

AN ASSESSMENT OF REGISTERED NURSES'
KNOWLEDGE OF DIABETES MELLITUS

by

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DEDICATION

"Love joins our present with the
past and the future."

--Kahlil Gibran

The author wishes to dedicate this study and the degree for which it is a partial requirement to her mother, Lavilda Parks, who instilled the value of education and supported all pursuits, and to her fiance, Jerry, who inspired confidence through his support and optimism.

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ABSTRACT

This study investigated whether registered nurses who are employed on general medical units were knowledgeable enough about diabetes mellitus to teach diabetic patients and their families. The sample consisted of 40 volunteer subjects from a general hospital. A nurse was considered knowledgeable enough to teach diabetic patients if she could answer all questions correctly on a 30-item multiple choice instrument. A one-page, seven-question biographical data sheet was attached to the questionnaire.

None of the participants answered all questions correctly; four participants were able to answer 26 questions correctly. Only two questions were answered correctly by all participants. The study indicated that registered nurses who care for the majority of hospitalized diabetic patients are not knowledgeable enough to do diabetic teaching.

CHAPTER 1

INTRODUCTION

According to the American Diabetic Association, there are at least ten million known or potential diabetic persons in the United States. Six million are known diabetics, another two million people have diabetes and do not know it, and at least two million will develop diabetes in their lifetime (Guthrie and Guthrie 1977). It is clear that the prevalence of diabetes is increasing with the adoption of Western dietary habits and increased life expectancy (Skillman and Tzagournis 1976).

Diabetes is a chronic disease which cannot be cured but can be controlled by a well-informed, cooperative patient. In diabetes, a tremendous amount of responsibility is necessarily thrust on the patient. He must do his own urine testing, inject his insulin, regulate his activity, choose his diet wisely, and at times, alter his insulin dosage. Thus, such a patient acts as his own laboratory technician, nurse, dietician and even physician (Etzwiler 1962).

The major objective of diabetic management is the promotion of optimal health and metabolic balance. Such

management aims for absence of or minimal glycosuria, relatively normal glycemia and eliminates or decreases the occurrence of acute complications such as hypoglycemia and acidosis and many long-term or chronic complications frequently associated with the disease. Optimal control offers the promise of increased life expectancy with a minimum of complications.

Education of the patient and his family is an essential part of the management of the diabetic. Learning how to cope with disease and how to safely and effectively carry out the required health care actions depend upon the ability of the patient to perform self-care and on the adequacy of his education for this role. The late eminent diabetic authority, Joslin (as cited by Painton 1969, p. 13) stated that, "The diabetic who knows the most lives the longest."

The teaching of patients has been accepted as an integral part of the nurse's function. Nursing educators, nursing leaders, nursing textbooks and nursing organizations all emphasize the role of the nurse in patient education. Pender (1974, p.265) defines the nurse's role as follows:

The nurse bears the primary responsibility for assisting the hospitalized patient to verbalize his learning needs as he sees them and for the identification of additional information needs implied in observable behavior. Since the nurse

has the most extensive contact with the patient, she is also responsible for planning and implementing appropriate formal and informal patient teaching activities to meet the learning needs of each individual patient.

Formal patient teaching involves the presentation of specific planned materials (Monteiro 1964). The teaching situation is purposeful. Teaching methods are specific and often encompass the use of visual aids, demonstration or observation of the patient while he repeats a demonstration. Formal teaching involves considerable advanced planning by the nurse.

In informal patient teaching, the nurse uses patient conversations as the teaching vehicle. Informal teaching is particularly important because it is based on the patient's interests and immediate needs (Monteiro 1964). It should be oriented, however, not only towards his present condition but also towards his future health needs. This type of teaching is the unique opportunity of the bedside nurse. Informal teaching allows the individual clarification and reinforcement of information and materials presented in more formal situations.

The nurse who is attuned to the need for teaching and who accepts teaching as a part of her role can be very useful to patients (Monteiro 1964). Pohl (1965) in a survey of 1500 nurses, who were members of the American Nurses Association from throughout the United States

working in private duty, public health, occupational health or offices, found nurses accept the teaching role as a major responsibility and believe this role to be as important as any other aspect of their work. Of significance, however, is the fact that 37.2 percent (107 cases) of those refusing to answer the questionnaire indicated on followup that they gave direct nursing care but did not teach. Two overall findings with broad implications reported by Pohl were: (1) there is confusion as to what the nurse's teaching role is, and (2) there is marked lack of preparation for this role. Monteiro (1964) notes that in her experience bedside nurses often viewed teaching narrowly as formal instruction and that the opportunity for informal teaching was missed.

There is indeed much evidence that effective consistent patient teaching is not being done by any member of the health team. The Quality Review Bulletin (Cohn and Shanahan 1976), the official publication of the Joint Commission on Accreditation of Hospitals, reports an "abundant" lack of actual practice and documentation of patient education in the audits it has published.

The focus of health care today must necessarily be on illness prevention and health maintenance. A study by Miller and Goldstein (1972) at the Los Angeles County Hospital, found that "preventable admissions" constituted

approximately 50 percent of the admissions to the diabetic service. By creating and implementing a patient education and support program, this figure was reduced to 27 percent. Graber and associates (1977) reporting for the Grady Memorial Hospital in Atlanta stated admissions for diabetic ketoacidosis decreased from over 500 per year to less than 100 per year. Patient education and improved clinical management were believed responsible for the decline. Both hospitals were able to save millions of dollars and patient morbidity and mortality were drastically reduced through these programs.

Other studies indicated the educated patient is a health care resource--he understands efforts to make him better, tends to break health appointments less, is more informative in diagnostic interviews, complies with his therapy and even pays his bills more promptly (Report on the 1974 American Health Congress, 1974).

Many years ago, Joslin (as cited by Painton 1969) established classes for the education of his diabetic patients. He believed the dictum that the diabetic patient has every right to live as long with diabetes as he might expect to live if he did not have diabetes. The diabetic patient should also be able to expect a lifetime of "quality" years. Implied in this definition are infrequent hospitalizations, a limited number of

complications and minor disability. If the patient is to achieve these goals then he must be the recipient of quality education efforts. Quality education requires teachers who are knowledgeable in the field of diabetes care and management.

Statement of the Problem

Do nurses who give direct nursing care to diabetic patients have knowledge of the general basic concepts required for the control and management of diabetes as measured by a diabetes knowledge test?

Statement of the Purpose

The purpose of this study is to assess the diabetes mellitus knowledge base of nurses who work on general medical units and thereby indirectly evaluate their effectiveness as diabetic educators.

Significance of the Problem

One out of every 20 persons in the United States will develop diabetes in his lifetime. It is the fifth leading cause of death in the United States and may precipitate serious complications such as heart disease, stroke, blindness, kidney disease and neuropathy. Diabetes cannot be cured but it can be controlled. To achieve control the patient must be informed and

cooperative as he directly manages his own care. The patient's knowledge of diabetes and its management is essential to his survival.

Assumptions

For the purpose of this study, the following assumptions have been made.

1. Nurses receive basic knowledge about diabetes as a part of their education programs.
2. The teaching of patients has been accepted as an integral part of the nurse's function.
3. Nurses should teach diabetics and their families about the control and management of diabetes.
4. The measuring tool used is one measure of the general basic concepts required for the control and management of diabetes (Collier and Etzwiler 1971).

Definitions of Terms Used

For the purpose of this study, the following definitions of terms were selected.

1. A nurse is a registered nurse who gives direct nursing care to patients; she may be a graduate of any type of basic program-diploma, associate or baccalaurette.

