EFFECTIVENESS OF EXCHANGE LIST CARDS

IN THE DIABETIC EDUCATION PROCESS

BY

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CHAPTER I

INTRODUCTION

An estimated 12 million people have diabetes mellitus
in the United States. Approximately six million persons
have been diagnosed by a physician and an additional six
million people have undiagnosed diabetes. Diabetes in the
U.S. economy costs approximately 18 billion dollars per
year (American Diabetes Association, 1985). Diabetes is a
major cause of hospitalization, disability, and suffering
and, with its complications, contributes to at least seven
percent of all deaths in the United States (Coughlin and
Kahn, 1986).

Diabetes is ranked as the fifth leading cause of
death by disease and the second leading cause of new cases
of blindness. Heart attacks are at least two-and-half
times more frequent in diabetics than in nondiabetics of
the same age, and diabetes may contribute either directly
or indirectly as a major cause of cardiovascular disease
of all types (American Diabetes Association, 1985).

The complications of diabetes and premature mortality
are not as common as they have been in the past. With
new, easily available tools such as the glucometer,
hospitalizations for uncontrolled diabetes can be reduced.

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Better diabetes management retards the development of long-term complications (American Diabetes Association, 1985). Effective nutritional education can provide patients with the information needed to maintain their blood glucose levels using diet, activity, and medication, if necessary. Meal plans developed individually with each patient encourages patients to participate in their own treatment care. Diabetic nutrition education is necessary to keep patients with diabetes fully informed of the need for, and the methods of proper management of this disease.

Several professional associations have made statements which support diabetes education. The American Diabetes Association encourages continuing patient education for patients with diabetes. Diabetic patients need affordable education that is available and accessible (American Diabetes Association, 1984, p. 505). The American Hospital Association also supports the need for high quality care at a low cost. Patients with diabetes need to know how to manage their illness and how to take care of themselves at home (American Hospital Association, 1982). The National Diabetes Advisory Board states that more insurers are paying for diabetic education. This is encouraging because as more patients learn how to care for their illness, long term complications may be prevented or protracted. These complications are an expensive burden on our society and with more insurance companies paying for education, hopefully more patients are being educated

(National Diabetes Advisory Board, 1986). The American Association of Diabetes Educators encourage patients with diabetes to participate in the treatment of their disease and to understand their diet (American Diabetes Association, 1982).

Statement of the Problem

The most common tool in diabetic nutrition education is the American Diabetic Association/American Dietetic Association exchange list booklet (booklet). Due to the complex nature of this booklet, understanding and compliance are poor in a high percentage of patients who have been taught using this method (Rapp,1986). Alternative teaching methods need to be explored to discern which educational method would be the most effective. The diabetic exchange list cards (cards) were developed by the author and other Registered Dietitians at St. Mary's Hospital in Enid, Ok as an alternative teaching tool in diabetic education.

Objectives

Specific objectives for this study were as follows:
1. To compare the effectiveness of the exchange list cards to the ADA diabetic exchange list booklet.
2. To assess the nutritional comprehension of patients before and after receiving diabetic nutrition education, utilizing either the

ADA diabetic booklet or the diabetic exchange list cards.

3. To assess dietary compliance utilizing the Ghb lab test before and after receiving diabetic nutrition education.

4. Make suggestions for further research in this area.

Hypotheses

The following hypotheses were recognized for this study:

1. Hypothesis One: There will be no significant difference between the pre and post test scores (nutrition knowledge) of patients taught with the booklet based on selected personal variables such as age, sex, and marital status.

2. Hypothesis Two: There will be no significant difference between the pre and post test scores (nutrition knowledge) of patient's taught with the cards based on selected personal variables such as age, sex, and marital status.

3. Hypothesis Three: There will be no significant difference between the pre and post test scores (nutrition knowledge) of patient's taught with either the booklet or the cards.

4. Hypothesis Four: There will be no significant difference in the post Ghb values (dietary

compliance) of patients taught with the booklet based on selected personal variables such as age, sex, and marital status.

5. Hypothesis Five: There will be no significant difference in the post Ghb values (dietary compliance) of patients taught with the cards based on selected personal variables such as age, sex, and marital status.

6. Hypothesis Six: There will be no significant difference between the pre and post Ghb values (dietary compliance) of patients taught with either the booklet or the cards.

Assumptions

The following assumptions were recognized for this study:

1. The researcher conducted the nutrition education given to both groups and covered the same material using the two teaching tools.

2. The researcher assumed that two months was a sufficient time to determine a change in Ghb laboratory tests.

3. The study was conducted from October 1988 to April 1989 and the researcher assumed that the major holidays (Thanksgiving, Christmas, and Easter) affected all of the patients eating patterns in the same manner.

Limitations of the Study

The subjects in the study were limited to those patients diagnosed with diabetes and who were referred to St. Mary's Hospital out patient clinic for diabetic education by several physician's in the Enid, Oklahoma area. Only those patients who were willing to participate and to complete the appropriate information needed were included in the study.

Definitions

The following definitions were used in this study:

1. Diabetes mellitus: a chronic syndrome of impaired carbohydrate, protein, and fat metabolism secondary to insufficient secretion of insulin or to target tissue insulin resistance. (Dorland's Illustrated Medical Dictionary, 1988, p. 460).

2. Diet: a prescribed allowance of nutrients provided via the oral route (Mayo Clinic Diet Manual, 1988, p. 518).

3. Exchange Lists: groups of measured foods which have similar dietary values which can be substituted in meal plans (Green, Wheeler, and Rosett, 1986).

4. Menu-planning: the process of planning nutritious meals by utilizing the knowledge of

nutrition facts, the availability of foods, and cooking skills (Krause and Mahan, 1984).

5. 24-hour recall: a data collection technique where an individual completes a questionnaire or is interviewed by a dietitian/nutritionist or nurse experienced in dietary interviewing and is asked to recall every food item that he/she ate within the last 24 hours, or the previous day (Krause and Mahan, 1984).

6. Registered Dietitian: a dietitian who has met the standards of the American Dietetic Association and is recognized by the medical profession as the primary provider of nutrition care, education, and counseling (American Diabetes Association/American Dietetic Association, 1986, p. 27).

7. Glycosylated Hemoglobin (Ghb): an integrated measure of long-term (past 60 to 90 days) blood glucose level (Krause and Mahan, 1984, p. 487).

8. Nutrition Knowledge Test: A pre and post 18 question multiple choice test including topics in nutrition, diet, and medication (Appendix C).

9. Knowledge Gained: the improvement (post - pre test) in understanding relating to diet and nutrition.

10. Compliance: A comparison of values between a Ghb laboratory test taken at the time of the

education process and two months later assuming
that is if they follow their diet their Ghb
laboratory values will decrease.

11. American Dietetic Association (ADA): a
professional organization responsible for
establishing education and supervised clinical
experience requirements and standards of practice
in dietetics (American Dietetic Association
Reports, 1981, p. 62).

CHAPTER II

REVIEW OF LITERATURE

This chapter will be divided into three sections. The first section describes the importance of nutrition education for patients with diabetes, defines different types of diabetes, and describes the Ghb laboratory test. The second section focuses on the different teaching methods used in the education process. The third section reviews studies which compare the effectiveness of food exchange lists to other meal planning approaches.

Importance of Diabetic Nutrition Education

Effective diabetic nutrition education can provide patients with the information needed to maintain their blood glucose levels using diet, activity, and medication, if necessary. Nutrition education for those patients with diabetes, including past diet history, basic nutrition, usual food selection and preparation, is the key to a successful meal plan. Meal plans should be flexible and a large variety of foods need to be included in the daily diet. The education process and the meal plan should be individualized to fit the person's education level, lifestyle and personality (American Diabetic Association,

1987). A flexible meal plan may be more practical and more acceptable for less compliant patients, whereas a more rigid dietary regimen may be highly accepted for a more compliant patient.

A few of the goals of nutrition education as set forth by the Committee on Food and Nutrition of the American Diabetes Association (American Diabetes Association, 1984) are as follows:

a. Improve the overall health of the patient by attaining and maintaining optimum nutrition.
b. Attain and/or maintain an ideal body weight.
c. Maintain plasma glucose as near the normal physiologic range as possible.
d. Prevent and/or delay the development and/or progression of cardiovascular, renal, retinal, neurologic, and other complications associated with diabetes, insofar as these are related to metabolic control.
e. Modify the diet as necessary for complications of diabetes and for associated diseases.
f. Make the dietary prescription as attractive and realistic as possible. Provide each patient with an individualized educational and follow up program. Repeat visits serve to extend and clarify the instruction, to provide assurance, and to check progress (page 607).

Dietary control is an integral part of management for the diabetic. The diet should always provide the essentials for good nutrition and adjustments must be made from time to time for changing metabolic needs. Such as during pregnancy or change in activity level (Robinson, 1982).

Definition of Insulin Dependent Diabetes

Insulin-dependent diabetes is characterized by an absolute deficiency of endogenous insulin and patients

with this illness are prone to ketosis. They usually have experienced some or all of the following symptoms.

-Polyuria: frequent urination and an abnormally
          large quantity of urine
-Polydipsia: excessive thirst
-Polyphagia: increased appetite
-Ketosis: a condition of having ketone bodies build
          up in the body tissues and fluids
-Loss of weight

Insulin injections are necessary to control these symptoms since the body can not make enough insulin. Because insulin is produced by the beta cells of the islets of Langerhans, any reduction in the number of functioning cells will decrease the amount of insulin that can be synthesized. When insulin is not being produced or is not utilized effectively, the formation of glycogen is decreased; therefore, the utilization of glucose in the peripheral tissues is reduced. As a result, the glucose that enters the circulation is r noved more slowly and hyperglycemia follows (Davidson, 1986).

Definition of Non-Insulin Dependent Diabetes

Approximately 80 percent of all patients with diabetes have non-insulin dependent diabetes (Robinson, 1986). This type of diabetes is usually associated with obese patients. With every 20 percent increase in body fat, the chance of becoming diabetic can double (Krause and Mahan, 1984). After a person has reached a certain

level of weight, the beta cells may not keep up with the increased insulin needs. In a select few, insulin resistance does occur without obesity and these people may require a hypoglycemic agent to enhance the insulin function.

The symptoms seen are not as severe as with insulin dependent diabetes mellitus. Insulin is usually not required to control the symptoms, except under circumstances such as infection, surgery, etc. Usually the patient with non-insulin dependent diabetes is controlled with diet alone or diet and a hypoglycemic agent (Davidson, 1986).

Hypoglycemic Agents in Diabetes

Hypoglycemia drugs are used with certain non-insulin dependent diabetics who cannot control their diabetes with diet alone. The sulfonylurea compound in the drug increases the release of insulin from the beta cells in the pancreas. These drugs may also increase insulin's activity on the cell surface of the target organs (Skillman, 1984).

Glycosylated Hemoglobin

Glycosylated Hemoglobin (Ghb) laboratory tests have been used for evaluating patients with diabetes as an alternative to the oral glucose tolerance test (Modan, et al, 1988). These laboratory tests correlate with mean

serum glucose determinations over time. In NIDDM, the fasting serum glucose concentration usually correlates well with the concentration of Ghb. Little, England, and Weïdmeyer (1988) have investigated the possibility of using Ghb concentration as an indicator in the diagnosis of diabetes. The oral glucose tolerance test is primarily used for the diagnosis of diabetes, but it is tedious and inconvenient (Little, et al, 1988). It would be extremely useful if the Ghb test could replace this oral glucose tolerance test since fasting is not necessary (Little, et al, 1988). Currently, both tests can be run and this combination of tests identifies patients in need of treatment, since the increased glucose concentration indicates a problem at the moment, and an increased glycosylated hemoglobin concentration indicates that the problem has persisted for some time (Little, et al, 1988).

Ghb concentrations can be measured by several methods. The most common method involves column chroma-tography. Chromatographic assays can use small columns and small amounts of resin to separate only the total fast fraction (Goldstein, 1986). The Ghb test is an effective measure to determine dietary control over the previous 2 months (Goldstein, 1986).

Diabetic Teaching Tools

Diabetic Exchange Lists for Meal Planning Booklet

The most common teaching approach to diet therapy for those patients with diabetes is the American Diabetic Association /American Dietetic Association Meal Planning Booklet-1986 (Green et al, 1986). This booklet is based on the six food exchanges, i.e. starch, meat, milk, vegetable, fruit, and fat. The booklet includes some general information about controlling diabetes with blood glucose monitoring, diet, and weight control. Symbols, such as a plant leave are used for foods which contain more than 2-3 gm dietary fiber and a salt shaker for foods which contain more than 400 mg sodium per serving. The booklet emphasizes the importance of reducing fat intake for a healthy diet. Meat is divided into high fat, medium fat, and lean meat categories. Milk is divided into whole, low-fat, and skim milk categories. The booklet has a 10th grade reading level and is very detailed. It covers many aspects of the diet and is a very complete teaching tool for the educated patient (Franz, et al, 1987).

Healthy Food Choices

An alternative tool, the Meal Planning Booklet, entitled "Healthy Food Choices", was developed by the

American Diabetic Association/American Dietetic Association to educate patients who cannot understand the definition of the term "exchanges" (Franz, et al, 1987, p. 28). This tool is a single sheet of paper which is folded into a pamphlet and is a modification of the exchange list for meal planning booklet.

