Perceived and actual level of knowledge of diabetes among medical-surgical nurses

Patricia Helen Hess
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Perceived and actual level of knowledge of diabetes among medical-surgical nurses

Hess, Patricia Helen, M.S.N.

University of Nevada, Las Vegas, 1992
PERCEIVED AND ACTUAL LEVEL OF KNOWLEDGE OF DIABETES AMONG MEDICAL-SURGICAL NURSES

by

Patricia Helen Hess

A thesis submitted in partial fulfillment of the requirements for the degree of

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in

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University of Nevada, Las Vegas
December, 1992
Approval Page

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Abstract

The purpose of this study was three fold: To survey the level of perceived and actual knowledge of diabetes mellitus among medical-surgical nurses, to investigate the relationship of perceived to actual knowledge of diabetes, and to identify factors that affect nurses’ level of perceived and actual knowledge of diabetes mellitus. Data was obtained from a convenience sample of medical-surgical nurses (N=77). Tools used to gather data were the Demographic Data Sheet (DDS), Diabetes Self-Report Tool (DSRT), and Diabetes Basic Knowledge Test (DBKT). Reliability for the DSRT and the DBKT was established by a Cronbach’s alpha score of .89 and .785 respectively. The DSRT measured the perceived knowledge of medical surgical nurses. The DSRT revealed a mean score of 67.5 points indicating that the subjects had a moderately high level of perception regarding their knowledge of diabetes. The actual knowledge level of diabetes was measured by the DBKT. A mean score of 66% demonstrated that nurses had less than an adequate level of knowledge of diabetes. A Pearson’s Correlation indicated that there was a positive relationship between the subjects’ perceived and actual level of knowledge \( (r = .2600 \ p < .05, \ r^2 6.8\%) \). Multiple Regression statistics on variables obtained from the DDS indicated that reading literature affected the subjects perception while no significant factors were found to affect their actual level of knowledge.
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CHAPTER 1

Introduction

Diabetes Mellitus is a complex hormonal disease that has been recognized as a health disorder since the second millennium B.C. (Guthrie & Guthrie, 1982). The complexity of diabetes has circumvented any cure and those who have the disease can only learn to live with this disorder and wait for a remedy.

Over seven million people are diagnosed with diabetes mellitus in the United States (American Diabetes Association, 1991). It is estimated the number of individuals who acquire this health disorder will continue to rise at a rate of six percent per year (Covelli & Wiedman, 1988). Those patients who have diabetes not only suffer from a hormonal imbalance but also the long term affects this disease has on all systems of the human body. It is well documented that diabetes mellitus plays a significant role in cardio-vascular, cerebral vascular, and renal disease. Diabetes is also the leading cause of blindness and is second only to accidents as the cause of lower extremity amputations. (Guthrie & Guthrie, 1988). Diabetes Mellitus is categorized as a chronic illness.

Cluff (1981), defines chronic illness as:

A condition not cured by medical intervention, requiring periodic monitoring and supportive care to reduce the degree of illness, maximize the person's functioning and responsibility for self-care. (p. 299)
Survival of those affected with a chronic illness, such as diabetes mellitus, is not dependent on quick remedies, but more on the individual's ability to adapt to the illness. Adaptation skills for diabetes mellitus are learned behaviors, that are best taught through a multi-disciplinary team of knowledgeable health professionals. Though the concept of a multi-disciplinary team approach to diabetic teaching is a well accepted concept, studies indicate that such an approach is not always occurring. This has left the responsibility with individual team members, mainly the nurse. Hopper and Lang demonstrated this deficit in their 1987 study. The researchers found that though hospitals stated that diabetic teaching was done through a multi-disciplinary team approach, 96% of the time it was the staff nurse who did the actual diabetic patient teaching with the dietician the second most frequent contributor at 77% of the time.

Many diabetic patients are admitted to the hospital due to the disease itself or complications that accompany the disease. Though they are in contact with many health professionals during their hospitalization, the majority of their contact is with the nurse caring for them (Anderson, R.M., Lockwood, D., Derdrick, R., & Hiss, R.M., 1988). It is the staff nurse who will have the best opportunity to influence the adaptive skills of the diabetic patient and thus, return the patient to a state of self-care.
According to Orem (1991), assisting in the attainment or restoration of self-care behaviors is the true purpose of professional nursing. Restoration or assistance in self-care actions among diabetic patients can only come about through the care, teaching, and guidance of knowledgeable nurses. Knowledgeable nurses are professional nurses whose knowledge base of diabetes is grounded on current information.

Though no cure has been found for diabetes mellitus, advances in its management and understanding are occurring at a rapid pace. The question is, has this progress in diabetes care outpaced the staff nurse’s knowledge base of diabetes? If so, why? Is it that nurses may perceive to know more about diabetes than they have actual knowledge. If so, this inverse relationship may have a negative impact on the morbidity and mortality of many diabetic patients.

Statement of the Problem

In 1976, the National Diabetes Commission (Report, 1976) and more recently the American Association of Diabetes Educators, 1988 (Guthrie, Hinnen, & DeShetler, 1988), have expressed concern over the quality of instruction diabetic patients are receiving on understanding and management of their chronic disease. It is their concern that nurses’ knowledge of diabetes is less than adequate; thus having a negative affect on patients’ self-care actions. Few studies have been done to measure the knowledge base of health
professionals in the area of diabetes and especially that of nurses, which the diabetic patient has the most contact. Even fewer studies have been done to investigate what factors may prevent health professionals from attaining a competent knowledge base in the area of care of the diabetic patient. Drass, Muir-Nash, Boykin, Turek, and Baker (1989), conducted a study on the level of actual knowledge among nurses and their perceived level of knowledge. The findings showed that nurses failed to have an adequate amount of knowledge of diabetes mellitus, which was congruent with previous studies (Etzwieler, 1967; Feustel, 1976; and Leichter, 1980). More importantly, the study noted that nurses’ level of actual knowledge had an inverse relationship to their perceived knowledge level of diabetes.

Purpose of the Study

Studies have indicated that it is the staff nurse who most often is responsible for caring, teaching, and guiding the diabetic patient (Hopper & Lange, 1987; Anderson et al., 1988). In order to assist the diabetic patient in adaptation to their chronic illness and thus self-care behaviors, the staff nurse requires a current knowledge base of diabetes mellitus. Should nurses not have a current diabetic knowledge base, factors that may interfere with attainment of such knowledge should be identified. Diabetic patients who do not receive current information on their illness are at great risk of continuing to be in a self-care
deficit state and thus the true purpose of nursing has not been realized. The purpose of this study was four fold: (a) To measure medical-surgical nurses’ level of actual knowledge of diabetes mellitus, (b) to measure their perceived knowledge of diabetes mellitus, (c) to investigate the relationship between the level of perceived knowledge and the level of actual knowledge of diabetes mellitus, and (d) to investigate factors that may affect the actual or perceived knowledge of diabetes mellitus among medical-surgical staff nurses.

Significance of the Study

It is estimated that seven million people in the United States have been diagnosed with diabetes mellitus (American Diabetes Association, 1991). The consequences of this disease does not only effect the personal lives of diabetic patients, but places a burden on society as well. Individuals with diabetes place a strain on society through their lack of ability to care for themselves, inability to contribute to the work force, and utilization of a great portion of the medical dollar. According the American Diabetes Association (Facts and Figures 1991), direct and indirect cost for diabetes runs more than $20.4 billion annually.

Though diabetes mellitus has no cure, its devastating effects can be controlled through proper management of this disease. Diabetic patients who have the skills to modify
their illness, experience fewer ill effects and utilize less of the health care dollar. In a study done by Wylie-Rosett, Villeneuve, and Mazza (1985), it was demonstrated that when nurses taught management skills of diabetes to diabetic patients, health care funds could be saved. The study indicated that educated diabetic patients returned less frequently to acute care facilities and suffered from fewer acute complications such as amputations. The authors estimated a $50,000, savings for every diabetic patient that did not require hospitalization for one year.

Skills required to control diabetes are learned behaviors that are best taught by health professionals, such as the nurse. A group of nurses that frequently comes in contact with diabetic patients are the medical-surgical nurses. Medical-surgical nurses require current knowledge of diabetes to guide and teach diabetic patients skills of self-care. Unfortunately, studies that have monitored the level of actual or current knowledge of diabetes have shown that nurses do not have an appropriate level of knowledge in this area (Etzwiler, 1967; Feustel, 1976; and Leichter, 1980; Scheiderich, 1983). Only two studies have been done to evaluate why the progress in diabetes knowledge is out pacing nurses. The study by Drass et al. (1989) and Moriarty and Stephens (1990), identified that perception of knowledge was the major factor that affected comprehension of diabetes among nurses. It is important to further
research this area to confirm prior findings and perhaps
discover other factors that are affecting the actual
knowledge of nurses in the area of diabetes. With this
information, improved approaches to diabetic education for
nurses can be developed. The more knowledgeable the nurse
is in diabetes the greater the nurse’s ability to impart
information that will assist diabetic patients to adapt to
their chronic illness through self-care behaviors.
According to Orem (1991), a nurse cannot function as a
professional without current knowledge and thus is unable to
complete the true purpose of nursing which is return of the
patient to a self-care state.
CHAPTER II

Review of Literature and Conceptual Framework

Review of Literature

An extensive review of the literature was performed. Due to the limited studies regarding nurses' actual knowledge of diabetes mellitus, studies from the past 25 years were reviewed. In reviewing literature regarding the relationship of actual knowledge and perceived knowledge only two studies were found in nursing literature. Though nursing research is limited in the study of perceived knowledge, the concept of perceived knowledge and its affects on actual knowledge have been examined in more depth by researchers in the areas of educational and developmental psychology.

Actual Level of Knowledge of Diabetes Mellitus Among Nurses

An exhaustive review of the literature, revealed that only a few studies have been done to evaluate the actual knowledge of nurses in the area of diabetes mellitus over the last 25 years. Review of the literature indicated a true paucity of research in this area especially over the past decade.

Etzwiler (1967), a leader in diabetes research and a member of the International Diabetic Center, was the first
to investigate the actual knowledge of diabetes mellitus among nurses. It was the authors’s belief that patients with diabetes must assume the major role in management of their disorder. In order for this to occur, it is necessary for health care workers who are instructing diabetics to have a basic understanding of diabetes mellitus themselves. Etzwiler identified that the majority of teaching was being done by the nurse, thus he decided to investigate the knowledge of diabetes mellitus among nurses. Etzwiler chose to study a convenience group of 289 senior nursing students attending six eastern schools. These student nurses were within two to four weeks of taking state board examinations. Etzwiler (1967), assumed that these graduate nurses were "relatively near the peak of their general nursing knowledge," which would provide them with basic knowledge of diabetes mellitus.

Etzwiler constructed a 35 item questionnaire referred to as the Diabetes Basic Knowledge Test (DBKT). The items on the questionnaire addressed four areas that the author identified, through studies of diabetic patient knowledge, as critical to diabetic management: (a) symptomatology of diabetes as well as hyperglycemia and hypoglycemia, (b) use of diabetic medications, (c) diabetic diet, and (d) the effects of exercise and illness on diabetes mellitus. There is no mention in the study of the reliability and validity of this questionnaire.
The results of the study indicated a general lack of knowledge in the above stated areas. Twenty-two percent of the sample population were unable to describe the effects of insulin, differentiate between short, moderate, and long acting insulin, or describe correct techniques in the administration of insulin. Forty-five percent were unable to comprehend the relationship between diabetes, exercise, and illness. Seventy-one percent were unable to interpret a urine glucose test. Thirty-one percent were unable to describe symptomatology of hypo and hyperglycemia and less than half of the convenience sample possessed a basic understanding of the diabetic diet, an area that the author felt was vital in the management of diabetes. The author was astounded that graduate nurses were so deficient in the basic understanding of diabetes mellitus and questioned the knowledge of nurses who were not freshly out of school.

Etzwiler concluded that lack of knowledge of diabetes mellitus, especially among nurses, had negative affects on two aspects of patient care. First, patient's understanding and management of their disease was dependent on the level of understanding of there primary instructor, the nurse. Secondly, a less than adequate level of knowledge of diabetes among health professionals would lead to a decline in confidence among patients in those responsible for their care. According to Etzwiler, this in turn could lead to non-compliance among patients in the care prescribed for
them. Thus, placing the diabetic patient at a greater risk for complications.

In 1970, Stern was concerned with the inadequate level of understanding diabetic patients had about their disease. Stern postulated that diabetic patients were not receiving needed information because those teaching the patient were inadequately prepared. Since nurses and dieticians were primarily responsible for the education of diabetic patients, Stern conducted a study to monitor their actual knowledge of diabetes. Stern distributed 300 questionnaires to senior nursing students, practicing nurses and dieticians. The number of participants in each group was not given and only a statement that senior nursing students and registered nurses made up the majority of the convenience sample.

The questionnaire was identical to the one used in the Etzwiler study of 1967. There is no statement on the tool's reliability and validity. Although 300 questionnaires were distributed only 137 were returned. The data obtained from the questionnaires were similar to those of the Etzwiler (1967) study. Nursing students, practicing nurses, and dieticians had less than adequate knowledge of diabetes mellitus, its pathophysiology, and its management. Major areas in which the three groups displayed weakness were: (a) the effects of exercise and illness on insulin utilization, (b) interpretation of glucose testing, and (c) indications
and effects of diabetic medication. Senior nursing students and practicing nurses were especially deficient in nutritional management of diabetes mellitus.

Several conclusions were drawn from this study: (a) nursing schools were not preparing students adequately to care for and guide diabetic patients, (b) practicing nurses were not assessing their understanding of diabetes mellitus, thus potentially adversely effecting the management skills of diabetic patients, and (c) dieticians need to expand their knowledge base further than just nutritional understanding of the disease management.