2. Direct nursing care is any service rendered directly to the patient by the nurse. It includes physical, mental and emotional aspects as well as teaching and preparation for home care; it implies direct contact between the nurse and the patient.
3. Patient education is the act or process of providing patients with knowledge, skill, competence or desirable qualities of behavior (Harper 1976).
4. Informal patient education is probably the most important form of patient teaching. It is unplanned, incidental teaching in a quasi-spontaneous response to a patient's statement or question (Monteiro 1964).
5. Formal patient education is purposeful teaching of specific, planned materials that may or may not take place at the patient's bedside (Monteiro 1964).

Theoretical Framework

The theoretical framework for this study is based on Festinger's (1957) theory of cognitive dissonance. The theory is concerned with the relations among cognitive elements and the consequences when the cognitive elements are inconsistent (dissonant) with one another. The

cognitive elements are any knowledge about oneself or one's environment. The basic hypotheses of the theory are:

1. The existence of dissonance, being psychologically uncomfortable, will motivate the person to try to reduce the dissonance and achieve consonance.
2. When dissonance is present, in addition to trying to reduce it, the person will actively avoid situations and information which would likely increase the dissonance.

A nurse's attitude is a composite of particular cognitive elements regarding the role of the health teacher in relation to herself. The attitude evolves from preparation for the teaching role, knowledge about the disease and support structures that facilitate allocation of teaching responsibilities among health professionals. The nurse's cognitive awareness of each of these elements and their interaction will determine consonance or dissonance (see Figure 1).

If the elements are consonant, the nurse's attitude or self-concept is upheld. She is thus secure and displays a behavior compliant with the accepted teaching role for nurses.

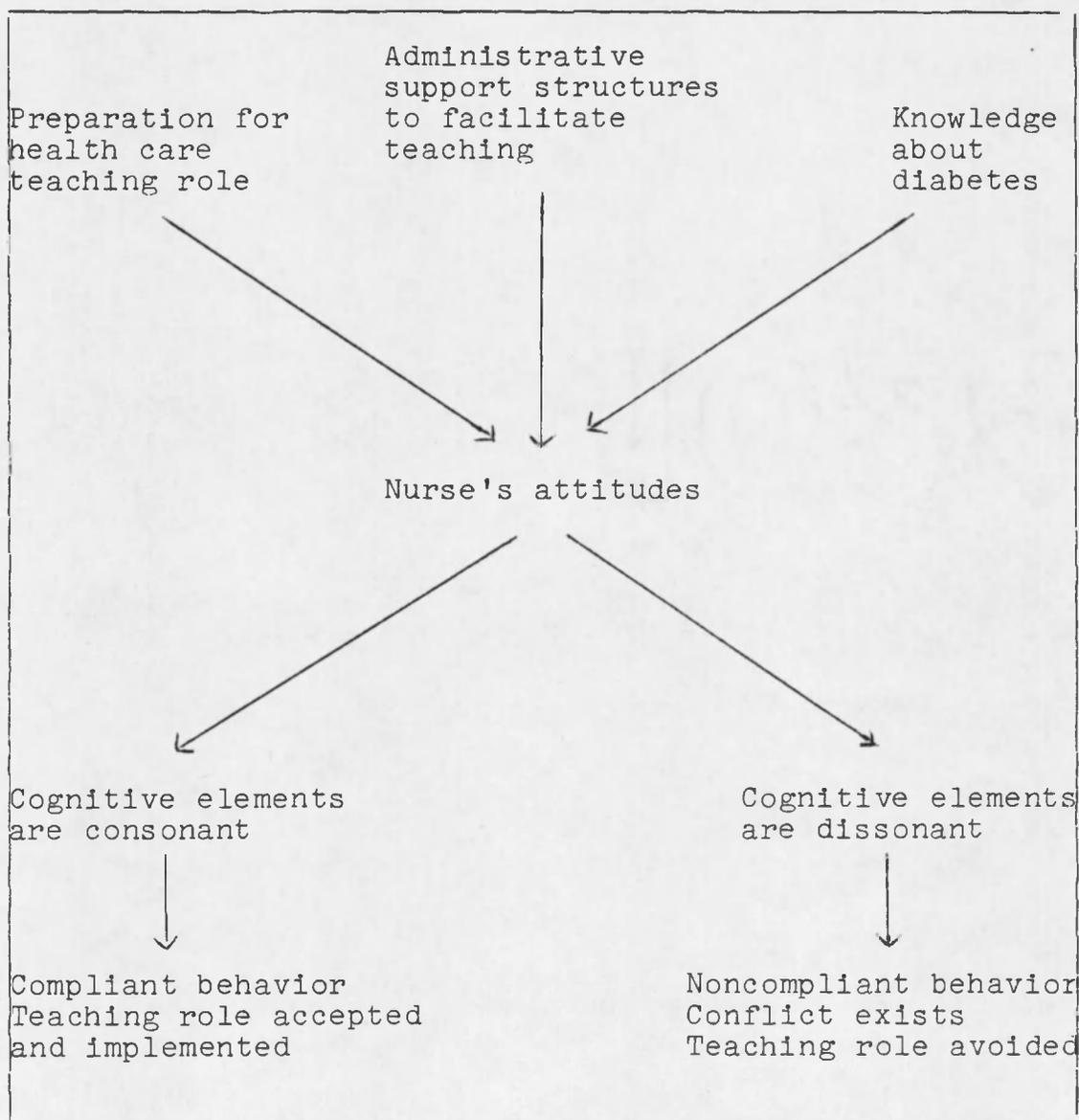


Figure 1. Process of cognitive dissonance theory related to teaching activities of nurses.

If the elements are dissonant, if knowledge about diabetes is lacking, administrative support is lacking or preparation for the teaching role is not provided, behavior is noncompliant and teaching behavior is not exhibited. Aronson (1972) stated dissonance-reducing behavior is "ego-defensive" behavior. By decreasing dissonance a person maintains a positive image of self, an image that depicts one's self as good, smart or worthwhile.

The major element that is missing is knowledge about diabetes. This creates dissonance and the nurse copes by avoiding teaching situations, particularly informal teaching. Knowledge lack can be accounted for because student nurses are not allowed to validate learned content to patient care immediately (Porter 1977). Rogers (1969) stated that learning is facilitated when the learner recognizes the content as being relevant to his own needs. Frequently nursing programs do not provide settings in which theory directly correlates with practice. The nursing student is forced to acquire data for which she does not perceive a need at that time and consequently knowledge is not retained.

CHAPTER 2

REVIEW OF THE LITERATURE

The literature was reviewed for studies indicating nurses' knowledge of diabetes as well as knowledge demonstrated by diabetic patients. Previous studies which have evaluated the knowledge of both these groups would seem to indicate nurses lack the knowledge to adequately educate diabetic patients about the disease process, while the patients' lack of knowledge is inadequate for managing the disease. The patients' lack of understanding of diabetes may stem from poorly informed professional personnel.

The Professional's Knowledge About Diabetes Mellitus

Etzwiler (1967) first proposed that a lack of understanding of the basic fundamental concepts of diabetes mellitus among health professionals may be the contributing factor to inadequate or ineffective patient education. He undertook a study of 289 senior nursing students attending six schools of nursing, who were within four weeks of graduation to determine if they

possessed general knowledge about diabetes. It is assumed these students would be at their peak level of knowledge. Results of the multiple-choice test indicated that eight percent did not realize regular insulin acts rapidly over a short period of time and 14 percent did not know Lente, PZI and NPH act more slowly over a longer period of time. Thirty-two to 44 percent could not comprehend relationships between diabetes, exercise, activity and illness. Over 44 percent did not know that if a diabetic patient who routinely uses insulin becomes ill and cannot eat his prescribed diet, he must continue to take insulin. Knowledge of urine tests for sugar and interpretations of these results were reasonably good when Clinitest tablets were used, but 71 percent were unfamiliar with Tes-Tape results.