This sheet reinforces healthy eating habits and advises against excessive sugar and fat intake (Heins, Wylie-Rosett and Davis, 1987). The foods are grouped by calories; portion sizes of common foods are listed. Diabetes is not mentioned so this sheet can be used for weight loss as well as in the diabetic teaching process. It has been tested at the 6th to 7th grade level (Franz, et al, 1987).

High Carbohydrate - High Fiber (HCF)

This teaching method is also based on the exchange list system. The system includes eight food groups instead of six and encourages an increase of high fiber foods. The HCF diet is quite different from the typical American diet (red meat at every meal), because since it is more like a vegetarian diet. Many vegetables, fruits, and grains are included in the daily meal plan since 55-60% of the calories come from high fiber carbohydrates. When following this diet, many patients complain of bloating, flatulence, and diarrhea (Story, Anderson, and Chen, 1985).

Glycemic Index

The glycemic index can also be used to control blood sugar levels. This index ranks foods according to their ability to raise blood sugar levels (Engel and Wylie-Rossett, 1985). This index is a good method to trouble-shoot and to fine-tune food choices, but it cannot be relied on to predict blood glucose response for all patients (Heins, Wylie-Rosett, and Davis, 1987).

Point System

There are point type systems developed to help control intakes of sodium, fat, and calories. Stuckey developed a calorie point system to be used for weight loss or for controlling hyperglycemia (Stuckey, 1981). This system is easy to learn since one point equals 75 calories. An 1800 calorie diet would include 24 points; however, this system does not focus on teaching basic nutrition principles, such as eating a variety of foods.

Card System

Several card systems are available in the market to be used in teaching low calorie, low fat, and low sodium diets. One card system was developed by Richard Simmons based on the four food groups to promote basic weight loss. The front of the card lists the food group and the back of the card lists portion sizes for common the foods

in the group. Patients receive a set number of cards based on caloric needs and do not need to count calories or points to lose weight.

Research on the use of the Exchange Lists
vs. Other Meal Plans

Traditional vs. Nontradition Diet Methods

Chandler, Moore, and Leichter (1983) tested the effects on high density lipoproteins (HDL) levels and weight in 45 diabetic patients of the traditional diet – exchange and preplanned meals vs. a nontraditional approach – a personal guideline system. Laboratory data were collected and evaluated 6 weeks, 12 weeks, and 16 weeks after the intervention. No significant statistical differences were found in either HDL levels or the patient's percent of ideal body weight. Both traditional and nontraditional methods of diet instruction were equally effective in treating diabetes (Chandler, Moore, and Leichter, 1983).

Exchange System vs. Calorie Counting

Ciavarella and Atkinson (1983) investigated the effect on weight loss of two methods: calorie counting vs. the exchange system. Twenty-eight subjects using calorie counting lost more weight than the 24 subjects using the exchange lists after 3-, 6-, and 11 month intervals. Dietary compliance was evaluated by the

nutritionist and determined better in the calorie counting group. In addition, the drop out rate was higher in those subjects using the exchange list in their daily intake of food (Ciavarella and Atkinson, 1983).

Unmeasured Diets vs. Exchange List

A prospective study was done over a two year period to evaluate the effectiveness of using unmeasured diets versus the exchange list diet with accurate portion sizes. All 30 patients from both the control and the experimental group were instructed individually on diet principles. The results showed that both groups reported similar caloric and nutrient intakes. No significant differences were reported in fasting blood glucose or body weight. The results from this study suggested that both teaching methods were effective in weight and diet control (Abraira, de Bartolo, and Mycofski, 1980).

Summary

There are a variety of teaching methods to use in the diabetic nutrition education process, although there is a lack of information showing the effectiveness of these teaching methods. Other systems need to be developed and their effectiveness tested against the ADA/ADA meal planning booklet.

CHAPTER III

METHODS AND PROCEDURES

Overview

The material in this chapter is divided into four
sections. The research design and description of subjects
are covered in the first two sections. The last two
sections are descriptions of the data collection and the
analysis procedures which include the statistical design
and analyzes used to interpret the research data
collected.

Research Design

The research design is illustrated in Figure 1a: X
represents exposure of the group to the independent
variable; O_1 and O_2 refer to the measurement or observa-
tion of the dependent variable (Huck, Cormier, and Bounds,
1974). The dependent variables in this study were the
test scores and the Ghb values. The independent variable
was the teaching method which included both the booklet
and the cards. The O_1 was the pre test scores and the pre
Ghb values. The X was the teaching method using either
the booklet or the cards. After the patients were

referred to the dietitian they were randomly assigned
to either treatment using random selection by the
computer. Those patients taught with the booklet were
considered the control group. The patients taught with
the cards were considered the experimental group. The
terms control and experimental group will be used in the
rest of this thesis. The O_2 was the post test scores and
the post Ghb values.

O_1	X	O_2
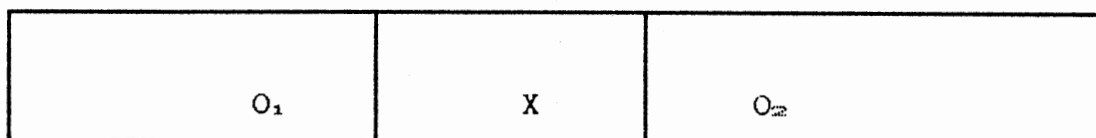
O_1	a.) pre test b.) pre Ghb values
X	a.) exchange list booklet b.) exchange list cards
O_2	a.) post test scores b.) post Ghb values

Figure 1. Research Design

Subjects

St. Mary's Hospital is a 227-bed Regional Medical
Center which meets the health care needs of Northwest
Oklahoma, Southwest Kansas and the Texas panhandle with a
medical staff of 130 physicians, representing 27 medical

specialties. The hospital is accredited by the Joint Commission on the Accreditation of Health Organizations composed of the American Medical Association, American Hospital Association and the American Dental Association. A variety of outpatient services designed to provide alternatives to hospitalization are available. In addition to being less costly, they also allow certain choices by the patient in selecting types of health care best suited to his/her individual lifestyle. All out patient services, including nutrition educational services, are supported by the entire scope of resources and capabilities of St. Mary's Hospital.

Patients with diabetes were referred to the hospital dietitian from 5 local physicians practicing in Enid, Oklahoma. All of the subjects lived within a 100-mile radius of Enid, OK. The criteria for inclusion in the study included adult subjects older than 30 years of age who treat their diabetes with insulin, hypoglycemic agent, or with diet alone. Patients diagnosed with diabetes before 30 years of age were excluded from the study. The patients must have been newly diagnosed or must not have had any diabetes nutrition education during the previous year. Subjects had diabetes mellitus as a primary diagnosis and had a physician's order for diabetic nutrition education.

Data Collection

The planning and development of the activities of this study were conducted during spring, 1988. This included the planning and printing of the card system. A proposal was written and submitted to the American Diabetes Association (ADA) in May of 1988. After the proposal was approved by the ADA and the Human Subject Review Board in the summer of 1988, the research design and population were specified. After consulting with a statistician and a graduate committee the instruments for data collection were identified and developed. Actual data collection was accomplished between September 1988 and April 1989.

Instrumentation

Card System. A card system was developed by the dietitians at St. Mary's Hospital in Enid, Oklahoma using the diabetic exchange lists. It is proposed that these cards will be useful for those patients who need basic diabetic nutrition education or those who are not able to follow the detailed meal planning booklet.

After viewing a weight loss TV commercial using a simplified card system, an idea was emerged. The researcher thought an easier system like this would work well with teaching patients with diabetes about their diet. The researcher developed this system based on the

ADA/ADA Exchange list for Meal Planning Booklet. Six groups were identified, i.e. milk, meat, vegetable, starch, bread, and fat. Common foods and portion sizes were then determined, i.e. Fat - 1 T. salad dressing, 1 tsp. margarine. Cards were printed by a local company in Enid, Oklahoma. The front of the card listed the major food group and the back of the card listed the common food sources and the portion sizes (see figure 4 and Appendix A). There are 6 different color coded groups of cards:

```
Starch    - Gray
Fruit     - Orange
Vegetable - Blue
Fat       - Green
Milk      - Pink
Meat      - Red
```

The name of the exchange group is on the front of each card and serving sizes of common foods are listed on the back. Patients received one card for each exchange allowed. For example, after a 1500 calorie ADA diet was individualized, the patient would have received the following:

```
6 Starch Cards
3 Fruit Cards
4 Vegetable Cards
3 Fat Cards
2 Milk Cards
6 Meat Cards
```

These cards were placed in a small folder for easy access by the patient. After each card was used, it was placed on the right side of the folder. Once all of the

cards were placed on the right side, caloric needs were met for the day. The folders were small enough for the patient to carry with them when eating out.

Diet History. A diet history questionnaire was completed by all of the patients during the first visit. The content of the questionnaire covered personal data such as weight, height, employment, previous nutrition education, physical activity, etc. Age, marital status, and diabetic control (insulin, oral hypoglycemic agent, or diet) were also included in the diet history (Appendix B).

24 Hour Recall. Each of the patients was asked to describe a typical daily diet. The meal plan was individualized using the 24 hour recall and the patient's input. This information was also used in planning a sample menu with the patient's meal plan in the education process. The sample menu was then used by the patients at home as a guideline to follow.

Multiple Choice Test. An 18 question multiple choice test was used to determine understanding of the diabetic meal plan. This test was adapted from the Diabetes Information Test with written permission from Judy Ostrum Joynes (Appendix D) and the International Diabetes Center (Garrard, et al, 1987). The content of the test included 6 areas covered in the education

process. These areas included nutrition, insulin, general knowledge, methods of control, exercise, and complications (Appendix C).

Procedure

By instructing patients with diabetes with either the exchange list booklet or newly developed exchange list cards, the effectiveness of each method will be determined. The effectiveness of each will include testing the understanding with a pre and post multiple choice test and the compliance with a pre and post Ghb laboratory test. It is hypothesized that each method may be useful in different situations. The booklet may be more useful for patients who are willing and able to follow a complicated, but complete system. The cards may be more useful for patients who have difficulty in understanding the booklet or who simply won't follow the booklet because of the lack of time. And, as in Ciaverella, Chandler, and Abraira's research, it may not be necessary to follow a complicated method when a simpler method shows the same results (Ciavarella, et al, 1983; Chandler, et al, 1983; Abraira, et al, 1980).

Letters were sent to five physicians in the Enid area to inform them of the research. The letter included the criteria for patient selection and the nutrition education process. All of the subjects arranged individual appointments with the dietitian after being referred by

their personal physician. One-half of the patients were randomly assigned to be instructed with the booklet and the other half were instructed with the newly developed card system. The procedure is illustrated in Figure 2.

1st visit

Pre-test
Personal Data
Diet History
24 hour recall
Education
Ghb

2nd visit
  Follow up (2 months later)

Post-test
Ghb

Figure 2. Overview of the Procedure

During the initial visit, a consent form was reviewed with each patient to explain the purpose of the study and the basic education process. An 18 question multiple choice test was given to determine the subjects' knowledge of diabetes and the diet. Level of education, number of hospitalizations, and frequency of exercise were also recorded to be analyzed against dietary compliance. A 24-hour diet intake record was taken for each client. This was used during the education process to indivualize the meal pattern and the sample menu for the client to follow at home. The education process included an in depth review of the diabetic diet guidelines and food exchanges. A sample menu was written with the client's

input to be used as a guideline for meal planning at home.
The client was then brought to the hospital laboratory
to have a blood sample drawn and analyzed for the Ghb
level by a qualified medical technician.

During the follow up visit, the same 18 question
multiple choice test was taken to determine the knowledge
gained regarding the education process. The questions
were rearranged to prevent the possibility of patients
remembering exact question order. The diet was discussed
and questions were answered. A follow up Ghb laboratory
test was then taken by the laboratory medical technician
and used to estimate dietary compliance. The education
process for the control and experimental groups is
illustrated in Figures 3 and 4.

Control Group

1. Pre-test will be given.

2. Diet rationale and complications of diabetes will be
   discussed with the patient.

3. Typical 24 hour recall will be obtained and an
   individualized meal pattern will be established.

4. Exchange lists will be taught to the patient using the
   American Diabetes Association/American Dietetic
   Association "Exchange Lists for Meal Planning."

5. Sample menu will be made according to individualized
   meal pattern.

6. Exchange lists, exercise, and medications will be
   discussed.

7. Questions will be answered.

Figure 3. Education Process for the Control Group

Experimental group

1. Pre-test will be given.

2. Diet rationale and complications of diabetes will be
    discussed with the patient.

3. Typical 24 hour recall will be obtained and an
    individualized meal pattern will be established.

4. Exchange List Cards will be utilized as the teaching
    tool (Appendix 1). Cards were color coded as follows:

    Starch   - Gray
    Fruit   - Orange
    Vegetable - Blue
    Fat   - Green
    Milk   - Pink
    Meat   - Red

    The name of the exchange group is on the front of
    each card and serving size of common foods are listed
    on the back. Patients will receive one card for each
    exchange allowed. For example, after individualizing
    a 1500 calorie ADA diet, the patient will receive the
    following:

    6 Starch Cards
    3 Fruit Cards
    4 Vegetable Cards
    3 Fat Cards
    2 Milk Cards
    6 Meat Cards

    These cards will be placed in a small folder for easy
    access for the patient. After each card is used, it
    will be placed on the right side of the folder. Once
    all of the cards have been placed on the right side,
    caloric needs have been met. The folders will be
    small enough for the patient to carry with them when
    eating out.