Feustel (1976), conducted a study to probe whether senior nursing students, about to graduate from four baccalaureate programs, were knowledgeable enough in the area of diabetes to teach diabetic patients and their families. It was the researcher’s belief that diabetic patients needed to have a working knowledge of their condition, its problems, and means of controlling it, and that the nurse would be most instrumental in imparting this knowledge. The researcher felt that senior nursing students, who would soon be entering the work area, would have the most up-to-date basic understanding of diabetes and thus play a significant role in diabetic patient education as well as a resource for nurses who did not possess current knowledge of diabetes.
The study was conducted among four south central metropolitan colleges. A questionnaire that was developed by Etzwiler (1967) and revised by Collier and Etzwiler in 1971, the Diabetic Knowledge Test (DKT), was used to collect data. Feustel (1976), did not report reliability or validity of the revised DKT. The tool was distributed to a convenience sample of 144 senior nursing students. The questionnaire consisted of 35 items intended to assess knowledge of basic fundamentals of diabetes and its management. The researcher hypothesized that the correct answering of all 34 questions indicated student readiness to teach diabetic patients. Frequency distribution and correlations were calculated. The data revealed that none of the participants of the study could correctly answer all 34 questions of DKT. The mean score of the participants of the study was 67%. Statistics revealed that participants of the study were most deficient of knowledge in the following areas of diabetes mellitus: control factors of diabetes, nutrition and its relationship to diabetes, and symptomatology of diabetes.

Since none of the 144 students were able to answer all 34 questions correctly, the researcher concluded that students were not adequately prepared to do diabetic teaching. Feustel questioned the preparation baccalaureate nursing students were receiving in the area of one of the most prevalent chronic disease in the United States,
diabetes mellitus. The author suggested that further studies be done to investigate nursing students’ knowledge, as well as the knowledge level of staff nurses who are generally responsible for diabetic teaching.

Scheiderich, Freibaum, and Peterson (1983), conducted a study among 137 medical-surgical nurses in three midwest hospitals for the purpose of measuring their level of knowledge of diabetes. The tool used to collect data was Etzwiler’s 1971 Diabetic Knowledge Test (DKT) which was modified to accommodate current diabetic concepts. Validity and reliability was established by submitting the tool to a panel of five postgraduate diabetic educators and obtaining a .62 alpha coefficient.

The 34 item questionnaire used to collect data addressed areas of foot care, urine testing, exercise, action of insulin, pathophysiology, and symptomatology of the disease. The results indicated a mean score achieved by nurses on the Diabetic Knowledge Test was 74% with 30% of the sample scoring 70% or less. ANOVA was used to test the differences in means among levels of nurses educational preparation, continuing education, and the nurse’s exposure to diabetic patients. No significance was established.

The findings of Scheiderich et al., were congruent with other investigators. Nurses caring for diabetic patients have less than an adequate level of knowledge of diabetes mellitus to effectively instruct the patient. This is a
concern since it is the medical-surgical nurse who is responsible for discharge teaching of diabetic patients. Scheiderich, Freibaum, and Peterson suggest that nurses take the responsibility to monitor their understanding of diabetes. The authors also recommend that diabetic nurse educators continually assess the level of knowledge of staff nurses and develop programs appropriate to the staff nurses’ needs.

Leichter, Ferguson, Collins, Rhodes, Garrity, and Hernandez (1980), conducted a survey of knowledge among primary public health care workers in Kentucky. These health care workers consisted of nurses, dieticians, and health educators. A convenience sample of 137 primary care givers were surveyed. There was no mention of the exact number of nurses, dieticians, or health care educators that participated in the study. The authors developed a 20 item questionnaire of which all questions were an "A"-type, multiple choice format. There was no statement of reliability or validity for this tool. The items of the questionnaire addressed areas of diabetic management and symptomatology.

The questionnaire was distributed to the convenience sample prior to the start of a symposium on diabetes mellitus. The mean score was 58.5%. No significant differences were noted in the performance of dieticians, nurses, and health educators. The questionnaire was
redistributed at the conclusion of the symposium and a mean score of 82.5% was obtained. To test retention of knowledge, the questionnaire was administered one year after the symposium to 37 attendees and the mean score had dropped to 69.2%.

The authors concluded that the level of knowledge of diabetes among Kentucky primary public health care workers was less than adequate. Such lack of understanding could be remedied by attendance of continuing education classes in the area of diabetes mellitus. The authors did emphasize that without continual updating of information, the primary health care workers' level of knowledge will tend to lessen over time. It was the conclusion of the authors that in order to adequately provide care to diabetic patients, health care workers must continually assess their level of understanding of diabetes and update themselves when necessary.

According to the review of the literature, mean scores of basic diabetes knowledge tests have not improved among nurses in the past 25 years. Etzwiler (1967), Stern (1970), and Feustel (1976), all used the same tool to gather data about nurses' knowledge. Though there was no validity or reliability known about their tool, their findings were parallel to Scheiderich's et al. (1983) who established validity and reliability as well as researchers who used other tools such as Leichter et al. (1980). The conclusions
of all the above named researchers were that nurses’ knowledge of diabetes is less than adequate. A factor that may be interfering with nurses’ accrual of a knowledge base of diabetes mellitus is their perception of knowledge in this area.

Perceived Knowledge

Just as there has been a limited number of studies in nursing research done to investigate the actual knowledge of diabetes among nurses, even less have been done to investigate the perceived knowledge of nurses. After a extensive literature review, only two studies were found that addressed perceived knowledge of diabetes among nurses. In 1990, Moriarty and Stephens, nurse researchers, studied nurses’ perception and actual knowledge of diabetes. Their convenience sample consisted of 39 staff nurses who worked in various areas of a hospital. Two instruments were used to gather data. The Diabetes Patient Education Survey (DPES) was used to gather information regarding the nurses perception of their understanding of diabetes. The DPES consisted of 22 items. Each item made a statement regarding some facet of diabetes patient teaching, and responses to the statement were made on a 4 point Likert scale. There was no reliability and validity stated for DPES. The Diabetes Knowledge Test (DKT) was a 38 item questionnaire that evaluated the actual knowledge of nurses. The reliability of the DKT was previously established by Hess
Hess demonstrated a .89 Cronbach's alpha for internal consistency and reliability.

The findings of the DPES indicated that 70% of the nurses sampled believed that they had good understanding of diabetes and 56% were satisfied with their skills of diabetes teaching. The DKT indicated a less than average knowledge base of diabetes mellitus among staff nurses. The mean score of the DKT was 70%. With the largest number of incorrect answers related to nutrition. Those questions relating to nutrition alone revealed a mean score of 56%.

The authors drew several conclusions from their study: (a) there is a serious knowledge deficit of diabetes among staff nurses, (b) nurses' perception of knowledge and actual knowledge of diabetes do not correlate, and (c) this lack of correlation could be one factor that interferes with diabetic patient teaching and thus the adaptation of patients to their chronic illness. Moriarty and Stephens suggested that the diabetes nurse specialist assist in helping nurses identify their deficiencies and provided them with skills and information in instructing diabetic patients.

A more extensive study on perceived and actual knowledge of nurses was conducted by Drass, Muir-Nash, Broykin, Turek, and Baker in 1989. Drass and colleagues studied the actual and perceived knowledge of diabetes among a convenience sample of 184 registered nurses. These nurses
were employed in an east coast hospital and practiced in various in-hospital and outpatient areas. The investigators utilized three tools to obtain data; a Demographic Data Sheet (DDS), Diabetes Self Report Tool (DSRT), and the Diabetes Basic Knowledge Test (DBKT). The DDS tool was created by the investigators to obtain background information on the subjects.

The DSRT was developed by the investigators to assess staff nurses' perception of diabetes knowledge. The tool consisted of 22 statements that were answered through the use of a Likert scale. The tool was submitted to six experts in the field of diabetes for review of content validity, item construction, and test format. A Cronbach's alpha for internal consistency and reliability revealed a coefficient of .91.

The DBKT was a 45 item questionnaire. The DBKT was created in 1967, by Etzwiler to assess basic diabetes knowledge among nurses. Stern (1970), Feustel (1976), and Scheiderich et al. (1983), have also used the tool in collecting data on nurses' knowledge of diabetes. Scheiderich et al. (1983) updated the tool to reflect current knowledge of diabetes with reliability and validity established at .62 coefficient alpha. Because of the rapid change in basic understanding of diabetes, Drass et al. also modified the DBKT to reflect updated information. The revised material was submitted to six experts in the field
of diabetes for review of content validity, item construction, and test format. A Cronbach's alpha revealed a coefficient of .79 for internal consistency and reliability.

In a controlled environment, subjects were first asked to complete the DSRT and the DDS. When completed, they were asked to complete the DBKT. Frequencies were done on the data. A mean standard deviation of 28.6 ± 5.7 (64% correct) was obtained on the DBKT and 47 ± on the DSRT. Utilizing a Pearson’s correlation to analyze the relationship between perceived and actual knowledge of diabetes, a moderately negative correlation was found (r = -.36, p,.001). Staff nurses who scored higher on the DSRT achieved a lower score on the DBKT. Individual content areas that demonstrated the highest degree of negative correlations were: etiology of Non-insulin dependent diabetes mellitus (NIDDM), management of NIDDM and Insulin dependent diabetes mellitus (IDDM), effects of insulin, and nutritional needs in NIDDM.

Factors that seem to affect the negative correlation between the DSRT and DBKT were the frequency nurses came in contact with diabetic patients and the time they last attended a diabetic educational program. The lower the number of diabetic patients seen, the higher the score on the DSRT and the lower the score on the DBKT. Another factor that influenced the correlation was attendance at a
diabetic class in the past six months. Those who had attended class scored higher on the DBKT and lower on the DRST.

The researchers were surprised by the general lack of knowledge of diabetes especially in regards to the treatment of hypoglycemia, the newest test to monitor glucose and the lack of information on diet management of diabetes, areas the researchers felt were vital for diabetic patients to comprehend for self-care actions to occur. From the results of the Pearson’s correlation, the investigators questioned the ability of nurses to assess their educational deficits in the area of diabetes. The researchers felt that without good assessment skills nurses would be less able to predict when they needed more updated information, thus effecting their actual knowledge base.

Drass et al. (1989), concluded that nurses still are not taking responsibility to know the basics about diabetic care as well as not keeping current in the latest therapies and care of the diabetic patient. Furthermore, the investigators were concerned about the affects of perceived knowledge on actual knowledge of diabetes. They suggested that further studies be done on factors that increase perception of knowledge since such factors may adversely affect the actual level of diabetic understanding among nurses.
Though the field of nursing has just begun to study the relationship of perception to actual knowledge, the areas of educational and developmental psychology have been investigating the topic for the past 20 years.

Markman (1979), was one of the first developmental researchers to study the concept of perceived knowledge. The investigator defined perception as comprehension failure. Comprehension failure occurred when one perceived they had an understanding on a topic, yet failed to demonstrate actual knowledge. Markman utilized subjects from the ages of 9 through 11 years to study the concept of comprehension failure. To gather data on comprehension failure, the author created tools with contradictory paragraphs. One tool consisted of a paragraph with an explicit contradiction and the other paragraph contained an implicit contradiction. Failure to note the contradiction in the paragraph and yet declare comprehension indicated comprehension failure.

Subjects were divided into two groups. Both groups were asked to notify the investigator of any contradictions in the passages. Group 1 was read the passage with the explicit contradiction and group 2 the implicit contradictory passage. After the passages were read to both groups, the subjects were asked if they clearly understood the passages and then asked once again if contradictions were noted. Finally the subjects were asked to write essays
on the passages. This was a final effort to have subjects recall contradictory information. The results of the study indicated in general the subjects failed to note contradictory information in the passages yet responded that they understood the passages clearly. Those who were read the passages with explicit contradictions showed less comprehension failure than those who were read implicit contradictory passages.

Markman (1979), concluded that comprehension failure had been demonstrated. The researcher then stated that notation of inconsistencies requires that one encode and store information, draw the relevant inferences, retrieve and maintain the propositions in working memory, and compare them. The author questions the capability of children to process information out, thus theorizes that comprehension failure is very common in children and may have affects on their learning processes (Markman, 1979 p. 653).

In 1977, Lichtenstien and Fischoff studied the concept of perception of knowledge. The researchers felt that one’s perceived knowledge should equal one’s actual knowledge. If this occurred then it could be said that one was well "calibrated". The researchers also felt that calibration was affected by how difficult material was to process, one’s expertise in an area, and one’s level of education. To study the concept of calibration and factors that may affect it, the researchers conducted five experiments in which
undergraduate subjects varied from a N-92 to N-120. They manipulated the difficulty of informational material, subjects areas of expertise, and intelligence level of subject groups. The researchers gave no information on the reliability and validity of the tools used to obtain this data. On completion of the five experiments lack of calibration was demonstrated among 63% of all subjects. The subjects tended to overestimate their understanding. No significant findings were drawn as to factors that may affect calibration. There seemed to be a lack of calibration whether the material was difficult or uncomplicated, or if the subjects were experts or novices in the area. There was a slight significance among those who were highly intellectual and those who exhibited a lower degree of intelligence. The highly intellectual subjects exhibited more calibration than those with lower degrees of intelligence. The researchers found that an increase in calibration was not significantly affected by differences in intelligence, expertise, or context. Lichtenstien and Fischhoff (1977), concluded that although people are moderately well calibrated, their probability judgements are prone to overestimation of knowledge.

In 1982, Glenberg, Wilkinson, and Epstien studied perception of knowledge but referred to perception as the "Illusion of Knowing". Glenberg et al. defined the "Illusion of Knowing" as the belief that comprehension has
been attained when in fact comprehension has failed. In other words, there is a mismatch between one's self-assessment of understanding and objective accuracy of understanding. The researchers became interested in the concept because they felt it occurred frequently among students and may be a major obstacle to effective learning and instruction.

In the study, the authors wanted to demonstrate that the "Illusion of Knowing" does occur and can be induced in the laboratory. As leaders in educational psychology, the authors were also interested in characteristics of written material that might induce the frequency of "Illusion" more often. The study consisted of a convenience sample of 94 subjects. All subjects were students of an undergraduate psychology class. The investigators created three texts that had contradictory information. The contradictory statements were placed at the beginning, middle, or end of the set of three paragraphs. There is no information on the validity or reliability of the created tools used for data collection.

Prior to reading the three assigned paragraphs, the subjects were notified that there were contradictory statements in the paragraphs and that they were to look for them since they would be tested later for the contradictions. The subjects then were allowed to read the assigned text. After reading the text the students were
asked to identify the contradiction and give a brief statement of why it was contradictory. The explanation was used to determine if the contradictions detected were indeed the ones intended by the investigator. On completion of each text the subjects completed a 4 point Likert scale on how well they understood the text. "Illusion of Knowing" was operationally defined when the subject were unable to detect the contradiction yet indicated confidence in comprehension with a rating of 3 or 4.