Answers to the ten diet questions covering dietary aspects of diabetes indicated less than one-half of the graduating nurses possessed a basic understanding of diabetic dietary principles. Fifty-five percent did not regard a diabetic diet as a well-balanced diet that the whole family can use. Less than one-half of the group could make proper exchanges when given three foods from which to choose, and 72 percent could not give the number of calories contained in one whole milk exchange.

Stern (1970) found strikingly similar results. He administered the questionnaire prepared by Etzwiler (1967) to 137 senior nursing students, licensed practical nurses, student practical nurses, registered nurses and dieticians. The questionnaires were administered in the south central location of the country so the geographic distribution of the respondents was completely different from Etzwiler's sample. Some of the results included: 34.3 percent did not know that acetone in the urine requires more insulin and 19 percent did not know acetone in the urine was a bad sign. He found nurses did extremely poorly on the questions related to diet.

Feustel (1976) studying 144 baccalaureate senior student nurses in a south central metropolitan area found only 4.9 percent answered questions on control correctly, only 1.4 percent answered nutrition components correctly. None of the participants in the study were able to answer all 34 items about diabetes correctly, therefore, none of the students were judged knowledgeable enough about diabetes mellitus to teach diabetic patients and their families. Feustel used a revised edition of the questionnaire utilized by Etzwiler (1967) and Stern (1970).

The Diabetic's Knowledge of the Disease

Beaser (1956) questioned a total of 238 diabetics using a standard ten question, multiple-choice test to

evaluate patients' knowledge of diabetes. The results showed that all were distinctly deficient in their knowledge about the disease. This study demonstrated that both old and new diabetics were equally in need of education. Both groups have their share of misconceptions about the disease.

Stone (1961) reported 126 of 160 patients had failed to achieve good control when first seen in clinics at the University of Iowa Hospital. Usually they were poorly regulated because they did not adhere to the prescribed diet. In this series, four features appeared to accompany unsatisfactory control: ignorance about the diabetic routine, social or environmental difficulties, emotional problems and refusal of control. In this study, Stone was able to demonstrate that 83 of 126 patients with fair and poor control did not know enough about the diabetic routine. After instruction, 43 of 83 patients demonstrated good control. Of the remaining 40, four were judged unable to learn while 36 "defied" efforts to teach.

Etzwiler and Sines (1962) evaluated knowledge level of parents whose children were attending a diabetic camp. A total of 62 mothers and 53 fathers completed the multiple-choice test on diabetes. Scores showed that

only 40 percent of the mothers could give 14 or 15 correct answers out of 15 fundamental questions about the disease. Another 28 percent of the mothers could answer only 12 or 13 questions correctly. Only 26 percent of the fathers managed to achieve a score of 14 or 15 on the test, and another 32 percent could answer 12 or 13 correctly. Since the test was designed to test only gross concepts of diabetes, a perfect or near perfect score was expected.

Williams and others (1967, p. 450) measured diabetics' knowledge and assessed management and control. In a study sample of 86 patients referred from metabolic clinics in two North Carolina University Hospitals, he found 70 percent of diabetic patients taking insulin were in poor control. Poor control was defined as,

1-3 insulin reactions per month, or weight 10 percent above or 20 percent below average, or 50 percent of blood sugars over 250 mg %, or more than 33 percent of urine sugars greater than 2+.

He also found patients' knowledge about diabetes was quite variable. Knowledge was measured by 18 true-false and multiple-choice questions dealing with cause, insulin, diet, activity, urine tests and need for special foot care. Williams et al. was able to demonstrate a positive correlation between knowledge and performance, i.e., the

more the patient knows about his disease, the better he carries out the recommended therapy.

Watkins et al. (1967) in a study of 60 diabetic patients from two metabolic clinics sought to determine the relationships among knowledge, management, and control of the disease. The patients were observed and interviewed in their homes and were rated on management of insulin, urine testing, diet, foot care, and disease control. Thirty-one patients made errors in insulin dosage; 27 used urine tests in a way which would probably affect control adversely; 44 had meals and spacing of meals unacceptable for diabetics; 31 carried out poor foot care. Those who knew more about diabetes were able to manage better. It was also found that the longer they had the disease, the more insulin errors they made.

In 1968, McDonald of the U.S. Public Health Service reported findings based on the National Health Survey of 1800 diabetics. He found a drastic deficit in patient knowledge in the area of food and nutrition. In his study, 77 percent of all patients with diabetes were on some form of dietary management but only approximately ten percent had a good comprehension of what this constituted.

Collier and Etzwiler (1971) tested knowledge levels of 129 diabetic children and 141 of their parents.

The areas of knowledge assessed were general concepts of diabetes, insulin effects, levels of control symptoms, urine testing procedures and nutritional components. A multiple-choice questionnaire was used. Responses to the items included under general knowledge, which are critical in control of the disease, indicated failure to recognize symptoms associated with the development of acidosis. Greater than 50 percent of the children and 27.7 percent of the parents did not know rapid breathing and nausea were also symptoms of acidosis. Broad concepts of the various time actions of insulin were not well comprehended nor were sick day rules. Understanding and comprehension of dietary items in general were poor, particularly among the teenagers who are primarily responsible for their food intake away from home. Parents generally scored higher than the children.

CHAPTER 3

METHODOLOGY

The study was descriptive in nature and was designed to describe nurses' knowledge of basic concepts of diabetes mellitus. This chapter presents the research design, the sample selection, and the development of the tool for data collection.

Research Design

The study utilized a questionnaire for data collection. Nurses who agreed to participate were asked to sign an approved consent form prior to administration of the questionnaire (see Appendix A).

Protection of Human Rights

Permission to conduct the study was obtained from the Human Subjects Committee of The University of Arizona (see Appendix A) and also the department of staff development and administration of the clinical facility used in the study.

Only persons who consented to participate in this study were used. The purpose of the study was explained to each participant and each was assured she could

withdraw from the study at any time and that refusal to participate would not affect employment status. The confidentiality of the information was insured by coding the questionnaires.

The Study Sample

The population for this study consisted of registered nurses employed as staff nurses on general medical units of a southwestern urban general hospital. Four separate nursing units were used with 48 available registered nurses. Of these, 40 agreed to take the Diabetes Knowledge Test (Appendix B) and signed the subject consent form. A 40-minute time limit was set for completion of the questionnaire. In actuality, no participant required longer than 15 minutes for completion of the test.

Registered nurses who had formal advanced educational preparation in the teaching of diabetes or who participated as a member of a formal diabetic teaching team or who had an immediate family member who was diabetic were excluded from the study. Five participants had diabetic family members. Their questionnaires were excluded from the main data analysis.

Research Tool

A questionnaire developed by Etzwiler (1967) to determine knowledge of dieticians and senior nursing students and revised by Collier and Etzwiler (1971) was used. Certain revisions were made by the researcher to reflect changes in diabetic management. A discussion of the changes follows.

A total of four questions were eliminated from Collier and Etzwiler's (1971) questionnaire. Their original questionnaire included two questions which asked the number of units in one-half cc of U-80 and U-40 insulin, respectively. Current medical practice is to use U-100 insulin; therefore, a single question concerning the number of units in one-half cc of U-100 insulin was substituted.

A series of questions in the original questionnaire sought to evaluate the nurse's knowledge of urine tests using various products. Because two of these questions concerned a product not utilized by the clinical facility where the study was conducted, these questions were eliminated.

A final question concerning a description of vegetables was also eliminated. Although the question was accurate in its content according to the Exchange Lists for Meal Planning (1976) published by the American

Diabetic Association, the question did not reflect current practice in the clinical facilities so it was felt the question might be misleading.

