is increasingly important and legally mandated. An example is a patient who was discharged on home hemodialysis subsequently died while on the machine. The patient's wife sued alleging that the hospital staff were negligent because they did not teach her or her late husband how to properly use and maintain the dialyzer. Nurses had given and documented the patient education provided, and the court ruled there was no basis for liability (Smith, 1987). Patient educators must be able to determine the readability of their patient education materials and to obtain or develop materials appropriate to the needs and skills of their learners.

Oral patient instructions are frequently supplemented with written materials. This has been proven to be
effective since patients may forget over half the content of verbal instructions within a few minutes of hearing them (Taylor, Skelton & Czajkowski, 1982).

Approximately 50% of health care clients have serious difficulty with reading or are unable to read instructional material written at a fifth grade level (Streiff, 1986). Educational materials are frequently written at a much higher level. Spadero (1983) reviewed 55 brochures and found only 25.5% were written at or below the ninth grade level. A University of Virginia readability study examined 94 patient educational materials and found that the mean grade equivalent was seventh grade. The standard surgical consent form used today in most hospitals demands a 16th grade reading level (Taylor, Skelton & Czajkowski, 1982).

Presently in the United States no systematic examination of the relationship of literacy and health exists. In Canada, however, a project titled, "Literacy and Health," was established to find out how reading and health problems are connected.

The literacy project asked three central questions that also appear in the introduction of this document:

- What is the relationship between literacy and health?
- What is being done to ensure that people who do not read, write, or use numbers well live healthier and safer lives?
What should be done in the future to "make the world healthier and safer for people who can't read?"

The project has demonstrated a clear relationship between literacy and health: that people with low literacy skills are more likely to be in worse health than people who are literate. Also, many people do not know about the extent of illiteracy or of the impact of illiteracy on health.

In addition, the report highlighted the following:

1. Health information is hard to read.
   It was found that people who can't read well have a hard time getting the information they need. Most health books and pamphlets are written for people with a lot of education.

2. People with reading problems have more health problems.
   It was found that people who can't read well have more health problems than those who can read. Some health problems are clearly caused by reading problems. For example:
   - Many people can't read the directions on medicines. This can result in problems such as using the wrong medication or taking too much medicine.
   - Many people make mistakes because they cannot read the instructions on packaged food. For example, if
baby formula is not mixed the right way, it can cause serious health problems for babies.

- Many people can't read the written instructions they get from their doctors or nurses. This can affect how they cope with an illness, or how well they recover after an operation.
- Many people are hurt at work. This is often because they cannot read the warning signs or the safety information.

People with reading problems have certain kinds of health problems more often than people who read well. For example, people with less education don't use seat belts regularly. They don't exercise regularly. They also smoke more. They don't eat well. They tend to live in places that are less healthy. They tend to work in jobs that are more dangerous.

People who don't read well tend to be poorer. It is much harder to live in a healthy way if you are poor. Good food and good, safe housing are expensive.

Problems such as these and other health problems need to be prevented. People who can't read well have the right to be healthy and safe. They have the right to information and services that will help them be healthy and safe.

In 1979, Doak and Doak initiated the Patient Comprehension Assessment Study at the U.S. Public Health Service Hospital in Norfolk, Virginia. The major objective
of the project was to assess the match between the literacy requirements of the health instruction used with the literacy skills of the patients. The questions to be answered were as follows:

► What are the patients' reading and listening levels for comprehension of health instructions?
► What are the reading levels of the Public Health Service instructions and pamphlets? What are the listening levels of the audio and oral instructions?
► What percentage of Public Health Service patients present a serious mismatch with the level of the Public Health Service instructions? What can be done about it?

![Graph showing the relationship between years of schooling declared by patients and their word recognition (WRAT).](image)

**Figure 2.3** Years of Schooling and Word Recognition (WRAT). (Reprinted by permission)
Profiles of Wide Range Achievement Test (WRAT) scores and years of schooling completed are shown in Figure 2.3; nearly half the patients claimed to have completed high school. Figure 2.3 shows that the average word recognition level was at the seventh grade, which is lower than the average grade of schooling of the patient.

Comprehension levels for the 87 of 101 patients who were able to complete at least some of the tests are shown in Figure 2.4. The test data show that about 50 percent of the patients had difficulty or did not understand instructions except at the most basic levels.

![Patient Comprehension Profile](image)

**Figure 2.4** Patient Comprehension Profile.
(Reprinted by permission)

Figure 2.5 shows a profile of 100 written instructions in use at Public Health Service, Norfolk, that are typical...
for hospitals systemwide. The figure shows that very few instructions are written at the seventh grade level and below. The mean level for all the instructions was at the tenth grade level.

![Graph showing reading levels of written instructions](image)

**Figure 2.5** Reading Levels of Written Instructions (100 Samples).

The audiotapes analyzed were typically at the tenth grade level. For at least 50 percent of the patients, there was a mismatch between their ability to understand and the level of instructions given to them.
This study was replicated in 1980-81 in South Carolina (McNeal, et al., 1984) as "The Diabetes Control Project of the South Carolina Department of Health." The purpose of their study was "to examine the reading levels of diabetes education materials and oral presentations to determine if the health messages given are compatible with the reading and comprehension levels of program participants."

Diabetes education program participants were assessed to determine their reading and comprehension skill levels, and written and oral instructions were evaluated to determine the reading level of information presented in the education program. "A significant mismatch was found between the reading and comprehension levels of program participants and the level of oral instruction and printed materials." More than half of the program participants could not fully comprehend educational materials at fifth-grade level, while nearly all written materials and oral instructions were presented at the ninth grade level or above (McNeal, et al., 1984).

In light of the fact that intensive diabetes education is a major component in the care of the diabetic patient these findings were of considerable importance.
CHAPTER III

METHODS

Patient education interventions have been the major vehicle for informing, instructing, and monitoring patients with diabetes. Foot care, although recognized as an important aspect of a treatment/education plan, has been traditionally minimized or given only cursory attention (Rae, 1990). In this study, literacy-related factors influencing the degree to which an individual with NIDDM is at risk for lower extremity amputation were investigated. The latter has been defined operationally as healthy versus unhealthy feet.

Research Design

This study was a descriptive study in accordance with purposes and components described by Van Dalen (1979):

a. Examine factual information that describes existing phenomena;

b. Identify problems or justify current conditions or practices;

c. Make comparisons of evaluation; and

d. Examine what others are doing with similar problems or situations and benefit from their experience in making future plans and decisions.
This nonexperimental approach is retrospective in keeping with the guidelines of Campbell and Stanley (1966): "The dependent variable is observed first and then traced back and related to relevant independent variables that are hypothesized as being associated with the dependent variable. The subjects are simply asked to reflect on their attitudes or behavior prior to some given event on which they are being compared" (Campbell & Stanley, 1966). In addition to obtaining information regarding the status of a situation, retrospective research helps to explain the current happening with regard to variables or situations at the time of the study. Further, descriptive studies usually do not lend themselves to hypothesis testing (Ary, Jacobs & Razavieh, 1979).

Conceptual Model

The research design for this study has been adapted from the work of Lane and Evans (1979) in which they used diabetes as a prototype condition to evaluate the impact of patient education programs. This has been discussed in Chapter II and Figure 2.1 depicts this adapted design.

Using the Lane and Evans conceptualization, factors that may influence the outcome of a patient education/intervention plan have been categorized into three distinct sets: patient, disease, and system factors. These were assigned as independent variables. The dependent variables are healthy/unhealthy feet as designated by the test results
For this study, the original factors identified by Lane and Evans have been expanded to include literacy and literacy-related patient education factors. The variables were:

1. **Patient factors:**
   - Age
   - Gender
   - Race
   - Visual acuity (self-reported)
   - Hearing acuity (self-reported)
   - Income
   - Primary Language

**Literacy characteristics:**
- Grade level achievement (self-reported)
- Reading grade equivalent (WRAT)
- Listening comprehension (Doak & Doak version)
- Reading comprehension (Cloze technique)

2. **Disease factors:**
   - Length of time with disease (years)
   - Perceived risk for diabetic foot problem
   - Belief about foot problem prevention
   - Foot care knowledge before foot care instruction
3. **System factors:**

   Primary care source for diabetes
   Previous diabetes education
   Instructor(s) for diabetes education
   Location of instruction for diabetes education
   Method(s) of diabetes instruction
   Previous foot care education
   Instructor(s) for foot care education
   Location of instruction for foot care
   Method(s) of foot care instruction

**Selection of Subjects**

A purposeful sample was recruited for this study from the larger pool of 203 ambulatory patients with NIDDM who were currently participating in the study of lower extremity amputation under way at OSU Diabetes Atherosclerosis Center. The clinic follows approximately 3,000 patients with Diabetes Mellitus living in the central Ohio area, including the city of Columbus and a 50- to 75-mile radius surrounding the city. The ratio of NIDDM to IDDM is approximately 70% to 30%, respectfully; thus 2,100 patients were the potential pool for the original foot study. Some patients are followed by their primary care physician in the local area and come to the clinic for special follow up and maintenance. Others are seen in DAC, where they receive assistance for all their primary care needs. See Figure 3.1 for the selection process for the study.
3,000 Diabetic Clinic Patients

900 (30%) IDDM

2,100 (70%) NIDDM

Screening 1

203 NIDDM Patients Enrolled in DAC Study

Baseline Data Collection
Physical Exam
Laboratory Workup

Healthy
Unhealthy
Classifications

Foot Class

Screening 2

24 Agree to Participate in Foot Study

29 Identified

Using Reported Grade Attainment < 10 years

21 Tested

- Interview
- WRAT
- Listening
- Cloze

Figure 3.1 Subject Selection.
Eligibility for participation in the OSU/DAC foot study included persons who:

- Consented to participate
- Were age 30 or older when their diabetes was diagnosed
- Were now 40 years of age or older
- Had their diabetes diagnosed by (1) current use of insulin or oral hypoglycemic agent; (2) random plasma glucose 200 mg/dl or greater; or (3) a fasting plasma glucose of 140 mg/dl or greater on more than one occasion with an oral glucose tolerance test with sustained elevation (greater than 200 mg/dl both at two hours and at some other time between one and two hours after a 75 gram dose).

Persons were excluded who:

- Were diagnosed with Insulin-Dependent Diabetes Mellitus
- Were under the age of 40
- Had a creatinine level $\geq 5.0$ (normal 0.6 - 1.3 mg/dl) within one year prior to enrollment
- Currently had gestational diabetes
- Were being treated for a major psychiatric illness, including dementia
- Suffered from a terminal illness (likely to cause death within one year)
o Had status postbilateral below-knee amputations
o Were unable to provide any self-care
o Were pregnant
o Weighed less than the ideal body weight.

All regular NIDDM patients on the rolls of the clinic were invited to participate. As mentioned, the first study group size consisted of 203 individuals. The patients were assessed to determine the risks associated with lower extremity disease (ulcers, amputations). They then were evaluated and interviewed using a baseline assessment for:

o Demographic information (medical, socioeconomic, reported educational attainment)

o Hyperglycemia
o Hypertension
o Peripheral vascular disease
o Neuropathy
o Smoking history
o Visual impairment
o Hyperlipidemia
o Intermittent claudication
o Nephropathy.

In addition to the above risk factors, patients were also interviewed for self-care practices, foot abnormalities, and previous foot care problems. The interviewers were health care professionals not directly involved with the intervention strategies or the study.
The study patients also underwent an extensive physical exam, noninvasive testing (neurometer, pedobarograph measurements, volume plethysmography, and Doppler Segmental Pressure Determinations), and fasting laboratory testing (HbA1, glucose, electrolytes, calcium, BUN, creatinine, uric acid, cholesterol, triglycerides, HDL-cholesterol, quantitative fibrinogen determination, CBC, and random urine for albumin and creatinine determination).

Based on the initial baseline assessment and the results of the testing, patients were divided into one of two groups. Group I, "healthy feet," had no evidence of neuropathy or peripheral vascular disease. Group 2, "unhealthy feet," had evidence of neuropathy and/or peripheral vascular disease. The latter group was further divided into the following subgroups: Group 2A, peripheral vascular disease only with or without ≤ Stage 2 ulcer; Group 2B, neuropathy only, with or without ≤ Stage 2 ulcer; and Group 2C, peripheral vascular disease and neuropathy with or without ≤ Stage 2 ulcer.

After the baseline assessment and testing, all 203 of the OSU/DAC subjects attended a foot care class which covered all aspects of preventive foot care and treatment for persons with diabetes. The importance of class attendance relative to this study was that it became the knowledge base for foot care information from which the patients could reflect back on their previous diabetes/foot
care educational experiences. As one patient mentioned, she did not know "how much I didn't know until I learned so much."

Screening and acceptance into this study, which was named "Foot Study Follow-up," were based on:

- Completion of grade 10 or less as reported by the subjects during the baseline assessment; and
- Willingness to be interviewed and tested as part of their scheduled appointment in the clinic or at home.

From the subject pool, 29 individuals (14% of the total foot study sample) had a self-reported grade level achievement of 10th grade or less. These potential subjects received a letter inviting them to participate in a brief extension of the DAC study. The letter was written in an uncomplicated format and was analyzed by the Department of Patient Education (OSU University Hospitals) using the software program RightWriter. The readability index was 8.69 (ninth-grade level of education needed) and it contained no jargon. The promise of a follow-up call was made to be sure the information and request were understood. The stated objectives of the study were to help better understand how patients learn about their diabetes and specifically foot care. It was felt that no benefit would be gained by telling individuals the selection criteria for
the follow-up foot study was the level of education attainment.

Twenty four (83%) responded positively and of this group, 21 were tested, representing 72% of the potential study patients. The reasons for nonparticipation were varied. Two individuals had become too ill to participate because of complications of their disease, and a third had relocated and could not be found using the mail or telephone. The final profile of subjects who participated appears in Chapter IV.

Protection of Human Subjects

The subject pool had earlier been cleared for participation in the OSU/DAC foot study by the Human Research Subject Committee of The Ohio State University College of Medicine. It was determined that the original approval would be applicable for this study as well. All information collected from the subjects was coded with confidential identification numbers. The names of the individuals have not been mentioned in the findings, and only group data are reported.

