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Effects of Education on Disease Management and Prevention of Complications in Diabetic Patients

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EFFECTS OF EDUCATION ON DISEASE MANAGEMENT
AND PREVENTION OF COMPLICATIONS IN DIABETIC PATIENTS

By

Debbie K. Provoast

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ABSTRACT

EFFECTS OF EDUCATION ON DISEASE MANAGEMENT
AND PREVENTION OF COMPLICATIONS IN DIABETIC PATIENTS

By

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The purpose of this study was to examine the efficacy of two specific methods of providing diabetic education employed by two different health clinics in Northern Michigan; Clinic A, which provided an intense program of diabetic education offered through a preventive services program or Clinic B, which provided brief office-based education where patients received all education at the time of the visit.

An ex-post facto retrospective chart review was done on a total of 40 charts, 20 from each clinic for the purpose of obtaining laboratory values for glycohemoglobin, serum creatinine, and blood urea nitrogen, at the beginning and end of a one year time period. Findings of the study indicated that patients who attended Clinic A had significantly improved outcomes in the final measurement of glycohemoglobin and serum creatinine levels. There was no significant difference in the amount of change that occurred in patients who attended either clinic A or Clinic B.

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CHAPTER 1

INTRODUCTION

Diabetes is a chronic illness that requires continuing medical care and education to prevent acute problems and reduce the risk of long-term complications. Since there are more than 10 million people in the United States that are currently diagnosed with diabetes, it is considered a major area in which health care dollars are lost in managing the complications that are outcomes of poor control of the disease (Duffy, 1993). How to best manage those complications is not clearly defined, and is the subject of ongoing research.

Persistent hyperglycemia is the hallmark of all forms of diabetes. Treatment aimed at lowering blood glucose levels to normal or near normal in all patients has been shown to result in reduced morbidity and mortality related to diabetic ketoacidosis, a reduction of symptoms of polyuria, polydipsia, fatigue, weight loss, and blurred vision, decrease risks of progression of diabetic retinopathy, nephropathy, and may in fact, even prevent these conditions. Although not proven, the risk for atherosclerotic vascular disease may also be greatly reduced (American Diabetes Association, 1994).

The results of prospective randomized clinical trials, specifically, the Diabetes Control and Complications Trial (DCCT) should also be noted. This trial conclusively demonstrated that in patients with insulin dependent Diabetes Mellitus (IDDM) the risk of development or progression of retinopathy, nephropathy, and neuropathy is reduced 50-75% by intensive treatment regimens when compared with conventional treatment regimens (Diabetes Control and Complications Trial Research Group, 1993).

Management of diabetes requires conscientious adherence to a prescribed self-care regimen on the part of the patient. Achieving normal or near normal blood glucose levels in patients with all types of diabetes requires comprehensive training in self-management. Ensuring that the patient is prepared to assume that self-control role and has acquired the knowledge, understanding and skills necessary to be successful remains a challenge to health care professionals. Teaching clients about their health and illness needs to be a high priority in providing care.

Unfortunately, diabetic patients typically have a low compliance rate relative to the prescribed interventions. This is evidenced by the increased number of complications that result in hospitalization related to poor diabetic control, such as heart disease, infection, and renal failure. There does however, appear to be a relationship between the type and intensity of patient treatment and the incidence of complications. Benefits of good control were measured in the DCCT (1993) by evaluating the results of a diagnostic test procedure called Hemoglobin A1c, (Hgb A1c) which reflects the average blood sugar levels for the 2-3 month period before the test. This test provides information for evaluating diabetic treatment modalities, and can be a valuable adjunct in determining therapeutic choices and direction for management. Normal values for a patient with diabetes range from 4.8% which is considered good control, to greater than 15.0 % which is considered poor control. The range of values between these percentages are evaluated when determining the effectiveness of the prescribed diabetic management regimen (Fischbach, 1996). In the DCCT (1993) it was observed that patients who had a comprehensive diabetes management and education program, and whose diabetes was treated more aggressively maintained an average Hgb A1c of 7.2% compared with 9.0%

in conventionally managed groups. There was also had a reduction in the onset of diabetes related complications. An additional means of measurement, similar to the Hgb1c, is the blood glycohemoglobin (Fischbach, 1993), which is also used as a measurement of diabetic control, reflects the blood sugar levels for the 2-3 month period prior to the test. Normal values for the glycohemoglobin range from 4.5% which constitutes good control, to greater than 7.5% which is considered poor control. Since the glycohemoglobin is the standard diagnostic measurement that is used by the clinics observed in this study, this measurement will be used as criteria for comparison of outcomes between the two clinics.

Despite advances in medical research, the components of treatment for people with diabetes have not changed over the last twenty years. Interventions consist of diet, exercise, and medications. Thus, diabetic education, or teaching the patient how to make lifestyle changes, administer medications, and monitor his or her blood glucose is the primary therapeutic modality. Health care providers do not have solid empirical grounds for predicting what types of educational interventions lead to effective behavior change (Ahroni, 1996).

Primary healthcare providers who can attempt an alternative delivery of care based on health promotion and disease prevention principles are in a unique position to intervene, motivate, and ultimately influence the patient's outcome through teaching and counseling as an adjunct to pharmacological resources (Sinsell-Phillips, 1996). One alternative avenue of delivery of care is that of health promotion. Health promotion behavior as a key entity in the concept of health care delivery and intervention has received wide-spread attention as impacting the likelihood of adherence to a diabetic

regimen. With the recent trend toward public awareness of life styles, the emphasis on health promotion and health behavior change techniques for wellness enhancement has surfaced as an issue for all health care professionals (Palank, 1991).