With the exclusion of the questions described above, the Diabetes Knowledge Test consisted of 30 items intended to assess specific knowledge of basic fundamentals of diabetes and certain aspects of its management (see Appendix B). The questionnaire contained five questions on general concepts of diabetes, six on level of control of diabetes, six questions on insulin effects, four on urine testing and nine questions on the nutritional components of the diabetic diet. A nurse was considered knowledgeable enough to teach diabetics or their families if she answered 30 items correctly. Etzwiler (1967) and Feustel (1976) determined this criterion measure for the purpose of their studies.

Since there were no measurements of validity with respect to this tool, the questionnaire was evaluated by a diabetic nurse educator, a diabetic nurse clinician and a registered dietitian to establish content validity. Content was validated when two of the three diabetic experts agreed upon the appropriateness of the questions and answers. The changes recommended by these experts are described below.

In the original questionnaire, Item 1 read, "The usual cause of diabetes is: 'failure of the pancreas to make enough insulin.'" The diabetic experts concluded this response did not accurately describe the adult onset diabetic who has a glucose intolerance, the cause of which is unclear. A more appropriate answer was considered to be "failure of insulin to control blood sugar levels."

The responses in Item 3 were changed from "increased" for response (a) to "higher than normal" and from "decreased" for response (b) to "lower than normal." The question sought to describe the amount of blood sugar in uncontrolled diabetes and the latter answers were believed to offer clarity.

Item 7 originally read "an insulin reaction or insulin shock" as if the two were different situations. To clarify the question, it was made to read "an insulin reaction is caused by:."

Item 8 on routine urine tests for sugar had a correct answer that stated urine tests should be made "just before meals." The insulin dependent diabetic, however, must also test his urine at bedtime so the correct response was made to read "just before meals and before bedtime."

In Item 13, the correct response previously read "as diabetics become older they may have poor circulation of the blood in their feet." Because the circulatory problems are not limited to the feet and because it is the inadequate circulation which results in poor tissue healing, the response was felt to be clearer if it read, "decreased circulation results in poor tissue healing."

Item 14, which focused on the insulin dependent mildly ill diabetic who is unable to eat his prescribed diet, did not consider the necessity of medical supervision. It was the belief of each of the experts that a diabetic should recognize the need for physician supervision when he is unable to eat so the phrase "and call his physician" was added to each response.

Item 16 which read "The presence of acetone in the urine of a diabetic indicates:" was changed to read "The presence of acetone with sugar in the urine of a diabetic indicates:" because the former did not exclude the starvation state.

Item 28 sought the number of calories in a milk exchange. Because the sample consisted only of nurses, it was concluded that knowledge of what constitutes a milk exchange was more relevant. The question was stated: "One milk exchange contains: (a) 1 cup skim milk, (b) 1/2 cup yogurt, (c) 1 cup whole milk, (d) I do not know."

Item 30, which sought a substitute for one slice of bread, contained two correct answers so one of these answers was changed from 3/4-cup cornflakes to 1 cup of spaghetti, which was a more acceptable distractor.

The questionnaire was pretested with ten registered nurses who met the criteria for inclusion in the study. Item analysis was computed for each test question to determine reliability. The index of difficulty ranged between .33 and 1. Fourteen items had a difficulty index of 1. The discriminating power ranged from 0 to +.66. The questionnaire was used in its final form.

Data Collection

Permission to perform the study was obtained from the appropriate persons in the hospital where the study was conducted. The researcher administered the Diabetes Knowledge Test (Appendix B).

After receiving permission to conduct the study, the researcher contacted the supervisor nurse on the general medical units which employed nurses who met the criteria for inclusion in the study. The researcher administered the test to the nurses on their regular tour of duty at a time which was mutually convenient to the supervisor nurse and the staff nurse.

Data Analysis

Frequency distributions of total scores and percentages of total number of correct answers per information subgroup were computed. Frequency distribution within each subgroup was inspected to determine the consistency of the overall distribution of the subgroup. The index of difficulty of each item was calculated yielding ordinal data.

CHAPTER 4

ANALYSIS OF DATA

The findings and the analysis of data collected by the Diabetes Knowledge Test are presented in this chapter. The basic demographic data of participants obtained from the biographical data page are presented in the first section. The results of the questionnaire are presented in the second section.

Demographic Data of Participants

The participant group consisted of 40 registered nurses, all female, employed on general medical units of a southwestern hospital. Their ages ranged from 21 years to 64 years with a mean age of 33 years. The years of nursing experience varied from a few days to 34 years, with 7.42 years being the mean. Four of the participants had a few days' nursing experience and two others had only a few months. Each had taken State Board Examinations.

Of the three types of educational programs for the registered nurse, 47.5 percent of those participating in the study held associate degrees. Another 30 percent

held baccalaureate degrees and 22.5 percent had graduated from diploma programs (see Table 1).

Table 1. Educational preparation of participants.

Type of Program	Participants (N = 40)
	%
Associate Degree	47.5
Diploma	22.5
Baccalaureate	30.0

All participants were employed greater than 20 hours per week. Of these participants 25 percent were new employees of the clinical facility while 75 percent were former employees who had had the opportunity to participate in educational programs about diabetes mellitus developed by the institution. No participant had attended formal educational programs about diabetes.

Although all participants were employed on general medical units where presumably they had contact with diabetic patients and opportunities for diabetic education, ten percent stated they did not participate in diabetic education. Another 7.5 percent indicated they did not participate in diabetic education but these respondents also had only a few days of nursing experience. Presumably one of the participants with limited experience had participated in diabetic education as a student since she indicated participation on the biographical data form. The remaining 82.5 percent of the respondents indicated they did participate in diabetic education. One person stated this was rare, however.

There were 12.5 percent (five cases) of the participants who had immediate family members who were diabetic. Their questionnaires were excluded from the main data analysis.

Diabetes Knowledge Test

Only two of the 30 questions were answered correctly by all 35 participants; all knew the usual cause of diabetes and that a diabetic who feels he is beginning to have an insulin reaction should immediately eat some sugar. Data on the percentage of participants answering each question correctly are presented in

Table 2. Data on the number and percentage of participants who gave correct answers are presented in Table 3. Two nurses answered only 17 questions correctly while four nurses were able to answer 26 correctly. No participant answered greater than 26 of the questions correctly. The median percent of correct answers was 70.3 or 21 questions while the mean was 71.8 percent, also 21 questions.

Frequency distributions of the percentage of total number of correct answers given by nurses according to information subgroup was computed. The five questions on general concepts were answered correctly by 74.3 percent of the respondents (Table 4); 40 percent correctly answered all questions on insulin effects (Table 5). The question which caused the most difficulty for the respondents asked when the maximum effect of Lente and NPH insulin occurs. Twenty-three percent of the respondents did not know that the maximum effect of regular insulin occurs rapidly, within one to three hours.

Only five percent of the participants were able to answer the six questions on level of control correctly (Table 6). Only 45.7 percent knew that "too much insulin" is usually not associated with acidosis while 95 percent knew chest pain was not associated with acidosis.

Table 2. Percentage of participants answering each question correctly.

Question	N	Percent
1	35	100.0
2	33	94.3
3	33	94.3
4	34	97.1
5	31	88.6
6	35	100.0
7	31	88.6
8	33	94.3
9	20	57.1
10	30	85.7
11	27	77.1
12	21	60.0
13	34	97.1
14	22	62.9
15	16	45.7
16	25	71.4
17	16	45.7
18	33	94.3
19	26	74.3
20	22	62.9
21	20	57.1
22	14	40.0
23	28	80.0
24	30	85.7
25	32	91.4
26	12	34.3
27	9	25.7
28	22	62.9
29	14	40.0
30	10	28.6

Table 3. Number and percentage of participants who gave correct answers to questions on Diabetes Knowledge Test.