Instrumentation

Three unique problems guided the selection of an instrumentation strategy that would be useful in meeting the goals of this research.

First, because literacy and literacy-related factors were being considered, a survey instrument that relied on
reading or reading comprehension skills would not be appropriate or useful. Therefore, personal interviews were considered the method of choice for assessing these factors and being assured the subjects understood the directions and tasks.

Second, the assessment and categorization of patients into healthy feet/unhealthy feet (the dependent variable) required detailed and sophisticated instrumentations and the expertise of trained health professionals. This was accomplished by designing the study to use patient groups enrolled in the DAC foot study.

Third, the identification of patient education and literacy-related factors as they dealt with health care is only now emerging as an area of concern for serious researchers in medicine, nursing, and adult education. Few test materials were available. Thus, it was felt that utilization and duplication of at least some of the instruments used in previous studies reported in the literature would assure more consistent results for evaluation.

In an effort to do this the investigator contacted Cecile and Leonard Doak of Patient Learning Systems. The Doaks have been cited in the literature review and throughout this document for their pioneering work in literacy and patient education. They supplied the project with their listening comprehension materials and consulted
on the use of the Cloze technique for this study. Because there is not a large body of research in this area, their tools and recommendations were utilized to promote the efficacy of this study. Figure 3.2 on the following page gives an overview of each variable and what instruments were used.

The baseline assessment was initiated as part of the DAC foot study. The follow-up foot study assessment was conducted by the researcher and an assistant and contained four segments: (1) a personal interview conducted by the researcher or an assistant; (2) the Wide Range Achievement Test; (3) a listening comprehension test (adapted by Doak & Doak); and (4) the Cloze technique applied to a diabetes education pamphlet.

**Baseline Assessment (OSU/DAC Study)**

The baseline assessment consisted of risk assessment, information concerning self-care practices, physical examinations, laboratory testing, and an interview schedule that yielded baseline data concerning demographic information. An abbreviated schedule for the interview appears in the appendices, and only those questions used for this study appear. Self-reported grade attainment from the baseline assessment was used to select the potential subjects for this follow-up study.
VARIABLE

Dependent Variable
Healthy/Unhealthy Foot Status

Independent Variables

Patient Factors

Age
Gender
Ethnicity/Race
Visual Acuity (self-reported)
Hearing Acuity (self-reported)
Household Income
Primary Language

Literacy Characteristics
  o self-reported grade level achievement
  o reading grade equivalent
  o listening comprehension test
  o reading comprehension test

INSTRUMENT

Baseline assessment
Demographics, laboratory testing)
absence of foot
Physical examination
(Non-invasive testing-
  Neurometer, doppler
  segmental pressure,
  volume phlethsmography

OSU/DAC baseline
Interview

OSU/DAC baseline
Interview

Interview

OSU/DAC baseline

COMMENT

This was done as part of the OSU/DAC foot study by a medical team

English as a primary language is a prerequisite for using the WRAT

Figure 3.2 Variables and instrumentation of the follow-up study.
**Figure 3.2 (continued)**

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>INSTRUMENT</th>
<th>COMMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Independent Variables</strong> (continued)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Disease Factors</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Length of disease since diagnosis</td>
<td>Interview</td>
<td></td>
</tr>
<tr>
<td>Risk knowledge (self-report)</td>
<td>Baseline</td>
<td></td>
</tr>
<tr>
<td>Belief about foot problem prevention (self-report)</td>
<td>Baseline</td>
<td></td>
</tr>
<tr>
<td>Foot care knowledge before foot care instruction</td>
<td>Interview</td>
<td></td>
</tr>
<tr>
<td><strong>System Factors</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary care source for diabetes</td>
<td>Baseline</td>
<td></td>
</tr>
<tr>
<td>Previous diabetes education</td>
<td>Interview</td>
<td></td>
</tr>
<tr>
<td>Instructor(s) of diabetes education</td>
<td>Interview</td>
<td></td>
</tr>
<tr>
<td>Location of instruction for diabetes education</td>
<td>Interview</td>
<td></td>
</tr>
<tr>
<td>Methods of diabetes instruction</td>
<td>Interview</td>
<td></td>
</tr>
<tr>
<td>Previous foot care education</td>
<td>Interview</td>
<td></td>
</tr>
<tr>
<td>Instructor(s) of foot care education</td>
<td>Interview</td>
<td></td>
</tr>
<tr>
<td>Location of instruction for foot care</td>
<td>Interview</td>
<td></td>
</tr>
<tr>
<td>Methods of foot care instruction</td>
<td>Interview</td>
<td></td>
</tr>
</tbody>
</table>

**KEY:**

OSU/DAC Study = Center for Disease Control/Diabetes Atherosclerosis Clinic

Baseline = Initial assessment all 203 OSU/DAC study patients underwent. Consisted of interview questions and self-report items.
Interview (Foot Study Follow-up)

The interview schedule was developed specifically to obtain information concerning events that took place before the DAC study, but utilized reference information taught to patients during the foot care class. The rationale being they would utilize the concepts learned to retrospectively explain their previous educational experiences.

Questions included:

- How the subjects received information and education about their disease (diabetes) generally and about foot care specifically.
- Who taught them and where.
- What the method of instruction was and what was their preference.
- Their perceived level of knowledge about foot care prior to coming into the DAC foot care class.

It was necessary to keep the interview brief and punctual because it was scheduled as part of the clinic appointment. (See appendices for interview schedule.)

Wide Range Achievement Test (WRAT-R) Level 2

Reading Subtest

WRAT is a graded list of words that yields a word-recognition, grade-level score. Each participant was given the WRAT-R level 2 reading test as a screening procedure to enable the interviewer to select either grade 5 level or grade 10 level paragraphs for further testing.
In the WRAT procedure, the participant was given a graded list of words (progressively more difficult) and asked to read each word aloud; this continued until ten or more consecutive words were mispronounced. A word-recognition score was then computed according to the level of difficulty of words that were correctly pronounced. The test, according to Doak & Doak (1979), also gives an approximation of the functional reading level of an adult. It is designed for people whose primary language is English. Individuals scoring above grade level five on the WRAT were then administered the Cloze test that was developed specifically using diabetes-related material. An attempt to adapt the test to below the fifth-grade level was not successful. This is discussed in Chapter V.

In addition, the WRAT score determined the level administered for the listening comprehension test. Individuals scoring at the grade 5 level or below were administered the fifth-grade Doak listening comprehension test. Those scoring above grade 5 were administered the tenth-grade Doak listening comprehension test.

The WRAT-R level 2 is intended for persons aged 12 through 74 years.

Listening Comprehension Test
(Doak Listening Test)

As referenced previously, the researcher obtained the original testing materials used by Doak & Doak (1979) in
their research for use in the listening comprehension test. The material was health related and graded at the fifth- and tenth-grade levels as measured using the SMOG Readability Assessment Formula as described by McLaughlin (1969) in Doak & Doak (1979).

The more difficult (grade 10) selection was taken from existing hospital health information. The less difficult (grade 5) material was adapted from the same information, but simplified by substituting easier (shorter) words where necessary and by shortening sentences.

The material included in the listening comprehension test was drawn from information on adult immunization. This subject matter was selected because it was thought to be of general interest to patients across a wide range of disease categories.

**The Cloze Technique**

The Cloze procedure measures a person's ability to comprehend a written passage. The test is systematically designed so that every fifth word is deleted from a passage, and the reader's task is to determine the missing words and to fill in the blanks. This requires that the reader be sensitive to grammatical, syntactical, and semantic clues. How well people supply the missing words is a significant indicator of their comprehension of the material.

The Cloze technique tests the comprehension process in two ways: (1) it tests how much knowledge was obtained from
the text surrounding the blank; and (2) it determines how well this information was used to obtain additional information (Bormuth, 1975).

As recommended by Leonard Doak in personal communication and following the guidelines from his text, Teaching Patients with Low Literacy Skills (Doak, Doak & Root, 1985), the Cloze test was adapted from existing material currently distributed in a pamphlet about diabetes.

According to Klare, Sinaiko & Stolorow (1972), the Cloze technique is favored by many practitioners in the field of reading because of its ease of design and its sensitivity to information within the reader, which other measures do not provide.

Finding material for the development of the test was difficult. Most of the patient education material available at the DAC had been sensitized to language level and/or was developed by pharmaceutical companies that were also sensitive to some of these literacy issues. Second, there was no way of being certain what information had or had not been seen by the study patients. Third, generic material for diabetics (information relative to both Type I and Type II diabetes) was not readily available.

The researcher visited eight local pharmacies (three independent and five chains) and made the request for whatever information was available in pamphlets applicable to diabetic patients. Most pamphlets were rejected because
they were either about very specific technical problems or not appropriate for NIDDM clients. One pamphlet was designed for all diabetic patients and addressed the issue of "Sick Days - How to Manage Your Disease" (Powers & White, 1990). Information obtained in this pamphlet was used in development of the Cloze test for this study as it was more generic to all patients (see appendices).

Instructions followed from the Doak & Doak text (1985) for constructing the Cloze test were as follows:

1. Select a prose passage from the instructional material now being used. Pamphlets, brochures, instruction sheets, and manuals are all useful for this purpose. Be sure the passage consists of prose without reference to figures, tables, charts, or pictures.

   Choose material not previously read by the patients, but that is typical of the instructions being given. The material should include complete paragraphs so that the readers will have the benefit of complete thought units.

2. Leave the first and last sentences intact; delete every fifth word for a total of about 50 deleted words. Do not delete proper nouns (delete the word following the proper noun). Replace all deleted words with a line or blank. All blanks should be of equal length. (See appendices for copy of the Cloze test.)

According to Bormuth, "The validity of the Cloze test
is firmly rooted in basic psychological theory and in the empirical evidence obtained from the extensive research on the subject" (Bormuth, 1975).

Pilot Study

Four different patient education and literacy tools were used for data collection. They are exclusive of the medical/physical examination tests used to determine healthy versus unhealthy foot status, which are described in the previous text.

To give the interviewer practice, all tools were pilot tested on five selected subjects before being used in actual data collection. Following the pilot testing, the initial interview questions were reworded for simplicity and clarity.

The Cloze test, described in the instrumentation section, was piloted using two patients and two nurses because of the need for the respondent to be familiar with diabetes and diabetes self-care management.

Data Collection

The patients from the 203 OSU/DAC patient pool, identified as potential subjects for this study by nature of their reported grade attainment, were asked if they would participate in the screening and brief interview.

Appointments were scheduled back to back with regular clinic appointments for those patients coming in to the clinic. For those patients not scheduled to visit the
clinic during the weeks allotted for testing, an interviewer met with the patients in their homes. Ten patients were seen in the clinic, and eleven were interviewed in their homes.

The DAC staff made a small comfortable testing room next to the waiting room available for the testing. The estimated maximum time from start to finish was 15 minutes. With the cooperation of the DAC staff, patients were scheduled for a screening and interview as part of their regular visit. The patients seen in the clinic were fasting for laboratory studies, therefore most appointments and interviews took place in the morning.

It was emphasized that participation in the study was voluntary and that they would be helping to establish a better understanding of how patients learn about foot care and diabetes. The interview data, listening comprehension test results, and the Cloze results were recorded on a specially developed form. The WRAT results were recorded on a standard WRAT scoring sheet. (See appendices.)

A follow-up thank you letter was sent to all participants at the completion of the project.

For this study, six groups of data were collected and recorded. They are listed below with a brief description of the method of collection and recording.

- DAC baseline and dependent variable measurement of healthy versus unhealthy feet.
The baseline and medical assessment worksheets were developed (Appendix B) to be computer ready and compatible with the CLINFO data management and analysis system used by the College of Medicine and Clinics. This offers the capability for data entry, storage, retrieval, and analysis.

- The foot study interview data, which included individual raw scores for the WRAT, listening comprehension, and Cloze tests, were also converted using the SAS system and capabilities of the Instruction and Research Computer Center (IRCC).

- Subjective and anecdotal data were noted during the interview. Notes were taken relative to response pattern, perceived difficulty, and general subjective atmosphere and affective comments.

Data Analysis

Descriptive, correlational, and inferential statistics were used to analyze the data.

Data for research question one were analyzed with descriptive statistics, which included frequencies, percentages, means, and standard deviation ranges.

Data for research questions two and three were analyzed by calculating appropriate correlation coefficients and Fishers. The correlation coefficients were calculated to examine the nature of relationships among variables. The Fisher's Test of Exact Probability was used to see if
patient, disease, and system factors were significantly different for the groups having healthy or unhealthy feet.
CHAPTER IV
ANALYSIS OF THE DATA

The purpose of the study was (1) to examine the nature of the relationship between patient education factors and the foot status of persons with NIDDM; (2) to examine education interventions related to literacy and the absence or presence of certain risk factors for lower extremity amputation in persons with NIDDM; (3) to gain insight into the relationship between foot care and foot care education for diabetic patients; and (4) to identify the characteristics of diabetic patients who lack literacy skills to deal with important health care information about their life-threatening disease.

The sample (n=21) for the study was selected from a pool of 203 patients with NIDDM who were participating in a DAC study looking at risk factors for and educational interventions to prevent lower extremity amputation. A self-reported grade achievement of 10th grade or less was used as a cut off for inclusion in the study sample. Twenty nine individuals were identified under this criteria. Twenty six indicated a willingness to cooperate. Twenty-one patients (72%) were tested and interviewed.
The analysis of the data begins with a discussion of descriptive statistics. Demographic information is presented followed by a comparison of subjects in the DAC study subjects and the follow-up study sample. Similarities and dissimilarities have been highlighted. The three categories of patient, disease, and system factors are compared for participants with unhealthy versus healthy foot status. Inferential statistics are presented. Chi-square analysis was used and a Fisher's Exact Test (2-Tail) was calculated when relative risk was indicated.

Descriptive Statistics

Demographic Information

Five variables (age at entry into the study, gender, race, self-reported grade attainment, and household income) were selected as being meaningful and relevant to the goals of the study.

The demographic variables for the DAC study subjects and the follow-up study sample have been reflected in Tables 4.1 and 4.2, respectively. Table 4.1 shows the mean age of the DAC study sample was 59 years with a range of 34 - 88 years. The standard deviation was 9.6. Two patients were admitted into the study below the entrance criteria age of 40 because they demonstrated clinical symptoms of interest to the research team.