5. Sample menu will be planned according to
    individualized meal pattern.

6. Exchange lists, exercise, and medications will be
    discussed.

7. Questions will be answered.

Figure 4. Education Process for the Experimental Group

Data Analysis

Prior to statistical analysis, the data were transcribed, coded, and inputed into the computer using the software program, PC-FILE III (Button, 1984). Analysis of variance and Duncan's Multiple Range Test were used to examine various characteristics of the data (Mendenhall, Reinmuth, Beaver, and Duhan, 1986). Paired t-tests were computed on selected variables using the Statistical Analysis System (SAS) was used for these analyses (Barr and Goodnight, 1976). The p value utilized for the remaining part of the text was tested at $p < .05$, unless specified otherwise.

CHAPTER IV

RESULTS AND DISCUSSION

The sample was composed of 40 patients with diabetes.
Twenty patients were randomly assigned to the experimental
group (card system) and 20 patients were randomly assigned
to the control group (booklet).

Characteristics of the Sample

Age, Sex, and Marital Background

The ages of the patients ranged from 31 to 81 years
old with a mean age of 54.7 and a standard deviation of
12.4. Three age groups were arbitrarily identified.
Those patients between 31 and 50 years of age were
considered the first age group. The patients between 51
and 65 years of age were considered the second age group,
while the third age group included patients between 66 and
81 years of age. Seventeen patients (42.5%) were in the
first age group, 14 patients (35%) were in the second age
group, and 9 patients (22.5%) were in the third age group
(Figure 5). Of the total patients, 52.5 percent (N=21)
were males and 47.5 percent (N=19) were females (Figure
6). With regard to marital status, 67.5 percent of the

Age of the patients
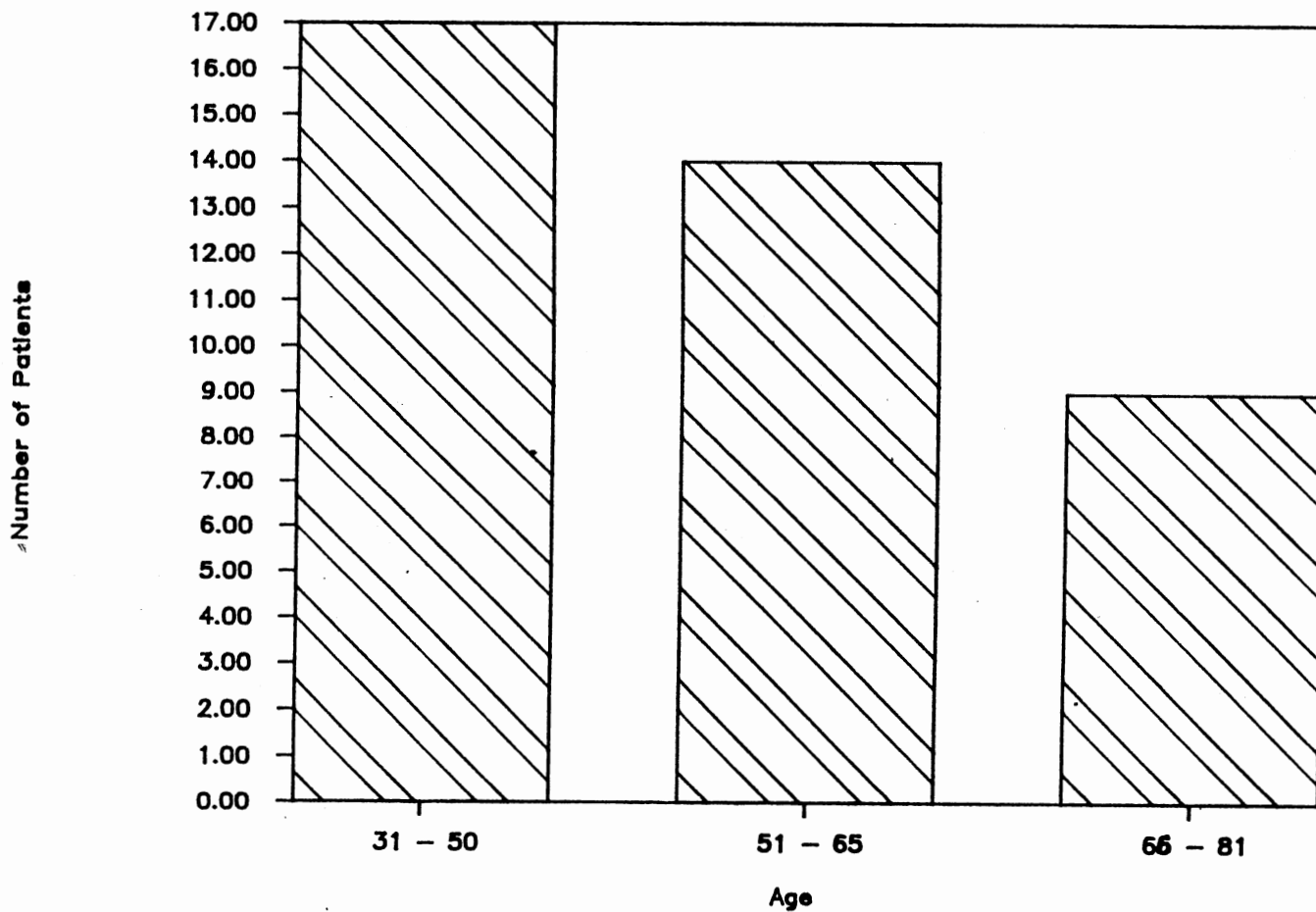
Figure 5.   Age of the Patients

Sex of the Patients
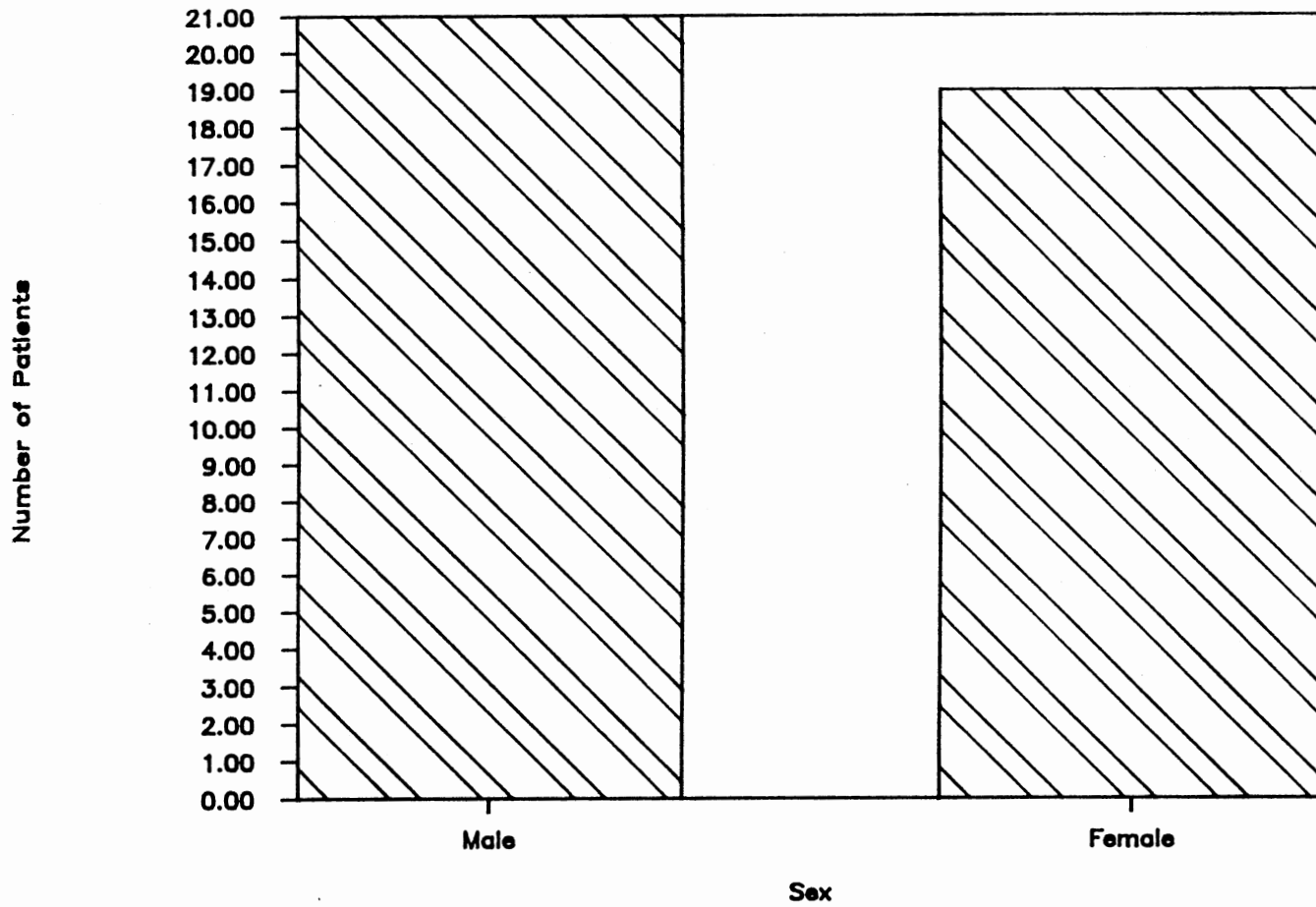
Figure 6. Sex of the Patients

patients (N=27) were married. Of the remaining patients,
12.5 percent (N=5) were single, 10 percent (N=4) were
divorced, and 10 percent (N=4) were widowed (Figure 7).

Diabetes Control

The duration of diabetes mellitus within the sample
ranged from newly diagnosed to 34 years, with a mean of
7.2 years and a standard deviation of 7.9. The mean
duration of the illness for those patients educated with
the booklet was 8.32 years, while the mean for those
trained with the cards was 6.13 years. Fifty-five percent
(N=18) of the patients have had diabetes for more than 5
years, while 30% (N=16) of the patients have had diabetes
for 1 to 5 years. Fifteen percent (N=6) of the patients
were newly diagnosed diabetics.

The majority of the patients (N=23, 57.5%) controlled
their diabetes with a hypoglycemic agent. Twenty-five
percent (N=10) of the patients controlled their diabetes
with insulin. Seven of the patients (17.5%) controlled
their diabetes with diet alone.

Forty-five percent of the patients had never been
hospitalized, while 40% percent (N=16) had been
hospitalized for diabetes only once. Fifteen percent
(N=6) of the patients had been hospitalized more than one
time. Ten percent (N=4) of the patients reported that
their diabetes had been out of control, and only 1
patient (2%) reported having a serious foot problem.

Figure 7. Marital Status of the Patients

Employment and Education Status

The majority of the patients were employed. Twenty-seven patients (67.5%) were employed at least part-time and 13 patients (32.5%) were either not employed or were retired. Twenty-nine of the patients (72.5%) had completed high school or had some high school education. Only 2 patients (5%) had less than 9 years of education. Five of the patients (12.5%) had 1 to 4 years of college education, while four patients (10%) had started post-graduate studies. At the time of this study, none of the patients were taking any college classes.

Diabetes Education.

Of the 40 patients in the study, 50 percent (N=20) had received formal diabetic nutrition education from a registered dietitian (R.D.). The other 50 percent (N=20) did not receive any formal education. Even though 50 percent of the patients had formal education, only 25 percent (N=10) of all of the patients knew how many kilocalories to consume daily to maintain or lose weight.

Some of the patients received informal education about diabetes mellitus from other sources. Slightly less than half of the patients had read books on diabetes (N=19, 47.5%), while 60 percent (N=24) of the patients had learned about diabetes from friends and family. Only 12.5 percent (N=5) of the patients received diabetes nutrition

pamphlets or nutrition education from their physician. One-fourth of the patients attended diabetes classes at the health department (N=10, 25%).

Physical Activity

Exercise plays a very important part in the control of diabetes, but the majority of the patients in this study claimed to be unmotivated or unable to exercise regularly. Over half of the patients exercised less than two times a week (N=22, 55%), while 20 percent of the patients exercised daily. Fifteen percent (N=6) exercised 2 to 3 times a week, while 10 percent (N=4) did no form of regular exercise at all (Figure 8).

Hobbies

Many of the patients in this study had areas of interest outside of their work or employment. Five of the patients (12.5%) did volunteer work at the local hospitals and 10 of the patients (25%) planted and maintained vegetable or flower gardens each year. Thirty of the patients (75%) had other hobbies such as needlework and antique cars, whereas 5 of the patients (12.5%) had no hobbies at all.