Total Correct Answers	N*	Percent
1-16	-	-
17	2	6.3
18	2	6.3
19	3	9.4
20	6	18.8
21	5	15.6
22	4	12.5
23	1	3.1
24	3	9.4
25	2	6.3
26	4	12.5
27-30	-	-

* Three participants did not answer all questions.

Table 4. Number and percentage of participants who correctly answered questions (1, 3, 4, 10, 13) on general concepts of diabetes.

Total Correct Answers	N	Percent
1	-	-
2	-	-
3	-	-
4	9	25.7
5	26	74.3
Total	35	100.0

Table 5. Number and percentage of participants who correctly answered questions (2, 5, 6, 7, 11, 12) on insulin effects.

Total Correct Answers	N	Percent
1	-	-
2	1	2.9
3	-	-
4	8	22.9
5	12	34.3
6	14	40.0
Total	35	100.0

Table 6. Number and percentage of participants who correctly answered questions (9, 14, 15, 16, 17, 18) on level of control of diabetes.

Total Correct Answers	N	Percent
1	1	2.9
2	4	11.4
3	8	22.9
4	13	37.1
5	7	20.0
6	2	5.7
Total	35	100.0

One participant was only able to answer one question of the six correctly.

Regarding urine testing procedures, eight nurses answered all four questions correctly while one was only able to answer one question correctly (Table 7). Three participants did not answer all of the questions in the subgroup. With regards to the diabetic who uses insulin and finds his urine checks are constantly testing brown 22.5 percent of the respondents marked "I don't know" rather than speculate on the necessary adjustment to the insulin dose.

Table 7. Number and percentage of participants who correctly answered questions (8, 19, 20, 21) on urine testing procedures.

Total Correct Answers	N	Percent
1	1	3.1
2	8	25.0
3	15	46.9
4	8	25.0
Total	32*	100.0

* Three participants did not answer all four questions in this subgroup.

No participant was able to answer all nine questions on diet correctly (Table 8). Seven of the nurses were able to answer seven questions correctly while one participant could only answer one question correctly. One participant did not answer any of the questions on nutritional components.

The consistency of each subgroup was inspected by examining the frequency distribution of individual items within each subgroup. The questions concerning level of control (Table 9) appeared consistent.

Table 8. Number and percentage of participants who correctly answered questions (22 through 30) on nutritional components.

Total Correct Answers	N	Percent
1	1	2.9
2	-	-
3	4	11.8
4	8	23.5
5	7	20.6
6	7	20.6
7	7	20.6
Total	34*	100.0

* One participant did not answer any of the nutritional component questions.

Table 9. Frequency distribution of questions on general concepts.

Question	Percent Answering Correct
1 (cause of diabetes)	100.0
3 (blood sugar in uncontrolled diabetes)	94.3
4 (complication of diabetes)	97.1
10 (units in one-half cc insulin)	85.7
13 (circulatory effects of diabetes)	97.1
Total	(Mean) 94.9

Correct answers ranged between 85.7 percent correct and 100 percent. The mean for this subgroup was 94.9 percent correct.

Data in Table 10 presents the frequency distributions of the items on insulin effects. The percent of respondents answering correctly ranged between 60 and 100 percent. The two questions on insulin action times posed difficulty for the respondents while those dealing with the effect of insulin and cause, symptom and action to take in the event of an insulin reaction were answered by at least 88.6 percent of the respondents. The mean for this subgroup was 84.8 percent.

Table 10. Frequency distribution of questions on insulin effects.

Question	Percent Answering Correct
2 (effect of insulin)	94.3
5 (symptom of insulin reaction)	88.6
6 (action with insulin reaction)	100.0
7 (cause of insulin reaction)	88.6
11 (action time of regular insulin)	77.1
12 (action time of Lente and NPH)	60.0
Total	(Mean) 84.8

The questions in the subgroup on level of control (Table 11), although more difficult for the respondents, appeared consistent. The mean for this subgroup was 62.9 percent. Percent correct answers clustered within 17 percent of this mean except for one question on symptoms associated with acidosis. This question was answered correctly by 94.3 percent of the respondents. It is a question which might have been more appropriate placed in the subgroup on general concepts.

Table 11. Frequency distribution of questions on level of control.

Question	Percent Answering Correct
9 (daily activity and insulin dosage)	57.1
14 (mildly ill diabetic)	62.9
15 (effect of illness on insulin dose)	45.7
16 (insulin need related to acidosis)	71.4
17 (factors associated with acidosis)	45.7
18 (symptoms associated with acidosis)	94.3
Total	(Mean) 62.9

The questions on urine testing procedures (Table 12) were answered correctly by a mean of 73.4 percent of the respondents. One question dealing with urine testing times was answered correctly by 94.3 percent of the respondents. In the process of establishing content validity, the answer to this question was strengthened by the addition of the phrase "and before bedtime" but no changes were made in the distractors. The change may have made the answer more apparent.

Table 12. Frequency distribution of questions on urine testing procedures.

Question	Percent Answering Correct
8 (urine testing times)	94.3
19 (color produced by the presence of acetone)	74.3
20 (implication of Diastix testing brown)	62.9
21 (implication of Clinitest testing blue)	57.1
Total	(Mean) 73.4

The percent of respondents answering questions on nutritional components is presented in Table 13. The mean for the subgroup was 55.9 percent with the percent of correct answers ranging between 28.6 and 91.4 percent. This subgroup was the least consistent. Consistency would be improved by dividing the nutritional components into two subgroups. The first four questions of the subgroup are concerned with general dietary concepts while the latter five questions pertain to dietary exchange principles.

Table 13. Frequency distribution of questions on nutritional components.

Question	Percent Answering Correct
22 (diabetic diet)	40.0
23 (diabetic diet prescription)	80.0
24 (diabetic diet and food exchanges)	85.7
25 (calories in diabetic diet)	91.4
26 (milk exchange)	34.3
27 (meat exchange)	25.7
28 (bread exchange)	62.9
29 (fruit exchange)	40.0
30 (meat exchange)	28.6
Total	(Mean) 55.9

Additional Information

Five participants who volunteered to participate had family members who were diabetic so their questionnaires were excluded from the data analysis presented above. Data in Table 14 presents a comparison of total scores and scores by information subgroup of those participants who did not have diabetic family members with those who did. Those participants who had family members who were diabetics scored higher than participants who did not have diabetic family members in all five subgroups and their total scores were also higher.

Participants with diabetic family members answered 82 percent of all questions on the questionnaire correctly while participants without diabetic family members were only able to answer 71.7 percent of the questions correctly.

Four of the participants had only a few days of nursing experience while two had only a few months. Each of these participants would have taken State Board Examinations during the last available offering. Because of their lack of experience their performance on the questionnaire could be expected to be more like that of a senior nursing student. The performance of these six individuals was, therefore, compared with the participants

Table 14. Number, mean and standard deviation for participants with diabetic family members and participants without diabetic family members.

Participants	Questionnaire Subgroup	N	Mean Percent Correct Answers	S.D.*
With diabetic family	General Concepts	5	100.0	0
Without diabetic family		35	94.8	8.9
With diabetic family	Insulin Effects	5	86.7	13.9
Without diabetic family		35	84.8	15.8
With diabetic family	Level of Control	5	70.0	13.9
Without diabetic family		35	62.8	19.4
With diabetic family	Urine Testing Procedures	5	95.0	11.2
Without diabetic family		32**	73.4	20.0
With diabetic family	Nutritional Components	5	71.1	14.9
Without diabetic family		34**	55.9	16.7
With diabetic family	Total	5	82.0	1.8
Without diabetic family		32**	71.7	9.0

* S.D. = Standard Deviation.

