The Effects of Blood Glucose Self-Monitoring on Self-Esteem and the Ability to Apply Knowledge About Diabetes Mellitus

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THE EFFECTS OF BLOOD GLUCOSE SELF-MONITORING
ON SELF-ESTEEM AND THE ABILITY TO
APPLY KNOWLEDGE ABOUT DIABETES MELLITUS

by

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B.S.N. May 1978, University of Virginia

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ABSTRACT

THE EFFECTS OF BLOOD GLUCOSE SELF-MONITORING ON SELF-ESTEEM AND THE ABILITY TO APPLY KNOWLEDGE ABOUT DIABETES MELLITUS

Nancy-Lu F. Moul
Old Dominion University, 1985
Director: Sue Young

This study explored the effect of blood glucose self-monitoring on two dependent variables: (a) the diabetic client's self-esteem, and (b) the diabetic client's ability to apply knowledge about diabetes mellitus. The sample consisted of two groups of adult Type I diabetic clients. Group I consisted of ten clients who had been performing blood glucose self-monitoring for at least one year, and group II consisted of ten clients who had been performing urine testing for at least one year. A questionnaire was utilized which included: (a) a demographic data sheet, (b) a diabetic knowledge tool, and (c) a self-esteem tool. The results showed that there were no significant differences in self-esteem between groups. However, there were significant differences between groups in the application of knowledge of diabetes mellitus as evidenced by the achievement of higher scores on the knowledge tool in group I.
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Chapter 1

Introduction

Over the past five years, blood glucose self-monitoring (hereafter referred to as BGSM) has achieved increased acceptance as a successful method of facilitating attainment of improved diabetic control. In studies by Mintz, Skyler, and Chez (1978); Sönksen, Judd, and Lowry (1978); Danowski and Sunder (1978); Peterson, Jones, Dupuis, Levine, Berstein, and O'Shea (1979); Ikeda, Tajima, Minami, Ide, Yokoyama, and Abe (1978); Skyler, J., Lasky, Skyler, D., Robertson, and Mintz (1978); and Tattersall (1979), it has been demonstrated that diabetic clients do well with self-monitoring of blood glucose and achieve better control than with urine testing alone. Industry sources estimate that more than 150,000 individuals in the United States are either continuously or intermittently utilizing this technique in the daily monitoring of diabetes self-management (McNeil, 1983).

Purpose

The purposes of this study were twofold: (a) to explore the effect of BGSM on the diabetic client's self-esteem, and (b) to explore the effect of BGSM on the diabetic client's ability to apply knowledge about diabetes mellitus to the self-management of everyday situations.

The significance of this study for nursing lies in the
fact that there is a need to further identify specific areas of concern in the management of diabetes mellitus, and to translate these findings into meaningful goals resulting in medical, clinical, psychological, and nursing interventions to enhance client care (Hamburg, Lipsett, Drash, & Inoff, 1980). This study particularly has implications for diabetes educators whose nursing role is changing from delivery of general patient education about diabetes mellitus to specific advice about adjustments in treatments to achieve normoglycemia.

**Problem Statement**

Does BGSM have a significant impact on self-esteem and the enhancement of understanding the self-management of diabetes mellitus?

BGSM allows the management of diabetes to rest in the hands of the diabetic person who now has the ability to: (a) measure what a given food portion or insulin dosage does to the body, (b) evaluate the results of a particular activity or stressful situation, and (c) determine whether a present regimen is adequate to maintain control or requires adjusting. In essence, as a result of BGSM, the diabetic client becomes more in touch with his or her feelings and how they affect one's blood glucose level.

However, BGSM is not necessarily indicated for all diabetic individuals. Thus far, the monitoring technique has proved to be helpful in the self-management of labile type I diabetics and pregnant diabetic clients. Possible
additional candidates are type II diabetics who may be very labile in response to treatment, as well as any diabetic clients requiring an on-the-spot decision on a change of regimen (Evanier, 1982).

BGSM has made a significant impact on the ability of the diabetic individual to evaluate the effects of insulin, diet, and exercise. Moreover, BGSM enables therapeutic goals to be clearly defined and permits assessment of glycemic control during everyday life (Strowig, 1982). These observations would suggest that clients utilizing this monitoring technique in a partnership role with the health care team would possess a greater understanding of their disease. One of the foci of this study was to investigate this concept further.

Generally, clients who are initially introduced to BGSM progress through several phases of adjustment. At first they may be upset or overwhelmed by the task. However, as clients achieve mastery and success with this technique for improving self-management capabilities, they become increasingly confident and less dependent on physicians and health care professionals. This phase is accompanied by a shift from an external locus of control and dependence to an internal locus of control with decreased depression, helplessness, and hopelessness, and increased self-reliance (Dupuis, 1980). Through the use of this method, a greater sense of partnership will arise between the client, the physician, the nurse, and other health care personnel, as
each becomes more skillful in the application of knowledge relating to the manipulation of insulin, diet, and exercise (Peterson et al., 1979). This shift to an internal locus of control will most likely have an effect on self-esteem, which was the second concept investigated in this study.

Theoretical Framework

The theoretical framework for this study was based on social learning theory and Dorothea Orem's self-care theory. Social learning theory provides a framework for analyzing human thought and behavior. Bandura's (1977) interpretation emphasizes that psychological functioning is determined by the reciprocal interaction between intrapersonal cognitive factors and controlling conditions in the environment. Bandura views the human being as a thinking organism possessing capabilities that provide him with the power of self direction. This concept of self-regulatory behavior has particular relevance for diabetic clients. The theory indicates that to function effectively, a person must be able to anticipate the probable consequences of different events and courses of action, and regulate his behavior accordingly (Bandura, 1977). Diabetic persons functioning as partners with their health care provider in the management of their disease must react to the consequences of their behaviors on-the-spot, and perform self-regulatory behaviors to maintain near normalization of their blood glucose concentrations. According to Bandura (1977), the consequences of behavior play a major role in learning and
also in providing incentives for action. Diabetic persons are repeatedly confronted with situations in daily living with which they must deal in one way or another. Some of the attempted responses result in success through improved diabetic control, and other responses are unsuccessful. Successful modes of behavior are selected from exploratory activities which have resulted in effective manipulation of diet, insulin, and exercise to achieve the appropriate balance based on immediate BGSM feedback.

Self-regulation can improve diabetes control through the individual's immediate efforts to handle circumstances as they occur and through the anticipation of problems before they occur. The ability to anticipate the outcomes of different actions can also promote effective, psychological functioning, motivation, and foresightful behavior (Strowig, 1982). When performances coincide with or exceed a person's standards, the individual evaluates himself favorably which is indicative of high self-esteem (Bandura, 1977). Thus, by improving diabetes control through self-regulatory behaviors which are based on feedback from BGSM, the individual will gain self-confidence and experience increased self-esteem.

According to Glasgow and McCaul (1982), social learning theory focuses on four closely related variables that together may influence an individual's adherence to a regimen, namely: (a) knowledge, (b) skills or capabilities in troubleshooting problematic situations, (c) incentives
or motivation for engaging in particular behaviors, and (d) beliefs about one's ability to perform and the value of performing various behaviors. These variables have been explored in this study to determine if the performance of BGSM had any impact on the application of knowledge and self-esteem.

The second theoretical framework for this study focused on Dorothea Orem's self-care theory, which has its rudiments in general systems theory. According to Orem, the self-care system is referred to as the ability to take health actions through interaction with the environment. Unless the individual is faced with a new health care situation requiring adaptation or alternative health behaviors, this self-care system is adequate for the maintenance of a healthy well-being. Orem's self-care concept of health emphasizes personal control over health care and health actions. The necessary prerequisites for self-care include: (a) knowledge about health, (b) motivation for health, and (c) the ability to initiate and perform self-care behaviors. Self-care abilities are affected by determinants which include age, sex, culture, health care situation, health status, education, roles, pathological disorders, and developmental stage. An individual who possesses the ability to satisfy health needs is defined as the self-care agent. The self-care agent is required to meet universal, health-deviated, and developmental health needs through actions which are known
as therapeutic self-care demands (Orem, 1980).

The perception of choice and the ability to make decisions flows from the performance of deliberate and successful actions. Orem categorizes her concept of deliberate action into two phases: (a) the individual gains the necessary knowledge to make a decision about his care and (b) the self-regulatory actions indicated by that decision are carried out. The knowledge needed to make self-care decisions includes knowledge of: (a) internal or external conditions which have utility for health, such as hypoglycemia, (b) characteristics of these conditions, such as weakness and sweating, (c) the meaning that a condition has for health such as the idea that hypoglycemia affects thinking, and (d) the beneficial or harmful results that will occur by choosing one action over another. For example, knowing that ignoring self-care action during a hypoglycemic event can lead to coma; whereas, drinking orange juice may relieve the symptoms (Orem, 1980). An individual who perceives that options are available and demonstrates the capability of making successful choices and solving problems will experience increased self-esteem (Lefcourt, 1976).

To make a decision about self-management of diabetes, the diabetic client should: (a) be knowledgeable about current and potential health problems, (b) be able to assess when he is having a medical problem, (c) be knowledgeable about successful action which will solve a
problem, and (d) be able to anticipate the consequences of taking a particular course of action. These aspects of knowledge related to diabetic self-management were analyzed in this study.

Backscheider (1974) adapted Orem's concept of therapeutic self-care to the development of four groups of capabilities necessary for the diabetic individual to manage his therapeutic regimen. One of the groups was identified as motivational and emotional capabilities which incorporated such aspects as self-worth, self-concern, willingness to engage in care, and self-discipline. These capabilities can become assets or liabilities, depending on the complexity of the self-care demand placed on the self-care system. An individual's decision to engage in self-care activities is ultimately determined by the balance between these assets and liabilities. Selected emotional capabilities were analyzed by the researcher in this study.

Definition of Terms

For the purposes of this study, the following definitions and operationalizations were developed:

1. Diabetic subjects - clients diagnosed as having type I insulin dependent diabetes mellitus (IDDM).

2. Conventional urine testing - a measurement of urine glucose based on a double voided urine specimen which is timed against a chemical reagent strip before each meal and at bedtime.
3. BGSM (blood glucose self-monitoring) - a self-management skill performed by diabetic clients to improve diabetic control, whereby a drop of blood obtained with a spring-loaded lancet device, is used to make blood glucose determinations with the aid of a chemical reagent strip or a reflectance meter.

4. Self-esteem - the degree to which one feels valued, worthwhile, confident or competent as measured by an adapted version of the Coopersmith Self-Esteem Inventory scale which utilizes a 34 item Likert scale format (Coopersmith, 1967).

5. Application of diabetic knowledge - the ability of the diabetic client to apply the knowledge and understanding of his/her disease to everyday activities as measured by a 12 item multiple-choice diabetic knowledge assessment tool focusing on situations that require manipulation of diet, insulin, and exercise.

6. Self-management - the appropriate selection of self-care strategies as measured by the accuracy of responses to the multiple-choice situational items in the knowledge assessment tool.

Assumptions

For the purposes of this study, it is assumed that:

1. Individuals with diabetes mellitus have some alteration in self-esteem as a result of possessing the disease.

2. Diabetes education fosters decision-making
abilities suited to a participatory, self-care approach as an outgrowth of the required patient involvement in his specific regimen (Storwig, 1982).

3. The glycosylated hemoglobin level (hereafter referred to as hemoglobin A1c) is the most reliable index of glucose control (Peterson, Forhan, & Jones, 1980).