Exercise

Daily (20.0%)

2-3 X Wk. (15.0%)

<2 X Wk. (55.0%)

Never (10.0%)
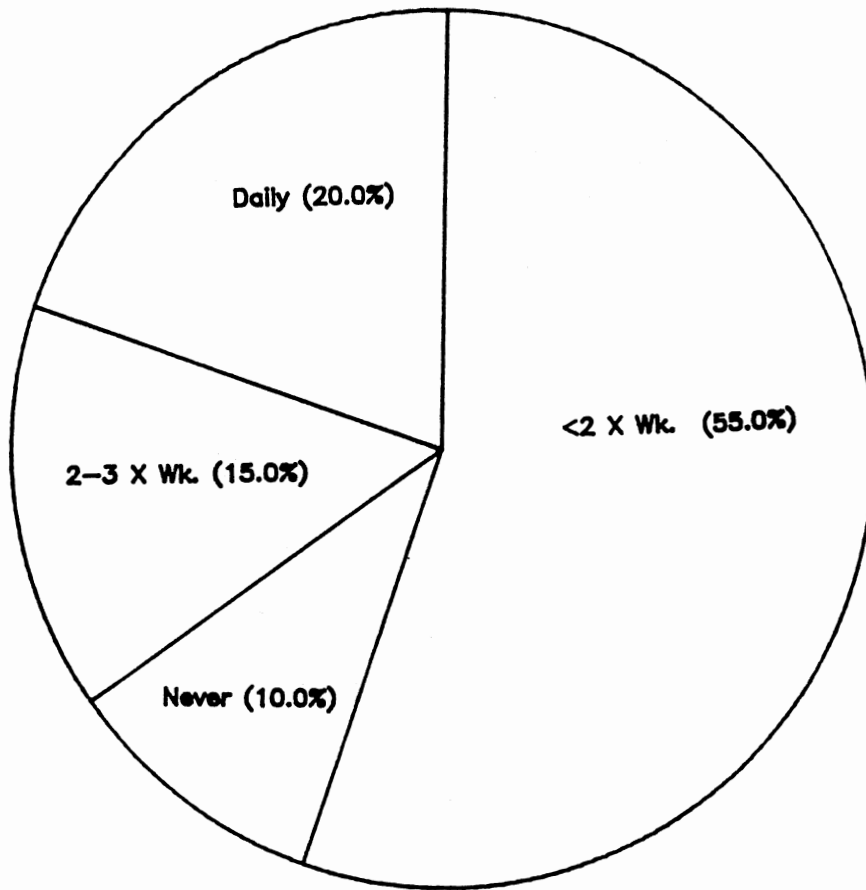
Figure 8.   Frequency of Exercise

Statistical Analysis

Nutrition Knowledge

Knowledge gained was computed by taking the difference between the post and pre test scores (test difference). Compliance was computed by taking the difference between the post and the pre Ghb laboratory values (laboratory difference). The booklet teaching method showed the highest test difference of 3.17 for the second age group (51-65) and the card teaching method showed the highest test difference of 4.5 for the third age group (Figure 9). This indicates that those patients older than 65 years of age may learn easier with the cards. In contrast, those patients between 51 and 65 years of age may learn better with the booklet. The patients older than 65 years of age may learn better with the card teaching method since they are constantly reminded of the types of food to eat and the correct portion sizes. The booklet teaching method showed the best laboratory difference (-1.72) for the second age group (Figure 10). The best post Ghb laboratory value with the cards was -1.16 for the first age group (31-50). However, there was no significant difference between the cards and the booklet in terms of laboratory values.

In terms of gender, males showed higher test differences in both teaching methods. In contrast, females showed better laboratory differences in both
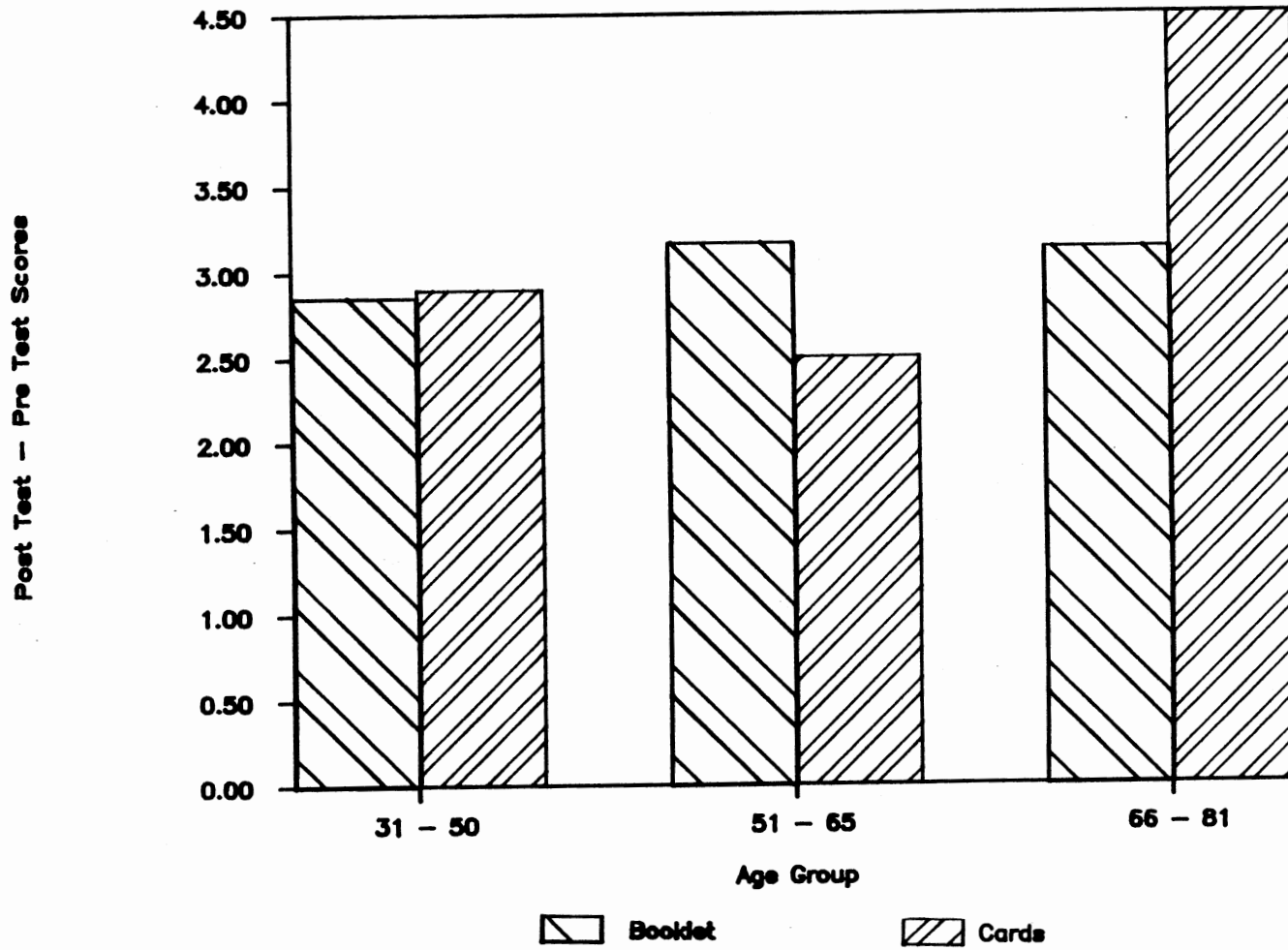
Figure 9. Difference in Test Scores Comparing
Methods by Age Groups
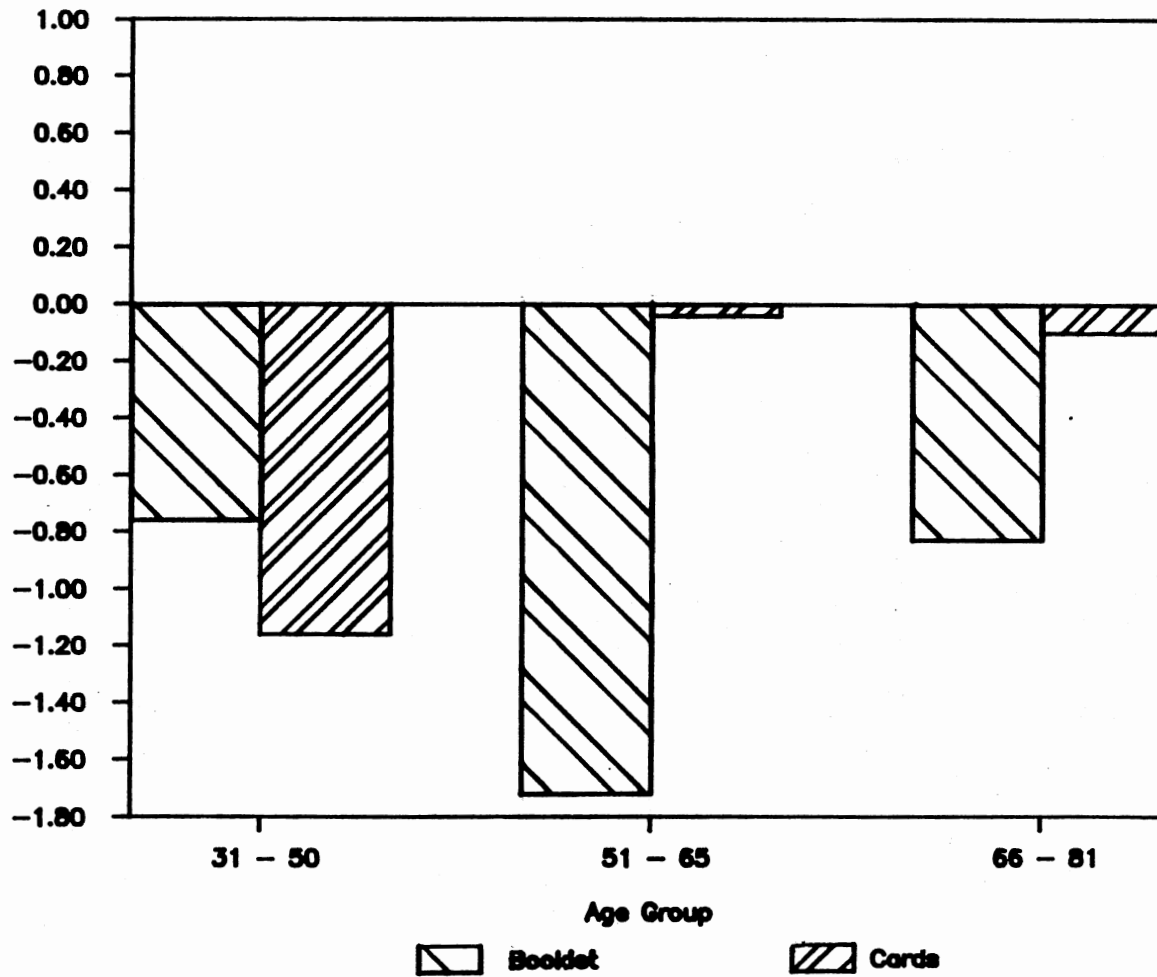
Figure 10. Difference in Ghb Laboratory Values Comparing
Methods by Age Groups
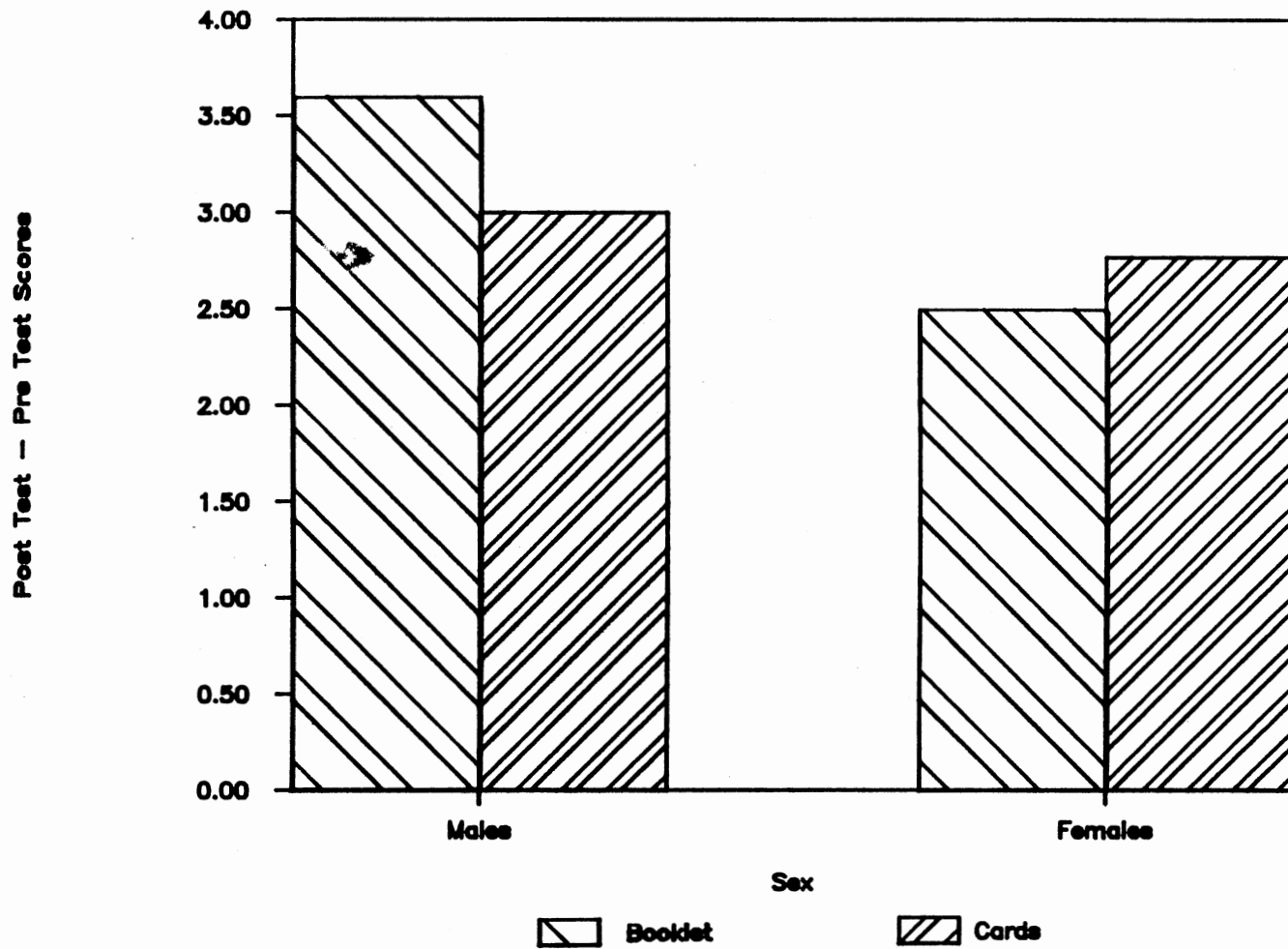
Figure 11.   Difference in Test Scores Comparing
Methods by Males and Females
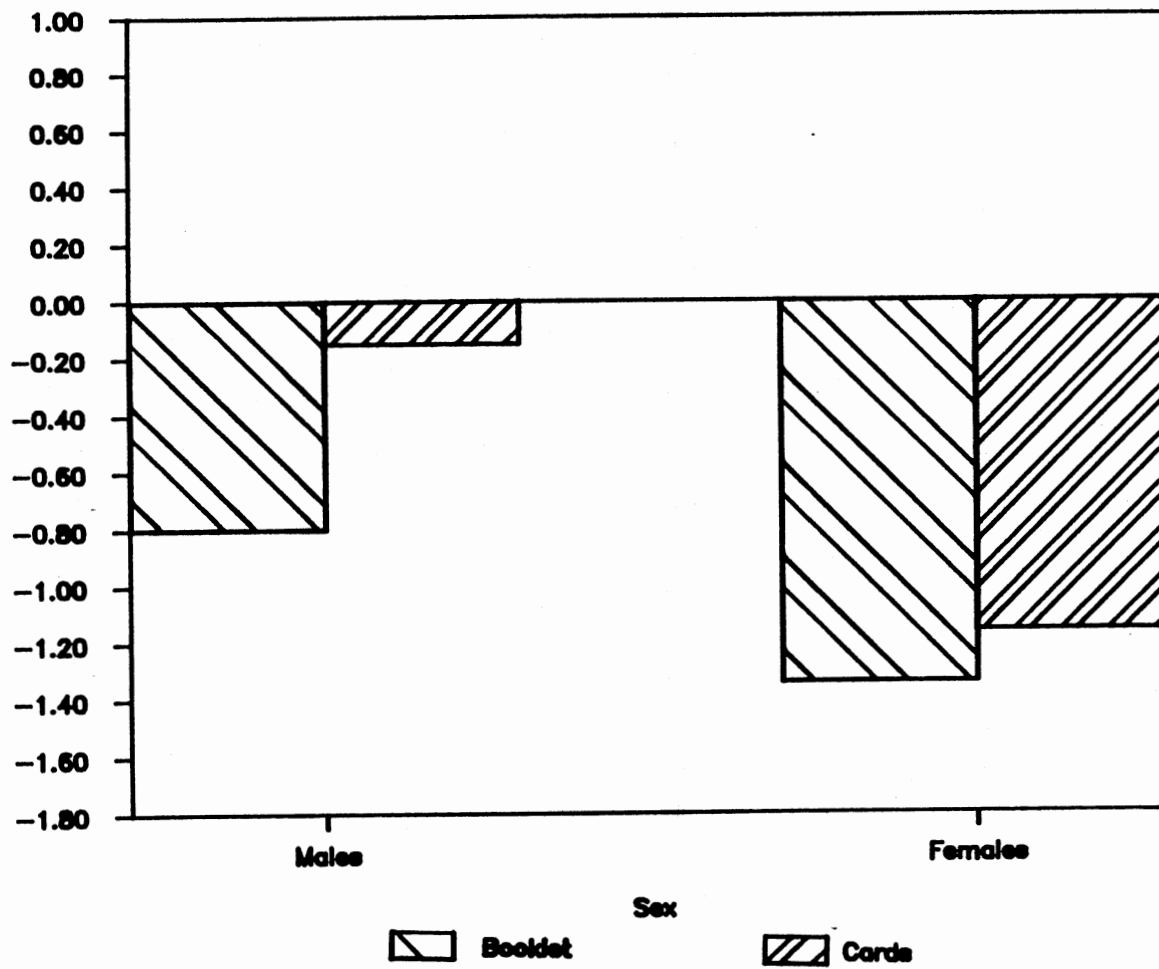
Figure 12.   Difference in Ghb Laboratory Values Comparing
Methods by Males and Females