** Number accounts for those participants who did not answer all items on the questionnaire.

who had at least eight months of experience. The mean years of experience of this latter group was 9.2 years. The mean test score in percent and standard deviation of those participants with limited experience is compared with those participants who had greater than eight months' experience in Table 15. Those participants with limited experience were able to score higher on general concepts while those participants with experience scored higher in the four remaining subgroups and in their total score. The mean percent of correct answers by the participants with experience was 74.1 percent while those with limited experience answered 67.7 percent correctly. The subgroup which showed the widest range of means was that of urine testing procedures. The mean for the participant group with experience was 79.8 percent while the participant group with limited experience was 58.3 percent. It can be speculated the lower score resulted from lack of familiarity with the products named in the questionnaire.

The test results were not compared on the basis of education background because the dates of graduation varied so tremendously. The range of graduation dates was between 1937 and 1978. The intervening variables were believed too numerous to allow reliability of the data that would have resulted.

Table 15. Number, mean and standard deviation for participants with limited nursing experience compared with those who had greater than eight months' experience.

Participants	Questionnaire Subgroup	N	Mean Percent Correct Answers	S.D.*
With experience	General Concepts	34	95.3	8.6
Without experience		6	96.6	8.1
With experience	Insulin Effects	34	85.7	15.4
without experience		6	80.5	16.3
With experience	Level of Control	34	64.7	19.5
Without experience		6	58.3	13.9
With experience	Urine Testing Procedures	31**	79.8	17.5
Without experience		6	58.3	25.8
With experience	Nutritional Components	33**	58.5	17.4
Without experience		6	53.7	16.3
With experience	Total	31**	74.1	8.7
Without experience		6	67.7	9.8

* S.D. = Standard Deviation.

** Number accounts for participants who did not answer all items on the questionnaire.

CHAPTER 5

INTERPRETATION OF FINDINGS

The purpose of this study was to assess the diabetic knowledge base of registered nurses who work on general medical units and are, therefore, patient educators of the diabetic and his family. The nurse's knowledge of general basic fundamentals of diabetes and certain aspects of its management were measured by a 30-item multiple choice Diabetes Knowledge Test (Appendix B).

Discussion of the Findings

The participants demonstrated knowledge of general concepts by answering 94.9 percent of the questions in this subgroup correctly. Knowledge of insulin effects was diminished slightly; a mean of 84.8 percent of these questions were answered correctly. The question concerning the maximum effect of Lente and NPH insulin offered the greatest difficulty with only 60 percent of the respondents knowing its effect was moderate within 8 to 12 hours. Only 77.1 percent knew regular insulin works rapidly within one to three hours. The staff nurse frequently teaches the patient how to give his insulin

injections and utilizes regular insulin in crisis situations. If this same nurse is unaware of the action time of either of these drugs, can she effectively prepare the patient for his independent use of the drug or effectively observe the patient's reaction to the drug she administered?

Urine testing procedures were less known than information concerning general concepts or insulin effects. Only 73.4 percent of these questions were answered correctly. The times to perform urine testing procedures posed no difficulty but the meaning of color results was not known. It should be mentioned that several respondents stated these questions were unfair because neither the nurse nor the patient report test results in terms of color. Reports are more properly made in terms of negative or degrees of positive. The questions may have tested knowledge more accurately if this terminology were used in the questionnaire.

The participants had even greater difficulty with the questions on level of control. As a subgroup only 62.8 percent of these questions were answered correctly. Only 57.1 percent of those responding knew that if a diabetic increases his activity after several months of relative inactivity his daily insulin dosage will probably decrease. Only 45.7 percent knew the ill

diabetic frequently requires more insulin and the same number did not know that illness and too little insulin are associated with acidosis. All of the above mentioned control factors, effect of activity on insulin, effect of illness on insulin and factors associated with acidosis, are of importance to the hospitalized diabetic and have relevance to the nursing plan of care and teaching plan.

With a majority of the respondents demonstrating lack of knowledge of the concepts, it is questionable if the care plan or teaching plan can encompass these patient needs. The ill diabetic at home must also have an understanding of these concepts if he is to prevent unnecessary complications. However, 37 percent of the respondents did not know how the mildly ill diabetic at home should alter his present plan of care. The nurse who is unknowledgeable of these concepts cannot effectively answer patient's questions or prepare the patient for home management on sick days.

Knowledge of nutrition components was less than any of the five subgroups. A mean of 55.9 percent of the questions were answered correctly. Only 40 percent of the respondents recognized the diabetic diet to be a well-balanced diet that the whole family can use. A lack of knowledge of this concept has implications regarding

patient compliance to the diet as well as health teaching concepts regarding nutrition in general.

Less than 40 percent of the respondents were able to name a milk, fruit or meat exchange. The bread exchange posed the least problem for respondents with 62.9 percent answering the item correctly. At the clinical facility used for this study, diet instruction is considered the exclusive domain of the dietician. However, the nurse in her informal teaching role must be able to demonstrate some knowledge of the exchange system.

Those participants who had diabetic family members appeared somewhat more knowledgeable than participants who did not have diabetic family members. The questions on urine testing procedures showed the greatest difference in the mean percent of correct answers. The participants who had diabetic family members answered 95 percent of the questions correctly while only 73.4 percent of the respondents without diabetic family members answered these items correctly. The question remains as to how accurately this set of questions actually measured knowledge.

The difference in knowledge between new graduates and experienced registered nurses is very slight. The differences in the means did not exceed six percent except regarding urine testing procedures. A lack of

experience might mean such procedures have not been performed. Learning color of test results may require validating such knowledge in the practice setting.

None of the participants in the study were able to answer all 30 questions about diabetes correctly; therefore, none of the participants can be judged knowledgeable enough about diabetes mellitus to teach diabetics and their families. The mean percent of correct answers was 71.8. Etzwiler (1967), Stern (1970) and Feustel (1976) concluded that graduated nursing students were not adequately prepared to do diabetic teaching. This study supports their findings by showing registered nurses and new graduates, who had not received State Board results, also lack knowledge of basic fundamental concepts of diabetes and certain aspects of its management.

Conclusion

Patient education is a process involving a partnership between patients and members of the health care team. The partnership requires a patient that is willing to build and rebuild skills and knowledge and a health care team member who is knowledgeable of the disease process and its management.

The teaching of patients is an integral part of the nurse's role. She not only has the opportunity for

planning and coordinating formal education but also has the unique opportunity for informal patient teaching. Informal patient teaching is probably the most important kind of patient education because it focuses on the patient's expressed needs and questions.

This study proposed that registered nurses did not participate in diabetic patient education because their lack of knowledge created cognitive dissonance and as a result they avoided teaching, especially informal, opportunities. The study does appear to support the belief that nurses lack knowledge of basic fundamentals of diabetes and certain aspects of its management. Knowledge about insulin action times, urine testing procedures, level of control and nutritional components is lacking. Overall only 71.8 percent of the questions were answered correctly. A nurse cannot adequately prepare a patient to manage his disease at home if she lacks knowledge about the disease and its management. The sample population is recognized to be too small to be overwhelmingly conclusive.

Although lacking in knowledge a majority (82.5 percent) of the participants stated they did diabetic patient education. Conversations with the nurses would seem to indicate this teaching is formal and depends primarily on prepared visual aids and printed matter.

The study did not measure actual teaching practice.
The study also did not measure administration support to teaching activities or preparation for the teaching role.

Recommendations

The recommendations based on this study are as follows:

1. Repeat the study using:
 - a. A larger sample population.
 - b. Members of formal diabetic teaching teams for the sample population.
 - c. The same sample population but in a clinical facility which employs a diabetic teaching team.
2. Design a study which measures:
 - a. Preparation for the health care teaching role.
 - b. Administration support for patient education.
 - c. Actual teaching practice, both formal and informal.