Limitations

1. Several demographic characteristics of the clients participating in this study may have influenced test scores for diabetic knowledge and self-esteem. These included: (a) the age of the client, (b) the duration of diabetes, (c) their educational background, (d) prior training about diabetes mellitus, and (e) varying degrees of client motivation. It was beyond the scope of this study to control for these extraneous variables.

2. In order to secure a sufficient sample size, clients from two different diabetologists' practices served as the accessible population. While diabetic management in the two settings was very similar, it is possible that setting differences may have influenced the self-esteem and knowledge of the study group.

3. A nonprobability purposive sample of diabetic clients from two diabetologists' practices was used. Study findings may be generalized only to this study group.

Review of Literature

A review of the related literature indicates that there are many recent studies that have been done to
analyze the use of BGSM as a method of facilitating diabetic control, but none of these have been done by nurses. Only a few of these studies have focused on the impact of BGSM on psychosocial well-being or the application of knowledge which was the focus of this study.

Self-esteem was chosen as the specific aspect of psychosocial well-being to be explored in this study. Many researchers have investigated this concept in depth; however, the work of Stanley Coopersmith regarding self-esteem was found to be the most influential in the field of psychology. Coopersmith began a series of studies in 1959 with the intention of clarifying the antecedents and consequences of self-esteem. His studies sought to more clearly define several concepts and methodological issues that had hindered the investigation of self-esteem in the past. His research conducted in 1967 involved the development of a classic tool entitled, Self-Esteem Inventory, which was designed to focus on those antecedent conditions that contribute to the development of positive and negative attitudes towards the self. Both reliability and validity were established to assess the quality and adequacy of the tool (Coopersmith, 1967). An adapted version of this tool served as the method of measuring the impact of BGSM on psychosocial well-being, specifically self-esteem, for this study.

Diabetes mellitus, like other chronic diseases, may have a major effect on the individual's psychosocial status.
However, unlike other chronic illnesses, there may be factors that could present added psychological and social stressors that would have an adverse impact on the person with diabetes, such as the inherent possibility of developing significant complications and the extraordinary effort required for self-care (Mazze, Lucido, & Shamoon, 1984). Previous studies concerning the psychological aspects of diabetes mellitus have examined four critical areas: (a) the role of psychological factors in the onset of diabetes, (b) the immediate response and long-term psychological adjustment of the diabetic individual after the onset, (c) the influence of the immediate environment upon the course of the disease, and (d) the reaction of the family to the illness and the impact of diabetes upon the family structure. According to Hauser and Pollets (1979) in a critical review of the literature regarding the psychological aspects of diabetes mellitus, most studies are divided as to whether persons with diabetes mellitus differ significantly from persons without the disease. Few studies have attempted to evaluate the relationship between psychological factors and glycemic control, mainly because of the absence of adequate measurements of long-term metabolic control. Although earlier studies have explored the psychological changes that correlate with the diagnosis of diabetes mellitus in addition to the psychological differences between individuals with and without the disease, few researchers have investigated the relationships
between glycemic control and such dynamic psychosocial characteristics as quality of life, self-esteem, depression, and anxiety. These relationships are of particular concern in view of the current interest in the maintenance of more stringent metabolic control and the prevention of complications (Mazze et al., 1984).

Chronic illness, particularly associated with complications can manifest the following fears in the diabetic individual: (a) decreased life span, (b) incapacitation, (c) pain (d) abandonment, (3) inconvenience to others, (f) loss of interpersonal relationships, and (g) loss of self-esteem. These psychological responses may hamper the diabetic individual's ability to cope with his chronic illness (Guthrie, 1982).

The classic study related to improved emotional well-being was conducted in 1980 at Rockefeller University by Dupuis et al. who studied the emotional response of ten insulin dependent diabetic clients participating in a rigorous program of self-monitored blood glucose determinations. The clients were observed by a psychiatrist at various stages while undergoing weekly training sessions designed to teach clients about BGSM. The psychiatrist recorded the content as well as reactions of the clients after each meeting. Initially, the clients were bewildered and tended to resist to the demands of the program. But within less than two months, they began to achieve mastery and developed increased self-esteem, better
self-reliance, diminished anxiety, and better acceptance of their illness. Psychiatric assessments performed at the beginning of the study and after eight months, revealed that all clients were initially depressed as reflected by high scores on the Hamilton Rating Scale for Depression measured during semistructured interviews. The rating scale for depression that was used in this study assessed nineteen symptoms associated with depression as evaluated by an interviewer (Hamilton, 1960). Despite their initial depression, after eight months of utilizing self blood glucose monitoring, all ten patients had achieved better carbohydrate control as reflected by decreased hemoglobin A1c levels and were much less depresed. Dupuis et al.'s findings support their conclusion that a program of self-monitored blood glucose determinations for insulin dependent diabetics leads not only to better carbohydrate control, but also to improved emotional well-being.

In 1982, Bogdonoff described the Dupuis study and suggested that "one might expect both a cognitive and affective change in patients placed on a program of rigorous self-monitoring of blood glucose" (p. 177). He also stated that "more dependence on a specific procedure may well result in more effective independence, and this may lead to a more emotionally satisfied patient" (Bogdonoff, 1982, p. 178). He closed by advocating that more research is needed in the area of the psychological impact of home glucose monitoring.
Prior to the availability of BGSM, traditional monitoring of the action of insulin on blood glucose concentrations had been performed indirectly by measuring the amount of glucose spillage into the urine, as a basis for guiding insulin usage and other treatments of diabetes mellitus. Although urine testing is easy to learn and provides a way for most diabetics to monitor and adjust their insulin doses, the test results are not always a reliable indicator of glycemia. Urine in the bladder integrates glucose levels over known periods of time and only reflects blood glucose concentrations greater than 180 mg/dl which is much higher than the normal serum glucose range (Clarke & Pohl, 1982). The amount of glucose in the urine is dependent upon renal threshold for glucose, adequacy of bladder emptying, recent fluid intake, and the rate and direction of recent changes in blood glucose concentrations (Ohlsen et al., 1980). Monitoring the treatment of diabetes with urine sugar tests provides the opportunity to avoid glycosuria indicative of high blood sugar values, but does not give the opportunity to recognize hypoglycemia, which is one of the major problems in diabetes. Indeed, urine testing as a data collection method lacks accuracy and adequacy in its attempt to monitor the normalization of blood glucose concentrations. Thus, physicians and clients are somewhat reluctant to respond definitively with insulin dosage changes to the values given by urinary glucose (Peterson, 1982).
Several studies have concluded that BGSM results in a greater client understanding of diabetes mellitus; however, none of them have actually used a tool to measure the application of knowledge and understanding. In 1980, Judd and Sönksen presented some clinical anecdotes to demonstrate some of the most obvious lessons learned in their practice about the benefits of BGSM. They observed dramatic improvements in diabetic control once the clients switched over to BGSM. Their conclusions emphasized that self-monitoring allows clients to discover what diabetes is all about. They stated that few patients who have only ever performed urine testing, really understand the concept of "sugar in the blood". They found that the initial impact of self-monitoring gave patients a new insight into the degree to which blood glucose varies. The majority of patients did not have a clear understanding of urine testing as an assessment of renal threshold. However, when they realized that the glucose in the blood fluctuates resulting in specific symptoms of hypoglycemia and hyperglycemia, the goals of insulin therapy in conjunction with diet and exercise began to crystallize.

Since it is blood glucose that the body depends on for accurate assessment of the need for adjustment in insulin dosage, diet, and exercise, it appears that BGSM is the method most likely associated with optimal self-management of diabetes mellitus. The key to success is the ability to measure blood glucose levels accurately and evaluate
activities of daily living. Diabetics can now measure their own blood glucose levels and respond with just the right amount of insulin. According to Christiansen and Sachsé (1980), the advantages of this method of control are as follows: (a) it gives information about the patterns of blood glucose fluctuations during everyday life, (b) it enables the physician to advise on changes in treatment on the basis of sound information, over the telephone if necessary, (c) it promotes increased self-confidence and emotional stability which clients attribute to relief at being in control of their body, (d) it enhances client motivation to maintain one's blood glucose within normal limits based on immediate feedback, (e) it promotes greater involvement in dietary control and adherence as a result of instant recognition of foods which prove to be the offending substances, (f) it clarifies the relationship between blood glucose and urine glucose when checked simultaneously, which is useful data in clients with unstable renal thresholds, (g) it prevents clients from becoming alarmed by negative urine results if they know that their blood is normal, (h) it teaches the client how he or she reacts to physical activity and emotional stress through blood glucose feedback, and (i) it enhances the clients' understanding of their disease and diminishes a sense of helplessness that diabetics so often face.

In 1978, Skyler et al. evaluated home glucose monitoring in 32 clients with insulin dependent diabetes
mellitus. The primary purpose of their study was threefold: (a) to define those circumstances in which this monitoring technique is feasible and beneficial, (b) to establish a protocol to guide implementation, and (c) to determine potential pitfalls in the procedure. The sample, comprised of clients who monitored their blood daily, included individuals who were pregnant, anephric, epileptic, unstable, undergoing weight reduction, or had altered renal threshold for glucose absorption. Of the 32 clients instructed in the monitoring technique, 30 of them complied with the recommended protocol as evidenced by their daily record keeping which showed improved control. Their findings supported their conclusions that this procedure "can greatly facilitate regulation of diabetes, particularly in some categories of patients" (Skyler et al., 1978, p. 156). Additionally, some of their clients reported that having blood glucose levels regularly available provides information that gives them insight into the understanding of their disease which they did not have previously when performing conventional urine testing.

One method of measuring the diabetic client's understanding of the cognitive aspects of diabetes management would be through the use of a knowledge assessment tool. According to Dunn, Bryson, Hoskins, Alford, Handelsman, and Turtle (1984), assessment of the individual client's knowledge of diabetes and its management is critical before an effective educational program can be
implemented. This group of researchers developed several diabetes knowledge assessment scales to meet a specific need for rapid and reliable assessment in diabetic clients. As a result of pilot testing over 300 diabetic subjects, item format and item selection from an initial pool of 89 items were determined. Reliability analysis of the resulting 40 multiple-choice items gave a Cronbach's alpha coefficient of 0.92. In addition, three tools consisting of 15 items each, selected from the parent set, had alpha coefficients above 0.82 and correlated 0.90 with each other. A full clinical trial, using all three tools was conducted with 219 subjects attending a two-day diabetes education program. Overall knowledge scores improved from 7.6 (51%) to 11.3 (75%). Analysis of variance confirmed that all three tools were equivalent forms at pretest. These results indicate that rapid and reliable assessment of diabetes knowledge is possible with a scale of only 15 validated items. An analysis of the sample revealed: (a) the mean age of the sample was 44 years, (b) 60% were women, (c) the average duration of diabetes was ten years, and (d) 61% had insulin dependent diabetes mellitus. Hemoglobin A₁C values averaged 10.0% for the type I diabetic clients and 9.7% for the type II diabetic clients. Most of the subjects (72%) had read literature on diabetes, 45% had attended diabetes education programs, and 21% had received no formal diabetes education. A high score on the knowledge tool was correlated (p<0.001) with more exposure to diabetes literature (r=0.52), regular
urinalysis (0.41), and frequent physical exercise (0.48). High scores were also related (p<0.01) to age (-0.31), increasing treatment regimen (0.34), attendance at diabetes education programs (0.21), and higher occupational status (-0.33).