Findings indicated that in spite of all the information given to the subjects about the contradictory information, over 51% of the contradictory statements went undetected yet subjects rated their comprehension at level three and four. The "Illusion of Knowing" increased the further back the contradictory statement was placed in the text. The investigators concluded that there is a high incidence of the "Illusion of Knowing". They also noted that subjects were less likely to note the contradictory statement if it was in the last paragraph less frequently because they became comfortable with their level of comprehension in the first two paragraphs, thus they perceived that comprehension was progressing smoothly. It was the belief of these investigators that this assumption continues until the reader is alerted by an error signal, such as an unfamiliar term in a text. Unfortunately "Illusion of Knowing" may
occur before a student is alerted to it, affecting the students learning and instruction.

In 1984 Epstien, Glenberg, and Bradley were interested in reproducing the concept of the "Illusion of Knowing" and investigating further causes of the "Illusion of Knowing" to occur. They believed that there would be less of a discrepancy between perceived and actual knowledge if activation of previously known factual material occurred. The investigators selected three passages from various science texts. Each passage consisted of 370-459 words and each addressed a different topic. A contradictory statement was introduced into each passage. Prior to the contradictory statement, a statement that had been made in class about the topic was introduced; this was known as the activation statement. Supposedly the activation statement would prevent the illusion of knowing concept from occurring. Each topic was reviewed by group of high school science teachers for appropriate level of reading for a high school sample. The convenience group studied consisted of 207 high school students.

The subjects of the study were given a booklet with three passages. Prior to beginning the task, the subjects were read the instructions and notified that there may be contradictions within the passages. They were asked to look for the contradictions and if contradictions were found, to state the number that correlated to the contradictory
statement and give a short explanation as to why it was contradictory. Then at the bottom of each text the subjects were asked to grade their degree of comprehension on a 4 point Likert scale. Notation of a 3 or 4 on the Likert scale indicated a high degree of comprehension. An "Illusion of Knowing" was scored if the subjects rated their understanding of a passage as 3 or 4 and failed to note contradictory information. The investigators noted that even with activation of previous learned material, a large portion (48%) of the sample population did not note the contradictory information and yet graded themselves high for understanding of information. They concluded that the concept of the "Illusion of Knowing" occurred frequently and suggested that further studies be conducted to find conditions that decrease one’s illusion of knowing, since the illusion of knowing may have adverse affects on learning.

It has been well documented in previous studies that people of all ages fail to monitor their comprehension. In other words, they perceive to know more than actual knowledge measurement examines indicate. Zabrucky, De Wayne, and Schultz (1987), were concerned with such findings. They felt that the ability to evaluate one’s comprehension and recognize comprehension failure was important. Without comprehension correction skills, such as rereading, further investigation would not occur, hindering
the learning process. With this in mind Zabrucky et al. set out to study the affects of age and educational background on comprehension monitoring.

The sample population (N=81) studied was divided into two groups. Group 1 consisted of 43 young adults whose mean age was 22.56 years with a mean education level of 15.81 years. The second group consisted of older adults whose mean age was 71.53 years and mean education level of 15.82 years. The educational background for both the young and older adults varied from high school graduate, to undergraduate, graduate, and PhD. The researchers hypothesized that monitor comprehension would improve over years and with increased education. To study the population, the researchers utilized materials used in the 1982 Glenberg study. Subjects were asked to read passages and underline the contradictory statements in the passages. They were then asked if they understood the passage. The subjects could answer: "yes", "sort of", or "no". Error in detecting the contradiction and a "yes" or "sort of" answer indicated comprehension monitor failure. Minimal information was given on the scoring techniques of the study.

The results of the study indicated that age was not a significant factor in determining comprehension monitoring skills. The pivotal factor was educational background. Adults with more education, regardless of age, showed better
comprehension monitoring skills or as Glenberg would say less "Illusion of Knowing". The researchers suggest that further studies be done, using text with varying degrees of difficulty, to confirm their findings.

Schommer and Surber (1986), also were interested in finding factors that effect one's perception of knowledge. Since 1979 researchers have been studying monitoring failure also known as a "Illusion of Knowing" (IK). IK is said to occur when self assessment of comprehension is greater than objective measurements indicate. Most of these studies altered passages and introduced contradictory passages that were explicit or implicit. Winograd and Johnston (1982), felt that such manipulation of passages may interfere with the findings on IK. With this in mind, Schommer and Surber used unaltered passages from anthropology textbooks which had a Dale-Chall corrected reading level of 13th - 15th grade and psychology textbooks that had a Dale-Chall corrected reading level of college graduates. They examined the influence of shallow and deep processing instructions and passage difficulty on comprehension monitoring of skilled adults. Forty-eight undergraduate students enrolled at a university were randomly assigned to four groups. Group 1 was given an easy passage with shallow processing information. Group 2 was given an easy passage with deep processing information. Groups 3 and 4 were given difficult passages with shallow and deep processing information.
respectively. The subjects were asked to read their assigned passages, answer questions and then rate their comprehension on a 1-4 Likert scale. IK was said to occur when the subject missed two or more items on the questionnaire and yet had a high rating, (3 or 4) on the confidence likert scale.

The researchers found that IK was dependent on two factors: (a) the difficulty of the material and (b) the type of processing used. Regardless of the type of processing used, shallow or deep, there was less IK in subjects who read easy passages. Subjects given difficult passages to read, demonstrated significantly less monitor failure or IK, with deep processing information than those who had shallow processing information.

The authors concluded that IK can be reproduced without a contradiction paradigm and cautioned educators to be aware of IK among their students. The researchers also noted that to prevent IK from occurring, it is necessary to match the level of processing information to the information presented.

Pressley, Ghatala, and Woloshyn (1990), further studied factors that could effect the well demonstrated concept of perception, also referred to as the illusion of knowing, faulty self-assessment, lack of calibration, or inaccurate comprehension monitoring. The investigators studied the affects of short answer versus multiple choice format on
student's comprehension monitoring. The investigators hypothesized that there would be less discrepancy between actual and perceived knowledge if students had to answer questions on learned material with short answer format versus multiple choice response. Since short answer comprehension questions would lead the reader to reexamine information more often than multiple choice answers.

The study was conducted in two parts with the first part of the study investigating the effects of short answer versus multi-choice answer format on comprehension. Thirty-four male and female undergraduate students in a first year psychology course with a mean age of 19.4 years were randomly assigned to either the multiple choice group or the short answer group. The 21 passages that the subjects would read and answer were from the PSAT and SAT exams. Both the multiple choice and short answer questions were reviewed by a group of four experts in the field of education to monitor consistency of the questions. Participants were also given a verbal exam as a reliable measure of reading ability so not to effect the results of the study.

Students were instructed to read the passages and answer the questions. The subjects were free to reread the passages to better answer the questions. Movement to the next passage indicated that comprehension had occurred. Comprehension occurred among 78.2% of the short answer group while 66.1% of the multi-choice group demonstrated
comprehension. The number of subjects that reread the passages did not differ significantly from the short answer and the multiple choice questions. The authors concluded that short answer may not encourage readers to reread information but that the format may cause the reader to become more in tuned with the initial information, thus resulting in better comprehension. The second part of the study was to investigate if there would be less discrepancy in the level of actual versus perceived knowledge among subjects that answered questions in short answer format than subjects that answered questions in multiple choice format. The subjects were again recruited from a first year psychology class during the following school year. The sample consisted of 48 males and females with a mean age of 20.3 years. The subjects were randomly assigned to either the multiple choice condition or the short answer condition. The procedure used was the same as that used in the first part of the study with the addition that the subjects were asked to rate their comprehension on a 7 point scale.

The findings of part two of the study did show a difference in actual and perceived knowledge in the short answer group and the multiple choice group. The short answer group overestimated their comprehension 59.7% of the time while the multiple choice group overestimated their comprehension 64% of the time.
Several conclusions were drawn from the study. The first was that the question format affected comprehension of material. Short answer questions were associated with a higher degree of comprehension than multiple choice questions. Secondly, that question format did have an affect on the relationship of actual to perceived knowledge. Multiple choice question group tended to overestimate there comprehension more often than the short answer group. The authors of the study suggested that more work be done to identify conditions that might lessen the discrepancy between actual and perceived knowledge since the more one perceives to know the less likely they are to learn.

In 1988 Park, Gardner, and Thukral conducted a study on the effects of knowledge discrepancies affecting learning. The authors recognized from pervious studies that people possess two types of knowledge: perceived and actual. They define actual as factual knowledge one possesses which allows one to make choices. Perceived knowledge is one’s self-assessment or belief of their knowledge or the feeling they have of knowing. Pervious studies have shown that perceived and actual don’t always coincide.

Things that can effect the perceived versus actual knowledge relationship is the level of knowledge development in a given domain (Gentner & Collins 1981). Actual and perceived seem to coincide when a person has no knowledge or has just begun to acquire actual knowledge, because one’s
lack of knowledge is self evident. They also coincide after much knowledge has been acquired and reconstructing of knowledge has occurred. At this stage a person is very aware of the extensive learning process they have gone through to acquire a high level of expertise. A large discrepancy occurs when one is in between these stages.

Other studies have shown how a discrepancy in these two types of knowledge may be detrimental to the person. Bransford (1979) and Glenberg (1982) found that the ability to learn and change is not simply a function of actual knowledge; it depends on feelings about that knowledge. Park, Gardner, and Thurkral (1988), set out to investigate the relationship of perceived and actual knowledge. They proposed that there is a negative relationship between the two previously mentioned types of knowledge. The researchers were also interested in seeing if there was any difference in how low versus high perceivers processed new information, related new information to old information, and utilized new versus conflict information. The researchers proposed that low perceivers would utilize new information more than the high perceiver group and that low perceivers would be able to note conflict information better than high perceivers.

The researchers randomly selected 100 adult subjects that did not own or have never used a VCR product. They gave various amounts of information on a VCR product to make them
have a high degree of knowledge versus a low degree of knowledge. To manipulate the subjects degree of perception the authors continually praised the high perceivers about their knowledge and downgraded the low perceivers regardless of the outcome of actual knowledge examines for both groups. The findings showed that low perceivers combined new information with old information more often than high perceivers. This suggests that low perceivers have a greater capacity for comprehension than high perceivers. The high perceivers were less likely to give up old information. Thus, the high perceivers did not utilize new information as much as low perceivers to problem solve. Upon exposure to conflicting knowledge, low perceivers tended to resolve the conflict by enhancing the value of the new information while high perceivers downgraded the new information. Low perceivers tended to handle conflict of knowledge better than high perceivers.

Park et al. (1988), concluded that people possess two types of knowledge, actual and perceived, and that the degree of the discrepancy in these two types of knowledge can significantly affect the processes of learning and change of behavior. In addition to confirming previous studies, it was found that the low perceivers were more ready to learn and change behavior than high perceivers. They suggest that a decrease in perceptual knowledge may be beneficial to the learning process.
The review of literature has shown that in general perceived knowledge is not always an accurate reflection of one's actual level of understanding. It has also been shown that a discrepancy in perceived and actual knowledge can have a negative affect on the learning process. Because of the possible affects on the learning process, educational and development psychologist continue to study affects that might lessen the discrepancy between perceived and actual knowledge and suggest that other disciplines do the same.

**Conceptual Framework**

Orem's self-care deficit theory has several assumptions about man and nursing which are founded on the following premises:

1. Self-care is based on voluntary action which man is capable of undertaking.
2. Self-Care is a requirement of every person for meeting human needs.
3. Individuals have the right and responsibility to perform self-care actions.
4. Self-care is a learned behavior that involves a combination of social and cognitive experiences.
5. Self-care contributes to personal growth by enhancing one's self-esteem and self-image.

The purpose of nursing is to facilitate and increase self-care abilities of individuals. When physical or psychosocial events occur that limit self-care actions, a
self-care deficit is present. According to the Orem model, the legitimate focus of nursing arises when there is a real or potential self-care deficit. Only nurses who possess current actual knowledge, such as a nurse agent, can assist in the restoration and creation of self-care actions. Current knowledge allows the nurse agent to properly assess the needs of the patient, and design and implement care for a patient with self-care deficits.

Diabetic patients who are unable to manage their disease can be said to have self-care deficits. To effectively assist these individuals back to self-care, a nurse must operate as a nurse agent. With the rapid advancements in the care of diabetic patients, nurse agents must continually assess their understanding of the disease so to offer their clients the most up-to-date care. Based on current knowledge, nurse agents may assist diabetic patients in the design of a therapeutic system. It is through this system that the nurse agent can individualize nursing actions, such as caring for, teaching, supporting, and guiding to assist the diabetic patient with self-care deficits back to a self-care state.

Nurses who perceive to know more about the care of the diabetic patient than their actual knowledge reflects, cannot function as nursing agents and thus, cannot function as professionals in the art of nursing. Such nurses can be said to have self-care deficits themselves since they have
not taken the responsibility to enhance their professional growth. Nurses whose perceived knowledge has an inverse relationship to their actual knowledge are unable to complete the legitimate work of nursing, that is, restore, maintain, or create self-care actions among human beings. Appendix A provides a diagram of Orem's model and the role of the nurse agent within the self-care agency.

Assumptions
Assumptions of this study include:
1. The goal of nursing is to restore or enhance patient’s self-care abilities through nursing actions such as caring, guiding, supporting, or teaching.
2. Nurses are obligated to be nursing agents and thus maintain current levels of knowledge in the area they most frequently are called to address.
3. Medical-Surgical nurses encounter inpatient diabetic patients with self-care deficits on a periodic bases.
4. The responsibility of initial diabetic patient education is frequently placed on the medical-surgical nurse.

Research questions
The research questions to be answered in this study were:
1. What is the actual knowledge level of diabetes mellitus among medical-surgical nurses?
2. What is the level of perceived knowledge of diabetes mellitus among medical-surgical nurses?
3. What is the relationship between the level of perceived and actual knowledge of diabetes mellitus among medical-surgical nurses?

4. Do years of nursing, nursing education, diabetic inservices, diabetic articles read, diabetic patient contact, presence of diabetes in self, family or friends, and feelings of competency in diabetic care influence medical-surgical nurses perceived knowledge of diabetes mellitus?

5. Do years of nursing, nursing education, diabetic inservices, diabetic articles read, diabetic patient contact, presence of diabetes in self, family or friends, and feelings of competency in diabetic care influence medical-surgical nurses actual knowledge of diabetes mellitus?

Operational definitions

Nurse - A licensed registered nurse (R.N.) who has obtained his/her nursing education through a Diploma, Associate, or Baccalaureate nursing program and is presently practicing nursing.

Perceived Knowledge - Level of knowledge one believes they have. This will be measured by the Diabetes Self-Report Tool (DSRT).