CHAPTER 6

SUMMARY

Health care in the United States is undergoing vast changes. The need to decrease health care costs requires the patient with a chronic disease like diabetes mellitus to assume an active participating role in the control of the disease and maintenance of health. If the patient is to be effective in this role, he must be educated and prepared to assume these responsibilities.

The primary patient educator is the nurse who because of her role has the most contact with the patient. A knowledgeable prepared nurse utilizes opportunities for informal and formal patient education.

This descriptive study was designed to assess the diabetes knowledge base of registered nurses who work on general medical units where diabetic patients are hospitalized and are, therefore, diabetic educators of the patient and his family.

Festinger's (1957) theory of cognitive dissonance provided the theoretical basis for the study. Knowledge lack was believed to create cognitive dissonance which resulted in the nurse avoiding teaching situations.

The study sample consisted of 40 registered nurses employed as staff nurses on general medical units in a general hospital. Five nurses' questionnaires were excluded from the main data analysis because they had immediate family members who were diabetic. The nurses' knowledge of general basic fundamentals of diabetes and certain aspects of its management were measured by a 30-item multiple choice Diabetes Knowledge Test (see Appendix B).

Frequency distributions of total scores and percent of total number of correct answers per information subgroup was chosen for data analysis. The results of the data analysis indicated that greater than 85 percent of the questions on general concepts and insulin effects were answered correctly, although less than 77 percent knew the action time of Lente, NPH or regular insulin. Less than 73.4 percent of the questions on urine testing procedures and level of control were answered correctly while less than 55 percent answered the items on nutritional components correctly. Participants were not able to answer greater than 26 of the 30 items correctly.

Recommendations for further study include repeating the study using a larger sample, repeating the study using members of diabetic teaching teams for the sample

population, repeating the study in a facility which utilizes a formal diabetic teaching team, designing a study which measures administration support for patient education, designing a study which measures preparation for the health care teaching role and designing a study which measures actual teaching practice, both formal and informal.

APPENDIX A

LETTERS OF CORRESPONDENCE AND CONSENT FORM



THE UNIVERSITY OF ARIZONA

TUCSON, ARIZONA 85724

HUMAN SUBJECTS COMMITTEE
Arizona Medical Center 2305

Telephone: 882-6721 or 882-7575

July 21, 1978

Ms. Kae Diane Parks
College of Nursing
Arizona Health Sciences Center

Dear Ms. Parks:

We are in receipt of your project entitled, "An Assessment of Registered Nurse's Knowledge of Diabetes Mellitus," which was submitted to the Human Subjects Committee. Before approval can be granted, the following additions to the consent form must be made:

1. Please entitle the form, "Subject's Consent Form".
2. Please add a subject's signature line. (You have included two witness' signature lines, but not a subject's signature line.)

As soon as we have received the above requested changes, we will be able to expedite the processing of your request for approval.

Sincerely yours,

A handwritten signature in cursive script that reads "Patricia A. Davis".

Ms. Patricia A. Davis
Human Subjects Committee Assistant

Enclosure



THE UNIVERSITY OF ARIZONA

TUCSON, ARIZONA 85724

HUMAN SUBJECTS COMMITTEE
Arizona Medical Center 2305

Telephone: 882-6721 or 882-7575

August 3, 1978

Ms. Kae Diane Parks
3660 East 3rd
Apartment T-14
Tucson, Az. 85716

Dear Ms. Parks:

I have reviewed your project entitled, "An Assessment of Registered Nurse's Knowledge of Diabetes Mellitus," which was submitted to the Human Subjects Committee and concur in the opinion of the Departmental Review Committee that this is a minimal risk project. Therefore, administrative approval is granted effective August 3, 1978, with the understanding that no changes will be made in the procedures followed or the questionnaire used (copies of which we have on file) without the knowledge and approval of the Human Subjects Committee or the Departmental Review Committee. Any physical or psychological harm to any subject must also be reported to each committee.

Sincerely yours,

A handwritten signature in cursive script that reads "Milan Novak".

Milan Novak, M.D., Ph.D.
Chairman
Human Subjects Committee

MN:pd

xc: Ada Sue Hinhaw, Ph.D.
Departmental Review Committee

Subject's Consent Form

A study, "Assessment of Registered Nurses' Knowledge of Diabetes Mellitus," is being conducted. The purpose of the study is to assess Registered Nurse's knowledge of diabetes mellitus. The study requires completion of a 30-item questionnaire and a one-page report form of biographical data. The testing should require approximately 40 minutes.

Registered nurses who are employed on general medical units will be asked to participate because it is believed these nurses are basic diabetic educators in informal teaching situations. The questionnaire will be administered on the unit of the nurse's employment at a time convenient to the participant and nursing administration.

Participation in this study is voluntary. Participation or refusal will have no effect on employment status. The study will serve to benefit participants by updating their knowledge of diabetes for the purpose of improved patient education.

All the information given will remain confidential and will not appear on any of the questionnaires nor in any reports of the study. Data analysis will be carried out on coded data by computer.

The data will be used only for the purpose of the study, and may be published in professional books or journals.

The outcome of the study will be revealed to the participants following the study's completion.

Participants will not receive remuneration for this study nor will there be any costs.

I consent to participate in the study described above. The nature, demands, benefits and risks of the study have been explained to me. I understand that I may withdraw from the study at any time without any untoward effects.

I also understand that this consent form will be filed in an area designated by the Human Subjects Committee with access restricted to the principle investigator or authorized representatives of particular department.

Subject's Signature

Date

Witness Signature

Date

APPENDIX B

DIABETES KNOWLEDGE TEST

Code: _____

Please answer the questions by circling the number of the best answer.

1. The usual cause of diabetes is:
 - a. eating too much sugar and other sweet foods.
 - b. failure of insulin to control blood sugar levels.
 - c. failure of the kidneys to control sugar in the urine.
 - d. I do not know.

2. Insulin causes the amount of blood sugar to:
 - a. increase.
 - b. decrease.
 - c. insulin has no effect on blood sugar.
 - d. I do not know.

3. In uncontrolled diabetes the amount of sugar in the blood is:
 - a. higher than normal.
 - b. lower than normal.
 - c. not affected.
 - d. I do not know.

4. Which of the following complications is usually NOT associated with diabetes?
 - a. Changes in vision.
 - b. Changes in the kidney.
 - c. Changes in the lungs.
 - d. I do not know.

5. Which of the following symptoms is usually NOT associated with an insulin reaction?
 - a. Weakness.
 - b. Hunger.
 - c. Chest pain.
 - d. I do not know.

6. When a diabetic feels he is beginning to have an insulin reaction, he should:
 - a. immediately take some insulin.
 - b. immediately lie down and rest.
 - c. immediately eat some sugar.
 - d. I do not know.

7. An insulin reaction is caused by having:
 - a. too much insulin in the system.
 - b. too little insulin in the system.
 - c. too little exercise.
 - d. I do not know.

8. Routine urine tests for sugar should be made:
 - a. just before meals and before bedtime.
 - b. one hour after meals.
 - c. each time a diabetic urinates.
 - d. I do not know.

9. If a diabetic increases his daily physical activity after several months of relative inactivity, his daily insulin dosage will probably:
 - a. increase.
 - b. decrease.
 - c. remain unchanged.
 - d. I do not know.

10. One-half cc of U-100 insulin contains:
 - a. 20 units of insulin.
 - b. 50 units of insulin.
 - c. 100 units of insulin.
 - d. I do not know.

11. The maximum effect of REGULAR insulin after being injected usually occurs:
 - a. rapidly, within 1 to 3 hours.
 - b. moderately, within 8 to 12 hours.
 - c. slowly, within 15 to 20 hours.
 - d. I do not know.