Research reports on diabetes knowledge often present a confusing and contradictory picture. Variables which one might expect to show simple linear correlation with knowledge do not. For example, according to Simon and Stewart (1976), age is inconsistently related to knowledge in juvenile diabetic clients, and only appears to show a reliable negative correlation in adulthood. Results for duration of diabetes are contradictory, as are correlations with knowledge reported for socioeconomic status variables. According to Collier and Etzwiler (1971) and Tiez and Vidmar (1972), the picture for diabetes control and its relation to knowledge is similarly confused. Much of this conflicting evidence on the correlates of diabetes knowledge is a consequence of the poor standardization of the measurements used in its assessment. These findings emphasize the importance of using an assessment tool which is brief, demonstrates high reliability, and relies on continuing and systematic comprehensive assessment to confirm the validity and reliability of the instrument in response to changing conditions.

Now that the constructs of self-esteem and knowledge in relation to diabetes mellitus have been explored, it is also
important to survey the literature regarding the self-care needs of diabetic clients. In 1982, Miller studied categories of self-care needs of 65 ambulatory clients with diabetes who were identified based on a self-care nursing framework, using a participant-observer methodology. She proposed that being able to anticipate needs of ambulatory patients would improve efficient delivery of professional nursing. The researchers individually provided care to patients with diabetes who attended a metabolic clinic. Care was provided one morning a week for one year. Subjects varied in age, culture, and socioeconomic background. A self-care concept of practice based on Orem's nursing theory was adopted in the clinic. Clients were interviewed and asked to complete a questionnaire designed by the researcher to assess each client's self-care agency. Assessment data included the following categories: (a) growth and development, (b) self-concept, (c) routine health practices, (d) motivation level, (e) level of understanding, (f) family functioning, (g) resources utilized, (h) problem-solving ability, (i) previous coping style, (j) personal factors, (k) role mastery, (l) locus of control, (m) life change events, and (n) individual strengths. The evaluation process consisted of four parts: (a) an interview, (b) physical assessment, (c) interpretation of findings, and (d) mutually determined goals. Two of the categories of needs identified in this study relate to the BGSM study, namely: (a) the acquisition of skills for self-care
management and (b) the enhancement of feelings of self-esteem. As a result of Miller's work, clients were aided to feel positively about themselves in terms of self-care management (Miller, 1982).

After surveying the literature, it is noted that many articles have been written on BGSM as a method of diabetic control, the psychological aspects associated with diabetes mellitus, diabetic knowledge, and self-care management; however, no research could be found related specifically to the effect of a self-care technique such as BGSM on self-esteem and the ability to apply knowledge about diabetes mellitus, which was the purpose of this study. It was important to explore the effects of BGSM on the above stated dependent variables investigated in this study in order to: (a) foster a participative health care model in which health professionals and diabetic clients share in the decision-making process as it relates to the optimal self-management of diabetes (McNeil, 1983), (b) identify the educational needs of diabetic clients which will aid in the development of diabetic training programs, and (c) identify possible alterations in the psychological well-being of diabetic clients which will enable health professionals to assist these individuals in coping with their disease.

Hypotheses

This study tested the following hypotheses:

1. Diabetic subjects who use conventional urine testing methods will not demonstrate a significant
difference in self-esteem when compared to diabetic subjects who have been using BGSM for at least one year.

2. Diabetic subjects who use conventional urine testing methods will not demonstrate a significant difference in understanding and application of knowledge when compared to diabetic subjects who have been using BGSM for at least one year.

Chapter 2 is a discussion of the methodological approach utilized in the execution of this research study and the testing of the two research hypotheses stated above. Included are an explanation of the research design and the findings of the pilot study which was performed with a sample of ten diabetic clients.
Chapter 2

Methodology

The purposes of this study were twofold: (a) to explore the effect of BGSM on the client's self-esteem, and (b) to explore the effect of BGSM on the diabetic client's ability to apply knowledge about diabetes mellitus to the self-management of everyday situations.

Research Design

The research design in this study was based on a nonexperimental descriptive correlational approach. This approach was selected as the most appropriate design to investigate the research questions for this study. The aim of nonexperimental correlational research is to describe the existing relationships among variables rather than to infer cause-and-effect relationships. The advantages of this design include the ability to provide factual information and to serve as an efficient and effective means of collecting a large amount of data about a problem area. The disadvantage of the approach is that it does not support causal inferences about the relationships between the variables studied (Polit & Hungler, 1983).

The original design of the study called for two control groups and one experimental group. However, the pilot study demonstrated inaccessibility of adequate numbers of subjects
for the experimental group. Therefore, the nonexperimental descriptive correlational approach was selected.

A two group design was implemented in this study which consisted of a group of diabetic clients who had been performing BGSM for at least one year (hereafter referred to as group I), and a group of diabetic clients who had been performing conventional urine testing for at least one year (hereafter referred to as group II). Data were collected at two different times, one month apart, as the means of assessing stability over time of diabetic knowledge and self-esteem.

**Sample**

The target population for the study consisted of adult diabetic clients classified with type I insulin dependent diabetes mellitus. The accessible population consisted of a nonrandom subset of the target population of adult type I diabetic clients living in the Tidewater area. The value of a nonprobability purposive sample is that it is convenient and economical. It allows the researcher to use knowledge about the population and its elements for sample selection.

Initially, a nonprobability, purposive sample consisting of 24 volunteers was asked to participate in the study and complete the initial questionnaires. Of these 24 volunteers, two were excluded from the study because they were unable to read the questionnaires due to severe diabetic retinopathy. Additionally, two subjects failed to complete the mailed questionnaires at the second data
collection time. Therefore, the final sample consisted of 20 subjects: ten in group I and ten in group II.

In the BGSM study, the researcher chose subjects who were judged to be "typical" of the target population. According to Polit and Hungler (1983), it is particularly advantageous to use a purposive sample of divergent types of people when attempting to effectively pretest newly developed instruments. The disadvantages of this sampling method are that: (a) it may produce data which are inaccurate and nonrepresentative, (b) it limits the researcher's ability to generalize research findings to specific target populations, and (c) it cannot be used effectively with a heterogeneous population (Polit & Hungler, 1983).

Setting

The offices of two diabetologists with similar management styles in the Tidewater area were utilized by the researcher for data collection. Initially, an abstract of the study, the self-scored questionnaires, and the data collection procedures were reviewed with both diabetologists. Verbal permission to conduct the study was obtained at this time.

The original plan involved the use of the office of one Tidewater area diabetologist. This specific setting was selected due to the participative rather than the authoritarian management style utilized by the practitioner. However, the pilot study demonstrated difficulty in
obtaining adequate numbers of subjects for group II at the original site.

Therefore, a second Tidewater area diabetologist with a similar management style was approached, and agreed to allow his clients to participate in the study. Two subjects were obtained from the practice of the second diabetologist to complete the required sample size of ten subjects for each group. Thus, the potential for selection biases must be acknowledged because subjects were not randomly selected from the two practices and may have represented some unknown selection biases.

**Tools**

In this study, two tools were utilized to measure the dependent variables selected for this study. Self-esteem as it relates to adult diabetic clients, was measured by the researcher's adapted version of the Coopersmith Self-Esteem Inventory scale (Appendix A). Application of knowledge of diabetes mellitus was measured by a tool entitled, Managing Diabetes, which was designed by the researcher in conjunction with the expert validation of several master's prepared diabetic nurse specialists functioning in patient education roles (Appendix B). Additionally, demographic data were obtained in terms of age, sex, educational level, duration of diabetes mellitus, urine and hemoglobin A1c values, frequency of hyperglycemic and hypoglycemic reactions, family status, and self-care strategies, to investigate possible relationships among diabetic persons.
performing BGSM and urine testing (Appendix C).

Initially, both tools and the demographic data sheet were tested at the time of the pilot study. Each tool will be discussed in terms of background information, validity, reliability, adaptations, the type of data yielded, scoring, and refinements based on the pilot study.

**Self-esteem tool.**

The original purpose of the Coopersmith Self-Esteem Inventory scale (1967) was to focus on those antecedent conditions that contribute to the development of positive and negative attitudes toward the self. This scale was originally devised for use with normal, white male and female adolescents of middle class background. Here, the context of the term "normal" was defined as the absence of serious symptoms of stress or an emotional disorder.

The original 50-item Self-Esteem Inventory was developed with items selected from the Rogers and Dymond (1954) scale dealing with psychotherapy and personality change, in addition to some original items developed by Coopersmith himself. All the statements were reworded for use with children. Five psychologists then sorted the items into two groups, those indicative of high self-esteem and those indicative of low self-esteem. Items that seemed repetitious or ambiguous, or about which there was disagreement were eliminated which established the process of content validity among experts. The set of items was then pilot tested for comprehensibility with a group of 30
children, which established the process of face and content validity among laymen. The final inventory consisted of 50 items concerned with subjects' self attitudes based on four constructs: peers, parents, school, and personal interest. The final form of the inventory was initially administered to a homogeneous group consisting of two fifth and sixth grade classes of elementary school children. The scores ranged from 40 to 100 with a mean of 82.3 and a standard deviation (s.d.) of 11.6. The difference between the mean scores for boys and girls was not significant (t=.80; p<.50).

The distribution of the scores was skewed in the direction of high self-esteem. The inventory was subsequently administered to a total of 1,748 children attending the public schools of central Connecticut. This heterogeneous group of children was more diverse in ability, interest, and social background than the initial sample. The distribution of scores obtained from this sample was also skewed in the direction of high self-esteem. The selection of the procedure and design of the study was intended to maximize the generalizations that could be derived from the sample by increasing its size with subsequent administrations of the tool.

Hauser and Pollets (1979) used the Coopersmith Self-Esteem Inventory tool to follow the self-esteem of 164 diabetic adolescents, drawn primarily from diabetes summer camps. The adolescents were between 11 and 19 years of age with an average age of 13. Their findings supported their
conclusions that self-esteem was more impaired in diabetic adolescents who were at lower levels of ego development and/or had a longer duration of diabetes. According to Robinson and Shaver (1973), this 50-item tool has also been condensed into a briefer unpublished scale and used by Coopersmith to assess the self-esteem of adults as well as children.

In addition to exploring the development and background of the Coopersmith tool, it is also important to focus on available data concerning two major criteria for assessing the quality and adequacy of the tool, namely, validity and reliability. Validity is defined as "the degree to which an instrument measures what it is supposed to be measuring" (Polit & Hungler, 1983, p. 394). According to Robinson and Shaver (1973), the central problem in self-esteem research is validity. Solid evidence proving the validity of most psychologically-oriented tools is almost never available (Robinson & Shaver, 1973). These two authors focus on construct and criterion-related validity in their summary of the Coopersmith tool.

Construct validity is defined as the degree to which an instrument measures the construct under investigation (Polit & Hungler, 1983). This type of validity is extremely important for the analysis of measures of affect such as self-esteem. There are three steps involved in the application of construct validity to research: (a) the researcher asks what hypotheses can be formulated based on
the behaviors of subjects with high or low scores on this tool, (b) the researcher tests these hypotheses based on data collected, and (c) the researcher makes an inference as to whether the data collected can be supported by the rationale underlying the construction of the tool. Revision of the tool is necessary if the rationale fails to adequately explain the data collected (Waltz & Bausell, 1981). Robinson and Shaver (1973) report correlations of +.59 and +.60 between the short form of the Coopersmith tool and the Rosenberg Self-Esteem scale (1965), both of which are outgrowths of a similar perspective. These values are high enough to provide evidence that the two different methods of measuring the construct of self-esteem yield similar results (Waltz & Bausell, 1981).