The participants (n=203) in the DAC study included near equal proportions of 103 males (51%) and 100 females (49%).
The distribution of race showed approximately 151 (74%) of the participants as white and 52 (26%) as black.

Table 4.1

Demographic Profile of DAC Study Subjects

<table>
<thead>
<tr>
<th>Variable</th>
<th>f</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>203</td>
<td>100.0</td>
</tr>
<tr>
<td>(Mean = 58.85; Range = 34-88)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>103</td>
<td>50.7</td>
</tr>
<tr>
<td>Female</td>
<td>100</td>
<td>49.3</td>
</tr>
<tr>
<td>Total</td>
<td>203</td>
<td>100.0</td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>151</td>
<td>74.4</td>
</tr>
<tr>
<td>Black</td>
<td>52</td>
<td>25.6</td>
</tr>
<tr>
<td>Total</td>
<td>203</td>
<td>100.0</td>
</tr>
<tr>
<td>Self-reported grade achievement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grade 3</td>
<td>2</td>
<td>1.00</td>
</tr>
<tr>
<td>Grade 4</td>
<td>1</td>
<td>0.50</td>
</tr>
<tr>
<td>Grade 6</td>
<td>1</td>
<td>0.50</td>
</tr>
<tr>
<td>Grade 7</td>
<td>2</td>
<td>1.00</td>
</tr>
<tr>
<td>Grade 8</td>
<td>7</td>
<td>3.50</td>
</tr>
<tr>
<td>Grade 9</td>
<td>6</td>
<td>3.00</td>
</tr>
<tr>
<td>Grade 10</td>
<td>13</td>
<td>6.50</td>
</tr>
<tr>
<td>Grade 11</td>
<td>17</td>
<td>8.00</td>
</tr>
<tr>
<td>Grade 12</td>
<td>154</td>
<td>76.00</td>
</tr>
<tr>
<td>Total</td>
<td>203</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Household Income

<table>
<thead>
<tr>
<th>Income</th>
<th>f</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;$10,000</td>
<td>31</td>
<td>15.27</td>
</tr>
<tr>
<td>$10 - $19,999</td>
<td>44</td>
<td>21.67</td>
</tr>
<tr>
<td>$20 - $29,999</td>
<td>30</td>
<td>14.78</td>
</tr>
<tr>
<td>$30 - $39,999</td>
<td>30</td>
<td>14.78</td>
</tr>
<tr>
<td>$40 - $49,999</td>
<td>17</td>
<td>8.37</td>
</tr>
<tr>
<td>$50,000 or &gt;</td>
<td>34</td>
<td>16.75</td>
</tr>
<tr>
<td>Refused to answer</td>
<td>13</td>
<td>6.40</td>
</tr>
<tr>
<td>Did not know</td>
<td>4</td>
<td>1.97</td>
</tr>
<tr>
<td>Total</td>
<td>203</td>
<td>100.00</td>
</tr>
</tbody>
</table>

The range for self-reported grade attainment ranged from 3 years to 12 years of high school plus post-secondary college or trade school.
The household income was reported into six categories; < $10,000 being the lowest category and $50,000 or more being the highest category. Interestingly, all categories but one, included at least 15% of the patients.

Table 4.2

Demographic Profile of Follow-up Study Sample

n = 21

<table>
<thead>
<tr>
<th>Variable</th>
<th>f</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (Years)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>45</td>
<td>1</td>
<td>4.8</td>
</tr>
<tr>
<td>50</td>
<td>1</td>
<td>4.8</td>
</tr>
<tr>
<td>58</td>
<td>2</td>
<td>9.5</td>
</tr>
<tr>
<td>60</td>
<td>1</td>
<td>4.8</td>
</tr>
<tr>
<td>61</td>
<td>5</td>
<td>23.8</td>
</tr>
<tr>
<td>63</td>
<td>1</td>
<td>4.8</td>
</tr>
<tr>
<td>65</td>
<td>1</td>
<td>4.8</td>
</tr>
<tr>
<td>66</td>
<td>2</td>
<td>9.5</td>
</tr>
<tr>
<td>69</td>
<td>1</td>
<td>4.8</td>
</tr>
<tr>
<td>71</td>
<td>2</td>
<td>9.5</td>
</tr>
<tr>
<td>73</td>
<td>1</td>
<td>4.8</td>
</tr>
<tr>
<td>74</td>
<td>1</td>
<td>4.8</td>
</tr>
<tr>
<td>78</td>
<td>1</td>
<td>4.8</td>
</tr>
<tr>
<td>88</td>
<td>1</td>
<td>4.8</td>
</tr>
<tr>
<td>Total</td>
<td>21</td>
<td>100.0</td>
</tr>
</tbody>
</table>

(Mean = 65; range = 45–88)

<table>
<thead>
<tr>
<th>Gender</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>11</td>
<td>52.4</td>
</tr>
<tr>
<td>Female</td>
<td>10</td>
<td>47.6</td>
</tr>
<tr>
<td>Total</td>
<td>21</td>
<td>100.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Race</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>15</td>
<td>71.4</td>
</tr>
<tr>
<td>Black</td>
<td>6</td>
<td>28.6</td>
</tr>
<tr>
<td>Total</td>
<td>21</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Self-reported grade achievement

<table>
<thead>
<tr>
<th>Grade</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade 3</td>
<td>2</td>
<td>9.5</td>
</tr>
<tr>
<td>Grade 4</td>
<td>1</td>
<td>4.8</td>
</tr>
<tr>
<td>Grade 7</td>
<td>2</td>
<td>9.5</td>
</tr>
<tr>
<td>Grade 8</td>
<td>5</td>
<td>23.8</td>
</tr>
<tr>
<td>Grade 9</td>
<td>3</td>
<td>14.3</td>
</tr>
<tr>
<td>Grade 10</td>
<td>8</td>
<td>38.1</td>
</tr>
<tr>
<td>Total</td>
<td>21</td>
<td>100.0</td>
</tr>
</tbody>
</table>
Table 4.2 shows the mean age for the follow-up study sample was 65 years with a range of 45-88 years. The standard deviation was 9.3 years.

The study sample included an almost equal number of 11 males (52%) and 10 females (48%). Approximately three-fourths 15 (71%) of the sample was white and one fourth 6 (29%) were black.

The range for self-reported grade attainment was 3 to 10 years. The mean was 8 years and the standard deviation was 2.3.

**Comparison of subjects in the DAC study and follow-up study sample**

The follow-up study sample was older by approximately six years and had a smaller range (45-88 versus 34-88). As noted, the DAC study subjects had two individuals below the established cut off which brought their range down from 40 to 34. The difference may be attributed to the cut-off of
10th grade which would include older individuals who had not acquired as much education for various reasons.

The gender breakdown of both groups were almost identical as were the racial demographics. Because of the criteria of 10th grade cut off for inclusion into the follow-up study comparisons were not possible for self-reported grade achievement.

A comparison of the income of the patients indicated that the follow-up study sample was relatively underrepresented in three categories; $30,000-$39,000, $40,000-$49,000, and $50,000 or more.

Patient, Disease, and System Factor Comparisons

This section discusses patient, disease, and system factors, comparing them for participants with unhealthy versus healthy foot status.

The list of factors follows:

Patient Factors (Tables 4.3 - 4.9)

Age
Gender
Race
Visual acuity (self-reported)
Hearing acuity (self-reported)
Household Income
Primary Language
Literacy Characteristics
Grade level achievement (self-reported)
Reading grade achievement (WRAT)
Listening comprehension (Doak)
Reading comprehension (Cloze technique)

Disease Factors (Tables 4.10 - 4.13)
Length of time with disease (years)
Perceived risk for diabetic foot problem (self-report)
Belief about foot problem prevention (self-report)
Foot care knowledge before foot care class (self-report)

System Factors (Tables 4.14 - 4.18)
Primary care source for diabetes
Previous diabetes education
Instructor(s) for diabetes education
Location of instruction for diabetes education
Method of diabetes instruction
Previous foot care instruction
Instructor(s) for foot care education
Location of instruction for foot care education
Method of foot care instruction

Patient Factors

The mean ages (Table 4.3) of both the unhealthy and healthy groups were found to be almost identical. The gender of participants was also almost evenly divided within the two groups. Racially the follow-up study group reflected an approximate 25% black versus 75% (one to three
ratio) white in the unhealthy category, and a 33% black versus 66% (one to two ratio) white in the healthy category.

Table 4.3

Comparison of Unhealthy Versus Healthy Foot Status for Patient Factors Age, Gender, and Race

<table>
<thead>
<tr>
<th>Variable</th>
<th>Unhealthy Feet</th>
<th></th>
<th>Healthy Feet</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>f</td>
<td>%</td>
<td>M</td>
<td>S.D.</td>
</tr>
<tr>
<td>Age</td>
<td>15</td>
<td>71</td>
<td>64.9</td>
<td>9.6</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>8</td>
<td>53.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>7</td>
<td>46.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>100.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black</td>
<td>4</td>
<td>26.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>11</td>
<td>73.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>100.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4.4

Comparison of Unhealthy versus Healthy Foot Status for the Patient Factors of Visual and Hearing Acuity

<table>
<thead>
<tr>
<th>Variable</th>
<th>Unhealthy Feet</th>
<th></th>
<th>Healthy Feet</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>f</td>
<td>%</td>
<td>f</td>
<td>%</td>
</tr>
<tr>
<td>Visual Acuity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>See well enough to read newspaper with glasses?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>12</td>
<td>80.0</td>
<td>4</td>
<td>66.7</td>
</tr>
<tr>
<td>No</td>
<td>3</td>
<td>20.0</td>
<td>2</td>
<td>33.3</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>100.0</td>
<td>6</td>
<td>100.0</td>
</tr>
<tr>
<td>Hearing Acuity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hear well enough to understand conversational speech?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>12</td>
<td>80.0</td>
<td>6</td>
<td>100.0</td>
</tr>
<tr>
<td>No</td>
<td>3</td>
<td>20.0</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>100.0</td>
<td>6</td>
<td>100.0</td>
</tr>
</tbody>
</table>
Table 4.4 demonstrated that three of the unhealthy feet group could not see well enough to read a newspaper aided with glasses versus two in the healthy group. For hearing acuity again 3 from the unhealthy feet group reported not hearing well enough to understand conversational speech. All participants from the healthy group reported no problems hearing conversational speech.

Table 4.5 showed one participant from each group selected the option of not responding to (refused to answer) the income question. Of the unhealthy group the income range was $10,000 or less to $39,000. For the healthy group the range was $10,000 or less to $49,999.

Table 4.5

| Factor of Income | Unhealthy Feet | | Healthy Feet | | Total |
|------------------|----------------|--------------------------|--------------------------|------------|
| **Variable**     | **f** | **%** | **f** | **%** | **Total** |
| Income           |       |     |       |     |           |
| < $10,000        | 3     | 20.0 | 2     | 33.3 | 5         |
| $10 - $19,999    | 5     | 33.3 | 0     | 0.0  | 5         |
| $20 - $29,999    | 4     | 26.7 | 2     | 33.3 | 6         |
| $30 - $39,999    | 2     | 13.3 | 0     | 0.0  | 2         |
| $40 - $49,999    | 0     | 0.0  | 1     | 16.7 | 1         |
| $50,000 or >     | 0     | 0.0  | 0     | 0.0  | 0         |
| Refused          | 1     | 6.7  | 1     | 16.7 | 2         |
| **Total**        | 15    | 100.0| 6     | 100.0| 21        |
Table 4.6
Comparison of Unhealthy Versus Healthy Foot Status for the Patient Factor of Self-reported Grade Level Achievement and Reading Grade Level Equivalent

<table>
<thead>
<tr>
<th>Variable</th>
<th>Unhealthy Feet</th>
<th></th>
<th>Healthy Feet</th>
<th></th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade level</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>achievement</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(self-reported)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grade 3</td>
<td>1</td>
<td>6.7</td>
<td>1</td>
<td>16.7</td>
<td>2</td>
</tr>
<tr>
<td>Grade 4</td>
<td>1</td>
<td>6.7</td>
<td>0</td>
<td>0.0</td>
<td>1</td>
</tr>
<tr>
<td>Grade 5</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
</tr>
<tr>
<td>Grade 6</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
</tr>
<tr>
<td>Grade 7</td>
<td>2</td>
<td>13.3</td>
<td>0</td>
<td>0.0</td>
<td>2</td>
</tr>
<tr>
<td>Grade 8</td>
<td>4</td>
<td>26.7</td>
<td>1</td>
<td>16.7</td>
<td>5</td>
</tr>
<tr>
<td>Grade 9</td>
<td>3</td>
<td>20.0</td>
<td>0</td>
<td>0.0</td>
<td>3</td>
</tr>
<tr>
<td>Grade 10</td>
<td>4</td>
<td>26.7</td>
<td>4</td>
<td>66.7</td>
<td>8</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>100.0</td>
<td>6</td>
<td>100.0</td>
<td>21</td>
</tr>
<tr>
<td>Reading grade</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>equivalent</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(WRAT)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not taken*</td>
<td>1</td>
<td>6.6</td>
<td>1</td>
<td>16.6</td>
<td>2</td>
</tr>
<tr>
<td>Below Grade 3</td>
<td>6</td>
<td>40.0</td>
<td>1</td>
<td>16.6</td>
<td>7</td>
</tr>
<tr>
<td>Grade 3</td>
<td>1</td>
<td>6.6</td>
<td>1</td>
<td>16.6</td>
<td>2</td>
</tr>
<tr>
<td>Grade 4</td>
<td>1</td>
<td>6.6</td>
<td>0</td>
<td>0.0</td>
<td>1</td>
</tr>
<tr>
<td>Grade 5</td>
<td>1</td>
<td>6.6</td>
<td>2</td>
<td>33.3</td>
<td>3</td>
</tr>
<tr>
<td>Grade 8</td>
<td>2</td>
<td>13.3</td>
<td>0</td>
<td>0.0</td>
<td>2</td>
</tr>
<tr>
<td>Grade 9</td>
<td>1</td>
<td>6.6</td>
<td>0</td>
<td>0.0</td>
<td>1</td>
</tr>
<tr>
<td>Grade 10</td>
<td>2</td>
<td>13.3</td>
<td>1</td>
<td>16.6</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>100.0</td>
<td>6</td>
<td>100.0</td>
<td>21</td>
</tr>
</tbody>
</table>

*Two individuals were legally blind and did not take the test.