Actual knowledge - Knowledge one has that can be objectively measured. This type of knowledge will be measured by the Diabetes Basic Knowledge Test (DBKT).
Diabetes - In this study diabetes is referring to the disease of Diabetes Mellitus. Diabetes Mellitus is a chronic disease characterized by abnormal levels of glucose in the blood. The basic defect is insufficient amounts of insulin production which leads to abnormalities of metabolism of carbohydrates, fats, and proteins.

Diabetes care - The act of providing physical care, guidance and/or teaching to diabetic patients.

Man - A human being of any age or sex.

Patient - One who has a self-care deficit and is seeking nursing care.

Limitations of the Study

There are two limitations to this study. First, the sample is a convenience sample from one acute care institution. This may not provide for a good cross section of the general nursing population, though the hospital employs nurses with varying educational backgrounds, from all parts of the nation, and with varying years of nursing experience. Secondly, the sample number of 77 medical-surgical nurses is relatively small. Significant generalization of findings to the entire medical-surgical nursing population will not be possible.
CHAPTER III

Methodology

Design

A review of the literature since 1967 demonstrates that nurses’ knowledge of diabetes has been less than adequate and that perception of knowledge of diabetes may influence the attainment of actual knowledge. There has been only one major nursing study that addressed both actual and perceived knowledge. With such a limited amount of information, it was the intent of this researcher to replicate the 1989 descriptive study of Drass et al. and add to the already gained information of the perceived and actual level of knowledge of diabetes among nurses especially those who work in medical-surgical areas.

A descriptive correlation design was implemented in this study. Such a design allowed this researcher to examine the medical-surgical nurses’ actual level of diabetes knowledge, their perceived level of diabetes knowledge, the relationship of actual to perceived knowledge, and factors that may influence nurses’ perceived and actual level of diabetes knowledge.

Sample

The target population of this study were nurses working in medical-surgical areas, in an acute care, non-profit facility located in the southwest area of the United States.
Through study of the patient population, of the sample facility, it was found that diabetic patients were most often placed on the four medical-surgical areas within the hospital. Nurses who work in these medical-surgical areas would be called upon most often to provide care, guidance, and education to diabetics with self-care deficits. With such responsibility placed on these medical-surgical nurses the researcher thought it appropriate to study the level of perceived and actual knowledge of this nursing population.

The accessible population for the study consisted of approximately 110 nurses who work on four medical-surgical areas of the hospital. Nurses employed in these areas were from a composite of nursing educational backgrounds. Their experience in the field of medical-surgical nursing ranged from 42 years to less than one year. Nurses working on these four medical-surgical floors had been offered diabetes inservices within the last six months and had an opportunity to care for a diabetic patient within the last year. According to the medical record department of the facility approximately 1900 patients with diabetes had been admitted to these floors within the fiscal year of 1991-1992.

The nurses who participated in this study did so on a voluntary bases. Subjects of the study were not charged or reimbursed for their participation in the study. The identity of the participants was kept confidential.
Each subject received a participation letter that described the rights of the participant, potential risks, and purpose of the study.

**Data Collection**

Data was collected over a 30 day period. Nurses who agreed to participate in the study were asked to complete three questionnaires; the Demographic Data Sheet (DDS) the Diabetes Self-Report Tool (DSRT), and the Diabetes Basic Knowledge Test (DBKT). Nurses were asked to complete the set of three questionnaires in order: first the DDS, secondly, the DSRT and finally the DBKT. The subjects were to complete the three questionnaires while on the hospital premises.

The Demographic Data Sheet (DDS) (appendix B), was developed by the researcher and reviewed by two Doctoral prepared nurses for clarity and conciseness. Use of the DDS was two-fold (a) to obtain basic demographic information on the subjects and (b) to extrapolate variables that might affect nurses actual or perceived level of knowledge of diabetes. The variables were as follows: years of nursing experience, nursing educational preparation length of time since last inservice on diabetes, number of articles read on diabetes in the last six months, personal experience with diabetes among friends, self or family, referred to in the study as "Presence", approximate number of diabetic patients cared for in one month, and the feeling of competency in
providing physical care, guidance and teaching for a diabetic patient.

The second questionnaire the participants of the study were asked to complete was the Diabetic Self-Report Tool (DSRT) (appendix C). This tool was chosen to measure the concept of perceived knowledge. The DSRT was developed by Drass et al. for their 1989 study that probed perceived and actual level of knowledge of diabetes among 184 nurses employed at the National Institutes of Health in Bethesda, Maryland. Drass et al. (1989) submitted the tool to six experts in the field of diabetes education for a review of content validity, item construction, and test format. A Cronbach’s alpha was done and a reliability coefficient of .91 was obtained. For this study the DSRT was submitted to two Doctoral prepared nurses for a review of content validity, item construction and test format and a Cronbach’s alpha revealed a reliability coefficient of .89.

The DSRT consisted of 22 questions, set on a 4 point Likert scale. These questions asked nurses to describe how competent they felt in nine areas of diabetic care. The nine areas were as follows: (a) nutritional needs of the diabetic patient, (b) affects of stress and exercise on diabetes, (c) general management of diabetes, (d) diabetic medications, (e) personal care and complications, (f) methods of testing blood sugar and urine ketones, (g) etiology of types of diabetes, (h) hyperglycemia, and (i)
hypoglycemia. Each question allowed the participants of the study to choose from four categories of competency. The categories indicated feelings of very competent, competent, somewhat competent, and not competent. A numerical score was assigned to each category. Scores of 1 and 2 indicated low levels of perceived knowledge while scores of 3 and 4 indicated high levels of perceived knowledge of diabetes mellitus.

After completing the DDS and DSRT nurses were asked to complete the Diabetes Basic Knowledge Test (DBKT), a 43 item multiple choice questionnaire (appendix D). The DBKT was originally used in the 1967, Etzwiler study and consisted of a 35 item multiple choice questionnaire. The Scheiderich et al. study of 1983, updated the tool and established reliability and validity of the tool. In 1989, Drass made further modifications and reestablished validity and reliability of a 45 item multiple choice questionnaire. Drass obtained consensual validity from a panel of six experts in the field of diabetes, on item construction and content validity. A Cronbach’s alpha for internal consistency revealed a reliability coefficient of .79. For the present study, two questions from the 1989 DBKT (Drass et al., 1989) were deleted. It was the consensus of ten certified diabetic nurse educators that the two deleted questions were no longer pertinent to diabetes care and should be deleted. To reestablish validity, a content
validity index was performed by a panel of six certified diabetic nurse educators. A context validity index of 97.3 was calculated through the method of Waltz, Strickland, and Lenz (1991). A Cronbach’s alpha was also done to test for internal consistency and revealed a reliability coefficient of .785.

The advantage of using the DSRT and the DBKT were several. The tools have been successfully utilized in other studies and Drass et al. (1989) had established a relationship between the DSRT and DBKT. This relationship was confirmed for the present study by two nurse diabetic educators. The only disadvantage of these tools was the length of time it took to complete the three questionnaires. Approximate time needed to complete the three questionnaires was 30 minutes.

Procedure

After receiving approval from administrators of the acute non-profit hospital, memos were sent to nurses from the four medical-surgical areas. The memos described the study and asked nurses to consider participation in the study. Arrangements were made to meet with the nurses in person during a monthly staff meeting. At the staff meetings, the nurses were notified of the purpose of the study, the dates the study would be conducted, which was approximately from June 1 through June 30, 1992, approximate time needed to complete the three questionnaires, procedure
to be followed in obtaining data, and implications for nursing. A copy of the material discussed in the staff meeting was placed on the staff message board along with information on how to take part in the study for those nurses who may wish to participate and were not at the staff meeting.

On the dates of data collection, those nurses who agreed to participate in the study were notified that they would be required to respond to a set of three questionnaires. On agreement to this the subjects were given a packet with a consent form that outlined the purpose of the study, risk, benefits, and issues of confidentiality (appendix E). Accompanying the consent form was the first part of randomly numbered set of questionnaires, the Demographic Data Sheet (DDS) and Diabetic Self-Report Tool (DSRT) questionnaires. Each packet had detailed instructions on how and what order to complete the questionnaire. On completion of the DDS and DSRT the subjects were asked to remove the numbered crack and peel label from the DSRT and place the DDS and DSRT questionnaires into the provided unmarked envelope and to seal the envelope. The envelope was then collected and the subject was given the Diabetic Basic Knowledge Test (DBKT). Accompanying the DBKT were complete instructions on how to complete the questionnaire. The subjects affixed the crack and peel label on the dispensed DBKT. This allowed for
confidentiality to be maintained and yet permitted for correlation of the information obtained from the DDS, DSRT, and DBKT. On completion of the DBKT the subjects placed the questionnaire into the provided unmarked envelope and again sealed the envelope. The envelopes with the DBKT were then collected. All completed tools were gathered and secured by the researcher.

Data Analysis

To organize the data from the DDS, DSRT, and the DBKT descriptive statistics was initially used. Organization of information from the DDS allowed for an overview of the sample population of study. Descriptive statistics allowed for organization of the ratio level data obtained from the DBKT, thus allowing for the first research question to be answered, "What is the actual level of knowledge of diabetes mellitus among medical-surgical nurses". Each of the 43 questions had one correct answer based on the Core Curriculum of Diabetes Education (Guthrie, D.W.; Hinnen, D.; & DeShetler, E. 1988). Each correct answer carried a score of one point or 2.32 percent for a total score of 43 points or 100 percent. Thus the greater the score on the DBKT the greater the actual level of knowledge of diabetes the subject had.

The second research question, "What is the level of perceived knowledge of diabetes mellitus among medical-surgical nurses", was answered through use of descriptive
statistics on the ordinal/interval data obtained from the Diabetes Self-Report Tool (DSRT). The four categories of the Likert scale of the DSRT were assigned interval scores. Scores of 1 indicated no competency in diabetic care, 2 indicated somewhat competent in diabetic care, 3 indicated competent in diabetic care, and 4 indicated very competent in diabetic care. Total scores were then tabulated. The higher the DSRT score the higher the level of perceived knowledge of diabetes the subject had. A total possible score of the DSRT was 88 points or 100% competency. The lowest possible score on the DSRT, which indicated no competency in care of the diabetic patient, was 22 points or 0% competency.

A Pearson’s Correlation Coefficient was done to address the third research question, "What is the relationship between the level of perceived and actual knowledge of diabetes mellitus among medical-surgical nurses". The Pearson’s correlation indicated the magnitude and direction of the correlation at a level of significance of .05 or less.

Finally to answer the fourth and fifth research questions, as to factors that could affect perceived and actual knowledge, variables from the DDS were studied (Table 1). This was done through use of the following statistical studies; Cross-tabs, a Pearson’s Correlation Coefficient and a Multiple Regression.
Table 1

Level of Variables Within the Study

<table>
<thead>
<tr>
<th>Variables</th>
<th>Method Measurement</th>
<th>Level of Scores</th>
<th>Range of Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual Knowledge</td>
<td>DBKT</td>
<td>Ratio</td>
<td>0-43</td>
</tr>
<tr>
<td>Perceived Knowledge</td>
<td>DSRT</td>
<td>Nominal/interval</td>
<td>1-4</td>
</tr>
<tr>
<td>Yrs. as R.N.</td>
<td>DDS</td>
<td>Ratio</td>
<td>6 mon. to 50 yr.</td>
</tr>
<tr>
<td>Education</td>
<td>DDS</td>
<td>Nominal/interval</td>
<td>1-4</td>
</tr>
<tr>
<td>Inservice</td>
<td>DDS</td>
<td>Ratio</td>
<td>0-&gt;2 yrs</td>
</tr>
<tr>
<td># of Diabetic articles read</td>
<td>DDS</td>
<td>Ratio</td>
<td>0-&gt;6</td>
</tr>
<tr>
<td># of Diabetic patients cared for</td>
<td>DDS</td>
<td>Ratio</td>
<td>0-&gt;4</td>
</tr>
<tr>
<td>Presence</td>
<td>DDS</td>
<td>Ordinal/interval</td>
<td>1-4</td>
</tr>
<tr>
<td>Competency</td>
<td>DDS</td>
<td>Nominal/interval</td>
<td>1-4</td>
</tr>
</tbody>
</table>
CHAPTER IV

Results

The total accessible population for this study was 110 medical-surgical nurses. Ninety-five nurses were asked to participate in the study. Seventy-nine nurses agreed to participate in the study. On evaluation of data it was found that two sets of data were incomplete and thus eliminated from the study. This resulted in actual data being obtained from 77 medical-surgical nurses which gave a 81% return rate of the set of three tools the Demographic Data Sheet (DDS), Diabetes Self Report Tool (DSRT), and the Diabetes Basic Knowledge Test (DBKT).

Demographics

The characteristics of the sample population (Tables 2 and 3) were obtained through use of the Demographic Data Sheet (DDS). The data from the DDS showed a wide range of years of nursing practice, 6 months to 42 years. The mean number of years of practice were 13.5 years. The largest portion of the sample was divided into two groups, group A practiced one to five years (28.6%) and group B practiced sixteen to twenty years (28.5%). The largest portion of group A had been practicing for one year or less (13%).

The sample’s nursing education background included diploma nursing preparation to masters level of education. The largest group of the sample had been prepared by an
Associate Degree program (40.3%). Subjects prepared by a Diploma and Baccalaureate Nursing programs were equal at 28.6% each.

Thirty-five percent of the sample had reported receiving some type of inservice on diabetes within the last six months. Thirty-five percent reported greater than two years or never having an inservice, with 30% of the sample reporting their last inservice between 6 months and 2 years ago. The majority (65%) of the sample reported that their last inservice was more than six months ago (Table 2). In addition, 59.7% of the sample population read one to three articles regarding diabetes in the past six months.

The data showed that 59.7% of the nurses cared for more than four diabetic patients per month. Only 5.2% reported caring for no diabetic patients. Fifty percent of the group had no exposure outside of work to diabetes while the other fifty percent encountered diabetes in themselves, family members, or friends.