12. The maximum effect of Lente and NPH insulin usually occurs:
 - a. rapidly, within 1 to 3 hours.
 - b. moderately, within 8 to 12 hours.
 - c. slowly, within 15 to 20 hours.
 - d. I do not know.

13. Diabetics should take especially good care of their feet because:
 - a. the number of years of injecting insulin into the legs may cause swelling of the feet.
 - b. flat feet are commonly associated with diabetes.
 - c. decreased circulation results in poor tissue healing.
 - d. I do not know.

14. When a diabetic who routinely uses insulin becomes mildly ill and unable to eat his prescribed diet:
 - a. he should immediately stop taking his insulin and call his physician.
 - b. he should continue to take his insulin and call his physician.
 - c. he should use the oral hypoglycemic pill instead of the insulin and call his physician.
 - d. I do not know.

15. When a diabetic who routinely uses insulin becomes ill, he frequently requires:
 - a. no insulin.
 - b. less insulin.
 - c. more insulin.
 - d. I do not know.

16. The presence of acetone with sugar in the urine of a diabetic indicates:
 - a. a need for more insulin.
 - b. a need for less insulin.
 - c. a normal insulin need.
 - d. I do not know.

17. Which one of the following factors is usually NOT associated with acidosis?
 - a. Illness.
 - b. Too little insulin.
 - c. Too much insulin.
 - d. I do not know.

18. Which ONE of the following symptoms is usually NOT associated with acidosis?
 - a. Chest pain.
 - b. Rapid breathing.
 - c. Nausea.
 - d. I do not know.

19. Acetest tablets or Diastix give the following color when acetone is present in the urine:
- green.
 - blue.
 - purple.
 - I do not know.
20. A diabetic who uses insulin and finds that his urine checks are constantly testing brown with Diastix for glucose should:
- stop taking his insulin.
 - increase his insulin dosage.
 - decrease his insulin dosage.
 - I do not know.
21. When urine is tested with Clinitest tablets, a BLUE color indicates:
- there is a large amount of sugar in the urine.
 - there is little or no sugar in the urine.
 - Clinitest tablets are not used to measure sugar in the urine.
 - I do not know.
22. A diabetic diet is normally:
- a guide for planning only the carbohydrate or sugar content of a meal.
 - a well balanced diet that the whole family can use.
 - a carefully planned system of special foods and measured insulin.
 - I do not know.
23. A diabetic diet prescription is NOT calculated for:
- carbohydrates.
 - protein.
 - vitamins.
 - I do not know.
24. A diabetic should normally:
- have his food cooked separate from that of the family.
 - limit the variety of foods that he eats.
 - vary his diet from the foods listed in a food exchange list.
 - I do not know.

25. The number of calories in most diabetic diets range:
- from 200 to 800 calories.
 - from 1000 to 3500 calories.
 - from 4000 to 6000 calories.
 - I do not know.
26. One milk exchange contains:
- 1 cup skim milk.
 - 1/2 cup yogurt.
 - 1 cup whole milk.
 - I do not know.
27. Which ONE of the following statements is correct?
- One cup milk can be exchanged for four ounces of cheese.
 - One ounce of beef can be exchanged for one ounce of bacon.
 - One egg can be exchanged for one ounce of fish.
 - I do not know.
28. The bread exchange list contains many similar foods. One slice of bread may be exchanged for:
- 1 cup spaghetti.
 - 4 graham crackers.
 - 1 small potato (2" diameter)
 - I do not know.
29. Fruits contain mainly carbohydrates. One orange may be exchanged for:
- 1 banana, medium size.
 - 1 cup of orange juice.
 - 1 small apple.
 - I do not know.
30. One egg can be exchanged for:
- 3 ounces of meat.
 - 1 ounce of hard cheese.
 - 4 tablespoons of peanut butter.
 - I do not know.

REFERENCES CITED

- Aronson, Elliot. The Social Animal. New York: Viking Press, 1972.
- Beaser, Samuel. "Teaching the Diabetic Patient." Diabetics 5(2):146-149, March-April 1956.
- Cohn, Ronald and Maryanne Shanahan. "Revise and Consent." Quality Review Bulletin 2(7):14-20, July 1976.
- Collier, Boy and Donnell Etwiler. "Comparative Study of Diabetes Knowledge Among Juvenile Diabetics and Their Parents." Diabetes 20(1):51-57, January 1971.
- Etwiler, Donnell. "What the Juvenile Diabetic Knows About His Disease." Pediatrics 29:135-141, January 1962.
- Etwiler, Donnell. "Who's Teaching the Diabetic." Diabetes 16(2):111-117, February 1967.
- Etwiler, Donnell and Lloyd Sines. "Juvenile Diabetes and Its Management: Family, Social and Academic Implications." American Medical Association Journal 181(4):304-308, July 1962.
- Exchange Lists for Meal Planning. Chicago: American Diabetic Association, 1976.
- Festinger, Leon. A Theory of Cognitive Dissonance. Evanston, Illinois: Row, Peterson and Co., 1957.
- Feustel, Delycia. "Nursing Student's Knowledge About Diabetes Mellitus." Nursing Research 25(1):4-8, January-February 1976.
- Graber, Alan, Barbara Christman, Maria Alogna and John Davidson. "Evaluation of Diabetes Patient Education Programs." Diabetes 26(1):61-63, January 1977.

Guthrie, Diana and Richard A. Guthrie (eds.). Nursing Management of Diabetes Mellitus. St. Louis: The C. V. Mosby Co., 1977.

Harper, Lilah. "Developing and Evaluating a Patient Education Program." Patient Education, Publication No. 20-1633. New York: National League for Nursing, 1976, pp. 1-7.

McDonald, Glen. "Diabetes Supplement of the National Health Survey." Journal of the American Dietetic Association 52:118-124, 1968.

Miller, Leona and Jack Goldstein. "More Efficient Care of Diabetic Patients in a County-Hospital Setting." New England Journal of Medicine 286:1388-1391, June 1972.

Monteiro, Lois. "Notes on Patient Teaching." Nursing Forum III(1):26-33, 1964.

Painton, J. Frederick. "Education of the Diabetic Patient." Readings in Health Education. Chicago: American Hospital Association, 1969, pp. 12-17.

Pender, Nola. "Patient Identification of Health Information Received During Hospitalization." Nursing Research 23(3):262-267, May-June 1974.

Pohl, Margaret. "Teaching Activities of the Nursing Practitioner." Nursing Research 14(1):4-11, Winter 1965.

Porter, Anne. "Student Participation in Diabetic Patient Education." Nursing Clinics of North America 12(3):407-414, September 1977.

Report on the 1974 American Health Congress. "The Educated Patient: A New Health Care Resource." Hospitals 48:88-90, September 1974.

Rogers, Carl. Freedom to Learn. Columbus, Ohio: Charles E. Merrill Publishing Co., 1969.

Skillman, Thomas and Manuel Tzagournis. Diabetes Mellitus. Columbus, Ohio: The Upjohn Co., 1976.

Stern, Sol. "Educating the Diabetic Patient." Journal of the Louisiana State Medical Society 122(11): 332-336, November 1970.

Stone, Daniel. "A Study of the Incidence and Causes of Poor Control in Patients with Diabetes Mellitus." The American Journal of the Medical Sciences 241: 436-441, April 1961.

Watkins, Julia, Doris Roberts, T. Franklin Williams, Dan Martin and Virginia Coyle. "Observation of Medication Errors Made by Diabetic Patients in the Home." Diabetes 16:882-885, December 1967.

Williams, T. Franklin, Dan Martin, Michael Hogan, Julia Watkins and E. V. Ellis. "The Clinical Picture of Diabetic Control, Studied in Four Settings." American Journal of Public Health 57(3):441-457, March 1967.