Self-reported grade level achievement (Table 4.6) was 87% and 83% above grade level five for the unhealthy and healthy feet samples respectively. When given the WRAT, individuals scoring above grade level five in the unhealthy feet group was 33% and the healthy feet sample dropped lower to 17%. 
Table 4.7 showed of the total sample fifteen (71%) were administered the 5th grade listening comprehension test and 6 (29%) were administered the 10th grade test based on their performance on the WRAT. Of the unhealthy feet group 10 (66%) took the 5th grade versus 5 (83%) of the healthy feet group. Five (33%) of the unhealthy foot participants took the 10th grade test versus 1 (17%) of the healthy foot participants.

An analysis of the correct scores demonstrated for the unhealthy foot group one individual scored 0% correct, 2 (9%) scored 25% correct, 9 (43%) scored between 38% and 50% correct, 5 (24%) scored between 63% and 75% correct, and 4 (19%) scored between 88% and 100%. One individual from the
unhealthy feet group scored 100%.

Table 4.8

Comparison of Unhealthy Versus Healthy Foot Status for the Patient Factor of Reading Comprehension (Cloze Technique)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Unhealthy Feet</th>
<th></th>
<th>Healthy Feet</th>
<th></th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>f</td>
<td>%</td>
<td>f</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td>Reading Comprehension</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Cloze technique)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percentage</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not taken*</td>
<td>10</td>
<td>67.0</td>
<td>6</td>
<td>100.0</td>
<td>16</td>
</tr>
<tr>
<td>0%</td>
<td>1</td>
<td>6.6</td>
<td>0</td>
<td>0.0</td>
<td>1</td>
</tr>
<tr>
<td>36%</td>
<td>2</td>
<td>13.2</td>
<td>0</td>
<td>0.0</td>
<td>2</td>
</tr>
<tr>
<td>48%</td>
<td>1</td>
<td>6.6</td>
<td>0</td>
<td>0.0</td>
<td>1</td>
</tr>
<tr>
<td>60%</td>
<td>1</td>
<td>6.6</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>100.0</td>
<td>6</td>
<td>100.0</td>
<td>21</td>
</tr>
</tbody>
</table>

*Scored the fifth-grade level or below on the WRAT. Three of these subjects were unable to see well enough to read the text.

Table 4.8 demonstrated that five individuals were administered the test. Sixteen did not take the test because they either scored at the fifth grade level or below on the WRAT or had vision problems that precluded attempting it. An explanation appears in Chapter V relative to the additional problems associated with trying to adapt the Cloze down to a fifth-grade level. The five individuals completing the test were all from the unhealthy feet group and scores ranged from 0% to 60% comprehension of the material.

Table 4.9 showed that English was the primary language in both the unhealthy and the healthy foot status groups. All participants learned and used English on a daily basis.
Table 4.9

**Comparison of Unhealthy Versus Healthy Foot Status for the Patient Factor of Primary Language**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Unhealthy Feet</th>
<th>Healthy Feet</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>f</td>
<td>%</td>
<td>f</td>
</tr>
<tr>
<td><strong>Language</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>What is your primary language?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>English</td>
<td>15</td>
<td>100</td>
<td>6</td>
</tr>
<tr>
<td>Spanish</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Mexican</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Other</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>15</td>
<td>100</td>
<td>6</td>
</tr>
</tbody>
</table>

**Disease Factors**

In Table 4.10 the length of time with the disease was calculated from when diabetes was diagnosed to the present realizing that some individuals could have been undiagnosed for a period of time. The total range of number of years was four years to 42 years for the unhealthy feet group and four years to 25 years for the healthy feet. The upper range of the unhealthy groups (42 years) was primarily because only one patient had been living with the disease beyond 25 years. Otherwise, both groups had a similar range of years for living with diabetes.
### Table 4.10
Comparison of Unhealthy Versus Healthy Foot Status for the Disease Factor of Length of Time with Disease (Diabetes)

<table>
<thead>
<tr>
<th>Length of Time with Disease (Years)</th>
<th>Unhealthy Feet</th>
<th>Healthy Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>f</td>
<td>%</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>6.7</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>6.7</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>6.7</td>
</tr>
<tr>
<td>7</td>
<td>1</td>
<td>6.7</td>
</tr>
<tr>
<td>8</td>
<td>1</td>
<td>6.7</td>
</tr>
<tr>
<td>9</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>10</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>11</td>
<td>1</td>
<td>6.7</td>
</tr>
<tr>
<td>12</td>
<td>1</td>
<td>6.7</td>
</tr>
<tr>
<td>13</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>14</td>
<td>2</td>
<td>13.3</td>
</tr>
<tr>
<td>15</td>
<td>1</td>
<td>6.7</td>
</tr>
<tr>
<td>16</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>17</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>18</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>19</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>20</td>
<td>2</td>
<td>13.3</td>
</tr>
<tr>
<td>21</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>22</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>23</td>
<td>1</td>
<td>6.7</td>
</tr>
<tr>
<td>24</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>25</td>
<td>1</td>
<td>6.7</td>
</tr>
<tr>
<td>42</td>
<td>1</td>
<td>6.7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>15</td>
<td>100.0</td>
</tr>
</tbody>
</table>

### Table 4.11
Comparison of Unhealthy Versus Healthy Foot Status for the Disease Factor of Perceived Risk for Diabetic Foot Problems

<table>
<thead>
<tr>
<th>Variable</th>
<th>Unhealthy Feet</th>
<th>Healthy Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>f</td>
<td>%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>15</td>
<td>100.0</td>
</tr>
</tbody>
</table>

On a scale from 1 to 5, what do you perceive your risk for diabetic foot problems is?

<table>
<thead>
<tr>
<th>Risk Level</th>
<th>Unhealthy Feet</th>
<th>Healthy Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>High risk</td>
<td>2</td>
<td>13.3</td>
</tr>
<tr>
<td>Moderate risk</td>
<td>2</td>
<td>13.3</td>
</tr>
<tr>
<td>Average risk</td>
<td>7</td>
<td>46.6</td>
</tr>
<tr>
<td>Low risk</td>
<td>2</td>
<td>13.3</td>
</tr>
<tr>
<td>No risk</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Don't know</td>
<td>2</td>
<td>13.3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>15</td>
<td>100.0</td>
</tr>
</tbody>
</table>
Table 4.11 demonstrated that as a total group, 15 (72%) of the follow-up study group perceived that they were at average to high risk for diabetic foot problems. Eleven (74%) of the unhealthy feet category versus 4 (66%) of the healthy feet fell into this category grouping. Fourteen percent (3) of the total group perceived that they were at low risk. Thirteen percent (2) from the unhealthy and 17% (1) from the healthy comprised this group. None of the 21 study patients perceived that they were at no risk; however, 3 (14%) from both groups did not know if they were or not. The unhealthy feet group did not differ significantly from the healthy feet group on the average relative to perceived risk (self-reported) for diabetic foot problems.

Table 4.12
Comparison of Unhealthy Versus Healthy Foot Status for the Disease Factor of Belief About Foot Problem Prevention (Self-Reported)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Unhealthy Feet</th>
<th>Healthy Feet</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>f</td>
<td>%</td>
<td>f</td>
</tr>
<tr>
<td>On a scale from 1 to 5, how much can you do to prevent diabetic foot problems?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Can completely prevent</td>
<td>0</td>
<td>0.0</td>
<td>1</td>
</tr>
<tr>
<td>Much I can do</td>
<td>10</td>
<td>66.6</td>
<td>4</td>
</tr>
<tr>
<td>Some I can do</td>
<td>3</td>
<td>20.0</td>
<td>1</td>
</tr>
<tr>
<td>Little I can do</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
</tr>
<tr>
<td>Nothing I can do</td>
<td>1</td>
<td>6.7</td>
<td>0</td>
</tr>
<tr>
<td>I don't know</td>
<td>1</td>
<td>6.7</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>100.0</td>
<td>6</td>
</tr>
</tbody>
</table>

Table 4.12 showed that as a total group, 18 (85%) of the study sample felt there was much or something that they
could do to prevent diabetic foot problems. One (5%) thought they could be completely prevented, 1 (5%) felt there was nothing they could do, and 1 (5%) didn't know. For the unhealthy feet group, 13 (87%) felt there was something they could do to prevent foot problems, 1 (7%) felt there was nothing they could do, and another 1 (7%) didn't know. For the healthy feet group 1 (17%) felt that diabetic foot problems could be completely prevented. Five (84%) felt much or something could be done. No one from this group felt that there was nothing that could be done nor answered they did not know.

Table 4.13

<table>
<thead>
<tr>
<th>Variable</th>
<th>Unhealthy Feet</th>
<th>Healthy Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>f</td>
<td>%</td>
</tr>
<tr>
<td>Foot Care</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knowledge Before</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foot Care Instruction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knew nothing</td>
<td>5</td>
<td>33.0</td>
</tr>
<tr>
<td>Knew just a little</td>
<td>7</td>
<td>47.0</td>
</tr>
<tr>
<td>Knew enough</td>
<td>3</td>
<td>20.0</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table 4.13 demonstrated that all participants had received foot care instructions after entering the program. This reflective question was intended to have them retrospectively assess their previous knowledge. Of the total groups five (24%) felt they knew nothing about foot care before instruction. All five were from the unhealthy
feet category and none were from the healthy feet category. Eleven (52%) of the total group felt they knew just a little with this group comprising seven from the unhealthy and four from the healthy feet groups. Three members of the unhealthy feet group felt they knew enough and two from the healthy feet group were in this category which represented 24% of the total group.

**System Factors**

Table 4.14

Comparison of Unhealthy Versus Healthy Foot Status for the System Factor of Primary Care Source

<table>
<thead>
<tr>
<th>Variable</th>
<th>Unhealthy Feet</th>
<th></th>
<th></th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>f</td>
<td>%</td>
<td>f</td>
<td>%</td>
</tr>
<tr>
<td>Primary Care Source for Diabetes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diabetes Specialist</td>
<td>5</td>
<td>33.3</td>
<td>1</td>
<td>16.7</td>
</tr>
<tr>
<td>Primary Care Physician</td>
<td>10</td>
<td>66.7</td>
<td>5</td>
<td>83.3</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>100.0</td>
<td>6</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Referring to Table 4.14 many patients are diagnosed and their diabetes followed by their primary care physician (family doctor, general practitioner, or internist). Some are diagnosed and followed by a diabetes specialist and also use the specialist as their primary care physician from the onset of the disease. A third group may be managed by a primary care physician until such time as the disease progresses and the symptoms increase and/or become more complicated. For this study group six (29%) of the group
were seen initially by a diabetes specialist who continues to care for them as the primary care physician. Fifteen (71%) were seen by their primary care physician for a period of time then followed for their diabetes only by a specialist. They continue to see their primary care physician for all other health care needs. The unhealthy feet group was split 33% (specialist) versus 66% (primary care doctor). The healthy feet group was closer to 20% (specialist) versus 80% (primary care doctor) which may be a factor of the lack of progression of the disease process.

Table 4.15 showed that as a group 15 (72%) had received previous diabetes education and six (28%) had not when they were initially diagnosed as having the disease. Of the unhealthy foot group the ratio was 75%/25% for this question and the healthy feet group 66%/33%. As a group physicians only were instructors for 27% of the sample. Nurses singularly accounted for 1 (7%), diabetes educators 3 (20%), and 3 (20%) dieticians. Combinations of physician and nurse 1 (7%), physician and dietician 2 (12%) and physician and diabetes educator (1 (7%) comprised the total. Physicians were involved in the education process 53% of the time for the total group. Comparison of the unhealthy to healthy feet groups showed more combinations of instructors were named by individuals in the unhealthy feet group than by individuals in the healthy feet group. For both groups instruction took place in one of three locations. The
majority from both groups and individually had education in a hospital as an inpatient (63% and 50% respectively for unhealthy/healthy feet groups). More individuals in the unhealthy feet group (27%) had education in their physician's office than in a special class (9%). The healthy feet group was split (25%) for each of the locations of physician's office and special class.

Table 4.15

Comparison of Unhealthy Versus Healthy Foot Status for the System Factors of Previous Diabetes Education, Instructor, and Location of Instruction

<table>
<thead>
<tr>
<th>Variable</th>
<th>Unhealthy Feet</th>
<th>Healthy Feet</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Previous Diabetes Education</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Received</td>
<td>11 73.3</td>
<td>4 66.7</td>
<td>15</td>
</tr>
<tr>
<td>Not received</td>
<td>4 26.7</td>
<td>2 33.3</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>15 100.0</td>
<td>6 100.0</td>
<td>21</td>
</tr>
<tr>
<td><strong>Instructor(s) of Diabetes Education</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physician</td>
<td>3 27.3</td>
<td>1 25.0</td>
<td>4</td>
</tr>
<tr>
<td>Nurse</td>
<td>0 0.0</td>
<td>1 25.0</td>
<td>1</td>
</tr>
<tr>
<td>Diabetes educator</td>
<td>2 18.2</td>
<td>1 25.0</td>
<td>3</td>
</tr>
<tr>
<td>Dietician</td>
<td>3 27.3</td>
<td>0 0.0</td>
<td>3</td>
</tr>
<tr>
<td>Physician and nurse</td>
<td>1 9.1</td>
<td>0 0.0</td>
<td>1</td>
</tr>
<tr>
<td>Physician and dietician</td>
<td>2 18.2</td>
<td>0 0.0</td>
<td>2</td>
</tr>
<tr>
<td>Physician and diabetes educator</td>
<td>0 0.0</td>
<td>1 25.0</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>11 100.0</td>
<td>4 100.0</td>
<td>15</td>
</tr>
<tr>
<td><strong>Location of Instruction (Diabetes Education)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physician’s office</td>
<td>3 27.3</td>
<td>1 25.0</td>
<td>4</td>
</tr>
<tr>
<td>Hospital (inpatient)</td>
<td>7 63.6</td>
<td>2 50.0</td>
<td>9</td>
</tr>
<tr>
<td>Special class</td>
<td>1 9.1</td>
<td>1 25.0</td>
<td>2</td>
</tr>
<tr>
<td>Other</td>
<td>0 0.0</td>
<td>0 0.0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>11 100.0</td>
<td>4 100.0</td>
<td>15</td>
</tr>
</tbody>
</table>

Table 4.16 showed that participants identified more than one method of instruction used when being instructed in
### Table 4.16

**Comparison of Unhealthy Versus Healthy Foot Status for the System Factors of Method of Instruction (Diabetes Education)**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Unhealthy Feet</th>
<th>Healthy Feet</th>
<th>Total Group</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Methods of Instruction</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Diabetes Education)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Written materials/directions</td>
<td>6*</td>
<td>2*</td>
<td>8*</td>
</tr>
<tr>
<td>Handouts/pictures</td>
<td>4</td>
<td>2*</td>
<td>6</td>
</tr>
<tr>
<td>Lecture</td>
<td>5</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Group discussion</td>
<td>3</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Videotape</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Demonstration</td>
<td>0</td>
<td>2*</td>
<td>2</td>
</tr>
<tr>
<td>Individual instruction</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Blackboard</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Blackboard drawings/overheads</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

*Denotes the most used method of instruction for each group.

diabetes education. Ranking the responses as a group and by foot status indicates the following:

**Written materials** were identified by the total group and by the unhealthy feet group as the most used method of instruction.