On a scale of one to four, nurses rated their feeling of competency on providing physical care and diabetic education to diabetic patients. A rating of four indicated a very high competency level while a rating of one indicated a very low competency level. The largest portion of the sample rated themselves at a level two, "Somewhat competent" (46.8%). While 28.6% reported being competent
Table 2

Characteristics of the Sample in Regards to Years of Nursing, Nursing Educational Background, and Time Since Last Diabetes Inservice

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>N</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Years of Nursing</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-5</td>
<td>22</td>
<td>28.6%</td>
</tr>
<tr>
<td>6-10</td>
<td>9</td>
<td>11.7%</td>
</tr>
<tr>
<td>11-15</td>
<td>9</td>
<td>11.7%</td>
</tr>
<tr>
<td>16-20</td>
<td>22</td>
<td>28.5%</td>
</tr>
<tr>
<td>21 -42</td>
<td>15</td>
<td>19.5%</td>
</tr>
<tr>
<td><strong>Nursing Education</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diploma</td>
<td>22</td>
<td>28.6%</td>
</tr>
<tr>
<td>Associate</td>
<td>31</td>
<td>40.3%</td>
</tr>
<tr>
<td>Baccalaureate</td>
<td>22</td>
<td>28.6%</td>
</tr>
<tr>
<td>Masters</td>
<td>2</td>
<td>2.6%</td>
</tr>
<tr>
<td><strong>Last Diabetes Inservice</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 6 months</td>
<td>27</td>
<td>35.1%</td>
</tr>
<tr>
<td>&gt;6 months to 1 year</td>
<td>12</td>
<td>15.6%</td>
</tr>
<tr>
<td>&gt; 1 year to 2 years</td>
<td>11</td>
<td>14.3%</td>
</tr>
<tr>
<td>&gt; 2 years</td>
<td>11</td>
<td>14.3%</td>
</tr>
<tr>
<td>no inservices</td>
<td>16</td>
<td>20.8%</td>
</tr>
</tbody>
</table>
Table 3

Characteristics of the Sample in Regards to Number of Articles on Diabetes Read and Diabetic Patients Cared for, Presence of Diabetes, and Competency in Care.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>N</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Articles on Diabetes Read in Past 6 Months</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zero</td>
<td>22</td>
<td>28.6%</td>
</tr>
<tr>
<td>1-3</td>
<td>46</td>
<td>59.7%</td>
</tr>
<tr>
<td>4-6</td>
<td>4</td>
<td>5.2%</td>
</tr>
<tr>
<td>&gt; 4</td>
<td>5</td>
<td>6.5%</td>
</tr>
<tr>
<td><strong>Number of Diabetics Cared for in Past 6 Months</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zero</td>
<td>4</td>
<td>5.2%</td>
</tr>
<tr>
<td>1-3</td>
<td>27</td>
<td>35.1%</td>
</tr>
<tr>
<td>&gt; 4</td>
<td>46</td>
<td>59.7%</td>
</tr>
<tr>
<td><strong>Presence of Diabetes</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>40</td>
<td>50.6%</td>
</tr>
<tr>
<td>Self</td>
<td>2</td>
<td>2.6%</td>
</tr>
<tr>
<td>Family</td>
<td>20</td>
<td>26.0%</td>
</tr>
<tr>
<td>Friend</td>
<td>15</td>
<td>19.5%</td>
</tr>
<tr>
<td><strong>Competency in Care of Diabetic Patient</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Very</td>
<td>14</td>
<td>18.2%</td>
</tr>
<tr>
<td>Competent</td>
<td>22</td>
<td>28.6%</td>
</tr>
<tr>
<td>Somewhat Competent</td>
<td>36</td>
<td>46.8%</td>
</tr>
<tr>
<td>Not Competent</td>
<td>3</td>
<td>3.9%</td>
</tr>
</tbody>
</table>
which was a level three rating. Fourteen subjects (18.2%) reported feelings of strong competency or level four. Only 3.9% of the sample reported a level one competency, which indicated a belief of no competency in caring for diabetic patients.

Actual Level of Knowledge of Diabetes

Results of the Diabetes Basic Knowledge test (DBKT) answered the first research question, "What is the actual knowledge level of diabetes mellitus among medical-surgical nurses". The DBKT consisted of 43 multiple choice questions addressing the following areas: nutritional needs of diabetic patients, affects of stress and exercise on diabetes, general management of diabetes, diabetic medications, personal care and complications, methods of testing for blood sugar and urine ketones, etiology of types of diabetes, hypoglycemia, and hyperglycemia. Total possible score on the DBKT was 43 points or 100%. Each correct answer received a score of 1 point or 2.32%. The subjects were allowed to answer "I do not know" in any of the 43 questions but it was counted as an incorrect answer. Frequency distributions (Table 4) showed that 55.9% scored less than 70% correct while only 5.2% scored greater than 85%. The mean number of points obtained by the sample population was 28.4 or 66% with a Standard Deviation of 5.7. No one scored 100% on the DBKT. Questions that were most
Table 4

Frequency Distributions of Total Scale Scores on the Diabetes Basic Knowledge Test (DBKT)

<table>
<thead>
<tr>
<th>Score Correct</th>
<th>N</th>
<th>Percent/Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 50%</td>
<td>11</td>
<td>14.3%</td>
</tr>
<tr>
<td>50% to 69%</td>
<td>32</td>
<td>41.6%</td>
</tr>
<tr>
<td>70% to 85%</td>
<td>30</td>
<td>38.9%</td>
</tr>
<tr>
<td>greater than 85%</td>
<td>4</td>
<td>5.2%</td>
</tr>
</tbody>
</table>
often answered incorrectly related to treatment of hypoglycemia, meal planning, long term blood sugar testing, testing for ketones, Somogyi phenomenon, actions of insulin, actions and effects of oral hypoglycemics, and sites of insulin injection (Table 5). The questions most often answered with a "I do not know" were: affects of stress on diabetes (72.7%) and long term testing of blood sugar (87%). Table six outlines the number of times "I do not know" was answered in each category.

**Perceived Level of Knowledge of Diabetes**

To answer the second research question, "What is the level of perceived knowledge of diabetes among medical-surgical nurses", the findings of the Diabetes Self Report Tool (DSRT) were used. The DSRT consisted of 22 questions which addressed beliefs of competency in the following areas of diabetic care: nutritional needs of diabetic patients, affects of stress and exercise on diabetes, general management of diabetes, diabetic medications, personal care and complications, methods of testing blood sugar and urine ketones, etiology of types of diabetes, hypoglycemia, and hyperglycemia. Levels of competency were answered through use of a 4 point Likert scale with a range of 1 to 4. Scores of 3 and 4 indicated competency in caring for diabetic patients, while scores of 1 and 2 indicated questionable competency in caring for diabetic patients. Maximum possible score of the DSRT was 88 or 100%, which
Table 5

**Frequency Distribution of Most Often Incorrectly Answered Questions of the DBKT**

<table>
<thead>
<tr>
<th>Question Content</th>
<th>Responses: %Correct</th>
<th>%Incorrect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment of hypoglycemia</td>
<td>9.1%</td>
<td>90.9%</td>
</tr>
<tr>
<td>Sites of insulin injection</td>
<td>16.9%</td>
<td>83.1%</td>
</tr>
<tr>
<td>Physiological effect of insulin</td>
<td>20.8%</td>
<td>79.2%</td>
</tr>
<tr>
<td>Action of oral hypoglycemics</td>
<td>22.1%</td>
<td>77.9%</td>
</tr>
<tr>
<td>Somogyi phenomenon</td>
<td>29.9%</td>
<td>70.1%</td>
</tr>
<tr>
<td>Side effects of oral hypoglycemic</td>
<td>31.2%</td>
<td>68.8%</td>
</tr>
<tr>
<td>Meal Planning</td>
<td>42.9%</td>
<td>57.1%</td>
</tr>
<tr>
<td>Urine testing</td>
<td>40.3%</td>
<td>59.7%</td>
</tr>
<tr>
<td>Glycosylated Hemoglobin</td>
<td>46.8%</td>
<td>53.2%</td>
</tr>
</tbody>
</table>
Table 6

Frequency Distribution of DBKT Items by Category, Answered with the Response "I do not know"

<table>
<thead>
<tr>
<th>Category</th>
<th>N</th>
<th>Percent of Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Testing for Sugar and Ketones</td>
<td>67</td>
<td>87.0%</td>
</tr>
<tr>
<td>Stress &amp; exercise and Diabetes</td>
<td>56</td>
<td>72.7%</td>
</tr>
<tr>
<td>Diabetic Medications</td>
<td>38</td>
<td>49.4%</td>
</tr>
<tr>
<td>Nutrition and Diabetes</td>
<td>37</td>
<td>48.1%</td>
</tr>
<tr>
<td>Hyperglycemia</td>
<td>23</td>
<td>29.9%</td>
</tr>
<tr>
<td>Etiology of Diabetes</td>
<td>11</td>
<td>14.2%</td>
</tr>
<tr>
<td>Hypoglycemia</td>
<td>7</td>
<td>9.1%</td>
</tr>
<tr>
<td>Management of Diabetes</td>
<td>1</td>
<td>1.3%</td>
</tr>
<tr>
<td>Care and complication</td>
<td>1</td>
<td>1.3%</td>
</tr>
</tbody>
</table>
indicated strong competency. A score of 66 or 75% indicated average competency. A score of 44 (50%) indicated questionable competency, and a score of 22 (25%) indicated total incompetency. Frequency analysis (Table 7), showed that total scores of the DSRT ranged from 48 (55%) to 88 (100%) with a mean score of 67.5 points or 77% and a Standard Deviation of 8.4. Overall the sample population demonstrated average to high levels of competency in regards to providing care to diabetic patients. The majority of subjects (70.1% to 98.7%) responded to 20 questions with scores of 3 and 4 indicating feelings of competency or great competency. Two areas the majority of subjects (55.9% to 76.6%) responded to with weak feelings of confidence, that is scores of 1 and 2, were related to "Sick day" management and management of diabetic patients undergoing surgery.

**Relationship of Perceived and Actual Level of Knowledge**

In order to study the relationship of perceived level to actual level of diabetes knowledge and thus answer the third research question, "What is the relationship between the level of perceived an actual knowledge of diabetes mellitus among medical-surgical nurses", correlation of the DSRT and DBKT items was required. The correlation of items from the DSRT and the DBKT from Drass et al. (1989) was used to correlate the items of the DSRT and DBKT for the present study, resulting in 47 correlations. The correlation of
Table 7

**Frequency Distribution of Total Scores for Diabetes Self-Report Tool (DSRT)**

<table>
<thead>
<tr>
<th>Scores</th>
<th>%</th>
<th>N</th>
<th>% of Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 48</td>
<td>0-55%</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td>49-65</td>
<td>56%-74%</td>
<td>34</td>
<td>44%</td>
</tr>
<tr>
<td>66-85</td>
<td>75%-96%</td>
<td>39</td>
<td>51%</td>
</tr>
<tr>
<td>&gt; 85</td>
<td>97%-100%</td>
<td>3</td>
<td>4%</td>
</tr>
</tbody>
</table>
items were reviewed by two certified diabetes nurse educators with a percent agreement of 91.4%.

Two statistical procedures were conducted to study the relationship between the Diabetes Self-Report Tool (DSRT) and the Diabetes Basic Knowledge Test (DBKT): a Cross-tabs and a Pearson’s Correlation Coefficient. Cross-tabs were used to investigate the relationship of individual items of the DSRT to the individual items of the DBKT. The Cross-tabs revealed that the interrelationship of the DSRT and DBKT items were predominately positive; that is the level of confidence exhibited by the DSRT correlated with the percentage of correct answers in the DBKT. There were only five items of the DSRT that showed a negative correlation to the DBKT, that is the higher the perceived knowledge the lower the actual knowledge (Table 8). Cross-tabs also revealed that in 17 correlations when respondents stated a low level of competency, they tended to answer the corresponding DBKT items correctly over 50% of the time.

A Pearson’s Correlation Coefficient was performed on the total score of the Diabetes Self-Report Tool (DSRT) and Diabetes Basic Knowledge Test (DBKT). The Pearson’s correlation demonstrated an $r = 0.2600 \ p < 0.05, \ r^2 = 6.8\%$ (Table 9).

**Factors that Influence DSRT**

To investigate factors that may influence competency level, measured by the DSRT, a Pearson’s Correlation
Table 8

Negative Relationship of Competency Level (DSRT) and Actual Knowledge (DBKT) Demonstrated by Cross-Tabs.

<table>
<thead>
<tr>
<th>Content of DSRT</th>
<th>N*</th>
<th>%*</th>
<th>Content DBKT</th>
<th>N**</th>
<th>%**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Etiology</td>
<td>66</td>
<td>87%</td>
<td>Etiology</td>
<td>44</td>
<td>83%</td>
</tr>
<tr>
<td>Mild Hypoglycemia</td>
<td>75</td>
<td>97%</td>
<td>Exercise</td>
<td>68</td>
<td>91%</td>
</tr>
<tr>
<td>Insulin Admin.</td>
<td>75</td>
<td>97%</td>
<td>Injection Site</td>
<td>62</td>
<td>83%</td>
</tr>
<tr>
<td>Oral Hypoglycemic</td>
<td>64</td>
<td>83%</td>
<td>Glucotrol</td>
<td>48</td>
<td>75%</td>
</tr>
<tr>
<td>Sites of Admin.</td>
<td>76</td>
<td>87%</td>
<td>Injection Site</td>
<td>63</td>
<td>83%</td>
</tr>
</tbody>
</table>

N* = Total number of sample with high perceived knowledge
%* = Total percent of sample with high perceived knowledge
N** = Total number of incorrect answers
%** = Total percent of incorrect answers
Table 9

**Summary of Pearson's Correlation Coefficient of Diabetes Self-Report Tool (DSRT) To DBKT and Demographic Factors**

<table>
<thead>
<tr>
<th>DSRT to Variables</th>
<th>r</th>
<th>r²</th>
</tr>
</thead>
<tbody>
<tr>
<td>DBKT</td>
<td>.2600</td>
<td>6.80%</td>
</tr>
<tr>
<td># Articles Read</td>
<td>.3638</td>
<td>13.00%</td>
</tr>
<tr>
<td>Competency</td>
<td>.3119</td>
<td>9.70%</td>
</tr>
<tr>
<td># of Pt.s cared for</td>
<td>.2065</td>
<td>4.30%</td>
</tr>
<tr>
<td>Years of Nursing</td>
<td>.1045</td>
<td>1.00%</td>
</tr>
<tr>
<td>Educational Background</td>
<td>.0589</td>
<td>0.35%</td>
</tr>
<tr>
<td>Inservice Time</td>
<td>.0546</td>
<td>0.30%</td>
</tr>
</tbody>
</table>
Coefficient and a Multiple Regression were performed. The findings of these test allowed the fourth research question to be answered, "Do years of nursing, nursing education, diabetic inservices, diabetic articles read, diabetic patient contact, presence of diabetes in self, family, or friends, and feelings of competency in diabetic care influence medical-surgical nurses perceived knowledge of diabetes mellitus". Variables obtained from the DDS that were studied included: years of nursing practice, nursing educational background, length of time since last diabetes inservice, number of articles related to diabetes read within the last six months, presence of diabetes in self, family, or friend, number of diabetics cared for in one month, and perception of competency. The Pearson’s Correlation Coefficient revealed two factors that had the greatest positive correlation with the DSRT, (a) number of articles read ($r = .3638$, $p < .01$, $r^2 = 13.2\%$) and (b) perceived competency ($r = .3119$, $p < .01$, $r^2 = 9.7\%$) (Table 9). A Multiple Regression was performed on the previously identified independent factors identifying two variables that reacted. The variable that entered on step one was number of articles read, $r = .36379$, $r^2 = 13.2\%$, $p = .0011$. The variable that entered secondly was perceived competency, $r = .44710$, $r^2 = 19.99\%$, $p = .0003$. 
Factors that Influence DBKT