The concept of criterion-related validity is addressed but not tested by Coopersmith (1967) when he discusses predictive validity which refers to a tool's ability to highlight individuals who differ in their present status on a particular criterion (Polit & Hungler, 1983). One of the bases for Coopersmith's research upholds the belief that self-esteem is significantly associated with personal satisfaction and effective functioning (Coopersmith, 1967).

The second major criterion for assessing the quality and adequacy of a tool deals with reliability. Reliability is defined as a measure of the accuracy of the instrument given to a particular sample under particular conditions (Polit & Hungler, 1983). Instruments that are psychological
or behavioral in nature are strong candidates for pretesting and trial runs. An aspect of reliability which deals with the stability of a measure or the test-retest reliability indicates "the extent to which the same results are obtained on repeated administrations of the instrument" (Polit & Hungler, 1983, p. 387). The only available data on test-retest reliability for the Self-Esteem Inventory deals with children, where Coopersmith (1967) reports a value of +.88 after five weeks based on a sample of 30 fifth grade children, and a value of +.70 after a three year interval based on a sample of 56 children. These results would suggest that at sometime preceding childhood, the individual arrives at a general appraisal of his worth which remains relatively stable over a period of years. However, this stability can obviously be affected by specific situations and environmental changes.

Reliability data were also found relating to internal consistency or homogeneity. Robinson and Shaver (1973) cite a split-half reliability coefficient of +.90 for the 50-item tool which is significant, but could possibly underestimate the reliability on the entire tool.

As a result of an in-depth analysis of the tool, the decision was made by the researcher to make several adaptations in the original construction for the purposes of this study of adult type I insulin dependent diabetic clients. First, the title of the tool was changed from Self-Esteem Inventory to How I Feel About Myself, with the
intent of removing the emphasis on the word self-esteem, which to some may have a threatening connotation. Secondly, the directions were refined to relate more specifically to the population under investigation. Thirdly, both the original **Self-Esteem Inventory** tool and the condensed version included a series of statements about self-esteem with a choice of responses of either, *like me* or *unlike me*. It was believed by the researcher that a likert-type scale with ordinal data including responses of varying degrees such as *strongly agree*, *agree*, *undecided*, *disagree* and *strongly disagree*, would allow for a finer discrimination among individuals with different levels of self-esteem. Thus, the format of the tool was revised to include a choice of these five responses instead of two for each statement. Lastly, several items relating specifically to children were either altered significantly or deleted. This condensed the length of the tool from 50 to 40 items, requiring approximately five minutes for completion (Appendix D).

The ordinal data obtained from the adapted version of the Coopersmith Self-Esteem Inventory were scored as follows. Participants were asked to rate the statements as *strongly agree* (1 point), *agree* (2 points), *undecided* (3 points), *disagree* (4 points), and *strongly disagree* (5 points). A total of 17 items were evaluated as high self-esteem statements and 23 items were evaluated as low self-esteem statements. The low self-esteem items were scored directly and the high self-esteem items were reverse
scored. In the reverse scored items, a score of five was given for strongly agree and a score of one was given for strongly disagree. This reversal was necessary so that a high score would consistently reflect a higher level of self-esteem.

A letter requesting permission for the use of the adapted version of the Coopersmith tool was sent to the Consulting Psychologist Press Incorporated, and permission was granted after payment for the tools as well as the addition of a copyright statement concerning adaptation of the tool (Appendix A).

Minimal tool refinements were made as a result of the pilot study. Reliability was measured for the self-esteem tool by the researcher based on the pilot study data, using Cronbach’s alpha which is a measure of internal consistency. Although the researcher found the alpha coefficient for the adapted self-esteem tool to be 0.72, six items were still deleted from the questionnaire because they dealt with immediate family interactions, which did not apply to several of the pilot study subjects who were found to be single without close families. As a result, the final revised tool included a total of 15 items evaluated as high self-esteem statements, and 19 items evaluated as low self-esteem statements.

Diabetic knowledge tool.

The tool entitled, Managing Diabetes was designed by the researcher as the result of an unsuccessful literature
search for an appropriate instrument to assess the application of knowledge in the self-management of diabetes mellitus (Appendix B). Initially, the researcher developed a 21-item multiple-choice diabetic knowledge assessment tool (hereafter referred to as the DKA tool) which was composed of situations commonly encountered by diabetic clients. Ideas for the content of this original pool of items were derived from a literature search focusing on the work of Peterson (1982), particularly his book entitled, Take Charge of Your Diabetes: A New Approach to Self-Management.

Successful completion of the questionnaire required that participants make correct decisions or choices based on the application of their knowledge of diabetes mellitus. The primary aim of the researcher was to develop a tool using a subset of items of high internal consistency selected from available information on diabetes knowledge. The goal of each question was to focus on the balance between diet, insulin, and exercise in order to maximize the self-management of normoglycemia.

Due to the newly developed nature of the tool, the critical aspect of content validity was explored in great depth. Content validity is defined as the degree to which an instrument measures the intended content (Treece, 1977). It is developed by a jury of experts in the field one intends to study. These criteria were requested from seven master's prepared diabetic nurse specialists in the state of Virginia, one of which was a diabetic as well as a patient
educator. A draft of the tool accompanied by a cover letter describing the purpose of the study and the tool critique guidelines, was sent to these nursing experts with an 86% rate of return (Appendix E). Suggestions for revisions were made for most of the items in terms of clarity, simplicity of wording, accuracy of content, and overall length. As a result of this valuable feedback, the tool was condensed to 12 items and structural changes were made (Appendix F).

Additionally, a readability formula was used to assess the appropriateness and readability of the tool for use with clients. A sixth grade level of readability was established through this process. Since the total number of multisyllabic words is a major determinant of the readability score, the repetition of familiar words such as diabetes, insulin and exercise, quickly raised the readability level of the tool (McGraw, 1978).

The data obtained from the multiple-choice DKA tool were scored by adding up the total number of correct responses and dividing by the total number of questions which was 12. This process provided a mean percentage score for each DKA tool administered.

Face validity, internal consistency and stability over time were explored at the time of the pilot study. Tool refinements were based on the low alpha coefficient of 0.13. Reasons for the low internal consistency of this tool may have been due to the nature of pilot study sample. This population was highly motivated and well informed about
diabetes mellitus and its daily management. Thus, there was little variance in study subject responses on the diabetic knowledge questions. As a result of obtaining this measure of reliability, several items with little variance were refined.

**Demographic data sheet.**

Demographic data collected represented a combination of all four levels of measurement; namely, nominal, ordinal, interval and ratio. These data were used for the following purposes: (a) to determine if the participants met the established criteria for the study, (b) to describe the population with respect to age, educational level, practice of self-management strategies, family status, and length of time a person had been diabetic, and (c) to investigate any further relationships among diabetic persons performing urine testing or BGSM as methods of diabetic control.

Initially, the researcher developed a 15-item questionnaire with a variety of types of responses, and mailed it to the above stated nursing experts along with the DKA tool. Again, suggestions for revisions and additions were made in terms of clarity, design, and format. This feedback prompted the addition of two items dealing with self-care practices, which resulted in the 17-item tool used in the pilot study (Appendix G).

The readability formula was also used to assess the demographic data questionnaire and a sixth grade level was found (McGraw, 1978). Minor revisions were made on the
Demographic Data Sheet as a result of the pilot study, in the areas of reorganization of content items and typing format (Appendix C).

**Procedures**

The proposal for this study and all the data collection instruments were reviewed and approved by the Graduate Program Committee and the Committee for the Protection of Human Subjects in the Department of Nursing at Old Dominion University. The researcher was granted permission to conduct the pilot study at a meeting of the Peninsula Diabetes Association. The following criteria were required for inclusion in the pilot study: (a) the possession of type I insulin dependent diabetes, (b) the use of BGSM or urine testing as methods of glucose control for at least one year, and (c) the ability to read and write English. Seven members agreed to participate as subjects. Three additional type I insulin dependent diabetic subjects possessing the above criteria were obtained from the practice of a diabetologist to complete the pilot study. Thus, the total sample size for the completed pilot study was ten. Data were collected two times as the means of assessing reliability, specifically stability over time of diabetic knowledge and self-esteem. Retest data for the seven participants from the Peninsula Diabetes Association were obtained at their next monthly meeting. Additionally, retest data from the other three subjects were obtained by mailing the questionnaires to the participants one month
later. The return rate for this group of three was 66%.

Two additional qualities of the instruments were explored: efficiency and simplicity (Polit & Hungler, 1983). The tools were efficient since the average time required for completion was 15 minutes. The tools appeared to be appropriate in that they were readable and understandable. In instances where some difficulty was observed on an occasional item, questions were answered by the investigator.

Stability over time was also measured for both tools using the Product Moment Correlation Coefficient or the Pearson r. This index summarizes the degree of relationship between two variables, in this case the results of the knowledge and self-esteem tools measured at two different times (Polit & Hungler, 1983). The correlation coefficient for diabetic knowledge was $r=0.67$ ($p=0.23$), and the correlation coefficient for self-esteem was $r=0.90$ ($p=0.000$) indicating that the diabetic knowledge and self-esteem tools were stable over time.

After the pilot study was completed and the necessary tool revisions were made, the actual research study was begun. A procedure for data collection was devised between the researcher and the first diabetologist who provided 18 subjects. An agreement was made for the researcher to report to the office every Monday and Tuesday morning to explore the list of scheduled appointments, with the intent of identifying type I insulin dependent diabetic persons
who had either been performing conventional urine testing or BGSM for at least one year. The researcher returned at the designated appointment times to interview those clients who met the criteria for the study. After observing the interaction between the client and the physician during each office visit, the researcher provided a brief explanation of the purpose of the study. At this time the diabetologist strongly recommended that the client participate in the study which was being done to enhance the knowledge of diabetes self-management. The client was then taken to a private room and given a consent form which reinforced the purpose of the study, described the procedure for providing confidentiality, discussed the risk-benefit ratio, and stated the approval process of the study (Appendix H). The researcher also explained the role of the participant and the procedure for data collection initially in the physician's office, and one month later by mail. A phone number was given where the researcher could be contacted, and the participants were told that they could call this number to withdraw from the study at any time, request more information concerning the study, or request the results of the study. Upon agreement to participate in the study, the subjects were asked to sign the consent form. The participants were informed that all responses to the questionnaires would be held in strict confidence. The names of the subjects in the study were not used when reporting the results of the study. In addition, the consent
forms were separated from the questionnaires after the tools were completed.

The participants were instructed to proceed with the completion of the questionnaires and to feel free to inquire about any concerns. The researcher remained in the office to answer questions concerning the tools. The procedure for retesting one month later was reviewed and the subjects were informed that the mailed questionnaires would include a note stating the importance of a prompt response, and a self-addressed return envelope with a stamp. At the end of the discussion, the researcher requested the address and phone number of the subjects, and thanked them for their participation in the study.