**Handouts/pictures** were the second most used instructional method for the unhealthy feet group and was named by individuals in the healthy feet group along with written materials and demonstration as the most used methods of instructions.

**Lecture** was ranked third by both the total group and the unhealthy feet group but was not identified as an instructional method by the healthy feet group.
Group discussion was ranked fourth as the method employed for the total group and the unhealthy group. It was one of two least used methods for the healthy group. Videotape was the fifth most used method for the total group and the unhealthy feet group but was not mentioned as a method of instruction by the healthy feet group. Demonstration was the sixth most used method for the total group. The healthy feet group ranked this method as one of the most used (tied with written materials and handouts/pictures). Demonstration was not mentioned as a method used with the unhealthy feet group. Individual instruction was the seventh most used method for the total group. The healthy feet group ranked it as one of the second most used methods (tied with group discussion). Individual instruction was not mentioned as a method used with the unhealthy feet group.

Table 4.17 demonstrated the following: Previous foot care education. As a group 10 (48%) had received previous foot care education and 11 (52%) had not before entering the DAC study. Of the unhealthy foot group the ratio was 6 (40%) received and 9 (60%) had not received previous education. In the healthy group 4 (67%) received and 2 (33%) had not received previous education. Instructor(s) of foot care education. As a group physicians were instructors for 6 (60%) of both groups. Nurses accounted for 1 (10%), diabetes educators 2 (20%), and a
podiatrist 1 (10%). Comparisons of the unhealthy to healthy feet groups respectively indicated the healthy feet group had a physician and a diabetes educator only where the unhealthy feet group had a podiatrist and nurses as well as physicians and nurses.

Table 4.17

Comparison of Unhealthy Versus Healthy Foot Status for the System Factors of Previous Foot Care Education, Instructor, and Location of Instruction

<table>
<thead>
<tr>
<th>Variable</th>
<th>Unhealthy Feet</th>
<th></th>
<th>Healthy Feet</th>
<th></th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Previous Foot Care Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Received</td>
<td>6</td>
<td>40.0</td>
<td>4</td>
<td>66.7</td>
<td>10</td>
</tr>
<tr>
<td>Not received</td>
<td>9</td>
<td>60.0</td>
<td>2</td>
<td>33.3</td>
<td>11</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>100.0</td>
<td>6</td>
<td>100.0</td>
<td>21</td>
</tr>
</tbody>
</table>

Instructor(s) for Foot Care Education

<table>
<thead>
<tr>
<th>Variable</th>
<th>Unhealthy Feet</th>
<th></th>
<th>Healthy Feet</th>
<th></th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physician</td>
<td>3</td>
<td>50.0</td>
<td>3</td>
<td>75.0</td>
<td>6</td>
</tr>
<tr>
<td>Nurse</td>
<td>1</td>
<td>16.7</td>
<td>0</td>
<td>0.0</td>
<td>1</td>
</tr>
<tr>
<td>Diabetes Educator</td>
<td>1</td>
<td>16.7</td>
<td>1</td>
<td>25.0</td>
<td>2</td>
</tr>
<tr>
<td>Podiatrist</td>
<td>1</td>
<td>16.7</td>
<td>0</td>
<td>0.0</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>6</td>
<td>100.0</td>
<td>4</td>
<td>100.0</td>
<td>10</td>
</tr>
</tbody>
</table>

Location of Instruction (Foot Care)

<table>
<thead>
<tr>
<th>Location</th>
<th>Unhealthy Feet</th>
<th></th>
<th>Healthy Feet</th>
<th></th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physician's Office</td>
<td>3</td>
<td>50.0</td>
<td>3</td>
<td>75.0</td>
<td>6</td>
</tr>
<tr>
<td>Hospital (inpatient)</td>
<td>1</td>
<td>16.7</td>
<td>0</td>
<td>0.0</td>
<td>1</td>
</tr>
<tr>
<td>Special Class</td>
<td>1</td>
<td>16.7</td>
<td>1</td>
<td>25.0</td>
<td>2</td>
</tr>
<tr>
<td>Podiatrist Office</td>
<td>1</td>
<td>16.7</td>
<td>0</td>
<td>0.0</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>6</td>
<td>100.0</td>
<td>4</td>
<td>100.0</td>
<td>10</td>
</tr>
</tbody>
</table>

Location of Instruction for foot care. Instruction took place for the unhealthy feet group in four places. Half took place in a physician's office and the rest in either the hospital inpatient setting, a special class, or a
podiatrist's office. For the healthy feet group 3 (75%) reported that their previous foot care education took place in the physician's office and 1 (25%) in a special class.

Referring to Table 4.18 the following is demonstrated: Individual instruction was ranked first as the most used method of instruction for foot care by the total group and the healthy feet group. It was ranked as the third most used method (tied with group discussion) by individuals in the unhealthy feet group.

Written materials/directions was ranked second as the most used method of instruction by the total group and by both the unhealthy and healthy feet groups.

Lecture was the third most used method of instruction for the total group. It was ranked the first most used method by the unhealthy feet group and was not mentioned as a form of instruction used with the healthy feet group.

Group discussion was ranked fourth as a method of instruction for the total group. It was the third most common method (tied with individual instruction) by the unhealthy feet group. Group discussion was not mentioned as a form of instruction used with the healthy feet group.

Videotape was also ranked fourth as a method of instruction for the total group, and the unhealthy feet group (tied with demonstration and handouts/pictures). Videotape was the third and the least used (tied with demonstration) method used with the healthy feet group.
Demonstration was ranked as the fourth most used method of instruction along with group discussion and videotape. The unhealthy feet group also ranked it fourth (tied with videotape and handouts/pictures). The healthy feet group ranked it as the least used method of instruction (tied with videotape).

Handouts/pictures were ranked the fifth most used method by the total group. The unhealthy feet group ranked it fourth (tied with videotape and demonstration). Handouts/pictures were not used a methods of instruction with individuals in the healthy feet group.

Blackboard drawings/overheads were the least used method by the total group and the unhealthy feet group. This method was not used with individuals in the healthy feet group.

Table 4.18

Comparison of Unhealthy Versus Healthy Foot Status for the System Factor of Method of Instruction for Foot Care Education

<table>
<thead>
<tr>
<th>Variable</th>
<th>Unhealthy Feet</th>
<th>Healthy Feet</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>f %</td>
<td>f %</td>
<td></td>
</tr>
<tr>
<td>Method of Instruction (Foot Care)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Individual instruction</td>
<td>5 4*</td>
<td>4</td>
<td>9*</td>
</tr>
<tr>
<td>Written materials/directions</td>
<td>6 2</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Lecture</td>
<td>7* 0</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Group discussion</td>
<td>5 0</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Videotape</td>
<td>4 1</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Demonstration</td>
<td>4 1</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Handouts/pictures</td>
<td>4 0</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Blackboard drawings/overheads</td>
<td>3 0</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

*Denotes the most used method of instruction for each group.
Inferential Statistics

Originally it was planned to use chi square analysis, however, restrictions on its use were indicated as described by Isaac and Michael (1989). Fisher's Test of Exact Probability is used when the theoretical frequency is smaller than five (the theoretical frequency for any cell in the product of the two marginal totals common to that cell divided by the total number of cases N). In this event for 2 X 2 tables the Fisher's is recommended. This is collaborated by Blalock (1972) "In the case of 2 X 2 tables where N is small, it is possible to make use of a test developed by R. A. Fisher which gives us exact rather than approximate probabilities."

Table 4.19

<table>
<thead>
<tr>
<th>Foot Status</th>
<th>Unhealthy Feet</th>
<th>Healthy Feet</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>f %</td>
<td>f %</td>
<td>f %</td>
</tr>
<tr>
<td>&lt;65</td>
<td>9 43</td>
<td>3 29</td>
<td>12 71.43</td>
</tr>
<tr>
<td>&gt;65</td>
<td>6 14</td>
<td>3 14</td>
<td>9 28.57</td>
</tr>
<tr>
<td>Total</td>
<td>15 57</td>
<td>6 43</td>
<td>21 100.00</td>
</tr>
</tbody>
</table>

Probability = 1.0
Fisher's Exact Test (2-Tail)

H₀: The variables age category and foot status are independent.
H₁: There is an association between age and healthy/unhealthy foot status.
The null hypothesis that the variables age and healthy/unhealthy feet are independent was accepted at alpha = .05.

The data on age (Table 4.19) which ranged from 45 to 88 years was grouped into two categories: < 65 years and > 65 years. That means that the age at entry into the project category healthy/unhealthy foot status had no statistically significant association.

Table 4.20

Relationship Between Healthy/Unhealthy Feet and the Patient Factor

<table>
<thead>
<tr>
<th>Gender</th>
<th>Unhealthy Feet</th>
<th>Healthy Feet</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>f</td>
<td>%</td>
<td>f</td>
</tr>
<tr>
<td>Male</td>
<td>8</td>
<td>38</td>
<td>3</td>
</tr>
<tr>
<td>Female</td>
<td>7</td>
<td>33</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>71</td>
<td>6</td>
</tr>
</tbody>
</table>

Probability = 1.0
Fisher's Exact Test (2-Tail)

\[ H_0: \text{The variables gender and foot status are independent.} \]
\[ H_1: \text{There is an association between gender and healthy/unhealthy feet.} \]

The null hypothesis that the variables gender and healthy/unhealthy feet are independent was accepted at alpha = .05. That means that the gender category and healthy/unhealthy foot status had no statistically significant association.
Table 4.21

Relationship Between Healthy/Unhealthy Feet and the Patient Factor Race

<table>
<thead>
<tr>
<th>Race</th>
<th>Unhealthy Feet</th>
<th>Healthy Feet</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>f</td>
<td>%</td>
<td>f</td>
</tr>
<tr>
<td>White</td>
<td>11</td>
<td>52</td>
<td>4</td>
</tr>
<tr>
<td>Black</td>
<td>4</td>
<td>19</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>71</td>
<td>6</td>
</tr>
</tbody>
</table>

Probability = 1.0
Fisher's Exact Test (2-Tail)

H₀: The variables race and foot status are independent.
H₁: There is an association between race and healthy/unhealthy foot status.

The null hypotheses that the variables race and healthy/unhealthy feet are independent was accepted at alpha = .05. That means that race category and healthy/unhealthy foot status had no statistically significant association. However, Table 4.21 indicates a majority were white and had unhealthy feet.
Table 4.22

Relationship Between Healthy/Unhealthy Feet and the Patient Factor
Visual Acuity (Self Reported)

<table>
<thead>
<tr>
<th>Foot Status</th>
<th>Unhealthy Feet</th>
<th>Healthy Feet</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual Acuity (see newspaper)</td>
<td>$f$</td>
<td>$n$</td>
<td>$f$</td>
</tr>
<tr>
<td>Can see</td>
<td>12 57</td>
<td>4 19</td>
<td>16 76</td>
</tr>
<tr>
<td>Cannot see</td>
<td>3 14</td>
<td>2 10</td>
<td>5 24</td>
</tr>
<tr>
<td>Total</td>
<td>15 71</td>
<td>6 29</td>
<td>21 100</td>
</tr>
</tbody>
</table>

Probability $= 0.598$
Fisher's Exact Test (2-Tail)

$H_o$: The variables visual acuity and healthy/unhealthy feet are independent.

$H_A$: There is an association between visual acuity and healthy/unhealthy foot status.

The null hypothesis that the variables visual acuity and healthy/unhealthy feet are independent was accepted at alpha $= .05$. That means that the visual category and healthy/unhealthy foot status had no statistically significant association.
Table 4.23

Relationship Between Healthy/Unhealthy Feet and the Patient Factor
Hearing Acuity

<table>
<thead>
<tr>
<th>Variable</th>
<th>Foot Status</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Unhealthy Feet</td>
<td>Healthy Feet</td>
<td>Total</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>f</td>
<td>%</td>
<td>f</td>
<td>%</td>
<td>f</td>
</tr>
<tr>
<td>Hearing Acuity</td>
<td>hear conversational speech</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Can hear</td>
<td>12</td>
<td>57</td>
<td>6</td>
<td>28</td>
<td>18</td>
</tr>
<tr>
<td>Cannot hear</td>
<td>3</td>
<td>15</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>72</td>
<td>6</td>
<td>28</td>
<td>21</td>
</tr>
</tbody>
</table>

Probability = 0.526
Fisher’s Exact Test (2-Tail)

H₀: The variables hearing acuity and healthy/unhealthy feet are independent.

H₁: There is an association between hearing acuity and healthy/unhealthy foot status.