The affects of the variables from the DDS on the DBKT were studied through the use of a Pearson’s Correlation Coefficient and a Multiple Regression. This allowed the researcher to answer the fifth research question, "Do years of nursing, nursing education, diabetic inservices, diabetic articles read, diabetic patient contact, presence of diabetes in self, family, or friends, and feelings of competency in diabetic care influence medical-surgical nurses actual knowledge of diabetes mellitus". The independent variables were identical to those studied in the DSRT Pearson’s Correlation and Multiple Regression. The Pearson’s Correlation Coefficient demonstrated only one item of relationship. The perceived level of competency ($r = .2303 \ p < .05, \ r^2 = 5.3\%$) related positively to the DBKT (Table 10). The Multiple Regression study revealed only one entered variable, perceived competency, $r = .23 \ r^2 = 5.3\% \ p = .0439$. 
Table 10

**Summary of Pearson's Correlation Coefficient Diabetes Basic Knowledge Test (DBKT) To DSRT and Demographic Factors**

<table>
<thead>
<tr>
<th>DBKT to Variables</th>
<th>r</th>
<th>r²</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSRT</td>
<td>.2600</td>
<td>.0680%</td>
</tr>
<tr>
<td>Competency</td>
<td>.2303</td>
<td>.0530%</td>
</tr>
<tr>
<td>Inservice Time</td>
<td>-.1435</td>
<td>.0200%</td>
</tr>
<tr>
<td># of Pt.s cared for</td>
<td>.1149</td>
<td>.0130%</td>
</tr>
<tr>
<td>Years of Nursing</td>
<td>-.0995</td>
<td>.0099%</td>
</tr>
<tr>
<td>Educational Background</td>
<td>-.0851</td>
<td>.0070%</td>
</tr>
<tr>
<td># Articles Read</td>
<td>.0177</td>
<td>.0003%</td>
</tr>
</tbody>
</table>
CHAPTER V

Discussion

Over seven million people have been diagnosed with the chronic illness of diabetes mellitus with the number increasing by six percent yearly (American Diabetes Association, 1991). Due to primary and secondary complications of diabetes many individuals who have this disorder will require hospitalization. Though many health professionals will participate in the care of the diabetic patient who is experiencing self-care deficits, it is the nurse who will have the most contact with the patient and thus be most responsible to provide care, guidance, and diabetic education. To provide optimal care in these areas, understanding of this disorder is required.

Actual Level of Knowledge

From 1967 to 1989 studies have shown that nurses have less than adequate knowledge of diabetes mellitus (Etzwiler, 1967; Feustel, 1976; Leichter et al., 1980; Scheiderich et al; 1983; and Drass et al., 1989). Though it is not clearly understood why nurses lack such knowledge, some researchers suggest that perception of knowledge may be a factor.

This study was designed to measure the actual and perceived knowledge of medical-surgical nurses, investigate the relationship of these two types of knowledge, and study factors that may influence actual and perceived knowledge.
In spite of advancements in understanding and technology of diabetes mellitus, the current study revealed that nurses' actual knowledge of diabetes has not changed significantly over the past 25 years (Etzwiler, 1967). The sample population of the present study obtained a mean score of 66% on the Diabetes Basic Knowledge Test (DBKT). Using a slightly modified version of the DBKT, the Scheiderich study of 1983, and Drass study of 1989, described similar findings of test scores (74% and 64% respectively) when given to nurses. The greatest diabetes knowledge deficits were noted to be in the area of treatment of hypoglycemia, administration and action of hypoglycemic drugs, ketone testing, and nutritional needs of diabetic patients. These same deficits were noted 25 years ago in the first study of diabetes knowledge among nurses by Etzwiler (1967). A possible reason for the continued knowledge deficiency is that such treatments are basic to the care of diabetic patients and nurses have become complacent to them. As for the continued lack of understanding of nutritional needs of diabetic patients, it is the researcher's belief, that with the dawn of dieticians and increasing responsibilities in nursing, nurses have relinquished the responsibility of nutritional education for the diabetic patient. Such actions may place the patient more at risk for several reasons: (a) nurses are the most available health care worker to answer dietetic questions, (b) dieticians are not
always available, and (c) effective diabetes care requires integration of dietetic information in the total care regimen. Lack of understanding of more current diabetic knowledge was also demonstrated in the present study. In 1989, Drass et al. included questions that reflected more current information into the DBKT. Questions on management of type I and type II diabetes, affects of stress and exercise on diabetes, Somogyi phenomenon, and glycosylated hemoglobin were added. Since such questions were retained in the tool for the present study, nurses’ knowledge of current trends in diabetes was also reviewed. It was found that the majority of the sample population failed to answer questions related to more recent information including glycosylated hemoglobin (53.2%) and Somogyi phenomenon (70.1%) correctly. Also 72.7% of the nurses responded with "I do not know" to questions that addressed stress and its affects on diabetes. The lack of understanding among nurses about the affects of stress on diabetes was also reflected in the level of competency of care for patients undergoing stressful procedures such as surgery. Approximately 77% of the sample stated a low level of competency in this area. Failure to respond correctly to newer concepts of diabetic care can be attributed to three factors: (a) nurses lack of initiative to gain current knowledge, (b) failure of educators to introduce new information in diabetic educational classes, and (c) the nurses’ perception of
understanding of diabetes may affect their actual knowledge base.

Regardless of reasons for lack of diabetes knowledge among this sample of medical-surgical nurses, it must be remembered that nurses who do not have an adequate knowledge base can function only as technicians and not at a professional level. According to Orem (1991), it is only the professional nurse that can assist persons with self-care deficits return to self-care states, which is the primary purpose of nursing.

**Perceived Level of Knowledge**

Many studies have been done in educational and developmental psychology regarding the concept of perception of knowledge (Markman, 1979; Glenberg et al., 1982; and Epstien et al., 1984). Researchers not only agree that the phenomenon of perception exists but that it may have an inverse relationship to actual knowledge and may have a negative affect on one's actual level of knowledge (Glenberg et al., 1982; and Park et al., 1988). Though the inverse relationship of perceived to actual knowledge has been demonstrated in many educational and developmental psychology studies (Lichtenstein & Fiscoff, 1977; Zabrucky et al., 1987; Park et al., 1988; and Pressley et al., 1990), there has only been one study involving nurses that has demonstrated this phenomenon (Drass et al., 1989).

In the present study it was found that the perception
level of the sample group was relatively high as measured by the DSRT (mean 67.5 with a S.D. 8.4). According to Lichtenstein and Fischoff (1977), this is not unusual since judgements are prone to overestimation of knowledge (p. 161). The high levels of perception may also be influenced by familiarity of the subject (Schommer & Surber, 1986) which may account for the level of perception among the sample group. Nurses have long been exposed to information on Diabetes Mellitus, a chronic disorder that has been discussed among health care workers since the time of the Egyptians (Guthrie & Guthrie, 1982).

**Relationship of Perceived to Actual Knowledge**

Most studies that have looked at the relationship of perceived to actual knowledge have shown an inverse relationship (Lichtenstein & Fischoff, 1977; Zabrucky et al., 1987; Park et al., 1988; Drass et al., 1989; and Pressley et al., 1990). In contrast, the present study displayed a positive relationship between perceived and actual knowledge. Nurses level of perception correlated with their level of actual knowledge of diabetes ($r = .2600$, $p < .05$, $r^2 = 6.8\%$). Though the positive relationship is rather weak, factors that may have contributed to this positive relationship are evident. Specifically, nurses in the study had mandatory quarterly exposure to nurse educators during Accucheck recertification periods for one year prior to the study. Accucheck recertifications are one
on one inservices on the use of blood glucose monitors. This individualized time allowed nurses and nurse educators to exchange information not only on the technicalities of blood glucose monitoring but on current diabetes knowledge thus raising the level of actual diabetes knowledge to the level of perception. This opportunity to update actual knowledge may have also influenced nurses to be more attentive to their perceived level of knowledge, thus bringing the level of perceived knowledge more closely in line with actual level of diabetes knowledge. Further data indicated that the majority of the sample group of nurses read one to three articles related to diabetes within six months immediately prior to this study. Such behavior would enhance actual knowledge level which in turn enhanced perception of knowledge as shown through the multiple regression procedure, $r = .3119 \quad r^2 = 13.2\% \quad p = .0011$. Another factor that may have accounted for this positive relationship between perceived and actual knowledge was the availability of a diabetic educator within the sample facility. The diabetic educator in this facility not only conducts classes for diabetic patients and their families, but also is primarily responsible for education of the nursing staff. Approximately three inservices on diabetes are held for the staff yearly as well as a monthly inservices during orientation of new nursing staff. Also, as the subjects worked in a teaching facility they were
often exposed to diabetes knowledge from interaction with professionals from other disciplines. With multiple opportunities for exposure to diabetes knowledge, a more positive correlation between perceived and actual knowledge should be anticipated.

The results from this study indicate that enhancement of actual knowledge affected perceived knowledge so that one type of knowledge coincides with the other. Such findings were demonstrated in the Zabrucky et al. study of 1987. Zabrucky and associates demonstrated that adults that were better educated had less of an inverses relationship between perceived and actual knowledge.

Factors that Influence Perceived and Actual Knowledge

Additional factors were studied that might affect one’s level of perceived knowledge and actual knowledge. These factors were identical to the factors investigated in the 1989 Drass et al. study with the addition of one factor, the number of articles on diabetes read by the sample within a six month period prior to the study. Also, one question was excluded which asked the number of years the subject worked in the institution. As in the Drass et al. study (1989), number of years as a nurse had a negative relationship to actual knowledge scores; that is, test scores decreased as number of years as a nurse increased. Perhaps this occurred due to the fact that the workload, responsibility, and liability of nurses has increased without additional
staffing and autonomy, thus affecting the desire and enthusiasm of nurses to gain new information. Nursing educational background had no significant relationship in regards to perceived and actual knowledge just as found in the Drass et al. study (1989). These findings may be a result of the lack of specialty classes on diabetes mellitus in basic nursing curriculum. In general, primary nursing education integrates information on diabetes with other disease processes.

Unlike the Drass et al. study (1989), the number of diabetic patients cared for in the present study had little influence on the nurses' level of perceived or actual knowledge. A Pearson's Correlation Coefficient of the DSRT to number of diabetic patients cared for revealed an $r = .2065$ and the correlation of the DBKT demonstrated an $r = .1149$. The 1989 Drass et al. study showed an inverse correlation; the less nurses cared for diabetic patients the higher they scored in level of perceived knowledge. In addition, the present study found no significant correlation between inservice time and actual or perceived knowledge. The lack of adequately defined "Inservice" may have obliterated any significant correlation. The lack of definition may have possibly allowed subjects to count any formal or non-formal presentation of diabetes material as an "Inservices".
Only two factors influenced the perceived knowledge, the number of articles the subjects read and their actual level of knowledge of diabetes. The possible causes of these correlations were addressed previously. As for factors that affected actual knowledge of diabetes only one was found, the feeling of competency the subject had in the care of diabetic patients. The more competent nurses felt about their level of knowledge, the higher the score of their actual knowledge. All that can be said to account for this phenomenon is that the subjects monitored their level of perception and actual knowledge well.

Limitations of the Study

One limitation of the study was the use of convenience sampling. The disadvantage of such sampling is that convenience samples carry a high risk of bias, thus affecting the ability of the researcher to generalize findings. It was hoped that homogeneity of the study would somewhat offset the risk of bias. The advantage of the convenience sample was that it allowed the researcher to collect data from as many subjects as possible in a short period of time.

Another limitation of the study was the small sample size. According to Munro et al. (1988), the number of subjects was adequate for non-parametric testing such as Chi-square but not adequate for more powerful parametric testing. Nunnally (1979) suggests that there be a minimum
of 30 subjects per independent variable in parametric procedures such as a Pearson’s Correlation Coefficient and Multiple Regression. This might account for the lack of significant correlations between variables of the study and the DSRT and the DBKT. In addition, Cohen (1988) states, that a less than adequate sample may decrease the power of the findings. Thereby increasing the chance of making a Type II Error which is accepting a false null hypothesis.

The sample population all practiced within the same facility. This placed an additional limitation on the study, increasing the chance of bias. Findings of this study may only be applicable to the members of the sample institution.

The final limitation of this study was that nurses who participated in the study were not supplied with designated testing areas or additional work time to complete the three required questionnaires. This might have affected their ability to internalize and evaluate the questions on the tools.

Implications for Nursing

Several implications for nursing arose out of this study. As demonstrated in this and pervious studies, nurses do not exhibit an adequate level of actual knowledge of diabetes mellitus. To correct this deficiency, nurses must make an effort to monitor the depth and progression of their knowledge. Nurses need to seek information either through
formal classes or informal individual exchange of information.

It would behove hospital administrations to make available to nurses, educators to enhance nurses’ knowledge of diabetes mellitus and time to take advantage of the educational opportunities. Nurses who are well versed in care of the diabetic patient are more likely to assist patients with self-care deficits back to self-care states, thus decreasing hospital stay time and the risk of readmission for complications associated with inadequate self-management.

An implication for nurse educators is that they must assist nurses to become more aware of the two types of knowledge individuals possess, actual and perceived knowledge. With this awareness, nurses are then able to monitor their perceived and actual knowledge and work to prevent the emergence of an inverse relationship between these types of knowledge. Glenberg (1982) suggests, the primary work of educators is to assist students in differentiation between actual and perceived knowledge.