teaching methods (Figures 11 and 12). Although the males performed better on the test, they did not seem to comply to the diet as well as the females. The paired t-tests did not show significant differences however, between teaching methods by gender with the test scores or the laboratory values.

Unmarried patients showed the highest test difference when taught with the booklet teaching method (Figure 13 and 14). Better laboratory differences were shown by the married patients taught with the booklet teaching method (-1.21). It appears that marital status does not influence the effectiveness of either teaching method. Since no significant difference was shown between teaching methods by marital status with the scores or the values, either teaching method would be effective with married or unmarried patients.

Physical Activity

Physical activity was tested to determine if increasing frequency of exercise had an effect on the patient compliance with the diet. As the frequency of exercise increased, both pre and post Ghb laboratory values decreased. Those who exercised daily had a post Ghb laboratory value of 9.7 as contrasted with those who never exercised with a post Ghb laboratory value of 11.8 (Figure 15). The Ghb laboratory values appear to be substantially lower in patients who exercised more frequently than those
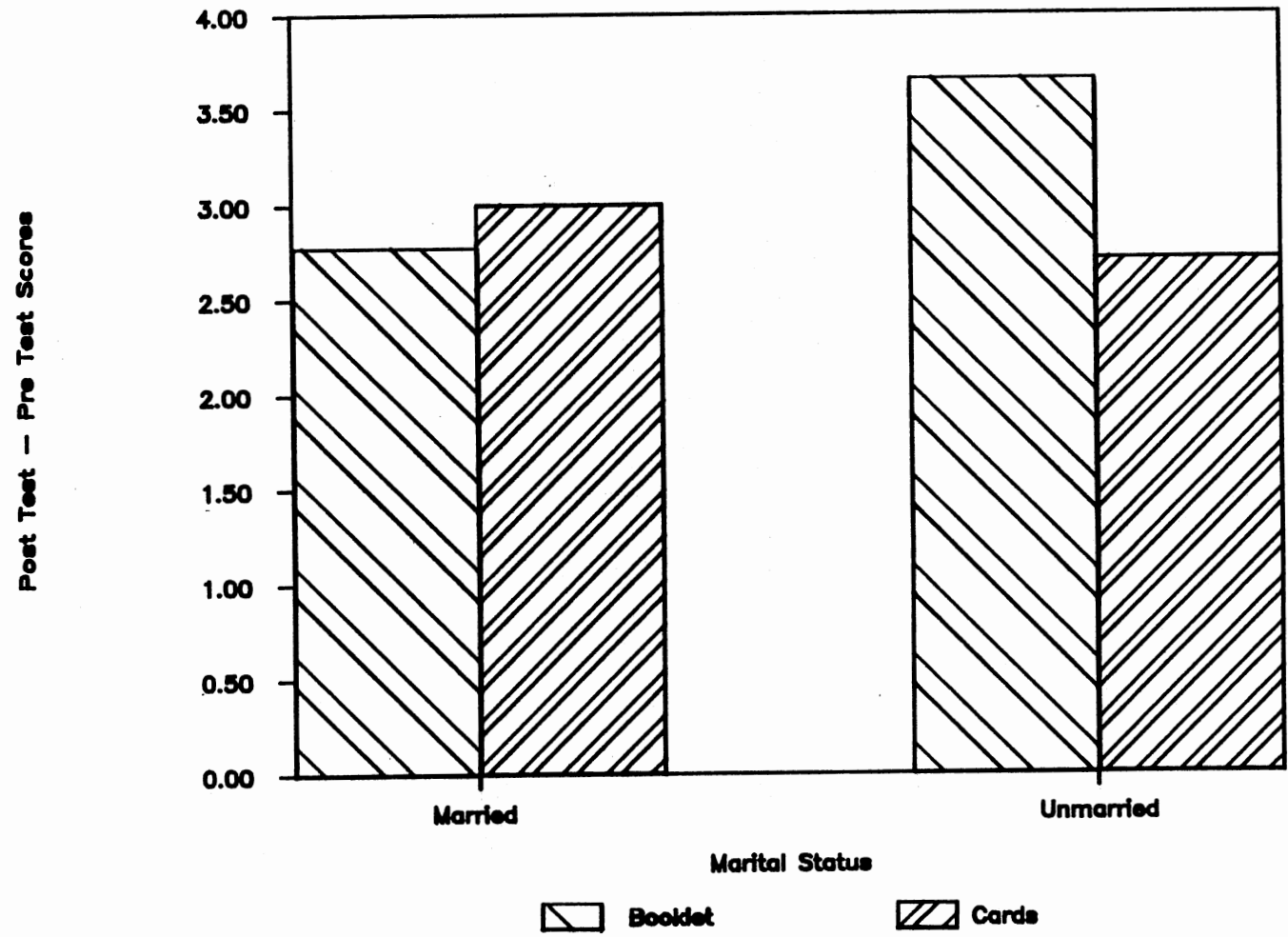
Figure 13. Difference in Test Scores Comparing
Methods by Marital Status
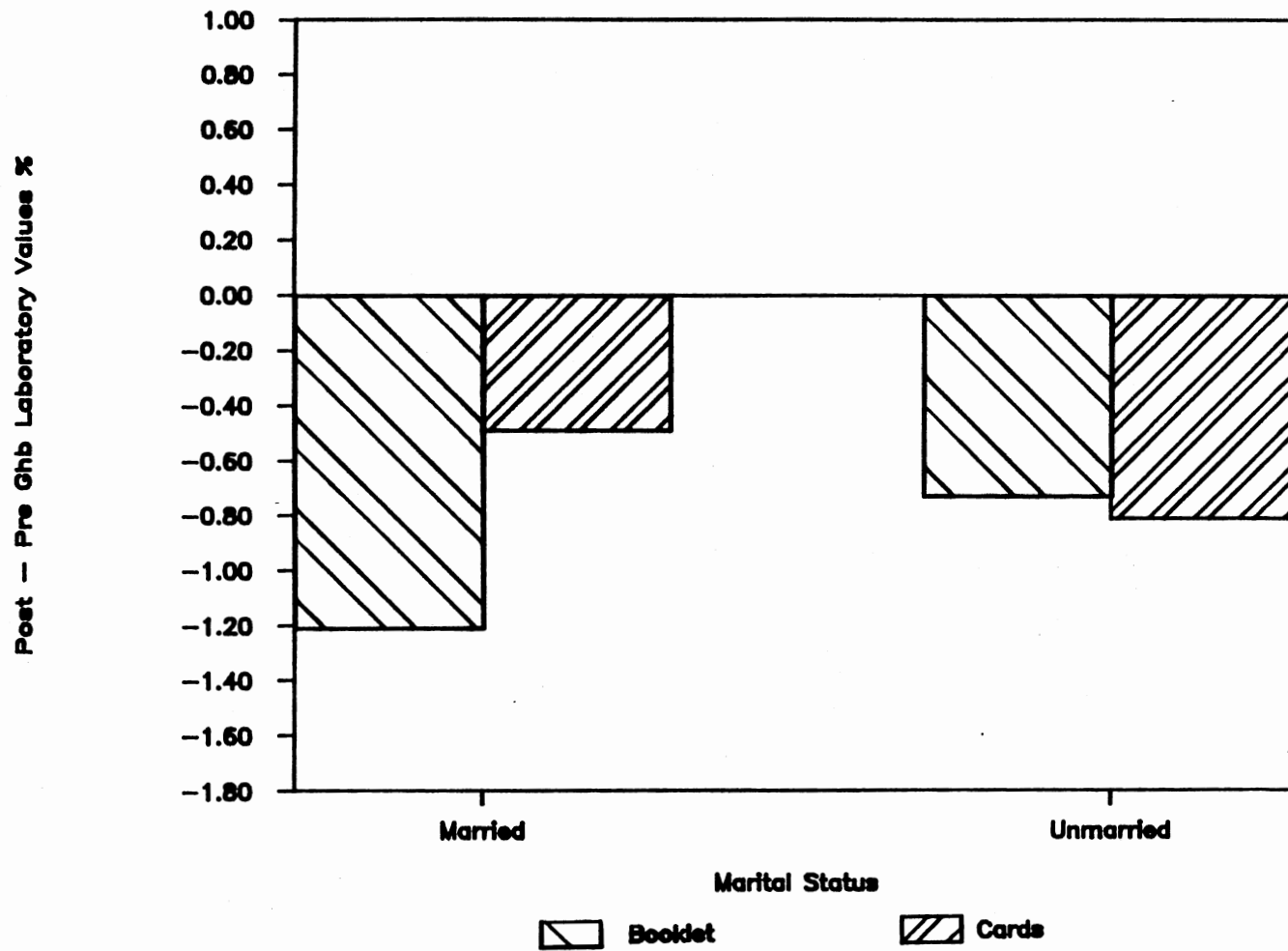
Figure 14.   Difference in Ghb Laboratory Values Comparing
Methods by Marital Status
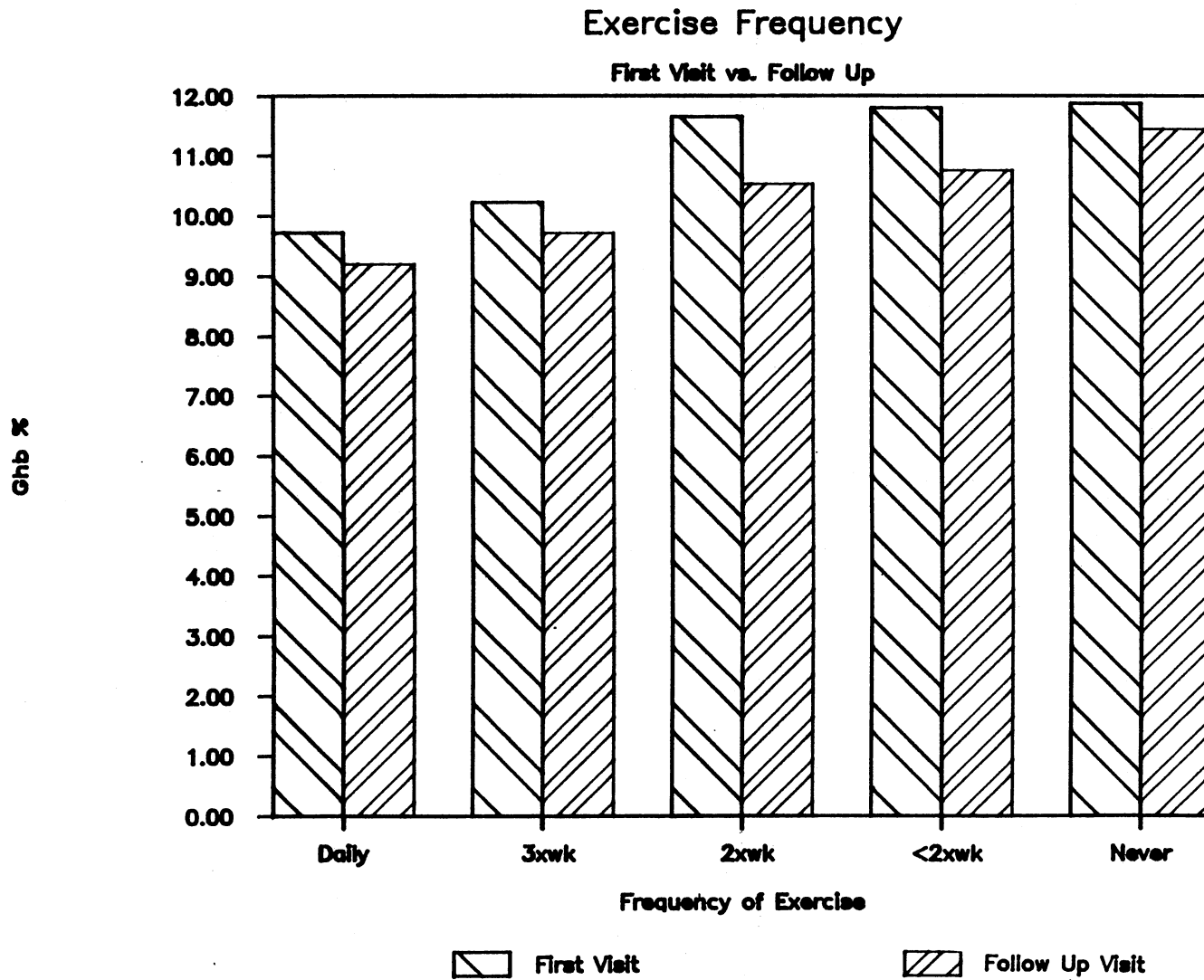
Figure 15. Ghb Laboratory Values Comparing
Frequency of Exercise