The null hypothesis that the variables hearing acuity and healthy/unhealthy feet are independent was accepted at alpha = .05. That means that the hearing acuity category and healthy/unhealthy foot status had no statistically significant association.
Table 4.24

Relationship Between Healthy/Unhealthy Feet and the Patient Factor of Income

n = 19*

<table>
<thead>
<tr>
<th>Household Income</th>
<th>Unhealthy Feet</th>
<th>Healthy Feet</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ $19,999</td>
<td>8</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>$20,000–49,000</td>
<td>6</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>Total</td>
<td>14</td>
<td>5</td>
<td>19</td>
</tr>
</tbody>
</table>

*Two participants elected not to answer the income question making n = 19.

Probability = 0.628
Fisher’s Exact Test (2-Tail)

$H_0$: The variables healthy/unhealthy feet and income are independent.

$H_1$: There is an association between income and healthy/unhealthy foot status.

The null hypothesis that the variables income and healthy/unhealthy feet are independent was accepted at alpha = .05. That means that the income category and healthy/unhealthy foot status had no statistically significant association.
Table 4.25

Relationship Between Healthy/Unhealthy Feet and the Patient Factor Grade Level Achievement (Self-Reported)

<table>
<thead>
<tr>
<th>Foot Status</th>
<th>Unhealthy Feet</th>
<th>Healthy Feet</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade Achievement</td>
<td>f</td>
<td>%</td>
<td>f</td>
</tr>
<tr>
<td>1-5</td>
<td>2</td>
<td>9</td>
<td>1</td>
</tr>
<tr>
<td>6-10</td>
<td>13</td>
<td>62</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>71</td>
<td>6</td>
</tr>
</tbody>
</table>

Probability = 1.00  
Fisher’s Exact Test (2-Tail)

H₀: The variables healthy/unhealthy feet and self reported grade level achievement are independent.

H₁: There is an association between self-reported grade level achievement and healthy/unhealthy foot status.

The null hypotheses that the variables grade achievement and healthy/unhealthy feet are independent was accepted at alpha = .05. That means that the grade level achievement category healthy/unhealthy and foot status had no statistically significant association.
Table 4.26

Relationship Between Healthy/Unhealthy Feet and the Patient Factor
Reading Grade Equivalent (WRAT) Level

<table>
<thead>
<tr>
<th>Foot Status</th>
<th>Unhealthy Feet</th>
<th>Healthy Feet</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>WRAT</td>
<td>f</td>
<td>%</td>
<td>f</td>
</tr>
<tr>
<td>5</td>
<td>10</td>
<td>47</td>
<td>5</td>
</tr>
<tr>
<td>10</td>
<td>5</td>
<td>24</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>71</td>
<td>6</td>
</tr>
</tbody>
</table>

Probability = 0.623
Fisher’s Exact Test (2-Tail)

H₀: The variable healthy/unhealthy feet and the WRAT score are independent.

H₁: There is an association between WRAT score and healthy/unhealthy feet.

The null hypothesis that the variables healthy/unhealthy feet and reading grade equivalent (WRAT) are independent was accepted at alpha = .05. That means that the reading grade equivalent (WRAT) category and healthy/unhealthy foot status had no statistically significant association.
Table 4.27

Relationship Between Healthy/Unhealthy Feet and the Patient Factor
Listening Comprehension Score (Doak & Doak)

<table>
<thead>
<tr>
<th>Foot Status</th>
<th>Unhealthy Feet</th>
<th>Healthy Feet</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Listening Score (% Correct)</strong></td>
<td>f</td>
<td>%</td>
<td>f</td>
</tr>
<tr>
<td>0-50%</td>
<td>9</td>
<td>43</td>
<td>3</td>
</tr>
<tr>
<td>51-100%</td>
<td>6</td>
<td>29</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>15</td>
<td>72</td>
<td>6</td>
</tr>
</tbody>
</table>

Probability = 1.000
Fisher’s Exact Test (2-Tail)

H₀: The variables listening score and foot status are independent.
H₁: There is an association between listening score and healthy/unhealthy feet.

The null hypothesis that the variables the listening comprehension score and healthy/unhealthy feet are independent was accepted at alpha = .05. That means that the listening comprehension score category and healthy/unhealthy foot status had no statistically significant association.

Table 4.28

Relationship Between Healthy/Unhealthy Feet and the Patient Factor of Reading Comprehension (Cloze Technique)

Chi Square analysis was not used with the patient factors of reading comprehension (Cloze technique) and primary language because there were not enough responses with the Cloze Technique to merit analysis and all subjects had English as their primary language.
Table 4.29

Relationship Between Healthy/Unhealthy Feet and The Disease Factor of Length of Time with Disease (Years)

<table>
<thead>
<tr>
<th>Foot Status</th>
<th>Unhealthy Feet</th>
<th>Healthy Feet</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time</td>
<td>$f$</td>
<td>$%$</td>
<td>$f$</td>
</tr>
<tr>
<td>1-12 years</td>
<td>7</td>
<td>33</td>
<td>3</td>
</tr>
<tr>
<td>&gt;12 years</td>
<td>8</td>
<td>38</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>71</td>
<td>6</td>
</tr>
</tbody>
</table>

Probability $= 1.000$
Fisher’s Exact Test (2-Tail)

$H_0$: The variables healthy/unhealthy feet and length of time with disease are independent.

$H_1$: There is an association between length of time with the disease and healthy/unhealthy feet.

The null hypothesis that the variables length of time with the disease and healthy/unhealthy feet are independent was accepted at alpha $= .05$. That means that the length of time with the disease category and healthy/unhealthy foot status had no statistically significant association.
Table 4.30

Relationship Between Healthy/Unhealthy Feet and the Disease Factor Perceived Risk For Diabetic Foot Problems

<table>
<thead>
<tr>
<th>Risk Probability Knowledge</th>
<th>Unhealthy Feet</th>
<th>Healthy Feet</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 High &amp; Moderate Risk</td>
<td>4 20</td>
<td>2 10</td>
<td>6 29</td>
</tr>
<tr>
<td>3 Average &amp; Low Risk</td>
<td>9 45</td>
<td>3 15</td>
<td>12 56</td>
</tr>
<tr>
<td>9 Don't know</td>
<td>1 5</td>
<td>1 5</td>
<td>2 15</td>
</tr>
<tr>
<td>Total</td>
<td>14 70</td>
<td>6 30</td>
<td>21 100</td>
</tr>
</tbody>
</table>

Probability = 0.76
Fisher's Exact Test (2-Tail)

H₀: The variables healthy/unhealthy feet and perceived risk for diabetic foot problems are independent.

H₁: There is an association between perceived risk for diabetic foot problems and foot status.

The null hypothesis that the variables perceived risk for diabetic foot problem and healthy/unhealthy feet are independent was accepted at alpha = .05. That means that the perceived risk category and healthy/unhealthy foot status had no statistically significant association.
Table 4.31

Relationship Between Healthy/Unhealthy Feet and the System Factor Primary Care Source for Diabetes

<table>
<thead>
<tr>
<th>Foot Status</th>
<th>Unhealthy Feet</th>
<th>Healthy Feet</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Care Source</td>
<td>f</td>
<td>%</td>
<td>f</td>
</tr>
<tr>
<td>DAC</td>
<td>5</td>
<td>24</td>
<td>1</td>
</tr>
<tr>
<td>Other</td>
<td>10</td>
<td>48</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>72</td>
<td>6</td>
</tr>
</tbody>
</table>

Probability = 0.623  
Fisher’s Exact Test (2-Tail)

H₀: The variables healthy/unhealthy feet and primary care source are independent.

H₁: There is an association between primary care source and healthy/unhealthy foot status.

The null hypothesis that the variables primary care source and healthy/unhealthy feet are independent was accepted at alpha = .05. That means that the primary care source category and healthy/unhealthy foot status had no statistically significant association.
Table 4.32

Relationship Between Healthy/Unhealthy Feet and The Disease Factor Belief About Foot Problem Prevention

<table>
<thead>
<tr>
<th>Belief Foot Problem Prevention</th>
<th>Unhealthy Feet</th>
<th>Healthy Feet</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>f</td>
<td>%</td>
<td>f</td>
</tr>
<tr>
<td>Much I can do</td>
<td>7</td>
<td>33</td>
<td>3</td>
</tr>
<tr>
<td>Little I can do</td>
<td>8</td>
<td>38</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>71</td>
<td>6</td>
</tr>
</tbody>
</table>

Probability = 1.000
Fisher’s Exact
### Table 4.33

**Relationship Between Healthy/Unhealthy Feet and the Disease Factor of Foot Care Knowledge Before Foot Care Instruction**

<table>
<thead>
<tr>
<th>Knowledge Before Instruction</th>
<th>Unhealthy Feet</th>
<th>Healthy Feet</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nothing</td>
<td>5</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Just a little</td>
<td>7</td>
<td>4</td>
<td>11</td>
</tr>
<tr>
<td>Enough</td>
<td>3</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>6</td>
<td>21</td>
</tr>
</tbody>
</table>

**Fisher's Exact Test (2-Tail)**

- **Probability** = 0.262
- **H₀**: The variables healthy/unhealthy feet and foot care knowledge before foot care instruction are independent.
- **H₁**: There is an association between foot care knowledge before foot care instruction and foot status.

The null hypothesis that the variables foot care knowledge before instruction and healthy/unhealthy feet are independent was accepted at alpha = .05. That means that the previous foot care knowledge category and healthy/unhealthy foot status had no statistically significant association.
Table 4.34

Relationship Between Healthy/Unhealthy Feet and the System Factor of Previous Diabetes Education

<table>
<thead>
<tr>
<th>Foot Status</th>
<th>Unhealthy Feet</th>
<th>Healthy Feet</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>f</td>
<td>%</td>
<td>f</td>
</tr>
<tr>
<td>Not received</td>
<td>4</td>
<td>19</td>
<td>2</td>
</tr>
<tr>
<td>Received</td>
<td>11</td>
<td>52</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>71</td>
<td>6</td>
</tr>
</tbody>
</table>

Probability = 1.000
Fisher’s Exact Test (2-Tail)

H₀: The variables previous diabetes education and foot status are independent.

H₁: There is an association between previous diabetes education and healthy/unhealthy feet.

The null hypotheses that the variables previous diabetes education and healthy/unhealthy feet are independent was accepted at alpha = .05. That means that the previous diabetes education category and healthy/unhealthy foot status had no statistically significant association.
Table 4.35

Relationship Between Healthy/Unhealthy Feet and the System Factor of Previous Foot Care Education

<table>
<thead>
<tr>
<th>Foot Status</th>
<th>Unhealthy</th>
<th>Healthy</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Previous Diabetes Education</td>
<td>f</td>
<td>%</td>
<td>f</td>
</tr>
<tr>
<td>Not received</td>
<td>9</td>
<td>43</td>
<td>2</td>
</tr>
<tr>
<td>Received</td>
<td>6</td>
<td>29</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>72</td>
<td>6</td>
</tr>
</tbody>
</table>

Probability = 0.361
Fisher’s Exact Test (2-Tail)

H₀: The variables previous foot care education and foot status are independent.

H₁: There is an association between previous foot care education and healthy/unhealthy feet.

The null hypothesis that the variables previous foot care education and healthy/unhealthy feet are independent was accepted at alpha = .05. That means that the previous foot care education category and healthy/unhealthy foot status had no statistically significant association.

The comparison of unhealthy versus healthy foot status and grade level achievement (self-reported) and reading grade equivalent (WRAT) is shown in Table 4.6.

An analysis of frequency distribution and percentages appears in the patient factor analysis. In order to check the strength and direction of the relationship between self-reported grade level and grade level as recorded by the Wide Range Achievement Test (WRAT) a Spearman rank correlation
coefficient was determined. The value of this correlation was found to be .4, which according to Davis (1979) convention suggested moderate positive relationship.

Table 4.17 showed the patient education system factors of previous foot care education, instructor(s), and location of instruction, and Table 4.18 showed the method of instruction of foot care.
CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

Introduction

In Chapter I the problem was introduced and its significance outlined. In Chapter II relevant research in diabetes, patient education, and adult literacy and health was detailed. The methodology and conceptual framework were explained in Chapter III and the analysis of the data was presented in Chapter IV.

This chapter is organized as follows: (1) a summary of the findings relative to the proposed research questions; (2) conclusions and implications; (3) recommendations; (4) suggestions for future research; and (5) a summary.

Summary of Findings

The first research question was What are the similarities or differences among individuals with NIDDM and low literacy skills who are classified as having healthy versus unhealthy feet?

Where appropriate, these will be reviewed by the categories of patient, disease, and system factors.
Patient Factors

Both groups were similar in age and gender, however, racially the healthy feet group had more blacks and fewer whites than the unhealthy feet group. For the patient factors of visual and hearing acuity, the groups were also similar. For the hearing acuity factor, however, the healthy feet group demonstrated no individuals who had problems understanding conversational speech as opposed to the unhealthy feet group, of which 20% had difficulty understanding conversational speech. For the income category, both groups were basically similar with the exception that the healthy group had one individual who was at the top range of $40,000-$49,999.

In comparing the patient factor of self-reported grade level achievement and reading grade level equivalent, both groups were roughly similar on the self-reported grade level with two (13%) of the unhealthy and one (17%) of the healthy feet groups reporting a fifth-grade level or below. On the reading grade equivalent (WRAT), however, ten (67%) of the unhealthy feet and five (83%) of the healthy feet group scored at the fifth-grade level or below. Interestingly, the WRAT scores for both groups indicated the same pattern of more individuals scoring at or below the fifth-grade level than was originally self-reported.

In the category of listening comprehension, both groups were more alike than different. On the patient factor of
reading comprehension (Cloze technique), there was one major difference. The healthy feet group did not have anyone who took the Cloze test versus five (33%) of the unhealthy feet group who did take the test.

**Disease Factors**

For the disease factor length of time with the disease, with the exception of one individual in the unhealthy group, both groups had a similar range of years for living with diabetes. For the factor perceived risk for diabetic foot problems, the unhealthy feet group did not differ significantly from the healthy feet group. On the average, perceived (self-reported) risk for diabetic foot problems was similar.

For the disease factor belief about foot problem prevention (self-reported), the healthy feet group differed from the unhealthy feet group. All of the former group fell in "something could be done" to "completely prevent foot problems" categories, whereas the latter group had 14% who felt that "little could be done" to "nothing could be done." Between the two groups, the majority did feel that "much could be done" or "something could be done."