Recommendations

Recommendations derived from this study are:

1. To duplicate this study among a larger randomized sample of medical-surgical nurses with the sampling being drawn from more than one institution. Such a study may have
findings that are more statistically significant and more applicable to the general population of nursing.

2. To conduct the study of perceived and actual level of knowledge of diabetes among nurses practicing in a teaching and non-teaching hospital. This would give further information on the affects of various facility educational systems on levels of perceived and actual knowledge, and possibly substantiate the hypothesis that with increased education comes decreased levels of perceived knowledge as was demonstrated in the Zabrucky et al. study (1987).

3. A study be done to monitor nurses' perceived knowledge and actual knowledge level of diabetes during three phases of their profession. Initially while they are in their formal nursing educational program, immediately on completion of the program, and at designated times after that. Such a longitudinal study would allow for exploration of when increases and decreases of perceived and actual knowledge occur. This information would be useful to educators at all levels of nursing education.

4. It may benefit nurse educators to study the level of awareness among nurses of the concepts of perceived and actual knowledge. If such concepts are unknown to nurses, they cannot monitor these two types of knowledge and thus are at risk of having an inverse relationship of perceived and actual knowledge.
5. And finally, more studies should be conducted to investigate the general knowledge of nursing in other chronic disease areas. Monitoring of nurses’ knowledge in these areas is imperative, since it is the nurses who is most responsible to teach adaptation skills based on actual up-to-date knowledge to the chronically ill patient.

Summary

This study has demonstrated that in spite of nurses’ feelings of general competency in caring for the diabetic patient, they continue to have low levels of actual diabetes knowledge. These low levels of knowledge are not only seen in more current diabetes information but also in long standing basic information. What was interesting was that the level of their actual knowledge had a positive relationship to their perceived knowledge. Such findings suggest that nurses may be monitoring their lack of knowledge more closely and thus becoming more accountable for their knowledge base. Though the researcher was unable to clearly identify variables that may affect actual or perceived knowledge, the investigator encourages other researchers to continue to probe for such variables. Since any factor that interferes with the attainment of actual knowledge, affects the nurses’ ability to complete the true work of nursing which is to return a patient to a self-care state.
Appendix A

Orem’s Self-Care Deficit Model
MAN

SELF CARE AGENT

DISEASE

LOSS OF SELF CARE AGENCY

SELF CARE DEFICIT STATE

NURSE

TECHNICAL

PROFESSIONAL

CURRENT ACTUAL KNOWLEDGE

NURSE AGENT

DESIGN NURSING SYSTEM
1. Caring
2. Teaching
3. Supporting
4. Guiding

SELF CARE ACTIONS

MAN
Appendix B
Demographic Data Sheet
DEMOGRAPHIC DATA SHEET

1. Number of years as a Registered Nurse
   (Fill in number of years)

2. Highest nursing educational preparation obtained:
   (Circle one)
   1) Diploma
   2) ADN
   3) BSN
   4) MS or>

3. Most recently attended inservice/ continuing education in Diabetes: (Circle one)
   1) None
   2) Within the last 6 months
   3) More than 6 mon. but less than 1 yr. ago
   4) More than 1 yr. but less than 2 yrs. ago
   5) More than 2 yrs. ago

4. Approximately how many articles regarding diabetes have you read within the pass 6 months? (Circle one)
   1. 0
   2. 1-3
   3. 4-6
   4. >6

5. Number of diabetics you personally care for per month on your unit: (Circle one)
   1) None
   2) 1-3 patients
   3) 4 or more
   4) None of the above

6. Presence of diabetes in:
   (Circle one or more)
   1) Self
   2) Immediate family
   3) Friend
   4) None of the above

7. How competent do you feel in caring for the diabetic patient. Caring is defined as providing physical care and teaching the diabetic patients about their disease.
   (Circle one)
   1. Very competent
   2. Competent
   3. Somewhat competent
   4. Not Competent
Appendix C
Diabetes Self-Report Tool
DIABETES SELF-REPORT TOOL


Instructions: Please place a circle around the appropriate response to each statement. Please be as honest as you can in evaluating your knowledge and skills in taking care of diabetic patients.

SA = Strongly agree  
A = Agree  
D = Disagree  
SD = Strongly Disagree

1. I can describe the etiology of Type I diabetes.  
2. I can describe the etiology of Type II diabetes.  
3. I can describe the basic treatment plan for Type I diabetes  
4. I can describe the basic treatment plan for Type II diabetes.  
5. I cannot identify the nursing needs of the diabetic patient undergoing surgery.  
6. I can manage the nursing care of diabetic patient experiencing mild hypoglycemia.  
7. I can manage the nursing care of a diabetic with loss of consciousness.  
8. I can interpret urine test results for a diabetic patient.
9. I cannot instruct a diabetic patient on self management for a "Sick Day". SA A D SD
10. I can describe the action of insulin. SA A D SD
11. I can list the steps of the procedure administering insulin. SA A D SD
12. I can describe the action and effect of a oral hypoglycemic agent. SA A D SD
13. I can assess the diabetic patient for the development of diabetic ketoacidosis. SA A D SD
14. I cannot explain how stress affects diabetes control. SA A D SD
15. I can identify the long-term complications associated with diabetes. SA A D SD
16. I cannot explain how exercise affects diabetes control. SA A D SD
17. I can describe the diet recommended for Type I diabetes. SA A D SD
18. I can describe the diet recommended for Type II diabetes. SA A D SD
19. I can perform one method of blood glucose monitoring. SA A D SD
20. I cannot instruct the diabetic patient on daily personal care. SA A D SD
21. I can identify three sites for the administration of insulin. SA A D SD
22. I can manage the nursing needs of the diabetic patient experiencing hyperglycemia without ketosis. SA A D SD
Appendix D
Diabetes Basic Knowledge Test
Dear Nurse,

The Diabetes: Basic Knowledge Test was utilized in the 1988, study conducted by Drass, Murir-Nash, Boykin, Turek and Baker, at the Institutes of Health in Bethesda, Maryland. Their study was published in the May 1989 issue of Diabetes Care, Vol. 12, pages 351-356. The resource for the correct answers is the American Association of Diabetic Educators 1988, Core Curriculum.
DIABETES: BASIC KNOWLEDGE TEST

Instructions: 1. Please answer all 43 questions.
2. Circle only one answer per question.
3. If you do not know the answer, please circle the response of "I do not know".

Sample Question:

A diabetic patient is considered to be hyperglycemic when the blood sugar is______

a. Greater than 200 mg/dl
b. Under 100 mg/dl
c. 100 - 120 mg/dl
d. I do not know

Answer "a" was circled since a diabetic patient with a blood sugar greater than 200 is considered to be hyperglycemic.

1. Which statement is characteristic of the etiology of Type I diabetes?
   a. Strongly associated with obesity
   b. Predominantly genetic
   c. Autoimmune, viral or toxic destruction of the beta cells
   d. I do not know

2. Which of these statements about the management of Type I diabetes is true?
   a. Insulin injections are necessary to maintain life
   b. Insulin injections are not always necessary if diet and exercise are well controlled
   c. Oral hypoglycemic agents are sufficient for blood control in most patients
   d. I do not know

3. Which statement is characteristic of the etiology of Type II diabetes?
   a. Predominantly non-genetic
   b. Frequently associated with obesity and resistance to insulin
   c. Autoimmune, viral or toxic destruction of the beta cells
   d. I do not know
4. Which of these statements about management of Type II diabetes is true?
   a. Insulin injections are necessary to maintain life
   b. A controlled diet and exercise program is the most effective treatment
   c. Oral hypoglycemic agents alone are most effective
   d. I do not know

5. What effect does insulin have on the blood glucose?
   a. Insulin causes blood glucose to increase
   b. Insulin causes blood glucose to decrease
   c. Insulin has no effect on blood glucose
   d. I do not know

6. Which are physiological actions of insulin?
   1. Transports glucose across cell membranes for use by the cells
   2. Enhances the formation of proteins from amino acids
   3. Enhances the breakdown of fats for energy
   a. 1 and 2
   b. 1, 2 and 3
   c. 1 and 3
   d. I do not know

7. If a known diabetic is found unresponsive, which of these assumptions about the person’s blood glucose should guide your initial actions?
   a. It may be very high
   b. It may be very low
   c. It may be normal
   d. I do not know

8. Normal fasting blood glucose level can best be described as ______.
   a. Below 150 mg/dl
   b. Between 100 and 200 mg/dl
   c. Between 70 and 120 mg/dl
   d. I do not know
9. Which of the following affect the accuracy and precision of test results obtained with most of the blood glucose monitoring strips?

   1. Size and placement of the blood sample on the reagent pad.
   2. Timing of the test.
   4. The patient’s hematocrit level.

   a. 1 and 3
   b. 2 and 4
   c. 1, 2, 3, and 4
   d. I do not know

10. Which of the following test can determine the patient’s average blood glucose control over an extended period of time?

   a. Glycosylated hemoglobin
   b. Plasma Renin Activity (PRA)
   c. Insulin antibodies
   d. I do not know

11. The following statements indicates reasons for utilizing blood glucose monitoring rather than urine testing. Which is the **BEST** reason?

   a. Drugs such as penicillins, ASA, cephalosporins, barbiturates, etc. can create falsely negative urine test results.
   b. Urine retention and changes in kidney function can increase the lag time between blood glucose rise and spill over of glucose into the urine.
   c. The diagnosis of diabetes can be more readily confirmed at the patient’s bedside than by laboratory testing.
   d. I do not know

12. When should a well-controlled diabetic always check urine for ketone?

   a. Whenever exercising
   b. Whenever testing urine for glucose
   c. Whenever blood glucose is greater than 200 mg/dl
   d. I do not know
13. What should a diabetic do when he/she has been showing 2% urine glucose or blood glucose greater than 240 mg/dl for two consecutive days and now has positive ketone urine tests?

a. Omit the next dose of insulin or oral hypoglycemic medication and test urine/blood as usual
b. Call the doctor, continue to test urine/blood every four hours or as directed by physician, and continue insulin or oral hypoglycemic medication
c. Continue with insulin or oral hypoglycemic medication and urine/blood testing as usual. These are normal results for diabetics
d. I do not know

14. The maximum effect (peak) of regular insulin occurs ___

a. 2-4 hours after injection
b. 6-12 hours after injection
c. 12-20 hours after injection
d. I do not know

15. The maximum effect (peak) of both NPH and Lente insulin occurs ___

a. 2-4 hours after injection
b. 8-12 hours after injection
c. 24-28 hours after injection
d. I do not know

16. Where should one store insulin that is PRESENTLY being used?

a. In the refrigerator near the freezer section
b. In the refrigerator away from the freezer section
c. At room temperature and away from excess light
d. I do not know
17. A diabetic contaminates the needle while preparing an insulin injection. What would be the BEST action to take?

a. Dispose of needle even if this means disposing of the insulin and syringe and starting preparation from the beginning.
b. Wipe the needle with an alcohol sponge and continue preparing the injection.
c. Continue preparing the injection, but wipe the injection site thoroughly with alcohol.
d. I do not know

18. When short-acting (regular) and intermediate-acting (NPH) are ordered to be given by injection at the same time, the nurse should ____

a. Use separate syringes to administer each insulin
b. Mix them in the same syringe drawing up the intermediate-acting insulin first.
c. Notify the doctor since these two insulins should not be given together.
d. Mix then in the same syringe drawing up the short-acting first.
e. I do not know

19. The duration of action of Glucotrol (Glipizide) is ____

a. 6-12 hours
b. 12-24 hours
c. 24-60 hours
d. I do not know

20. Which is NOT a common side effect of oral hypoglycemic agents?

1. Gastrointestinal upset
2. Allergic reaction
3. Skin rash
4. Constipation

a. 1 and 2
b. 4
c. 3 and 4
d. I do not know
21. A symptom of hypoglycemic (low blood sugar) is--
   a. Frequent urination
   b. Dry mouth and dry skin
   c. Nervousness
   d. I do not know

22. A symptom of hyperglycemia (high blood sugar) is--
   a. Frequent urination
   b. Low grade fever
   c. Cool, clammy skin
   d. I do not know

23. What is a common cause of hypoglycemia (low blood sugar) in a diabetic who is taking insulin or oral hypoglycemic agents?
   a. Skipping a meal
   b. Emotional stress
   c. Too little exercise
   d. I do not know

24. What is a common cause of hyperglycemia (high blood sugar)?
   a. Decreased food intake
   b. Infection
   c. Excessive insulin
   d. I do not know

25. One symptom associated with diabetic ketoacidosis (DKA) is __________
   a. Cold, clammy skin
   b. Acetone (fruity) breath
   c. Negative urine for glucose
   d. I do not know

26. What is a common cause of diabetic ketoacidosis (DKA) in the Type I diabetic?
   a. Excessive exercise
   b. Excessive intake of diet soft drinks over a prolonged period
   c. Failure to take daily insulin dose
   d. I do not know
27. What affect does illness commonly (for example a sick day) have on a diabetic's insulin requirements?

a. Illness causes a decrease in insulin requirements  
b. Illness causes an increase in insulin requirements 
c. Illness causes no changes in insulin requirements  
d. I do not know

28. In general, changes in the pattern of insulin administration for the diabetic undergoing surgery might include which of the following?

a. Increase the dose of long-acting insulin the night before and the morning of surgery.  
b. Discontinue all subcutaneous insulin the day of surgery and instead infuse long-acting insulin intravenously at a constant drip.  
c. Reduce the usual a.m. dose of insulin, on the day of surgery and give subcutaneous or IV boluses of short acting insulin per frequent blood glucose monitoring results.  
d. I do not know

29. Which of the following long term complications are associated with diabetes?

1. Eye changes  
2. Renal and cardiovascular changes  
3. Nervous system changes

a. 1  
b. 2 and 3  
c. 1, 2, and 3  
d. I do not know

30. The effect of physical and emotional stress on diabetes control includes--

a. The secretion of stress hormones that cause an elevation in blood glucose levels.  
b. The secretion of stress hormones that cause a decreases in blood glucose levels.  
c. The secretion of stress hormones that has no effect on blood glucose levels.  
d. I do not know
31. Why is it necessary that diabetics pay special attention to proper care of their feet?
   a. Several years of injecting insulin into the thighs can cause edema in both the legs and the feet.
   b. Flat feet are commonly associated with diabetes unless preventive measures are routinely used.
   c. Persons with diabetes often have changes in sensation and poor circulation to their feet.
   d. I do not know