who do not exercise. The change in laboratory values between the first visit and the follow up visit however, was not significant using the Analysis of Variance.

Years Diabetic

Pearson Correlation Coefficients Analysis was used to determine if there was a relationship between the patients knowledge and compliance vs. length of time the patients had the disease. The longer the patient had diabetes, the more likely the test difference increased and the change in the laboratory difference values decreased, however the changes were not significant.

Method of Teaching

The test difference was analyzed separately for those patients tested with the booklet teaching method and the card teaching method. The difference between the pre and post test scores were computed and the mean was determined for each group. Both the pre and post test had 18 questions with each question being 1 point. The group tested with the booklet had a test difference of 3.05 and the group tested with the cards had a test difference of 2.9 (Figure 16). Both of these means were highly significant (p < .0001). Both teaching methods showed a significant increase in the knowledge gained, emphasizing the need for diabetes nutrition education. Although the difference in test scores for nutrition knowledge of patients taught
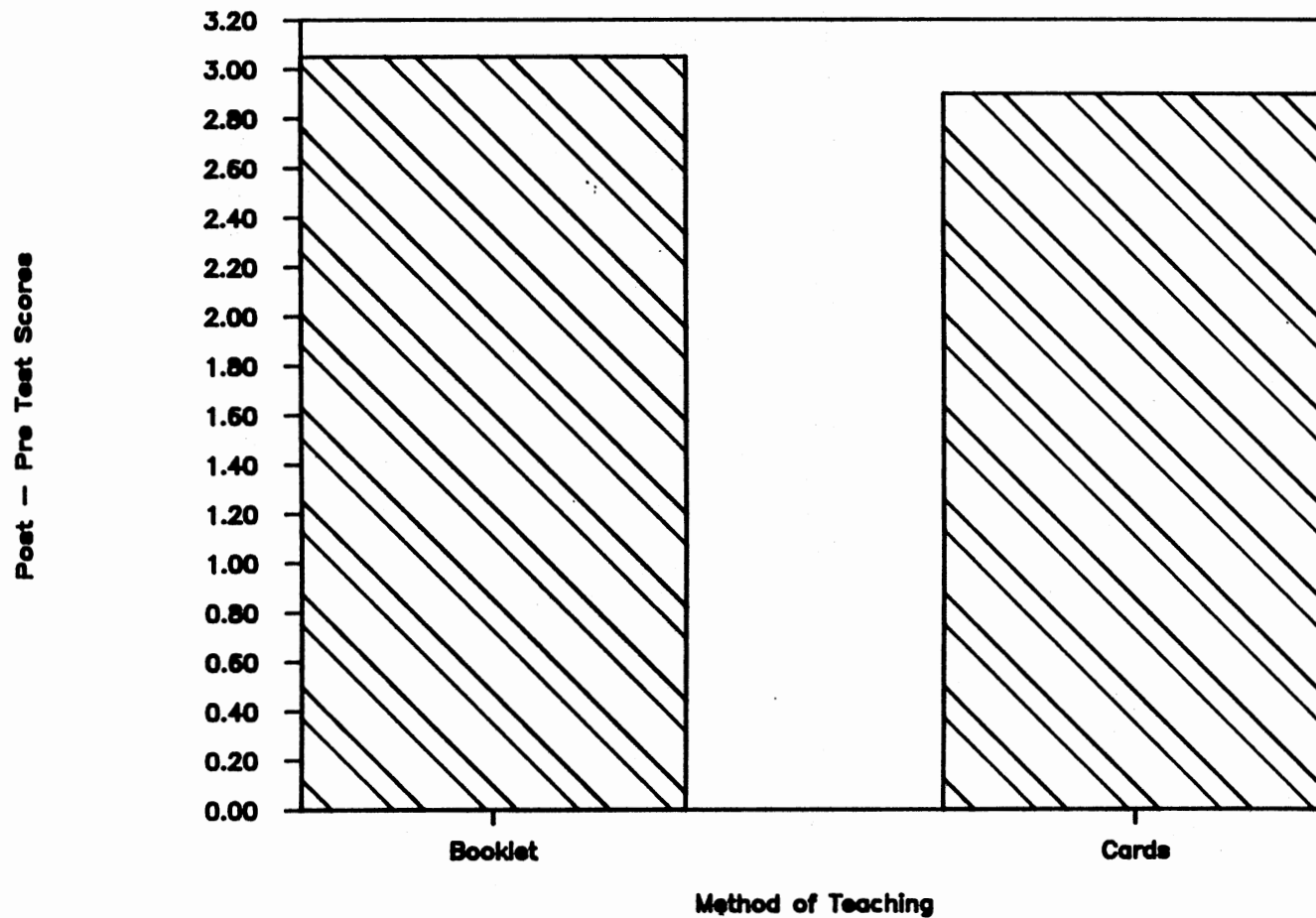
Figure 16.   Difference in Test Scores of Patients
Taught with Booklets or Cards

with the booklet were slightly higher than the test difference of those taught with the cards, the difference between the booklet and the cards were not significant in the Analysis of Variance Procedure.

Dietary compliance was tested by taking the difference between the pre and post Ghb laboratory values and then the mean for each treatment method was derived. The mean laboratory value for those taught with the booklet was -1.07 and the mean for those taught with the cards was -0.61 (Figure 17). No significant difference was found between these mean laboratory values. The patients taught with the booklet teaching method showed slightly better Ghb laboratory values than those patients taught with the card teaching method, though this difference was not significant. Perhaps the two month follow up period was not long enough to see a significant change in the Ghb laboratory values.

Testing the Hypothesis

Hypothesis One

"There will be no significant difference in the pre and post test scores (nutrition knowledge) of patients taught with the booklet based on selected personal variables such as age, sex, and marital status". The researcher failed to reject the null hypothesis 1 because no significant differences were found.
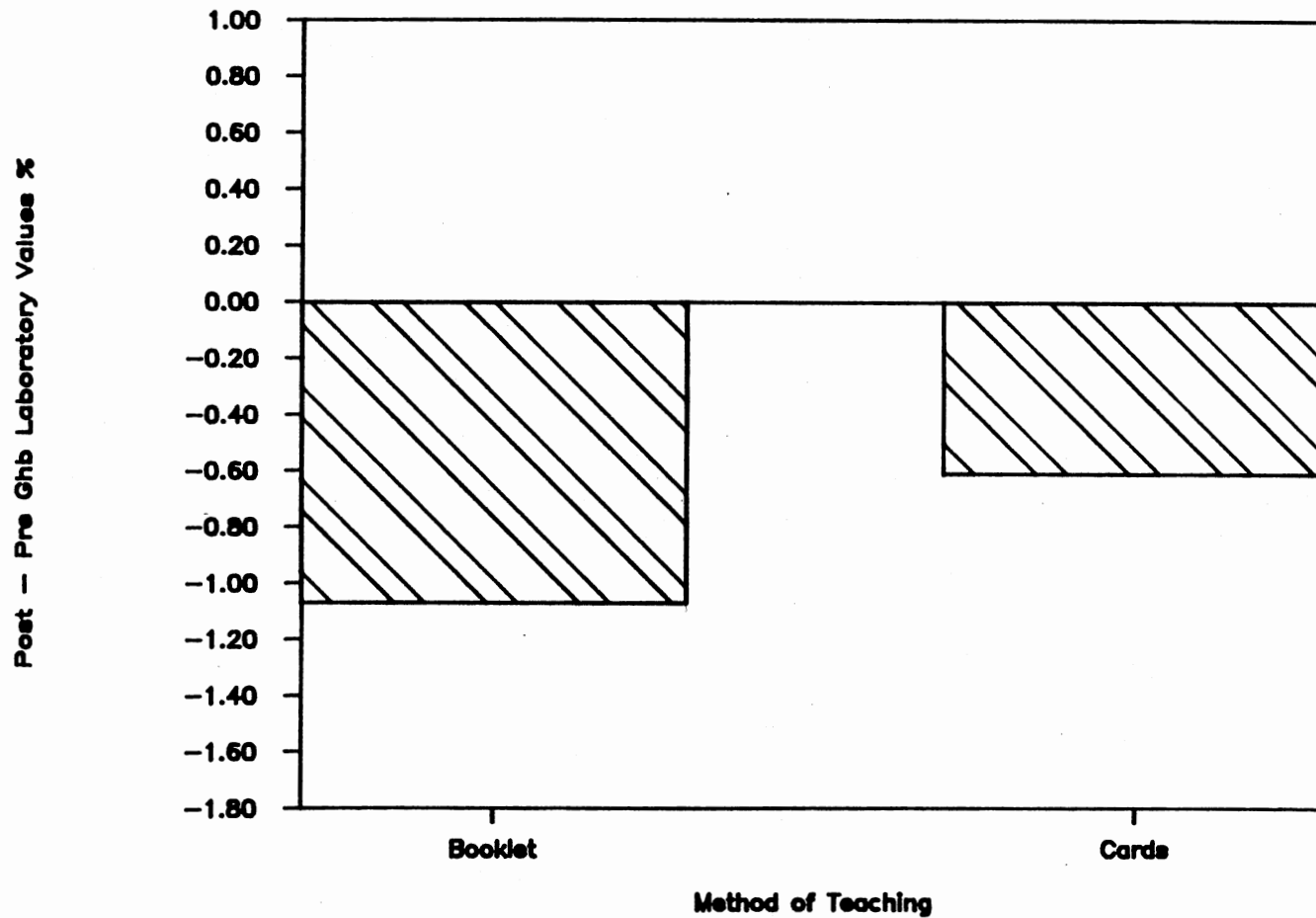
Figure 17.   Difference in Ghb Laboratory Values of
             Patients Taught with Booklets or Cards

Hypothesis Two

"There will be no significant difference in the pre and post test scores (nutrition knowledge) of patients taught with the cards based on selected personal variables such as age, sex, and marital status". The researcher failed to reject the null hypothesis 2 because no significant differences were found.