For foot care knowledge before foot care instruction (self-reported), the healthy group felt they knew "a little" to "enough" before the foot care instruction class. The unhealthy feet group, though, broke out with 33% reporting they knew nothing before the class with the rest stating
they knew "just a little" to "enough." This may have some significance in that the unhealthy feet group, the group that one might suspect would need the education and information the most, had approximately 80% of its members who knew "nothing" or "just a little" before the class.

System Factors

For the system factor primary care source, roughly 33% of the unhealthy feet group compared to nearly 17% of the healthy feet group were seeing a diabetes specialist. For the system factor previous diabetes education, instructor(s), and location of instruction, both groups were basically similar on all three variables. For the factor of method of instruction for diabetes education, the unhealthy feet group showed more variation in methods than the healthy feet group. Both groups, however, had "written materials and directions" as the most used method of instruction.

For previous foot care education, instructor(s), and location of instruction, there appears to be an inverse relationship between the unhealthy and healthy feet groups. Of the unhealthy feet group members, 60% had not received any foot care instruction compared to 40% who did. The healthy feet group had approximately 67% of its members receiving foot care instruction compared to 33% who did not. Both groups were similar on instructor(s) and location for foot care instruction. For the system factor of method of instruction for foot care education, there were no
outstanding differences or similarities between the two groups.

In summary, notable differences and similarities were found between both groups primarily in the disease factors of previous foot care knowledge, primary care source, and method of instruction for diabetes education. This was also true for the system factor of previous foot care education.

The second research question was What is the nature of the relationship of healthy versus unhealthy feet with the patient, disease, and system factors?

With the exception of primary language and Cloze technique, which were not subjected to Fishers Exact Test analysis, no statistically significant associations were found with any factors from the three categories.

Research question number three is What is the degree of agreement between functional grade level and the self-reported grade level of patients in the baseline study?

The degree of agreement between functional grade level and the self-reported grade level was negative for both groups. For the unhealthy feet group, two (13%) reported a grade level achievement of fifth grade or below, whereas the WRAT scores indicated ten (67%) were at a fifth-grade level or below. Thirteen (87%) reported a grade level of achievement above the fifth grade. The WRAT indicated that five (33%) scored above the fifth-grade level.
For the healthy feet group, one (17%) reported a grade level achievement of fifth grade or below, whereas the WRAT scores indicated five (83%) were at a fifth-grade level or below. Five (83%) reported a grade level of achievement above the fifth grade. The WRAT indicated that one (17%) scored above the fifth-grade level.

In summary, self-reported grade level achievement was more than the reading grade equivalent as measured by the WRAT. There is little agreement between functional grade level and self-reported grade level of the subjects in the follow-up study.

Research question number four is How do patients with NIDDM and limited literacy skills obtain patient education information about their risk for lower extremity amputation?

Of the unhealthy feet category, nine (60%) reported receiving no information about foot care until entering the DAC study; six (40%) answered in the positive. Of the latter, half had received instruction from their physician. One received instruction from a podiatrist, and two received information from a nurse or diabetes educator. The location of instruction was consistent with the instructor: three took place in a physician's office, one as an inpatient in a hospital, one in a special class not designated, and one in a podiatrist's office.

Of the healthy feet group as noted, an inverse relationship existed with 66% having and 33% not having
received foot care information. Three physicians and one diabetes educator worked with the healthy feet group. The location of instruction was consistent—with three in the physician's office and one in the special class.

Conclusions and Discussion

Descriptive research by definition is used to describe situations or events, to identify problems, to make comparisons, and to collect factual information about existing phenomena (Isaac & Michael, 1989). The following conclusions and discussions have emerged from the implementation of this study. They should be placed within the context that there is an emerging understanding of literacy and lack of literacy skills as being important aspects of the health care and patient education process. In addition, the initial work of Doak and Doak and other researchers who pioneered the need to match patient education information with the ability of the individual to receive and understand them was an important first step in this process. It would appear that a new range of activities are needed to continue the momentum and bring more definition to the problem. In addition, more questions and needs for further study are directly related to this initial work.

In general, the process of conducting this project yielded more information and insight than the products of the project. This was demonstrated in the following areas,
which will be discussed in the following order: definition of the problem; methodology; subject selection; instrumentation; service delivery/system factors; and dynamics observed.

Definition of the Problem

The original concept of literacy as a factor important to not only learning, but also life style adjustment as a result of a chronic disease at first appeared to be a valid and reasonable observation. As individuals were interviewed and more was known about the context of their problem, it appeared that literacy was really part of a larger problem, specifically how they use language.

A parallel example can be seen in deaf education where language is central to educating both children and adults. Problems in reading for the hearing impaired are not viewed independently, but within the context, of the total language environment.

During the interviews, especially with persons who had the least education (self-reported), the question of compensation and/or adaption consistently came to mind. How has this 60-year-old with a third-grade education and comparable reading grade level managed to deal with a complicated environment that increasingly emphasizes information processing? In three of the interviews, a spouse was present but not allowed to coach answers. It became apparent during the informal, follow-up conversation
that the patients relied upon their spouses to help with reading instructions, medication labels, and other health-related materials.

There is a need to know more about how individuals adapt and compensate using a broader concept of literacy—i.e., how do they manage their language needs and information requirements?

A second point relative to this area is "how do the health care professionals work successfully with patients with low literacy skills?" What adaptation, if any, have they made and how do they check or validate that patients understand what is being requested of them, especially when reading is involved?

During the planning and testing process of planning for this project, time was spent with the DAC clinical staff and, most specifically, with the clinical nurse specialists/diabetes educators. At the conclusion of the project, it became apparent that these health professionals had a good understanding about the problem. Because of time and scheduling, it was not possible to build into the project time for interviewing them or the physicians.

An area that was also overlooked is what goes on with patients in the primary care setting. As mentioned, 15 of the 21 subjects have a primary care physician who has been following them from the time of diagnosis. Understanding how the dynamics of information transferral took place in
the primary care setting would be important to know and specifically what kinds of written information they received. More depth than was obtained in the interview for this project would be important.

Methodology

Additional methodological issues are discussed in the preceding and following sections. A descriptive approach to this problem continues to be the method of choice. What did become apparent, however, was (1) how time consuming it is to schedule and conduct interviews; (2) when given an opportunity, how much people want to discuss their chronic disease; (3) how additional perceptions and observations, not necessarily related to the problem at hand, surface and the issue of what, if anything, to do with the information. Briefly, incidental observations related to this project are:

At the conclusion of each interview, the participant was asked about any questions or concerns. At this point, a number of them would go on to fill in the multiple details surrounding their disease, its progress, and their frustrations. This was generally without strong encouragement. It became obvious that for some, diabetes had become a major factor, particularly when a limitation (such as visual reduction) was imposed.

A second observation dealt with the often-expressed fear of losing a limb as a result of the disease. This
became a strong motivator especially after the completion of the foot care class.

A third observation dealt with working in the interdisciplinary setting of the medical environment. The DAC offered one of the most optimum environments for educational research. It became apparent that even with the best planning, vagaries of the clinic schedule and other requirements on patient time made flexibility a necessity. It has been noted that participating in our follow-up study may have placed additional stress on some clients and, as a result, affected data collection. Patients tested outside of the clinic appeared to be more relaxed.

Population/Sample Selection

In retrospect, including all 203 DAC subjects in our study would have been ideal. So, too, would have been the inclusion of literacy variables and other methods to evaluate the problem as part of the initial baseline assessment. This was not possible because of the timing of the original grant award and specific tasks requested by the federal government. Working within the construct of an existing project with specific goals and objectives after the fact can present an excellent opportunity. Yet it can limit not only the scope, but also the tasks that would be perceived as reasonable or tolerated by the subjects. The DAC study was first and foremost a medical study with an education component.
A second observation is that the concept of literacy and/or lack of skills was never discussed with the patients. How people learn about the management of their diabetes was the focus of the project. It may have been more beneficial to have worked with a group of subjects involved in a project to improve their literacy skills, such as adult basic education (ABE). Using such a group, for example, might have provided opportunities to research health-related instruction and situations that are problematic for people. Again, this would be a variation to consider when developing further research ideas.

Instrumentation

The use of standardized and adapted tests (WRAT, Cloze and Listening—Doak & Doak) has raised questions, which in turn present additional challenges to clinical patient educators and adult educators in the health care setting.

As mentioned earlier, these tests were used in previous research activities and for this project with the permission of the original investigators, C. Doak and L. Doak. Measuring the readability and comprehension level of written materials is not at issue here, but when trying to assess the individual, however the waters are not so clear. Questions and problems raised while using these instruments have presented some alternative ideas that may have merit for investigation.
WRAT (Wide Range Achievement Test)

The results of the WRAT as a screening for grade related reading were consistent with Doak and Doak's work. Basically, people do not necessarily function at their achieved grade level (self-reported). An often-mentioned observation was that although individuals could define a word voluntarily, they could not pronounce it correctly. It therefore became a scored error. Errors such as these made the examiner re-think the usefulness of this kind of testing. What is a better indication of literacy function? Pronunciation that is correlated to a grade level or the ability to use language purposefully? This is not a new notion, but one that educators of the deaf have been using, i.e., a person's ability to deal with the environment using language is an important concept.

The listening comprehension test materials (Doak & Doak, 1979) have been used in research for ten years. Again, the test materials and protocol were used by permission of the authors and supplied by them. There was confusion in the examiner's mind regarding what these instruments were testing—was it listening auditory memory skills or the person's ability to draw on previous knowledge about the subject? For example, when asked, "Based on the material just read, at what age should one receive a flu shot?", more than one subject responded, "I've always heard between 60 and 65 years old." This type of response
indicated that the subjects were drawing from previous experiences and not responding to what was just read to them, which told them the age to get a flu shot was 65.

**Cloze Technique**

The instrument that caused the most concern was the use of the Cloze technique as described in the Doak and Doak (1979) text and by personal communication with the authors. The most generic and appropriate material for NIDDM patients was selected and the test was adapted to this material (see appendices). The problem came in trying to adapt the material down to a fifth-grade level for 15 individuals who had screened out at this grade. The pilot test had been done on the tenth-grade version. Many of the words had to be either deleted or modified down to make it possible for them to succeed. Eliminating or substituting words for specific health care information was very difficult. For example, finding appropriate substitutes for the word glucose or insulin is difficult.

A second problem dealt with appropriateness for a sentence and the scoring mechanism. For example, in the sentence, "Signs of an infection ______ can increase the blood sugar . . . ." the correct answer was "which." However, although "that" has the same meaning, was scored as an error when used in the sentence.

These observations are in no way meant to be critical of past investigator efforts, but are raised to better
understand the problem of literacy assessment. In addition, technical health information, such as diabetes care, raises the issue whether this type of instrumentation is helpful in assessment and, if not, what would be. The assumption is it is applicable to all kinds of material, but this may not be the case. It was obvious those who took the test found it stressful and this was also a concern. In summary, many questions have been raised as a result of using these instruments.

Service Delivery or System Factors

During the interviewing process, when a situation came up that did not seem credible, the DAC staff were available to discuss whatever needed clarification. One example of the observation that the relationship of literacy and lifestyle may be more important than adult literacy alone is as follows. One subject (who reported not receiving any formal diabetes education) stated her mother had diabetes and "she was just spilling sugar like her mother and knew what to do about it, she just stayed away from certain foods." Where this appears simplistic, this is a lifestyle adjustment and a learning style. Previous experience and familiarity with diabetes may aid the patient in managing the disease.

Individuals with low literacy skills appear to draw from the resources of others when reading is required for medication instructions or other directions. This
observation was made by the investigator and was confirmed by a clinical nurse specialist working with the DAC study.

As stated, the patients seen in the DAC are from a 75-mile radius from Columbus, Ohio, which is in the central part of the state. Patients come from many small rural areas. For those rural patients diagnosed by their primary care physician, it was not clear what their quality of instruction was and how helpful it was. This remains an area for further investigation.

Another observation deals with the quality of support services to patients, particularly relative to adjustment. One patient at the end of the interview expressed strong resentment about having the disease and the fears he has for this feet, i.e., he was 45 and classified as having unhealthy feet. Later, in discussion with the DAC staff, it was made known that he had tried to join in a support group in his small town but was very dissatisfied. The patient felt a number of teenagers and others were not mature enough for the group.

Living with a chronic disease, such as diabetes, may have developmental tasks related to it that are overlooked, specifically those that relate to literacy. Two of the subjects were "legally blind"—one in his early sixties and the other in her early seventies. Their lives were changing considerably because of the progression of the disease and
the aging process. It would have been of benefit if an interdisciplinary clinic were available to help coordinate services related to the various manifestations of the disease, such as loss of vision. This is not always possible because the clinic case load would have to have a justifiable number of patients who would need to see a specialist to have one available. The demand on a continuing basis is not that high. The result is that deteriorating function and, more importantly, the implications do not get picked up or identified as problem areas.

In conclusion, these observations are a direct result of process of the descriptive research method. Each raises different questions for discussion and action.

Recommendations

The primary recommendation of this study is the need to rethink the concept of literacy as it relates to health and the acquisition of health information, with an emphasis on function and adjustment. Little is understood about how people compensate for their lack of literacy skills. It would seem appropriate to plan a national invitational conference preceded by discussion/state-of-the-art papers that would address the multiple issues that are emerging. The major theme might be adult literacy as it relates to health issues and health care. Topics to be addressed include measurement, legal implications, health care
implications, and design and selection of patient materials. In addition, capitalizing on the Ontario Health Project and expanding the topics to include major chronic disease would give a broad support base for the activity. From this conference, an action agenda and a research agenda could be generated that would provide a blueprint for future action and activities.

A second recommendation is to examine and identify exemplary programs nationally that have addressed the issue of literacy and chronic disease, specifically, diabetes. Projects that have a literacy component, such as job training, should also be studied to find out what obstacles have arisen and how these have been overcome.

**Future Research**

Future areas for research should focus on literacy and how it relates to health care. Field studies, for example, should be conducted on how people compensate within the health care setting and what they do to function. Effective methods and interventions to use with persons who have low literacy skills should also be identified.