32. A diabetic has a small corn on the right foot and wants it removed what should be done FIRST?
   a. Use a liquid corn remover, following the directions carefully
   b. Refer the diabetic to a podiatrist
   c. Carefully trim the corn with a sterile cutting instrument
   d. I do not know

33. A diabetic has just received a minor abrasion on the left leg. What should be done to treat the abrasion?
   a. Wash gently with mild soap and water, dry with clean towel, and observe carefully for any signs of infection.
   b. Wash gently with mild soap and water, apply a small amount of iodine or merthiolate, and observe carefully for any signs of infection
   c. Apply a small amount of iodine or merthiolate and call the doctor.
   d. I do not know

34. What effect does exercise have on blood glucose when the diabetic’s blood glucose is less than 300 mg/dl?
   a. Decreases blood glucose
   b. Increases blood glucose
   c. Has little effect on blood glucose
   d. I do not know

35. What effect does increased exercise have on a diabetic’s food intake needs if the patient has well-controlled Type I diabetes?
   a. Decreases the need for food
   b. Increases the need for food
   c. Has little effect on the need for food
   d. I do not know
36. Which is the most appropriate **INITIAL** action to take for the Type I diabetic who is having a hypoglycemic reaction (low blood sugar)?

a. Drink 4 oz of regular soda
b. Drink 8 oz of orange juice with 2 tsp. of sugar
c. Eat 4 crackers with butter or margarine
d. I do not know

37. A Type I diabetic does not like one of the food items on the meal tray. What would be the **BEST** action for the nurse to take?

a. Advise the patient to eat all other items on the tray and omit that one item
b. Advise the patient to omit that one item and adjust the next scheduled insulin dose to accommodate this deletion
c. Explain to the patient that the diabetic diet is carefully calculated and that the dietitian will be consulted about exchanging this item for another
d. I do not know

38. Which of these is the main objective when developing a meal plan for the person with Type II diabetes?

a. A calorie-controlled diet that will achieve and maintain ideal body weight
b. A high-carbohydrate, high-protein diet that encourages an increase in body protein reserves
c. A low-carbohydrate, high-protein diet that will prevent fluctuations in blood glucose levels
d. I do not know

39. A diabetic diet is calculated for which of the following nutrients:

1. Carbohydrates
2. Protein
3. Fat

a. 1
b. 2 and 3
c. 1, 2 and 3
d. I do not know
40. Which of these is the **MAIN** objective when developing a meal plan for the person with Type I diabetes?

A individualized:

a. Nutritionally balanced, six small meals per day plan
b. Diet plan that will maintain euglycemia that include foods from the basic 4 food groups, and has an even distribution of calories.
c. Low-fat, low-fiber diet to prevent excessive weight gain and minimize the risk of cardiovascular disease
d. I do not know

41. A diabetic has refused an evening snack of consisting of 4 ounces of fruit juice and one half of a chicken sandwich. You should substitute with___

a. Five Graham crackers and 8 oz of plain yogurt
b. Six crackers and 2 oz of cheese
c. A piece of fresh fruit, 1 oz of peanut butter and four crackers
d. I do not know

42. For the past **TWO** days, a diabetic patient has demonstrated the following:

Urine test results for glucose and ketones that jump from negative/negative, to 1-2%/moderate to large in just a few hours

Wide fluctuations in blood glucose levels over several hours, often unrelated to meals

2% glycosuria occurring upon awakening; preceded by nocturnal sweating, nightmares or headache

Based on this assessment data, which is the patient demonstrating?

a. Pass-through or flashback phenomenon
b. Somogyi or rebound effect
c. Dawn phenomenon
d. I do not know
43. Which of the following sets of figures best illustrates the correct sites for subcutaneous insulin administration?

A.) Front Back Front Back

B.) Front Back Front Back

C.) Front Back Front Back

D.) I do not know
Appendix E

Consent Form
Dear Nurse,

Diabetes mellitus is a chronic disease that is affecting the health of thousands of individuals. Since at the present time there is no cure for diabetes mellitus, patients experiencing this disorder can only learn to control their disease. The teaching of control measures are frequently done by medical-surgical nurses, which requires that such nurses have adequate knowledge of this disease. The purpose of this study is to better understand the medical-surgical nurse’s perceived and actual knowledge of diabetes. This will allow for the design of diabetic educational programs that can better meet the needs of nurses.

Participation in the study is voluntary and involves no risk to the subjects. Participants can withdraw from this study at any time without penalty. The participant will be asked to answer three randomly numbered questionnaires. The questionnaires will be completed in the work place. The total time it takes to complete these three questionnaires is approximately 15-30 minutes. Only the investigator will have access to the data. Individual findings will not be shared with your employer. Findings obtained from the questionnaires will be reported as grouped data only.
There is no cost or reimbursement for your participation in the study. Return of your questionnaires will indicate your willingness to participate in the study. Should you like more information regarding this study, you may contact me through the Nursing department at the University of Nevada, Las Vegas, (702) 739-3360.

Thank You,

Patricia H. Hess RN, BSN
Appendix F

University Medical Center of Southern Nevada Approval Letter
March 27, 1992

To: Pat Hess, RN

Your request for the UMC Nursing Department's involvement in your masters project has been accepted. We are pleased to have the opportunity to assist you in evaluating this area of diabetic teaching. We hope that you will share your results with us which will allow us to determine the needs of our employees for further inservice and education.

Thank you again for choosing us for your project.

Sincerely,

Elaine Young, Director
Staff Development
Appendix G

Permission Letter from Drass
Pat Hess, RN, BSN, CCRN
4083 Ridgewood Ave.
Las Vegas, Nevada 89120

Dear Pat,

Thank you for your inquiry and request for a copy of our research tools that were used in the recently published study entitled "Perceived and Actual Level of Knowledge of Diabetes Mellitus Among Nurses." I have enclosed copies of all three instruments: "Demographic Data Sheet," "Self-Report Tool," and the "Diabetes: Basic Knowledge Test (DBKT)."

I would recommend only one change in the DBKT in order to update it since its development. The answers to question 943 should be amended to reflect the revised exchange lists. I have also enclosed a copy of the answer sheet and answer key. In addition, I would also recommend changing the Likert scale of the "Self-Report Tool" into a 5-point scale since this is generally accepted as a standard in the area of attitudinal measurement. This addition would allow for individuals who truly have "no opinion" regarding the topic of inquiry.

You have our permission to copy the tool as needed for the purpose of replicating this study. We would ask only that you would send us a copy of any revisions made in the tools for your use, as well as a copy of your study results.

Please feel free to contact me should you have any further questions. I also apologize for the delay in responding to your request and hope that you will be able to replicate the study!

Sincerely,

Jan Drass, RN CDE
Appendix H
Human Subjects Rights
April 10, 1992

Patricia Hess, RN, BSN
4083 Ridgewood
Las Vegas, NV 89120

Dear Pat:

The Department of Nursing Human Subjects Rights Committee met and approved your proposal "Perceived and actual level of knowledge of diabetes mellitus among medical-surgical nurses" with the following additions:
Set up data collection so that someone else is processing the person for their accu-check certification.
When you have made this change in your proposal submit 8 copies of your proposal so it may be forwarded to the University Human Subjects Rights Committee. Their next meeting is Monday May 11 and the 8 copies must be in the IRB office by April 30.
If you have any questions or if there are any changes in your plan please give me a call.

Sincerely,

[Signature]

Margaret Louis, RN PhD
Chairperson
Human Subjects Rights Committee, Department of Nursing
University of Nevada, Las Vegas
4505 S. Maryland Parkway
Las Vegas, NV 89154
SUBMIT TO OFFICE OF THE GRADUATE DEAN: Original and 11 copies of the Protocol Form (pp. 1-3) plus one copy of the entire research proposal.

UNIVERSITY OF NEVADA, LAS VEGAS

PROTOCOL FORM

FOR RESEARCH INVOLVING HUMAN SUBJECTS

INVESTIGATORS: List person principally responsible for the investigation on line a). If principal investigator is a student, list faculty advisor on line b).

Investigator Department Phone

a) Patricia H. Hess RN, BSN,CCRN (702) 456-4746
b) Carolyn Sabo RN, Ed.D (702) 739-3360
c) d)  

UNLV status of Principal Investigator (circle): Faculty/Post-doctoral/Graduate/Undergraduate/Other________

TITLE OF PROJECT Perceived and Actual Level of Knowledge of Diabetes Mellitus Among Medical-Surgical Nurses

NAME AND ADDRESS of sponsoring agency or foundation (if other than UNLV)_____

CONTRACT OR GRANT NUMBER (if known)________________________

DURATION OF STUDY (Protocols must be renewed annually) 5-92 Start 12-92 Conclude

TYPE OF SUBMISSION x New ___ Continuation ___ Modification ___ Renewal (attach progress report) ___ Previous Log # (if any) ___

LOCATION(S) OR FACILITIES where study will take place University Medical Center of Southern Nevada

3-31-92 Date Patricia H. Hess
Principal Investigator’s Signature

3-31-92 Date

Department Chair or Unit Head’s Signature

3/31/92 Date Carolyn Sabo
Faculty Advisor’s Signature (if warranted)
SUBJECTS: (Please estimate numbers.)

- Patients as experimental subjects
- Patients as controls
- Minors (under 18)
- UNLV Students
- Pregnant women or fetuses
- Mentally disabled
- Prisoners, incarcerated subjects
- Normal adult volunteers
- Persons whose first language is not English.
- Medical-Surgical Nurses

TOTAL ANTICIPATED SUBJECTS: 75

PROCEDURES: (ATTACH relevant materials, such as questionnaires, interview schedules, written test instruments, etc.)

- Survey, questionnaire(s)
- Interview: phone/in-person
- Medical or other personal records
- Filming, tapping, recording
- Observation
- Participant observation
- Anthropological fieldwork
- Psychological intervention
- Incomplete disclosure of purpose
- Payment of subjects
- Costs to subjects/third parties
- Investigational Drug*
- Approved Drug, New Use*
- Investigational Device
- Placebo
- Ionizing Radiation
- Surgery
- In vitro fertilization
- Venipuncture
- Other body fluids, excreta
- Abortus, placenta, excess tissue
- Other (please specify)

Brief Explanation of Procedures:
Subjects will answer three questionnaires: The Demographic Data Sheet, Diabetes Self-Report Tool, and the Diabetes Basic Knowledge Test. The subjects will answer the Demographic and Self-Report Tool first, then the knowledge test. The questionnaires will be completed in the work place.
UNIVERSITY OF NEVADA, LAS VEGAS
PROTOCOL FORM APPROVAL SHEET
FOR RESEARCH INVOLVING HUMAN SUBJECTS

Log Number: __________________________

Title of Project: Perceived and Actual Level of Knowledge of Diabetes Mellitus Among Medical-Surgical Nurses

Investigator: Patricia H. Hess

After reviewing this proposal, the members of the Review Committee have indicated below their approval/disapproval of this proposal.

<table>
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<th>Signature of Committee Members</th>
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<th>Disapprove</th>
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The above named project is hereby approved/disapproved (circle one)

[Signature]
Title of study:
Perceived and Actual Level of Knowledge of Diabetes Among Medical-Surgical Nurses.

1. Subjects:
   Licensed Registered nurses who work in medical-surgical units of a local non-profit acute care hospital will be asked to complete three questionnaires. This sample will be a convenience sample. No randomization will be done. It is anticipated that 75 subjects will participate in the study.

2. Purpose, Methods, Procedures:
   The purpose of this study is to investigate the level of perceived and actual knowledge of diabetes mellitus among medical-surgical nurses, the relationship of perceived knowledge to actual knowledge, and factors that may effect perceived and actual knowledge. To collect data, three questionnaires will be completed. The Demographic Data Sheet (DDS) will be used to obtain basic information about the subjects and extraneous variables that may affect the actual and perceived knowledge of diabetes among nurses. The Diabetes Self-Report Tool (DSRT)
will measure the nurses perception of knowledge of diabetes mellitus. The Diabetes Basic Knowledge Test (DBKT) will be used to assess the participants actual level of knowledge of diabetes. The Diabetes Basic Knowledge Test (DBKT) will be used to assess the participants actual level of knowledge of diabetes.

Data will be collected over approximately 60 days. The month prior to the collection of data medical-surgical nurses will be notified during a scheduled staff meeting of the following: the purpose of the study, risk and benefits, the procedure used to collect data, and the dates data will be collected. Information reviewed at the staff meeting will also be posted in the nurses' lounge areas. On data collection dates the researcher will solicit volunteers for the study at the beginning of each shift. Nurses who volunteer to participate in the study will receive a randomly numbered packet containing the DDS and the DSRT during the first half of the shift. The researcher will return to the area during the last half of the shift to collect the completed questionnaires. Subjects who have completed the DDS and DSRT will place the questionnaires in a provided unmarked sealed envelope and return it to the researcher. On receipt of the unmarked envelope, the volunteer will be given the DBKT and a second unmarked envelope. The subjects will attach the random numbered crack and peek label on the DBKT in the designated area. The medical-surgical.
nurse will then complete the DBKT. On completion of
the DBKT the nurse will place the questionnaire into
the provided envelope, seal the envelope, and return it
to the researcher. All information pertaining to this
study will be stored in a secured area by the
researcher.

3. Risks:

   No risks to the subjects are identified. To
maintain subject confidentiality questionnaires are
randomly numbered. Data will be placed in a secure
area. Data obtained will be reported as grouped data
only.

4. Benefits:

   Information gained from this study will assist
nursing educators to better plan and implement diabetic
educational programs for nurses thus providing for
better patient care.

5. Risk-Benefit Ratio:

   There are no identified risks to the subjects.
They may benefit from the study with up-to-date
educational programs that will be tailored to their
needs.

6. Costs to Subjects:

   There is no financial cost to the subjects to
participate in this study. The greatest inconvenience
will be use of their time. The questionnaires will take approximately thirty minutes to complete.

7. Informed Consent:

Each subject will receive an informed consent at the time they are asked to participate in the study. Please see attached form. The consent form outlines the purpose, benefits, cost, and rights of the subject. Questionnaires will be handed out and collected by the investigator. The investigator will only have access to the completed questionnaires. The questionnaires are randomly coded and the name of the institution where data is collected will not be identified in this study. Subjects will be notified of the results from this study, which will be published as grouped data, upon request.
References


Lichtenstein, S., & Fischhoff, B. (1977). Do those who know more also know more about how much they know? Organizational Behavior and Human Performance, 20, 159-183.