Hypothesis Three

"There will be no significant difference in the pre and post Ghb scores (dietary compliance) of patients taught with the booklet based on selected personal variables such as age, sex, and marital status". The researcher rejected the null hypothesis 3 because significant differences were found.

Hypothesis Four

"There will be no significant difference in the pre and post Ghb scores (dietary compliance) of patients taught with the cards based on selected personal variables such as age, sex, and marital status". The researcher failed to reject the null hypothesis 4 because no significant differences were found.

Hypothesis Five

"There will be no significant difference in the pre

and post test scores (nutrition knowledge) of patients
taught with either the booklet or the cards". The
researcher failed to reject hypothesis 5 because no
significant differences were found.

Hypothesis Six

"There will be no significant difference in the pre
and post Ghb (dietary compliance) of patients taught
with either the booklet or the cards". The researcher
failed to reject the null hypothesis 6 because no
significant differences were found.

CHAPTER V

SUMMARY AND CONCLUSIONS

Patients with diabetes need to know how to manage
their diabetes and diet (ADA Policy Statement, 1982).
Effective nutrition education is necessary to keep
patients with diabetes fully informed on updated manage-
ment techniques of this disease. It is important for a
Registered Dietitian or a diabetic educator to employ a
variety of teaching methods since no two patients are
alike, and each individual's learning styles vary. While
one patient may be able to follow a more comprehensive
system, another patient may learn just as well with a
simplified version of the system.

Characteristics of the Patients

Thirty-five percent of the patients in this study
were between 51 and 65 years of age, while 42.5 percent
were 50 years or younger (Figure 4). Males comprised 52.5
percent of the sample, while the remaining 47.5 percent
were females (Figure 5). The majority of the patients
were married (67.5%), while the remaining patients were
single, divorced, or widowed (Figure 6). Fifty-five

percent of the patients had diabetes for more than 5 years. A hypoglycemic agent was used to control diabetes in 57.5 percent of the patients. In contrast, only 25 percent of the patients used insulin, while 17.5 percent of the patients controlled the diabetes with diet alone. About half of the patients had received formal diet instructions from a registered dietitian, while the remaining patients received pamphlets from their physician or did not receive any information at all. Fifty-five percent of the patients exercised less than two times a week.

Findings

The researcher failed to reject Hypothesis 1, Hypothesis 2, Hypothesis 4, Hypothesis 5, and Hypothesis 6 because no significant differences were found between personal variables, test scores, and Ghb laboratory values. The researcher rejected Hypothesis 3 since a significant difference was found between the pre and post test scores with both teaching methods.

Conclusions

Nutrition knowledge post tests scores of diabetic patients were significantly higher than their pre test scores with both teaching methods. Therefore, the card teaching method is just as effective as the booklet teaching method. This supports Chandler, et al, (1983),

Ciavarella and Atkinson (1983), and Abraira's, et al,

(1980) research which indicated that both traditional

and non-traditional teaching methods were equally

effective in the learning process of patients with

diabetes. The diabetic educator's priority is to provide

every diabetic patient the opportunity to receive nutri-

tion education. Based on the patients knowledge and

experience, the dietitian's responsibility is to discern

the most appropriate teaching method to obtain optimum

results.

Recommendations

Based on the results of the study, the researcher

proposes the following recommendations: Expand the study

to include more patients and to involve more physicians in

the Enid, Oklahoma area. One study could be limited to

elderly subjects who control diabetes with diet alone and

another study could involve insulin-dependent children.

Similar studies could utilize patients with a smaller age

difference or patients with the same previous nutrition

education background.

If the researcher has access to continued patient

contact, a nine month follow up study should be initiated

to determine knowledge retained and compliance of diet

quidelines. Perhaps future proposals could be written to

the American Diabetic Association or pharmaceutical

companies to fund similar state wide studies.

BIBLIOGRAPHY

Abraira, C., de Bartolo, M., & Mycofski, J.W. (1980). Comparison of unmeasured versus exchange diabetic diets in lean adults. Body weight and feeding patterns in a two-year prospective pilot study. American Journal of Clinical Nutrition, 33, 1064-1070.

American Diabetes Association (1982). Position Statement: Individualization of diabetes education and management. The Diabetes Educator, 8, 48.

American Diabetes Association (1984). Policy Statement: Glycemic effects of carbohydrates. Diabetes Care, 7, 607-708.

American Diabetes Associatio (1984). Policy Statement: Third-party reimbursement for outpatient education and nutrition counseling. Diabetes Care, 7, 505-506.

American Diabetes Association (1985). 1985 Fact sheet on diabetes, 1985, Bridgewater, N.J.: New Jersey Affiliate Inc.

American Diabetes Association (1987). Position Statement: Nutritional recommendations and principles for individuals with diabetes mellitus, 1986. Diabetes Care,10,126-132.

American Diabetes Association/American Dietetic Association (1986). Exchange lists for meal planning. Alexandria, VA: Diabetes Information Service Center.

American Dietetic Association Reports (1981). Position paper on recommended salaries and employment practices for members of the American Dietetic Association. Journal of the American Dietetic Association, 78, 62-73.

American Hospital Association (1982). Policy and Statement: The hospital's responsibility for patient education services.

Barr, A.J., & Goodnight, J.H. (1985). A user's guide to SAS 76. Raleigh, N.C.: SAS Institute.

Button, J. (1984). PC-File III: A data base manager program for the IBM personal computer. Bellevue, WA: Buttonware.

Chandler C., Moore, R., & Leichter, S. (1983). Traditional vs. nontraditional diet methods. Diabetes, 32, 18A.

Ciavarella, P.A., & Atkinson, R.L. (1983). Dietary therapy: Exchange system vs. calorie counting. Diabetes, 32, 6A.

Coughlin, S.H. & Kahn, R. (1986). Diabetes in America -Where do you fit in? Diabetes Forecast. NIH Pub. No. 85-1468. GPO Stock #017-045-00102-1. Washington, D.C.

Davidson, M.B. (1986). Diabetes Mellitus: Diagnosis and Treatment. New York, N.Y.: John Wiley and Sons.

Dorland's Illustrated Medical Dictionary (1988). 24th ed. Philadelphia, PA.: W.B. Saunders Co.

Engel, S.S., & Wylie-Fosett, J. (1985). The dietitian: Underutilized resource in diabetes care. Clinical Diabetes, (special report), 131-142.

Franz, M.J., Barr, P., Holler, H., Powers, M.A., Wheeler, M.L., & Wylie-Rosett, J. (1987). Exchange lists: Revised 1986. Journal American Dietetic Association 87, 28-34.

Garrard, J., Joynes, L.O., Mullen, L., McNeil, L., Mensing, C., Reste, C., & Etzwiler, D. (1987). Psychometric study of patient knowledge test. Diabetes Care 10, 4.

Goldstein, D. (1986). Understanding GHb assays: A quided tour for clinicians. Clinical Diabetes, 4, 1.

Green, J., Wheeler, M., & Rosett, J.W. (1986). Survey of dietitians' opinions and use of food exchange lists and alternative approaches. Diabetes, 35 (suppl 1), 44A.

Heins, J.M., Wylie-Rosett, J., & Davis, S.G. (1987). The new look in diabetic diets. American Journal of Nursing, Feb., 196-198.

Huck, S. W., Cormier, W.H. & Bounds, W.G. (1974). Reading Statistics and Research. New York: Harper and Row Publishing Co.

Krause, M.V., & Mahan, L.K. (1984). Food, Nutrition. and Diet Therapy. Philadephia, PA: W. B. Saunders Co.

Little, R.R., England, J.D., Weidmeyer, H., McKenzie, E.M., Pettitt, D.J., Knowler, W.C., & Goldstein, D.E. (1988). Relationship of Glycosylated Hemoglobin to oral glucose tolerance: Implications for diabetic screening. Diabetes, 37, p. 60-64.

Mayo Clinic Diet Manuel (1988). (6th ed.). Burlington, Ontario: B.C. Decker, Inc.

Mendenhall, W., Reinmuth, J.E., Beaver, R., & Duhan, D. (1986). Statistics for Management and Economics. Boston, Massachusetts: PWS Publishers.

Modan, M., Meytes, D., Rozeman, P., Yosef, S.B., Sehayek, E., Yosef, N.B., Lusky, A., & Halkin, H. (1988). Significance of high HbA1 levels in normal glucose tolerance. Diabetes Care, 11, 5, 422-428.

National Diabetes Advisory Board (1986). Meeting Summary.

Raskin, P., & Rosenstock, J.(1986). Blood glucose control and diabetic complications. Annual of Internal Medicine, 105, 254-263.

Rapp, S.R. (1986). Food portion size estimated by men with type II diabetes. Journal of the American Dietetic Association, 86, 249-251.

Robinson, C.H., Lawler, M.R., Chenoweth, S.L., & Garwick, A.E. (1986). Normal and Therapeutic Nutrition. New York, N.Y.: Macmillan Publishing Co.

Sinnock, P. (1985). Hospital utilization for diabetes, in Harris MI, Hamman RF (eds): Diabetes in America, NIH Publication No. 85-1468, ppxxvi, 1-11.

Skillman, T.G.(1984). Oral hypoglycemic agents for treatment of NIDDM. Geriatrics, 39, 77.

Story, L., Anderson, J.W., & Chen, W.L. (1985). Adherence to high-carbohydrate, high-fiber diets: Long-term studies of non-obese diabetic men. Journal of the American Dietetic Association, 85, 1105-1110.

Stuckey, V. (1981). Points for a good life (1st ed.). Sun City, Arizona: The Diet Teaching Programs.

APPENDIXES

APPENDIX A

CARD SYSTEM

Blue - Front

VEGETABLES

Blue - Back

1/2 c.   cooked vegetables
1/2 c.   vegetable juice
1 c.   raw vegetables
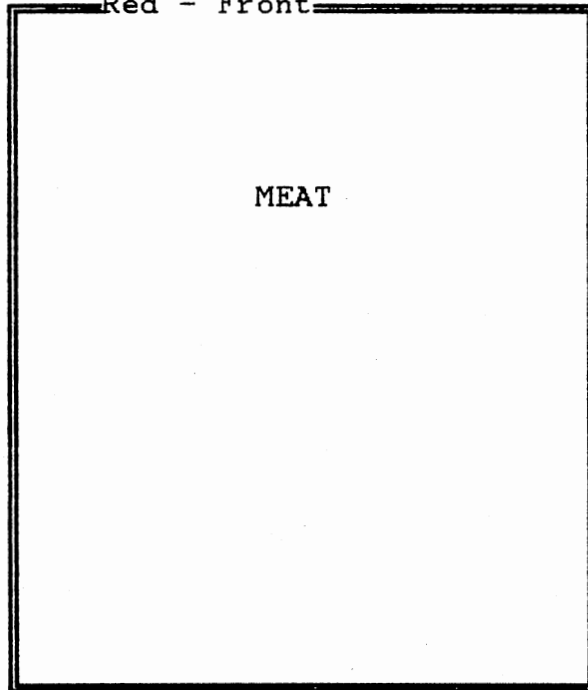
```
┌──Red - Front═══════════════════┐
│                                │
│                                │
│            MEAT                │
│                                │
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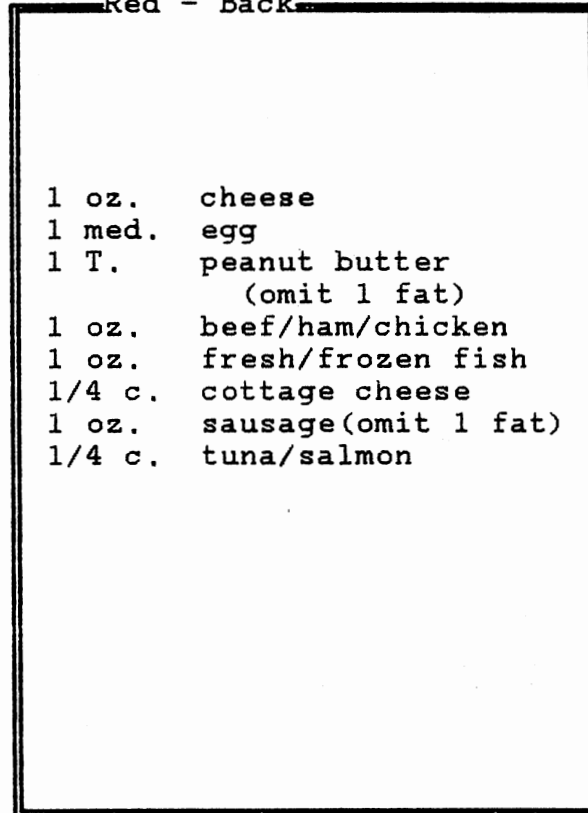
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┌──Red - Back═══════════════════┐
│                                │
│                                │
│  1 oz.    cheese               │
│  1 med.   egg                  │
│  1 T.     peanut butter        │
│              (omit 1 fat)      │
│  1 oz.    beef/ham/chicken     │
│  1 oz.    fresh/frozen fish    │
│  1/4 c.   cottage cheese       │
│  1 oz.    sausage(omit 1 fat)  │
│  1/4 c.   tuna/salmon          │
│                                │
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┌──Gray - Front──────────┐
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│                        │
│                        │
│      STARCH/BREAD       │
│                        │
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│                        │
│                        │
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```
┌──Gray - Back───────────┐
│ 1/2 c.   cereal        │
│ 1/3 c.   peas/kidney beans │
│ 1/4 c.   baked beans   │
│ 1/2 c.   corn/green peas/ │
│          mashed potatoes │
│ 1 sm.    baked potato  │
│ 8        animal crackers │
│ 3        graham crackers │
│ 3 c.     popcorn, no fat │
│ 6        crackers      │
│                        │
│ Include 1 fat with the │
│   following:           │
│ 1        biscuit       │
│ 1        cornbread     │
│ 10       french fries  │
│ 1        plain muffin  │
│ 2        pancake       │
│ 1        waffle        │
└────────────────────────┘
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====Orange - Front====

FRUIT

====Orange - Back====

1 sm.	apple
1/2	banana
1 c.	canteloupe
15 sm.	grapes
2 hlvs.	peaches
1 sm.	pear
1 1/4 c.	strawberries
3 med.	prunes
2 T.	raisins
1/2 c.	apple/grapefruit/ orange/pineapple juice
1/3 c.	prune/grape juice
1/3 c.	cranberry juice cocktail