As previously described, an insufficient number of clients possessing the criteria for inclusion in group II were found at the practice of the first diabetologist, necessitating that the utilization of clients from a second diabetologist's practice be investigated. At the conclusion of a discussion between the researcher and the second diabetologist, the researcher was provided with a lengthy alphabetical list of all type I diabetic clients within the practice. Permission was granted for the researcher to begin analyzing the charts of these clients to identify appropriate subjects for the study. Initially, five clients were contacted by telephone and asked to participate in the study. An explanation of the study and the role of the participant were provided. Two of the five
potential subjects agreed to participate. At this point, the consent form was read to the subject and verbal consent was received. The researcher then mailed the subjects a copy of the consent form, the tools along with a note emphasizing the importance of responding promptly, and a self-addressed return envelope with a stamp. One month later, the same procedure was carried out and both participants returned their completed questionnaires. Thus, the goal of obtaining a minimum of ten subjects in each group was achieved.

In summary, the overall study design was a nonexperimental descriptive correlational approach, utilizing a nonprobability, purposive sample of ten type I diabetic subjects in group I, and ten type I diabetic subjects in group II from the office of two Tidewater area diabetologists. Two tools were used to measure the dependent variables selected for the study, and background information was obtained through a Demographic Data Sheet. A pilot study was performed to test the tools prior to the implementation of the actual study at which time reliability and validity were established. Tool refinements were made on the basis of these results and the data collection for the study proceeded as described. Chapter 3 includes the presentation of the data and the analytical methods used to test the two hypotheses developed for the purpose of assessing group differences on the variables investigated in this study.
Chapter 3

Results

The purposes of this study were twofold: (a) to explore the effect of BGSM on the client's self-esteem, and (b) to explore the effect of BGSM on the diabetic client's ability to apply knowledge about diabetes mellitus to the self-management of everyday situations.

The study sample consisted of 20 type I insulin dependent diabetic clients from the practices of two Tidewater area diabetologists with similar management styles. Group I consisted of ten subjects who had been performing BGSM for at least one year as a self-care strategy, and group II consisted of ten subjects who had been performing conventional urine testing for at least one year. After achieving consent to participate, the participants completed a demographic data questionnaire and two tools. Data were collected at two times as the means of assessing tool reliability. Internal consistency and stability for the DKA and self-esteem measures were evaluated.

Analysis

Description of the sample.

Demographic data were collected on each subject concerning age, duration of diabetes mellitus, urine and hemoglobin A1c values, frequency of hyperglycemic and
hypoglycemic reactions, education, and family status. Table 1-7 summarize these data for both groups.

Table 1 presents the age group ranges for both study groups. The sample consisted of age groups which ranged from age 22-76 in group I, and from age 22 to greater than age 76 in group II. The mean age for the sample population was 49.80 with a standard deviation of 17.80 and a range of 60 years.

Table 1

<table>
<thead>
<tr>
<th>Age</th>
<th>Group I</th>
<th>Group II</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(n=10)</td>
<td>(n=10)</td>
</tr>
<tr>
<td>22-32</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>33-43</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>44-54</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>55-65</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>66-76</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>&gt;76</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>10</td>
<td>10</td>
</tr>
</tbody>
</table>

The length of time that these individuals had been diagnosed with diabetes mellitus is depicted by Table 2. The presence of this diagnosis for the sample population varied from a range of 2-39 years in group I to a range of 2-25 years in group II.
### Table 2

**Duration of Diabetes for Groups**

<table>
<thead>
<tr>
<th>Years Duration</th>
<th>Group I (n=10)</th>
<th>Group II (n=10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-9</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>10-19</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>20-29</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>30-39</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>10</strong></td>
<td><strong>10</strong></td>
</tr>
</tbody>
</table>

Table 3 represents urine sugar values for both study groups. In group I, the urine sugar values were 1+ for the seven responding subjects. Results for group II yielded 1+ urine sugars for six of the respondents and 2+ for the other four.
Table 3

Urine Sugar Values for Groups

<table>
<thead>
<tr>
<th>Urine Sugar</th>
<th>Group I (n=10)</th>
<th>Group II (n=10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1+</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>2+</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>3+</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4+</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>No Response</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>10</td>
<td>10</td>
</tr>
</tbody>
</table>

(normal urine sugar=negative)

In comparison, hemoglobin A1c values yielded more varied responses as demonstrated in Table 4. Group I had two subjects with a hemoglobin A1c value within normal limits (0-8.50%); whereas, group II had three subjects with normal hemoglobin A1c values. On the other end of the continuum, there were two subjects in group I with hemoglobin A1c values greater than 11.80% and no subjects in group II with hemoglobin A1c values greater than 11.80%. The mean hemoglobin A1c value for the sample population was 9.73% with a s.d. of 1.87 and a range of 6.90.
Table 4

Hgb A1c Values for Groups

<table>
<thead>
<tr>
<th>Hgb A1c (%)</th>
<th>Group I (n=10)</th>
<th>Group II (n=10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-8.50</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>8.60-9.60</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>9.70-10.70</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>10.80-11.80</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>&gt;11.80</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>10</strong></td>
<td><strong>10</strong></td>
</tr>
</tbody>
</table>

(normal Hgb A1c=0-8.50%)

Table 5 represents the frequency of hyperglycemic and hypoglycemic reactions in the last six months according to categories for both study groups. Data reported by subjects in both groups ranged from at least one reaction a week to no reactions. In group I, the majority of respondents reported no hyperglycemic reactions and less than one hypoglycemic reaction a month. In group II, the majority of respondents reported no hyperglycemic nor hypoglycemic reactions in the last six months.
Table 5

Frequency of High and Low Blood Glucose
Reactions in the Last Six Months for Groups

<table>
<thead>
<tr>
<th>Frequency of Blood Sugar Reaction</th>
<th>Study Groups</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Group I</td>
</tr>
<tr>
<td></td>
<td>(n=10)</td>
</tr>
<tr>
<td>Hyperglycemic Reaction</td>
<td></td>
</tr>
<tr>
<td>At least 1/week</td>
<td>2</td>
</tr>
<tr>
<td>Once every 2 weeks</td>
<td>2</td>
</tr>
<tr>
<td>1/month</td>
<td>0</td>
</tr>
<tr>
<td>Less than 1/month</td>
<td>0</td>
</tr>
<tr>
<td>No reaction</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>10</td>
</tr>
</tbody>
</table>

| Hypoglycemic Reaction            |              |              |
| At least 1/week                  | 1            | 1            |
| Once every 2 weeks               | 2            | 0            |
| 1/month                          | 2            | 2            |
| Less than 1/month                | 3            | 1            |
| No reaction                      | 2            | 6            |
| Total                            | 10           | 10           |

The variation in educational levels between groups is depicted in Table 6. All ten respondents in group I had completed high school; whereas, only seven out of ten respondents in group II were in this category.
Table 6
Educational Levels for Groups

<table>
<thead>
<tr>
<th>Level</th>
<th>Group I</th>
<th>Group II</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(n=10)</td>
<td>(n=10)</td>
</tr>
<tr>
<td>Grade School</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Junior High</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>High School</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>College</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Other (post high school)</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>10</td>
<td>10</td>
</tr>
</tbody>
</table>

Table 7 demonstrates that there was little difference in family status among the two groups. The majority of subjects in both groups were married and lived with their spouse.
Table 7
Family Status for Groups

<table>
<thead>
<tr>
<th>Family Status</th>
<th>Group I (n=10)</th>
<th>Group II (n=10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Live alone</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Live with relative</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Live with friends</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Live with spouse</td>
<td>8</td>
<td>7</td>
</tr>
<tr>
<td>Other</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>10</td>
<td>10</td>
</tr>
</tbody>
</table>

Additional interesting demographic findings which further describe the sample according to groups include the following areas: (a) occupation, (b) sex, and (c) the influence of cost of supplies on the chosen method of self-monitoring. Occupations for subjects in both groups were varied. Group I consisted primarily of housewives, supervisors, and professionals; whereas group II consisted of housewives, technicians, and secretaries.

The distribution of the sexes of the subjects were similar for group I and group II. The majority of subjects in both groups were female.

Lastly, the influence of the cost of supplies on the chosen method of self-monitoring was assessed for both groups. Out of ten subjects in group I, seven reported that
the cost of supplies had somewhat of an effect, and one reported that the cost of supplies had a great effect. Out of ten subjects in group II, four reported that the cost of supplies had no effect, two reported that the cost of supplies had somewhat of an effect, and four reported that the cost of supplies had a greater effect, which may explain why they chose the less expensive method of self-monitoring.

**Self-care practices of subjects.**

Demographic data were analyzed for the self-care practices of the subjects for both groups in terms of: (a) length of time testing, (b) frequency of testing, (c) treatment of a blood glucose reaction, and (d) frequency of self-care practices. The length of time that subjects in group I had been performing BGSM ranged from one to three years with a mean of two years. The length of time that subjects in group II had been performing urine testing ranged from two to 26 years with a mean of 12 years. The frequency of BGSM performed by the subjects in group I ranged from one to four times daily, with the majority of respondents reporting at least twice daily testing. Additionally, four subjects responded other, which they further clarified as twice weekly or occasionally. A variety of responses for the frequency of urine testing by subjects in group II included daily, twice daily, three times a week, every third day, once a week, and occasionally.

Regarding the way in which the subjects in both groups
handle a blood glucose reaction, some interesting findings were revealed. They included: (a) the majority of subjects in group I and group II reported that they take care of the reaction themselves, and (b) a few subjects in group II reported a variety of responses which involved both the doctor and a family member in the management of a reaction.

The final area of demographic data explored in this study dealt with the frequency of performing selected self-care practices for both groups. Regarding the self-administration of insulin, the majority of subjects in group I and group II reported that they always gave their own insulin.

In terms of the self-testing of urine, five subjects in group I reported self-testing their urine all of the time; two reported self-testing their urine sometimes; and, three reported never testing their urine. On the other hand, seven subjects in group II reported self-testing their urine all of the time and three reported self-testing their urine sometimes.

The frequency of making self-care decisions, for subjects in group I ranged from all of the time to sometimes, with the majority of respondents reporting sometimes. Additionally, the frequency of making self-care decisions for subjects in group II ranged from most of the time to never, with the majority of respondents reporting sometimes.

Lastly, the frequency of making self-adjustments in
one's diet was explored for both groups. In group I, responses ranged from always self-adjusting their diet to never making self-adjustments, with the majority of respondents reporting always. Whereas in group II, the responses of subjects regarding the frequency of making dietary self-adjustments were evenly distributed between the categories of always, mostly, and sometimes.

Testing research hypotheses.

The hypotheses for this study were: (a) "Diabetic subjects who use conventional urine testing methods will not demonstrate a significant difference in self-esteem when compared to diabetic subjects who have been using BGSM for at least one year", and (b) "Diabetic subjects who use conventional urine testing methods will not demonstrate a significant difference in understanding and application of knowledge when compared to diabetic subjects who have been using BGSM for at least one year". The Statistical Package for the Social Sciences computer program was used to analyze the response differences of the 20 subjects (Nie, Hull, Jenkins, Steinbrenner & Bent, 1975).