What can be employed to translate or implement effective or successful clinical management programs in diabetes? Establishment of long-term longitudinal projects, which appear to be successful in the area of literacy, should be considered.
Research to better understand how patients are instructed and educated about their diabetes by their primary care physician is also needed. What materials are used? Are they literacy sensitive? What particular problems are recurrent relative to adherence and education? Where do the health care professionals get their information that is given to patients in the primary care setting?

In addition, applied research should be implemented that would address the need for better assessment/screening tools to profile the literacy levels of individuals particularly for use in the health care setting.

In summary, the refinement and development of new techniques to understand how individuals with lower literacy skills can better use health care information will be important for successful patient education programming in the future.
APPENDIX A

LETTER OF INVITATION
Letter of Invitation

University Hospitals
410 West 10th Avenue
Columbus, OH 43210-1228

August 10, 1990

Dear Patient:

Your participation in our special foot study for persons with Type II Diabetes is greatly appreciated. As a follow up, we are asking 30 patients to help us in a one time follow-up activity.

We would like to interview you 10-15 minutes prior to your next clinic appointment in September. If you do not have a scheduled appointment in September, we will arrange to have an interviewer set up a time to visit you at home or a place convenient for you. You will be asked to review some materials and answer questions about learning. Any suggestions you may have will be welcomed.

Please return the self-addressed, stamped card on or before August 22, 1990. We will call you between August 23-25 to confirm the receipt of this letter and answer any questions you might have. You are under no obligation to participate, but your opinions and experiences are very important to us.

We look forward to having you work with us on this important one time follow-up activity to the foot study. If you have any questions please call us at (614) 292-3800.

Sincerely,

Cecilia Casey
Diabetes Clinical Nurse Specialist

A. Wyatt Emery, Jr.
Program Director
College of Medicine

Enclosure

cc: Samuel Cataland, M.D.
Thomas O'Dorisio, M.D.
APPENDIX B

DAC BASELINE DATA QUESTIONS

UTILIZED IN FOLLOW-UP STUDY
<table>
<thead>
<tr>
<th>Interview Question #</th>
<th>Data Entry</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Date of birth</td>
<td>(13-18)</td>
</tr>
<tr>
<td>3. Sex</td>
<td>(19)</td>
</tr>
<tr>
<td>1 = male</td>
<td>2 = female</td>
</tr>
<tr>
<td>4. Race (Interviewer, if unsure, ask What race do you consider yourself?)</td>
<td></td>
</tr>
<tr>
<td>1 = White</td>
<td>2 = Black</td>
</tr>
<tr>
<td>3 = American Indian or Alaskan Native</td>
<td></td>
</tr>
<tr>
<td>4 = Asian or Pacific Islander</td>
<td></td>
</tr>
<tr>
<td>5. Ethnicity (Interviewer, if unsure, ask &quot;Are you Hispanic?&quot;)</td>
<td></td>
</tr>
<tr>
<td>1 = yes</td>
<td>2 = no</td>
</tr>
<tr>
<td>9. What is the highest grade you completed in school?</td>
<td></td>
</tr>
<tr>
<td>a. elementary (1-8) and High School (9-12)</td>
<td>(28-29)</td>
</tr>
<tr>
<td>b. college (1-6+)</td>
<td>(30)</td>
</tr>
<tr>
<td>c. trade school (1-4+)</td>
<td>(31)</td>
</tr>
<tr>
<td>10a. Age diabetes diagnosed. (Interviewer, if obtained from the subject, ask &quot;At what age was your diabetes diagnosed?&quot;)</td>
<td></td>
</tr>
<tr>
<td>14. On a scale from 1 to 5, what do you believe your risk for diabetic foot problems is? (Use visual aid, card 14.)</td>
<td>(50)</td>
</tr>
<tr>
<td>Doan Hall / Dodd Hall / Means Hall / Rhodes Hall University Hospital / Starling Loving Hall / University Hospitals Clinic / Upham Hall / Wiseman Hall.</td>
<td></td>
</tr>
</tbody>
</table>
15. On a scale from 1 to 5, how much can you do (51) to prevent diabetic foot problems? (Use visual aid, card 15.)

18. Can you see well enough to read a newspaper, (64) with glasses?

29. In the past year, did you have a source of (101) primary care for your diabetes other than this clinic?
   1 = yes 2 = no

33. In the past year, when you visited [your (112) primary care doctor] or clinic for diabetes, how often did someone check your feet? (Use visual aid, card 13.)
   1 = every time 2 = usually 3 = half the time
   4 = seldom 5 = never 9 = don't know

45. I'd like to ask you about your household (117) income. This information will be strictly confidential. Which letter indicates the range which best describes your total annual household income, including income from all sources? (use visual aid, card 47.)
   1 = A ... less than $10,000
   2 = B ... $10 - 19,999
   3 = C ... $20 - 29,999
   4 = D ... $30 - 39,999
   5 = E ... $40 - 49,999
   6 = F ... $50,000 or more
   7 = refused
   9 = unknown
APPENDIX C

INTERVIEW QUESTIONNAIRE UTILIZED IN

THE FOLLOW-UP STUDY
Interview Questionnaire Utilized in the Follow-up Study

Code: _______

NAME: __________________________ (last) (first) __________

FOOT STUDY FOLLOW-UP 
Interview

Starting the interview: The purpose of this conversation is to understand how you learned about diabetes and foot care. This information will allow us to serve other diabetic patients in a better and more efficient way. I have six-seven questions which I will ask one by one.

A. Diabetes

Q1. When did you first learn that you had diabetes?

________ Year

Q2. Did somebody teach you about taking care of diabetes?________

NO YES

If YES, who taught you about diabetes?

TITLE _____________________________________________________

PLACE _____________________________________________________

Q3. What method(s) did they use to teach you about diabetes?

1. Video tape ______
2. Blackboard drawings/overheads ______
3. Lecture ______
4. Demonstration ______
5. Written materials/directions ______
6. Handouts with pictures ______
7. Individual instruction (one on one) ______
8. Group discussion ______
9. A combination of __________________________________________
10. Other ______

B. Foot Care

That was about diabetes. Now let us talk about your foot care -- when did you find out about it? Who taught you about care of feet?

Recently, you attended a class on foot care with Cecilia Casey, in which she tried to show you ways to reduce chances of having problems with your feet. I want you to forget the class for a moment and think back - before attending the class - and answer the following questions.

Q1. Thinking back, before attending the class, tell me if somebody taught you about your foot care.

NO YES

If YES, could you recall who taught you about foot care?

Person(s) _______________________________________________
Interview Questionnaire Utilized in the Follow-up Study (Continued)

Foot Care (Cont'd)

Q2. What method(s) did they use to teach you about foot care?

1. Video tape _____
2. Blackboard drawings/overheads _____
3. Lecture _____
4. Demonstration _____
5. Written materials/directions _____
6. Handouts with pictures _____
7. Individual instruction (one on one) _____
8. Group discussion _____
9. A combination of ________________________________
10. Other _________________________________________

Q3. Overall, would you say that before attending this class on foot care, you knew nothing, just a little, or enough about foot care? (CIRCLE ONE)

C. Background questions

Q1. What language is spoken in your home? ________________
   If not English, what is the language? ________________

Q2. Can you hear well enough to understand conversational speech?
   _____ NO _____ YES

Q3. Do you wear a hearing aid?
   _____ NO _____ YES If YES, 1 aid or 2 aids? ______
   If YES, how long have you been wearing a hearing aid?

D. Other comments (expanding on A.Q2 and A.Q3):
APPENDIX D

TEXT AND TEST QUESTIONS

LISTENING COMPREHENSION

GRADE 5
Text Used for Listening Comprehension Test - Grade 5

Shots

Most people see a doctor when they are sick. When you’re sick it’s easy to forget about the shots that could keep you from getting sick. Please listen to this and if you have any questions or need any of these shots, see your doctor.

The Flu

For a lot of people, the flue isn’t a very bad illness, but some people get very sick with it and may even die from it. If you are one of these people who get very sick with it, you should have a flu shot every fall.

Talk to the doctor if you have not had a flu shot and if

1. You are 65 years old or older
2. You have diabetes or lung, heart, kidney, or liver trouble or another disease you’ve had for a long time.

Pneumonia

There is a new shot against this disease. If you think you are one of the high-risk people who might get sick, ask your doctor about a shot. This might keep you from getting pneumonia.

Talk to your doctor if you have never had this shot and if

1. You have a disease you live with like lung, liver, kidney, or heart trouble, diabetes, alcoholism, or sickle cell anemia.
2. You have had your spleen taken out.

Doak & Doak (1979). Used with the permission of the authors.
Listening Comprehension Test - Grade 5

1. According to the information you’ve just heard, why do people not keep their shots up-to-date?
   A. They only see the doctor when they’re sick.

2. What should you do if you think you need any of these shots?
   A. See your doctor.

3. How long does a flu shot protect you?
   A. About a year, or have a flu shot every fall.

4. What diseases make you more likely to need a flu shot?
   A. Diabetes, lung, heart, kidney, liver, or other chronic illness. (Any three would be a correct answer.)

5. At what age should older people have a flu shot?
   A. 65

6. People have always died of pneumonia. Why is this disease less feared now?
   A. There is a new vaccine (shot) for pneumonia.

7. If you have an organ missing you should have a pneumonia shot. What organ is this?
   A. Spleen

8. Some chronic diseases, those you learn to live with, also signal a need for pneumonia vaccine. What are they?
   A. Lung, liver, or kidney disease, heart trouble, diabetes, alcoholism, sickle cell anemia. (Any four would be a correct answer.)

Doak & Doak (1979). Used with the permission of the authors.
APPENDIX E
TEXT AND TEST QUESTIONS
LISTENING COMPREHENSION
GRADE 10
Text Used for Listening Comprehension Test - Grade 10

Adult Immunizations

Most people see a doctor when they are sick. At that time, because you're not feeling well and the physician is busy for both of you to forget about routine immunizations or shots. Immunizations or shots can prevent many serious diseases. Please listen to this information. If you have any questions, or if you feel you need any of these shots, be sure to talk to your doctor.

Tetanus (Lockjaw)-Diphtheria

The treatment of any cut or wound is easier if you have an up-to-date tetanus shot. Tetanus (Lock-jaw) is a very serious disease. It still occurs in the U.S. and can result from only a minor wound or cut. Diphtheria also still occurs in the U.S. As many as 1 person of every 10 who get sick with diphtheria will die. Tell your physician if:

1. You have not had 3 tetanus shots in your life.
2. You have not had a tetanus/diphtheria shot in the last 10 years.

Influenza ("The Flu")

For most people the Flu is a minor illness. For some people, however, the Flu can be quite serious and can even cause death. These high risk people should have a Flu shot every year in the Fall.

Talk to your physician if you have not had a Flu shot and if:

1. You are 65 years old or older.
2. You have a chronic disease such as diabetes, lung, heart, kidney, or liver disease.

Pneumonia

There is a new vaccine which gives good protection against the pneumococcus. This is an infectious agent which causes most pneumonia and which leads to 25,000 deaths in the U.S. every year. This new vaccine is recommended for people at high risk of getting pneumonia and other infections caused by the pneumococcus.

Talk to your physician if you have never had this shot and if:

1. You have a chronic disease such as lung, liver, or kidney disease, congestive heart failure, alcoholism, diabetes, or sick cell anemia (not sickle cell trait).
2. You have had your spleen removed.

Doak & Doak (1979). Used with the permission of the authors.
Listening Comprehension Test - Grade 10

1. According to the information you've just heard, why do people not keep their shots up-to-date?
   A. They only see a doctor when they're sick.

2. What should you do if you think you need any of these shots?
   A. See your doctor.

3. Why should one receive immunizations?
   A. These shots can prevent many serious diseases.

4. You should call your doctor if you have not received a tetanus/diphtheria shot in the last _____ years.
   A. 10

5. A cut or wound can cause _____________.
   A. Tetanus

6. How long does a flu shot protect you?
   A. About a year, or have a flu shot every fall.

7. What diseases make you more likely to need a flu shot?
   A. Diabetes, lung, heart, kidney, liver, or other chronic illness (Any three would be a correct answer).

8. At what age should older people have a flu shot?
   A. 65

9. People have always died of pneumonia. Why is this disease less feared now?
   A. There is a new vaccine (shot) for pneumonia.

10. If you have an organ missing you should have a pneumonia shot. What organ is this?
    A. Spleen

Doak & Doak (1979). Used with the permission of the authors.
APPENDIX F

TEXT USED FOR THE CLOZE TEST
This pamphlet will answer some questions you may have about how the control of diabetes may be altered by illness and offers guidelines to follow on sick days to maintain relatively good control of your diabetes.

What sort of illnesses influence diabetes control?
It is difficult to maintain good control of your blood sugar if you have a cold, the flu, or an infected cut or sore. Signs of an infection which can increase the blood sugar are bleeding gums, loose teeth in adults, burning and pain on urination or vaginal itching. Even a severe sunburn can trigger problems with diabetes control.

When should I call my doctor about an illness?
Your physician may want to see you each time you are sick. Most physicians want you to call if any one of the following occurs:
- Ketones are present in the urine.
- Unable to eat or keep any food or liquids down.
- Unable to eat normally for more than 24 hours.
- Have a fever.

If you are unable to reach your doctor, go to the emergency room of your local hospital.

If it is necessary to be alone when you are sick, contact a friend or relative who will check on you several times during the day.
What should I be prepared to report about my illness?

When you contact your doctor you should report:

- your temperature
- Urine test results
- Whether you are eating normally
- Occurrence of vomiting or loose stools
- Signs of infection or illness

What should I eat when I am ill?

Often an illness will cause you to lose your appetite. But because you need food and liquids to help you recover you must continue to consume some foods. The following will help you select foods to eat when you are sick.


American Diabetes Association (1984): The physician's guide to Type II diabetes (NIDDM): Diagnosis and treatment (pp. 1-112). American Diabetes Association, Alexandria, VA.


Satiani, B. (1987, December). Diabetic foot problems and infections. Symposium conducted at Grant Medical Center, Columbus, Ohio.


Wide Range Achievement Test. (1972). In (Buros, O.K.)
Seventh Mental Measurements Yearbook (pp. 65-68).
Highland Park, NJ: Gryphon Press.