```
┌─────Green - Front═══════════┐
│                             │
│                             │
│             FAT             │
│                             │
│                             │
│                             │
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┌═════Green - Back═══════════┐
│                            │
│                            │
│  1 t.      margarine       │
│  1 T.      margarine, diet │
│  1 t.      mayonnaise      │
│  1 T.      mayonnaise, diet│
│  2 whole pecans            │
│  1 T.      sunflower seeds │
│  1 T.      salad dressing  │
│  1 slice bacon             │
│  2 T.      shredded wheat  │
│  2 T.      sour cream      │
│  1 T.      cream cheese    │
│                            │
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┌──Pink - Front─────────────┐
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│                           │
│           MILK            │
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┌──Pink - Back──────────────┐
│                           │
│    Skim Milk 1 Serving:   │
│ 1 c.     Skim/1%/Buttermilk-│
│                  Lowfat   │
│ 1/2 c.   Evaporated Skim Milk│
│ 1/3 c.   Dry Nonfat Milk  │
│ 8 oz.    Plain Nonfat Yogurt│
│                           │
│                           │
│    Lowfat 1 Serving:      │
│ 1 c.     2% Milk          │
│ 8 oz.    Plain Low-Fat    │
│          Yogurt           │
│                           │
│    Whole 1 Serving:       │
│ 1 c.     Whole Milk       │
│ 1/2 c.   Evaporated Whole │
│          Milk             │
│ 8 oz.    Whole Plain Yogurt│
│                           │
└───────────────────────────┘
```

APPENDIX B

DIET HISTORY

DIET HISTORY

Name_____   Age_____M F

Address_____   Insulin
        _____   Oral

Telephone_____   Marital Status__

                                    Original   Follow Up

Are you employed?
        Yes   No

Are you a Full-time student?
        Yes   No

Are you a Part-time student?
        Yes   No

Are you active in one of the
following:
        Volunteer Work
        Homemaking
        Gardening
        Home repairs
        Other hobby
        None

What type of physical activity
does your job require:
        Light-walk 1 mile/day
        Medium-walk 3 miles/day
        Heavy-walk 5 miles/day

Do you participate in physically
active sports or exercise program?
        Yes   No

How often?
        Daily
        3 or more times/week
        2 times/week
        Less frequently

How many years of formal schooling
have you had?
        Less than 4
        4 to 8
        9 to 12
        13 to 16
        More than 16

                                    Original   Follow-up

When were you first told you
had diabetes?
        19___

How many times have you been
hospitalized in the last 5 years?
        Never
        Once
        Twice
        3 times
        4 times
        5 or more times

Have you ever been hospitalized
for any of the following?
        Diabetes out of control
        Diabetic coma
        Hypoglycemic reaction
        Serious foot infection

Is you diabetes currently being
controlled by diet alone
        Yes   No

Is your diabetes currently being
controlled by oral agents?
        Yes   No

Is your diabetes currently being
controlled by insulin?
        Yes   No

What education in diabetes self-care
have you had?
        Reading
        Friends or family
        Physician's office
        Special outpatient class
        Public meetings or other

What is your height?
        ___Ft.   ___In.

What is your weight?
____#

Are you currently following a
prescribed diet for your diabetes?
      Yes   No

How many calories does this include?
      Yes   No

APPENDIX C

PRE AND POST TESTS

Diabetes Pre Test

1. The usual cause of diabetes is:
    a. eating too much sugar and other sweet foods
    b. lack of effective insulin in the body
    c. failure of the kidneys to control sugar in the urine
    d. I don't know

2. Glycosylated Hemoglobin (Ghb) is a laboratory test that gives an indication of the:
    a. changes in the walls of blood vessels
    b. average blood sugar level over a four to six week time period
    c. level of fat in the blood
    d. I don't know

3. The best laboratory test for diagnosing diabetes is the:
    a. urine test for sugar
    b. urine test for ketones
    c. blood test for sugar
    d. I don't know

4. In untreated diabetes the blood sugar is usually:
    a. normal
    b. increased
    c. decreased
    d. I don't know

5. Which of the following methods of control should be used by everyone with diabetes:
    a. meal planning
    b. oral tablets
    c. insulin
    d. I don't know

6. Foods which may be used "free" on a diabetes exchange meal plan are:
    a. foods labeled "dietetic" or "diabetic"
    b. foods which contain 20 calories or less per serving
    c. alcoholic beverages
    d. I don't know

7. The general effect of exercise is to:
    a. lower the blood sugar level
    b. raise the blood sugar level
    c. increase sugar in the urine
    d. I don't know

8. Insulin causes blood sugar to:
   a. increase
   b. decrease
   c. neither increase or decrease
   d. I don't know

9. Which of the following statements is correct:
   a. One cup of milk may be exchanged for four ounces of cheese.
   b. One ounce of beef may be exchanged for one ounce of cream cheese.
   c. One egg may be exchanged for one ounce of Canadian Bacon.
   d. I don't know

10. One bread exchange contains:
    a. 15 grams of carbohydrate
    b. 10 grams of carbohydrate
    c. 20 grams of carbohydrate
    d. I don't know

11. To decide if a change is needed in Regular insulin taken before supper, which urine/blood sugar test is Most helpful:
    a. breakfast
    b. supper
    c. evening snack
    d. I don't know

12. Foods included on the lean meat list are:
    a. fish, poultry, center-sliced ham
    b. ground beef, liver, eggs
    c. cheddar cheese, bologna, wieners
    d. I don't know

13. The bread exchange list contains food high in carbohydrate. One slice of bread may be exchanged for:
    a. 1/2 cup cornflakes
    b. 6 graham crackers
    c. 1 small potato
    d. I don't know

14. One ounce of a high fat meat may be exchanged for:
    a. 1/2 cup creamed cottage cheese
    b. 1 slice of cheddar cheese (1 ounce)
    c. 1 ounce of pork roast
    d. I don't know

15. One orange may be exchanged for:
    a. 1 banana (medium size)
    b. 1 cup orange juice
    c. 1 small apple
    d. I don't know

16. The meal plan used in diabetes management:
    a. is unlike the ordinary American diet
    b. could be the basis for an excellent family meal
       plan
    c. is too high in fat for general use
    d. I don't know

17. The type of food highest in calories per gram is:
    a. carbohydrate
    b. protein
    c. fat
    d. I don't know

18. The main sources of carbohydrate in the diabetes meal
    plan are:
    a. fats and oils
    b. vegetables
    c. breads and cereals
    d. I don't know

Diabetes Post-test

1. Insulin causes blood sugar to:
    a. increase
    b. decrease
    c. neither increase or decrease
    d. I don't know

2. Glycosylated hemoglobin (Ghb) is a laboratory test
    that gives an indication of the:
    a. changes in the walls of blood vessels
    b. average blood sugar level over a four- to six-
        week
        time period
    c. level of fat in the blood
    d. I don't know

3. The best laboratory test for diagnosing diabetes is
    the:
    a. urine test for sugar
    b. urine test for ketones
    c. blood test for sugar
    d. I don't know

4. In untreated diabetes the blood sugar is usually:
    a. normal
    b. increased
    c. decreased
    d. I don't know

5. Which of the following methods of control should be
    used by everyone with diabetes?
    a. meal planning
    b. oral tablets
    c. insulin
    d. I don't know

6. The main sources of carbohydrate in the diabetes meal
    plan are:
    a. fats and oils
    b. vegetables
    c. breads and cereals
    d. I don't know

7. The general effect of exercise is to:
    a. lower the blood sugar level
    b. raise the blood sugar level
    c. increase sugar in the urine
    d. I don't know

8. The usual cause of diabetes is:
   a. eating too much sugar and other sweet foods
   b. lack of effective insulin in the body
   c. failure of the kidneys to contol sugar in the urine
   d. I don't know

9. Which of the following statements is correct?
   a. One cup of milk may be exchanged for four ounces of cheese.
   b. One ounce of beef may be exchanged for one ounce of cream cheese.
   c. One egg may be exchanged for one ounce of Canadian bacon.
   d. I don't know

10. One bread exchange contains:
    a. 15 grams of carbohydrate
    b. 10 grams of carbohydrate
    c. 20 grams of carbohydrate
    d. I don't know

11. To decide if a change is needed in Regular insulin taken before supper, which urine/blood sugar test is Most Helpful?
    a. breakfast
    b. supper
    c. evening snack
    d. I don't know

12. One orange may be exchanged for:
    a. 1 banana (medium size)
    b. 1 cup orange juice
    c. 1 small apple
    d. I don't know

13. The bread exchange list contains food high in carbohydrate. One slice of bread may be exchanged for:
    a. 1/2 cup cornflakes
    b. 6 graham crackers
    c. 1 small potato
    d. I don't know

14. One ounce of a high fat meat may be exchanged for:
    a. 1/2 cup creamed cottage cheese
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    a. is unlike the ordinary American diet
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17. The type of food highest in calories per gram is:
    a. carbohydrate
    b. protein
    c. fat
    d. I don't know

18. Foods which may be used "free" on a diabetes exchange
    meal plan are:
    a. foods labeled "dietetic" or "diabetic"
    b. foods which contain 20 calories or less per
       serving
    c. alcoholic beverages
    d. I don't know

APPENDIX D

CORRESPONDENCES

American Diabetes Association

OKLAHOMA AFFILIATE, INC.

6465 SOUTH YALE - SUITE 423
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May 12, 1988

Toni Zemmer, R.D., L.D.
St. Mary's Hospital
305 S. 5th St.
P.O. Box 232
Enid, Oklahoma 73701

Dear Ms. Zemmer,

    Congratulations on your award! The American Diabetes Association, Oklahoma Affiliate is proud to be able to provide you with funding for your project.

    Our Research Committee has recommended a grant in the amount of $3,000.00 to fund your work. Your check will be processed the first of July, the beginning of our new fiscal year. You need to contact our state office at 1-800-722-5448 or 492-3839 and let us know how the check should be made out (specify individual, institution, etc.).

    We look forward to hearing from you and seeing the results of your work!

        Sincerely,

        Ann Richards Ketcham, CFRE, MPA
        Executive Director

cc: LeAnn Olansky, MD

International Diabetes Center
Park Nicollet Medical Foundation

5000 West 39th Street, Minneapolis, Minnesota 55416, U.S.A.
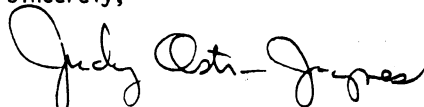
Phone (612) 927-3393

July 14, 1988

Toni Zemmer, R.D., L.D.
St. Mary's Hospital
305 S. 5th Street
Box 232
Enid, OK 73702

Dear Ms. Zemmer:

Thank you for your interest in utilizing our Patient Knowledge Test in your study. You have our permission. For our records I would appreciate a copy of your thesis upon completion.

Best of luck with your work.

Sincerely,

Judy Ostrom Joynes, R.N., M.A.
Vice President
Director of Education

JOJ:cp

WORLD HEALTH ORGANIZATION
Collaborating Center For Diabetes Education and Training

VITA

Toni A. Zemmer

Candidate for the Degree of

Master of Science

Thesis: EFFECTIVENESS OF EXCHANGE LIST CARDS IN THE
DIABETIC EDUCATION PROCESS

Major Field: Food, Nutrition, and Institution
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Biographical

Personal Data: Born in New Orleans, Louisiana,
February 3, 1962, the daughter of Alexander and
Kay Zemmer.

Education: Graduated from Grace King High School,
Metairie, Louisiana, in May 1980; received
Bachelor of Science Degree in Food, Nutrition,
and Institutional Administration from Louisiana
State University in May 1985; completed
Administrative Dietetic Internship from Oklahoma
State University in May 1986; completed
requirements for the Master of Science degree at
Oklahoma State University in July, 1989.

Professional Experience: Clinical Dietitian, Food
Service Department, St. Mary's Hospital, Enid,
Oklahoma, July 1986 to present.