Table 8 represents an analysis of the first hypothesis which explored group differences related to self-esteem. A t-test for independent samples showed the null hypothesis was not rejected. Based on the t-value of 0.05 (with 18 degrees of freedom and a p-value of 0.96), there were no significant differences in the way the subjects from the two groups responded to each of the 34 self-esteem items.
Table 8
T-Test Differences Between Groups\textsuperscript{a} on Self-Esteem

<table>
<thead>
<tr>
<th>Group</th>
<th>n</th>
<th>$\bar{x}$</th>
<th>s.d.</th>
<th>T-value</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group I</td>
<td>10</td>
<td>3.80</td>
<td>0.63</td>
<td></td>
<td>0.05</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.96</td>
</tr>
<tr>
<td>Group II</td>
<td>10</td>
<td>3.78</td>
<td>0.49</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\textsuperscript{a}df=18

Table 9 represents testing of the second hypothesis which explored group differences related to the ability to apply knowledge of diabetes mellitus. The null hypothesis was rejected based on the t-value of 4.04 (with 18 degrees of freedom and a p-value of 0.001), indicating that there was a significant difference in the clients' application of knowledge of diabetes mellitus between the BGSM and urine groups. T-tests were also computed to explore differences between the groups on the variables of duration of disease, age, hemoglobin A\textsubscript{1c} values, and urine sugar results, but no significant differences were found between groups (p<0.05).
Table 9

T-Test Differences Between Groups on Diabetic Knowledge

<table>
<thead>
<tr>
<th>Group</th>
<th>n</th>
<th>$\bar{x}$</th>
<th>s.d.</th>
<th>T-value</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group I</td>
<td>10</td>
<td>81.60</td>
<td>8.64</td>
<td>4.04</td>
<td>0.001</td>
</tr>
<tr>
<td>Group II</td>
<td>10</td>
<td>62.30</td>
<td>12.41</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

$^a$df=18

Additional Data Analysis

A measure of reliability (internal consistency) was calculated for both tools using Cronbach's alpha. The alpha coefficient for the newly designed DKA tool was 0.60 and the alpha coefficient for the adapted self-esteem tool was 0.71. Calculation of alpha is based on the comparison of individual item variance to total measure variance (Polit & Hungler, 1983). The low alpha coefficient on the DKA tool was probably due to little variance in the subjects' answers on individual items and on the measure as a whole.

The reliability of the research tools was further explored. In order to explore tool stability over time, test-retest reliability was measured for both tools using the Product Moment Correlation Coefficient. The correlation coefficient for the DKA tool was $r=0.62$ (p=0.002), and the correlation coefficient for the self-esteem tool was $r=0.93$
(p=0.000), indicating that the DKA tool was reasonably stable over time and the self-esteem tool was highly stable.

**Findings**

Analysis of the data for this study revealed that self-esteem was not influenced significantly by the self-care method of monitoring diabetes mellitus; however, the ability to apply knowledge of diabetes mellitus was influenced significantly. Clearly, subjects performing BGSM displayed an enhanced understanding of the self-management of diabetes mellitus as reflected by their scores on the diabetic knowledge tool.

In the specific sample, the following were found: (a) age did not vary significantly between groups, (b) the duration of disease tended to be slightly greater for more subjects in group II, (c) mean urine sugars did not vary significantly between groups, (d) more subjects in group I had hemoglobin A1c values above the normal range of 0-8.50%, (e) subjects in group I reported having slightly more frequent hyperglycemic and hypoglycemic reactions, (f) subjects in group I had a higher level of education, and (g) family status did not vary significantly between groups.

In summarizing the findings of this research study, there were no significant differences at the p≤0.05 level between the self-esteem scores of type I insulin dependent diabetics performing BGSM and urine testing as self-care strategies. In contrast, test statistics showed significant differences at the p≤0.05 level between the diabetic
knowledge scores of type I insulin dependent diabetics performing BGSM and urine testing. Respondents in group I showed a significantly greater ability to apply knowledge of diabetes mellitus to everyday situations when compared to group II.

Chapter 4 is a discussion of interpretations, implications, and recommendations related to the statistical findings derived from this study. Included in the interpretation of the results are statements about the relationship of the findings to earlier research investigations presented in the literature review. Additionally, there are recommendations for further research based on questions generated by the findings of this study.
The purposes of this study were twofold: (a) to explore the effect of BGSM on the client's self-esteem, and (b) to explore the effect of BGSM on the client's ability to apply knowledge about diabetes mellitus to the self-management of everyday situations. Another dimension of the study was an analysis of several items of demographic data relating to the self-care practices of adult type I diabetic clients.

This study tested two hypotheses using a t-test for independent samples. Statistical findings in relation to both hypotheses will be discussed.

The first hypothesis investigated the effect of two diabetes self-monitoring methods on the client's self-esteem. This null hypothesis was not rejected in that no significant differences were found in the way the subjects from the two groups responded to each of 34 self-esteem items (Table 8). It was anticipated that significant differences would be found between the two groups, reflecting higher levels of self-esteem for subjects in group I. Based on principles of social learning theory, it was hypothesized that BGSM would improve diabetes control through self-regulatory behaviors due to the immediate feedback from this accurate monitoring.
method. As a result, it was anticipated that individuals performing BGSM would gain self-confidence and experience increased self-esteem.

There are several possible explanations for the unexpected findings related to the first hypothesis. Perhaps, the design of the study, which consisted of a cross-sectional survey, may have limited the researcher's ability to explore the true impact of BGSM on the diabetic client's self-esteem. Although all of the subjects in the study had been performing BGSM for at least one year, a considerably longer period of monitoring may be necessary before the effects of BGSM on self-esteem can be demonstrated. It is also possible that the impact of BGSM on self-esteem could have been demonstrated if a third group of subjects could have been introduced into the design, and surveyed prior to their participation in a BGSM program, and then again one year later.

A second possible explanation for the findings related to the first hypothesis could be related to the small, non-probability purposive sample used in this study. It is possible that the researcher's sample was very different from the sample of insulin dependent diabetic clients used by Dupuis et al. (1980), who found a significant increase in self-esteem after eight months of participation in a rigorous program of self-monitored blood glucose determinations. Their subjects were also found to have improved carbohydrate control as evidenced by decreased
hemoglobin A₁c levels.

In contrast to the characteristics of the sample in the Dupuis et al. study (1980), the following characteristics of the researcher's sample for the present study were found. The frequency of BGSM performed by subjects in group I ranged from one to four times daily, with the majority of respondents reporting at least twice daily testing. Additionally, four subjects responded OTHER, which they further clarified as "twice weekly" or "occasionally". In analyzing the length of time that subjects in group I had been self-testing, a mean of two years was found, compared to a mean of twelve years in group II. Additionally, hemoglobin A₁c levels revealed that subjects in group II had slightly better carbohydrate control. This may represent significant differences in the level of experience with diabetes mellitus between the two groups. Perhaps, if the subjects in group I had been performing BGSM more frequently over a longer period of time, both their self-esteem and carbohydrate control would have been enhanced by their method of monitoring.

A third possible explanation for the unexpected findings of no significant differences in mean self-esteem scores could be the result of the existing relationship between the two diabetologists and their clients who served as the sample in this study. Perhaps the diabetologists' participative approach to client management affected all of their clients' self-esteem in a positive manner. It is
possible that many of the clients in this sample already had an increased level of self-esteem as a result of the rapport with their physician. Therefore, the conversion from one self-monitoring strategy to another would not be expected to have a significant impact on self-esteem.

A fourth possible explanation for the unexpected findings of no significant differences in mean self-esteem scores may be related to the adapted version of the Coopersmith Self-Esteem Inventory scale (1967) utilized in this study. It may not have been sufficiently sensitive to differences in self-esteem between the two groups of adult type I insulin dependent diabetic clients. Although the Coopersmith tool was found to be a valid and reliable tool for assessing the self-esteem of a variety of age groups, most of the data related to validity and reliability testing were obtained when testing large samples of children. Even though the researcher's adapted version of the Coopersmith tool yielded acceptable pilot study results in terms of reliability as evidenced by an alpha coefficient of 0.72, and support for both content and face validity; these results were based on a non-probability, convenience sample of adult diabetic clients. It is possible that the pilot study group of subjects did not represent the larger, target population of diabetic individuals from which the sample was drawn. Therefore, it would be advantageous to perform further testing of this tool with large samples of clients to determine if the Coopersmith tool can be used with adult
diabetic subjects.

The second hypothesis investigated the effect of two diabetes self-monitoring methods on the client's ability to apply knowledge of diabetes mellitus to the self-management of everyday situations. The null hypothesis was rejected because significant differences were found in the client's application of knowledge of diabetes mellitus between groups (Table 9). As proposed, subjects in group I as compared to subjects in group II were found to have a greater ability to apply knowledge of diabetes mellitus to the self-management of everyday situations. For these subjects it appeared that regularly available BGSM data provided information giving them insight into the understanding of their disease and allowed them to make more appropriate self-management decisions.

Conclusions

A major limitation in the study was the small, non-probability purposive sample used. This small, nonrandom sample of 20 adult insulin dependent diabetic clients limits generalizability of findings from this study to other settings.

In contrast to this study, Dupuis et al. (1980) found an increase in self-esteem for a sample of ten adult insulin dependent diabetic clients after eight months of participation in a rigorous program of self-monitored blood glucose determinations. By this time, clients have begun to achieve mastery over the self-monitoring technique and the
application of its results. These subjects performing BGSM were also found to have decreased hemoglobin A1c levels indicating better carbohydrate control once BGSM was performed routinely. It appears that the intensity and length of the monitoring program are critical factors which may greatly influence self-esteem and carbohydrate control. This conclusion supports a previously offered explanation for this researchers' unanticipated findings.

In relation to the application of knowledge of diabetes mellitus, this researcher's findings correspond with those of Judd and Sönksen (1980), Christiansen and Sachse (1980), and Skyler et al. (1978). All of these researchers have concluded that participation in BGSM enhances the client's understanding of their disease, but none of them have actually used a tool to measure the application of knowledge and understanding.

Recommendations

As a result of this research study, several recommendations are suggested. Due to the similarities identified between the mean self-esteem scores of subjects in group I and group II, a replication of this study with a large random sample of adult type I diabetic clients would be advantageous. A larger, more heterogeneous sample from a variety of settings may show significant differences between the self-esteem of the clients in the two groups not identified in this study.

As discussed earlier, further exploration of the
validity of the adapted version of the Coopersmith Self-Esteem Inventory scale (1967) needs to be conducted with adult populations. This investigation would facilitate strengthening of the tool for use with a variety of age groups.

Additionally, it would be worthwhile to further explore the issue of construct validity of the self-esteem tool, which was an essential factor for the study (Robinson & Shaver, 1973). It is important to remember that the Coopersmith Self-Esteem Inventory scale was designed to quantify a psychological parameter that generally characterizes human beings. Perhaps this standardized measure of self-esteem must be further refined to more specifically assess self-esteem in individuals with diabetes mellitus. Further comparison of the self-esteem of clients in the two groups in relation to the frequency of monitoring, the duration of monitoring, and carbohydrate control may explain differences or similarities identified in future studies of this kind.

In analyzing the effect of the self-monitoring method on the application of knowledge of diabetes mellitus in future research, it would be advantageous to control for the type and amount of diabetes education for subjects in both groups prior to the initiation of BGSM to ascertain the effects of implementing a particular BGSM training program. Other extraneous variables that would be advantageous to control for include: (a) age of the client, (b) duration
of diabetes, (c) educational background, and (d) varying degrees of motivation.

An additional dependent variable that would be interesting to incorporate into the design of a research study is locus of control. According to Dupuis (1980), it is anticipated that individuals performing BGSM would have a high internal locus of control with decreased depression, helplessness and hopelessness, and increased self-reliance. Through the use of this method, a greater sense of partnership is expected to arise between the client, the physician, the nurse, and other health care personnel, as each becomes more skillful in the application of knowledge relating to the manipulation of insulin, diet and exercise.

Other recommendations for future research in this area include the replication of the study using an experimental design with random assignment of adult diabetic clients to two control groups and one experimental group. The control groups should include a BGSM and a urine group, and the experimental group should be defined as a group of subjects who change to BGSM after performing conventional urine testing for at least one year. Standard BGSM training would be administered at the time of the change over to all members of the experimental group. Therefore, the impact of the training program could be measured by exploration of any differences in pre-test and post-test scores on the DKA tool.

Overall, this study suggests that BGSM had a
significant impact on the enhancement of understanding the self-management of diabetes mellitus for the sample studied. This finding has implications for diabetes educators whose nursing role is changing from delivery of general patient education about diabetes mellitus to specific advice about self-management strategies that will facilitate achievement of normoglycemia. Further research in the area of application of knowledge through a variety of DKA tools with all age groups may provide additional supporting evidence that BGSM facilitates improved self-management capabilities for clients with diabetes mellitus.

Although the results of this study related to self-esteem were not significant, they may be significant under different conditions. Nurses should continue to explore behavioral and psychosocial issues impacting clients with diabetes mellitus. Several related areas for research have been recommended by Hamburg et al. (1980): (a) investigation of the direct effects that shifting metabolic states have on moods and behaviors of diabetic clients, (b) identification of various coping strategies and their effectiveness in dealing with the crisis related to the chronic predictable course of diabetes mellitus, (c) application of recent advances in areas of stress management to provide the diabetic client with long-term easily applicable methods of reducing tension, (d) collection and evaluation of instruments designed to assess the degree of client and family behavioral adjustment to this chronic
illness, and (e) assessment of the efficacy of diverse educational approaches and behavioral interventions in enhancing adherence to prescribed regimens, in influencing psychosocial outcomes, and in stabilizing metabolic control. All of these potential research areas could easily be explored with diabetic clients performing BGSM in an effort to broaden the scope of research regarding this modern self-monitoring method.

In summary, this study explored the effect of BGSM on two dependent variables: (a) the diabetic client's self-esteem, and (b) the diabetic client's ability to apply knowledge about one's diagnosis to the self-management of everyday situations. For the sample of 20 adult insulin dependent diabetics studied, the researcher's findings support the identified conclusions concerning the impact of BGSM. The client's ability to apply knowledge of diabetes mellitus was found to be significantly affected by the performance of BGSM. This particular finding has implications for nurses involved in patient education roles regarding the instruction of diabetic individuals. Even though the client's self-esteem was not found to be significantly affected by the performance of BGSM in this study, future studies regarding the impact of BGSM on self-esteem and other psychological parameters may yield significant results that will be advantageous to health care professionals interacting with diabetic clients. Although BGSM is not an appropriate monitoring technique for all
individuals with diabetes mellitus, it certainly has many advantages over conventional urine testing and should be critically considered as a self-care strategy for the management of clients with diabetes mellitus.
Bibliography


Appendix A
Self-Esteem Research Tool
How I Feel About Myself

For each statement below, place a (/) in the box to the right of the question that comes closest to how you feel about yourself as a diabetic. There are no right or wrong answers. Please answer every item.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Undecided</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I'm pretty sure of myself.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. I often wish I were someone else.</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>3. I find it very hard to talk in front of a group.</td>
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<td></td>
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</tr>
<tr>
<td>4. There are lots of things about myself I'd change if I could.</td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>5. I can make up my mind without too much trouble.</td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>6. I'm a lot of fun to be with.</td>
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<tr>
<td>7. I get upset easily at home.</td>
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<tr>
<td>8. I always do the right thing.</td>
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<tr>
<td>9. I'm proud of what I do.</td>
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<tr>
<td>10. Someone always has to tell me what to do.</td>
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<tr>
<td>11. It takes me a long time to get used to anything new.</td>
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<tr>
<td>12. I always try to do my best.</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>13. I give in very easily.</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>14. I can usually take care of myself.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. I'm pretty happy.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16. I understand myself.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17. Things are all mixed up in my life.</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>18. Other people usually follow my ideas.</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19. I can make up my mind and stick to it.</td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20. I have a low opinion of myself.</td>
<td></td>
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</tr>
<tr>
<td>21. There are many times when I'd like to leave home.</td>
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</tr>
<tr>
<td>22. I often feel upset about the work that I do.</td>
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<td></td>
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</tr>
<tr>
<td>23. I often feel ashamed of myself.</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24. I'm not as nice looking as most people.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25. If I have something to say, I usually say it.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>26. I tell the truth most of the time.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>27. I don't care what happens to me.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>28. I'm a failure.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>29. I get upset easily when I make mistakes.</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>30. Most people are better liked than I am.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>31. I always know what to say to people.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>32. I often get discouraged at what I am doing.</td>
<td></td>
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</tr>
<tr>
<td>33. Things don't usually bother me.</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>34. I can't be depended on.</td>
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</tr>
</tbody>
</table>

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Appendix B

Diabetic Knowledge Assessment Research Tool
Appendix B

Diabetic Knowledge Assessment Research Tool

Managing Diabetes

Directions: Please read the following situations which commonly happen to diabetics. Even if they have not happened to you, try to imagine yourself in each situation. Circle the letter of the statement that is most like the way you would respond. If none of the answers describe the way you would respond, circle letter "d".

1. You have just finished exercising and begin to get a headache and feel sweaty, shaky and weak. You should:
   a. Inject yourself with insulin right away.
   b. Lie down and rest right away.
   c. Eat or drink something sweet right away.
   d. I don't know.

2. You are sick with the flu. You begin to have these symptoms: dry mouth, thirst, stomach pain, and sleepiness. When you test your urine or blood, you find increased sugar. Things you could do are:
   a. Decrease your usual daily insulin dose, drink lots of water, and call your doctor.
   b. Take your usual daily insulin dose, drink lots of water, and call your doctor.
   c. Double your usual daily insulin dose, drink lots of water, and call your doctor.
   d. I don't know.

3. You have an invitation to go out to dinner at nine o'clock tonight. You are used to eating at six o'clock. How could you change your usual routine?
   a. Wait until nine o'clock to eat dinner. Check your urine or blood when you get home.
   b. Eat a snack at six o'clock and eat dinner at nine o'clock. Check your urine or blood when you get home.
   c. Eat one half of your meal at six o'clock and one half when you go out for dinner. Check your urine or blood when you get home.
   d. I don't know.
4. You are going to the hospital tomorrow morning to have an x-ray procedure and you have been told not to eat or drink anything after midnight tonight. How could you change your morning schedule if you take Regular insulin?
   a. Wait until after the test to take the usual morning insulin dose.
   b. Take half of the insulin dose in the morning at the usual time and take the rest of the dose when the test is over.
   c. Take the usual morning dose of insulin before the procedure and eat when you can.
   d. I don't know.

5. The choices below appear on your dinner menu at a restaurant. Which meal would be best to choose?
   a. Fried fish, mashed potatoes with gravy, green beans, bread and butter, pudding.
   b. Broiled steak, coleslaw, creamed corn, bread and butter, dietetic chocolate cake.
   c. Baked chicken, broccoli, baked potato, bread and butter, salad with low calorie dressing, fruit cocktail.
   d. I don't know.

6. You are going to fix a bedtime snack, which one would be best to eat?
   a. Chocolate cookies, glass of skim milk.
   b. Roast beef sandwich with mustard, glass of skim milk.
   c. Bowl of ice milk, graham crackers.
   d. I don't know.

7. You are asked to go to a cocktail party which is serving snacks. Your doctor has said that once in awhile you may have one to two drinks of alcohol in a day. Which of these drinks would be best not to drink?
   a. 1-2 4 oz. glasses of dry table wine.
   b. 1-2 4 oz. rum and coke cocktails.
   c. 1-2 4 oz. whiskey and club soda cocktails.
   d. I don't know.

8. You have just eaten three pieces of pizza. About how long will it take for you to see the peak effects of this food in your blood sugar?
   a. 15-30 minutes
   b. 3 hours
   c. 1 - 1 1/2 hours
   d. I don't know.
9. If you don't feel like eating the egg allowed on your diet for breakfast, you could:
   a. Have extra toast.
   b. Have an ounce of cheese instead.
   c. Forget about it.
   d. I don't know.

10. You are about to begin an exercise program to help control your diabetes. You should:
   a. Exercise on weekends only.
   b. Exercise three times a week.
   c. Exercise the same amount daily.
   d. I don't know.

11. You have recently started a heavy exercise program and notice that you're having more headaches and some tingling in the fingers at about eleven o'clock in the morning. Your urine or blood tests show low sugar. You could:
   a. Decrease your morning insulin dose or eat a snack before exercising.
   b. Increase your morning insulin dose and eat a big lunch.
   c. Increase your morning insulin dose or eat a snack before exercising.
   d. I don't know.

12. You have gained 20 pounds recently and have been told by your doctor to lose weight. You should:
   a. Decrease your calories by 10% and spread them out evenly throughout the day.
   b. Increase your insulin intake by 10% and spread it out evenly throughout the day.
   c. Skip one full meal a day and eat a light snack to make up for it.
   d. I don't know.
Appendix C
Demographic Research Tool
Background Information

Directions: Please answer the following questions about yourself.
Check the space that best answers the question or write
your answer in the space after the question.

1. What year did you find out you had diabetes?.............................................Year____
2. Do you take insulin?....................Yes____ No____
   If yes:
   a. How much insulin do you usually take each day?.........Number of units____
   b. What type(s) do you take (i.e. NPH, Regular, Lente)?___________
   c. When do you take it?____________
3. Which answer best describes how you control your diabetes?....................Insulin alone
   Diet and insulin
   Insulin & exercise
   Diet, insulin, & exercise
   Other
4. Do you test your urine for ketones?....Yes____ No____
5. Do you test your urine for sugar?......Yes____ No____
   (If no, go on to question 6.)
   If yes:
   a. How long have you been testing your urine?................Years___ Months___
   b. How often do you test your urine?..................(check one)........1+ 2+ 3+ 4+
   c. What are your usual results?........................
5. Do you test your blood for sugar? Yes____ No____
   (If no, go on to question 7.)
   If yes:
   a. How long have you been testing your blood?................Years___ Months___
   b. How often do you test your blood?..................(check one)........Once a day 2-4 times a day 5 times a day Other
   c. What method do you use?.............Meter Read strips
   d. What are your usual results?.............
7. Does the cost of supplies influence the method you use to test for sugar? (circle one) ................................................................. Not at all  Very Much
   1  2  3  4  5

8. In the last six months, how often have you had a low blood sugar reaction (i.e. sweating, blurred vision, headache)? .................. At least once a week ______
   Once every two weeks ______
   Once a month ______
   Less than once a month ______
   I haven't had a reaction in the last six months ______

9. In the last six months, how often have you had a high blood sugar reaction (i.e. dry mouth, thirst, sleepiness)? ........... At least once a week ______
   Once every two weeks ______
   Once a month ______
   Less than once a month ______
   I haven't had a reaction in the last six months ______

10. In general, how do you treat a low or high blood sugar reaction? .......... Take care of it myself ______
   Let the doctor take care of it ______
   Each one is taken care of differently ______
   A family member takes care of it ______
   Does not apply ______

11. How often do you do the following: 

   a. Give your own insulin? .............. 1  2  3  4  5
   b. Test your own urine? ............... 1  2  3  4  5
   c. Test your own blood? .............. 1  2  3  4  5
   d. Make decisions about your care.... 1  2  3  4  5
   e. Make adjustments in your diet?.... 1  2  3  4  5

12. About how many times have you called your doctor about a diabetes related problem in the last six months? (check one only) ............... 0-2 times ______
   3-5 times ______
   6-8 times ______
   9-10 times ______
   11 or more times ______

13. What is your occupation? .............................................

14. What was your age on your last birthday? .................................................................

15. What is your sex? .................. Male ______  Female ______
16. Check the highest level of school that you have attended
   - Grade school
   - Junior high
   - High school
   - College
   - Other post high school training

17. What is your family status?
   - Live alone
   - Live with relative
   - Live with friends
   - Live with spouse
   - Other
Appendix D
Self-Esteem Pilot Study Tool
How I Feel About Myself

For each statement below, place a check (✓) in the box to the right of the question that comes closest to how you feel about yourself. There are no right or wrong answers. Please answer every item.

<table>
<thead>
<tr>
<th></th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Undecided</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>I'm pretty sure of myself</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>I often wish I were someone else.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>I find it very hard to talk in front of a group.</td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>4.</td>
<td>There are lots of things about myself I'd change if I could.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>I can make up my mind without too much trouble.</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>6.</td>
<td>I'm a lot of fun to be with.</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>7.</td>
<td>I get upset easily at home.</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>8.</td>
<td>I always do the right thing.</td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>9.</td>
<td>I'm proud of what I do.</td>
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<tr>
<td>10.</td>
<td>Someone always has to tell me what to do.</td>
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<tr>
<td>11.</td>
<td>It takes me a long time to get used to anything new.</td>
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<td></td>
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</tr>
<tr>
<td>12.</td>
<td>My family usually considers my feelings.</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>13.</td>
<td>I always try to do my best.</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15.</td>
<td>I can usually take care of myself.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16.</td>
<td>I'm pretty happy.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17.</td>
<td>My family expects too much of me.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18.</td>
<td>I understand myself.</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>19.</td>
<td>It's pretty tough to be me.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
20. Things are all mixed up in my life
21. Other people usually follow my ideas.
22. No one pays much attention to me at home.
23. I can make up my mind and stick to it.
24. I have a low opinion of myself.
25. There are many times when I'd like to leave home.
26. I often feel upset about the work that I do.
27. I often feel ashamed of myself.
28. I'm not as nice looking as most people.
29. If I have something to say, I usually say it.
30. My family understands me.
31. I tell the truth most of the time.
32. I don't care what happens to me.
33. I'm a failure.
34. I get upset easily when I make mistakes.
35. Most people are better liked than I am.
36. I usually feel as if my family is pushing me.
37. I always know what to say to people.
38. I often get discouraged at what I am doing.
39. Things don't usually bother me.
40. I can't be depended on.

Adapted from the Self-Esteem Inventory (Coopersmith, 1967).
Appendix E

Content Validity Form Letter

March 25, 1984

Dear ______________:

I am currently a graduate student in nursing at Old Dominion University and am conducting a research study on the effects of self blood glucose monitoring on self-esteem and the ability to apply knowledge about diabetes mellitus. I have been referred to you as an expert in diabetes and would greatly appreciate your feedback on the two enclosed tools designed specifically for this study. Please try to review each item from the perspective of my population which will be type I diabetics who have either been testing their urine or blood for sugar. Comparisons will be made to try to prove that diabetics performing self blood glucose monitoring have a better understanding of their disease and feel better about themselves. I have chosen to design the knowledge items based on adjustments in insulin, diet, and exercise in response to common situations encountered by diabetics. I would particularly like you to focus on clarity, content, reading level, appearance, length, and the relevance of each item as you review them on both tools. Feel free to write on these tools directly with your comments, and then return them in the enclosed self-addressed envelope.

Thank you for your assistance.

Sincerely yours,

Nancy Moul, R.N.
Old Dominion University
Graduate Department of Nursing
Hampton Boulevard
Norfolk, Virginia 23508
Appendix F

Diabetic Knowledge Pilot Study Tool
Appendix F
Diabetic Knowledge Pilot Study Tool
Managing Diabetes

Directions: Please read the following situations which commonly happen to diabetics. Even if they have not happened to you, try to imagine yourself in each situation. Circle the letter of the statement that best describes the way you would respond. If none of the answers describe the way you would respond, circle letter "d".

1. You have just finished exercising and you realize that it is one o'clock in the afternoon. You haven't eaten since breakfast. You begin to have these symptoms: sweating, shakiness, headache and weakness. What could you do?
   a. Inject yourself with insulin right away.
   b. Drink lots of water or diet soda.
   c. Drink orange juice.
   d. I don't know.

2. You are sick with the flu. You begin to have these symptoms: dry mouth, thirst, stomach pain, and sleepiness. When you test your urine or blood, you find increased sugar. Things you could do are:
   a. Decrease your usual daily insulin dose, drink lots of water, and call your doctor.
   b. Take your usual daily insulin dose, drink lots of water, and call your doctor.
   c. Double your usual daily insulin dose, drink lots of water, and call your doctor.
   d. I don't know.

3. You have an invitation to go out to dinner at nine o'clock tonight. You are used to eating at six o'clock. How could you change your usual routine?
   a. Wait until nine o'clock to eat dinner. Check your urine or blood when you get home.
   b. Eat a snack at six o'clock and eat dinner at nine o'clock. Check your urine or blood when you get home.
   c. Eat one half of your meal at six o'clock and one half when you go out for dinner. Check your urine or blood when you get home.
   d. I don't know.
4. You are going to the hospital tomorrow morning to have an x-ray procedure and you have been told not to eat or drink anything after midnight tonight. How could you change your insulin schedule?

a. Wait until after the test to take the usual morning insulin dose.

b. Take the first half of the insulin dose in the morning at the usual time and take the second half of the insulin dose after the test is over.

c. Take the usual morning dose of insulin before the procedure and eat when you can.

d. I don't know.

5. The choices below appear on your dinner menu at a restaurant. Which meal would be best to choose?

a. Fried fish, mashed potatoes with gravy, green beans, bread and butter, pudding.

b. Broiled steak, coleslaw, creamed corn, bread and butter, diatetic chocolate cake.

c. Baked chicken, peas, baked potatoe, bread and butter, salad with low calorie dressing, fruit cocktail.

d. I don't know.

6. You are going to fix a bedtime snack, which one would be best to eat?

a. Chocolate cookies, glass of skim milk

b. Lean roast beef sandwich with mustard, glass of skim milk.

c. Bowl of ice milk, graham crackers.

d. I don't know.

7. You are asked to go to a cocktail party which is serving snacks. Your doctor has said that once in awhile you may have one to two drinks of alcohol in a day. Which of these drinks would be best not to drink?

a. 1-2 4 oz. glasses of dry table wine.

b. 1-2 4 oz. rum and coke cocktails.

c. 1-2 4 oz. whiskey and club soda cocktails.

d. I don't know.

8. You have just eaten a lot of pizza. About how long will it take for you to see the peak effects of this starchy food in your blood sugar?

a. 15-30 minutes

b. 3 hours

c. 1 - 1 1/2 hours

d. I don't know.
9. Your urine sugars before breakfast, before supper, or at bedtime are high for three to five days in a row. You are not on a diet and you are having low blood sugar reactions - you should:
   a. Increase your usual daily insulin dose.
   b. Keep taking your usual daily insulin dose and call your doctor.
   c. Eat more at mealtime.
   d. I don't know.

10. You are about to begin an exercise program to help control your diabetes. You should:
   a. Exercise on weekends only.
   b. Exercise three times a week.
   c. Exercise the same amount daily.
   d. I don't know.

11. You have recently started a heavy exercise program and notice that you're having more headaches and some tingling in the fingers at about eleven o'clock in the morning. Your urine or blood tests show low sugar. You could:
   a. Decrease your morning insulin dose or eat a snack before exercising.
   b. Increase your morning insulin dose and eat a big lunch.
   c. Increase your morning insulin dose or eat a snack before exercising.
   d. I don't know.

12. You have gained 20 pounds recently and have been told by your doctor to lose weight. You should:
   a. Decrease your calories by 10% and spread them out evenly throughout the day.
   b. Increase your insulin intake by 10% and spread it out evenly throughout the day.
   c. Skip one full meal a day and eat a light snack to make up for it.
   d. I don't know.
Appendix G
Demographic Pilot Study Tool

Background Information

Directions: Please answer the following questions about yourself. Check the space that best answers the question or write your answer in the space after the question.

1. What year did you find out you had diabetes? Year___

2. Do you take insulin? Yes___ No___
   If yes:
   How much insulin do you usually take each day? ____________________________
   What type(s) (i.e. NPH, regular, Lente) ____________________________
   Number of units ____________________________
   When do you take it? ____________________________

3. Which answer best describes how you control your diabetes?
   Insulin alone ___
   Diet & insulin ___
   Insulin & exercise ___
   Diet, insulin & exercise ___
   Other ____________________________

4. Do you test your urine for ketones? Yes___ No___

5. Do you test your urine for sugar? Yes___ No___
   If yes:
   a. How long have you been testing your urine? Years___ Months___
   b. How often do you test your urine? ____________________________
   c. What are your usual results? (check one) 1+ ___ 2+ ___ 3+ ___ 4+ ___

6. Do you test your blood for sugar? Yes___ No___
   If yes:
   a. How long have you been testing your blood? Years___ Months___
   b. How often do you test your blood? ____________________________
   c. What method do you use? Meter___ Read strips___
7. Does the cost of supplies influence the method you use to test for sugar? (circle one)

8. In the last six months, how often have you had a low blood glucose reaction (i.e. sweating, blurred vision, headache)?

9. In the last six months, how often have you had a high blood glucose reaction (i.e. dry mouth, thirst, sleepiness)?

10. In general, how do you treat a low or high blood glucose reaction?

11. How often are you in charge of:
   a. Giving your insulin?
   b. Testing your urine?
   c. Testing your blood?
   d. Making decisions about your care?

12. About how many times have you called your doctor about a diabetes related problem in the last six months? (check one only)

13. What is your occupation?

14. What was your age on your last birthday?

15. What is your sex?

16. Circle the highest grade that you completed in school.
17. What is your family status?

- Live alone
- Live with relative
- Live with friend
- Other (please specify) ___
Appendix H
Consent Form

Old Dominion University
Department of Nursing

Informed Consent

You are being asked to participate in a nursing research study to determine what patients know about the self-management of diabetes mellitus and how they feel about themselves as they participate in the management of their disease.

The study and your role as a participant have been explained to you and you have indicated an understanding of the explanation. You are aware that you may drop out of the project at any time without penalty or prejudice.

You have been given a chance to ask questions concerning the purpose of this study and all of your questions have been answered satisfactorily. You understand that if you have any more questions in the future about this study, you may contact the undersigned researcher at 440-4297.

Your participation in this study is greatly appreciated. You may withhold any answer to specific questions in any questionnaire given to you for this study. Your name will in no way be associated with the findings of the study. Your decision to participate or not in the study will have no effect on the care you receive.

The potential risk associated with your participation in this study is that it may cause minimal anxiety.

The primary benefit associated with participation in this study is the possible improvement of knowledge associated with the self-management of diabetes mellitus.

By signing this form you are indicating your willingness to participate in this study. If you desire an abstract of the findings of the study, I will be happy to provide it for you. Your physician has indicated his interest in, and gives his consent for your participation.

Thank you for your assistance.

Signature of Graduate Student            Signature of Participant