Determining what interventions will best serve the client and be most effective in achieving the behaviors necessary to successful management of diabetes provides a complex challenge for both providers and patients. In diabetes care, daily attention to a myriad of factors is involved, making the issue of patient education, knowledge, and skill levels a critical one. How patients learn self-management through applying information, and how well they adapt it to their lives has not been well explained (Price, 1993).

According to Brown (1987) many investigators have examined the effectiveness of various teaching programs, linking the results of those studies to the degree of diabetic control experienced by the patients. The assumption has been that if the patient was in poor control, then either the teaching was faulty or the patient had not practiced adherence to the regimen prescribed. Few attempts have been made to determine whether diabetic patients actually learned the necessary information when exposed to the available education strategies, or whether the patient was able to transfer this knowledge to the home environment. Acceptable performance of recommended therapy by the patient is thought to result from a thorough understanding of the disease and its consequences, which in turn provides motivation for the patient to use the new knowledge (Scott, 1984). Consequently, adequate knowledge and accurate performance of self-care techniques should result in metabolic control.

Literature regarding what interventions are likely to result in the higher likelihood of adherence to a prescribed regimen is limited. In an attempt to examine the

role of health promotion as a basis for providing education to diabetic clients, this study will utilize the Health Promotion Model (Pender,1996) and the concept of interpersonal influence, to determine what the role of social support might play in increasing a client's adherence to a prescribed diabetic regimen..

According to Pender (1996) primary sources of interpersonal influence include family, peers, and health care providers. This study compared two methods of diabetic education that differ in the amount of social support provided to the diabetic client. Program number one is an intensive multi-faceted program that is designed to include criteria specific to diabetic education, while program number two involves a brief encounter with a provider in an office based setting. A detailed description of these programs is provided later in this report.

It is hypothesized that the more exposure a client has to interpersonal factors, including social support of peers, family and healthcare providers with regard to diabetic education, the greater the likelihood of adopting healthier life styles which result in improved patient outcomes. Therefore, the purpose of was study is to determine how type and intensity of diabetic education affect disease management, and prevention of complications of diabetic patients.

Chapter 2

CONCEPTUAL FRAMEWORK

The conceptual model for this study is Pender's Health Promotion Model (HPM; 1996). The HPM, based on Bandura's Social Learning Theory (1986) which emphasizes the cognitive mediating processes in the regulation of one's behavior, was originally presented by Pender in 1982, refined in 1987, and revised in 1996. Pender (1996) indicates the primary goal of health promotion is "ultimately directed toward attaining positive health outcomes for the client. Health promoting behaviors, particularly when integrated into a healthy life style that pervades all aspects of living, result in a positive health experience throughout the life span" (p.73).

The Health Promotion Model

The HPM is described as a competence- or approach-oriented model. The HPM differs from avoidance-oriented models in that it does not include fear or threat to motivate action. These models are of limited usefulness for health promotion in youth and early adulthood as well as for other individuals who for varying reasons perceive themselves to be invulnerable to illness. Because the HPM does not rely on personal threat as a source of health motivation, it is a model that is potentially applicable across the life span and in a multitude of various health needs.

The HPM is based on seven assumptions, which reflect both nursing and behavioral perspectives. They are listed by Pender (1996) as follows:

1. Persons seek to create conditions of living through which they can express their unique human health potential.
2. Persons have the capacity for reflective self-awareness, including assessment of their own competencies.
3. Persons value growth in directions viewed as positive and attempt to achieve a personally acceptable balance between change and stability.
4. Individuals seek to actively regulate their own behavior.
5. Individuals in all their biophysical complexity interact with the environment, progressively transforming the environment and being transformed over time.
6. Health professionals constitute a part of the interpersonal environment, which exerts influence on persons throughout their life span.
7. Self-initiated reconfiguration of person-environment interactive patterns is essential to behavior change (Pender, 1996, p. 54-55) .

These assumptions emphasize the active role of the client in shaping and maintaining health behaviors and in modifying the environmental context for health behaviors.

According to the revised HPM (1996) there are several determinants of health promoting behaviors and behavioral outcomes: (a) individual characteristics (each person's unique personal characteristics and experiences that affect subsequent actions), (b) behavior-specific cognitions and affect (the category of variables considered to be of major motivational significance that is subject to modification through intervention and nursing action), and (c) commitment to a plan of action (implies the underlying cognitive process or commitment to carry out a specific action at a given time, definitive strategies

for eliciting, carrying out and reinforcing the behavior). Each factor exerts a direct influence on the likelihood of engaging in health promoting behaviors.

Definitions of the Concepts of the Health Promotion Model

The following are definitions of the variables used in the HPM as developed and described by Pender (1996,p. 60):

Prior related behavior—the frequency of the same or similar behaviors in the past. Proposed as having both direct and indirect effects on the likelihood of engaging in health promoting behaviors; possibly related to habit formation, predisposing one to engage in the behavior automatically, with little attention to the specific details of its execution. Habit strength accrues each time the behavior occurs and is most facilitated by concentrated, repetitive practice.

Personal Factors—characterized as biologic, psychologic, and sociocultural. These factors include variables such as age, gender, body mass index, pubertal status, menopausal status, and physical factors. Psychologic factors can include such variables as self-esteem, self-motivation, personal competence, perceived health status, and definition of health. Socio-cultural factors can include race, ethnicity, education and socioeconomic status.

Perceived Benefits of Action—mental representations of the positive or reinforcing consequences of a behavior. The expected magnitude of benefits and the temporal relation of benefits to action impact the potency of anticipated benefits as a determinant of health behavior. In the HPM, perceived benefits are proposed as directly motivating behavior as well as indirectly motivating behavior

through determining the extent of commitment to a plan of action to engage in the behaviors from which the anticipated benefits will result.

Perceived Barriers to Action—perceptions, either real or imagined, concerning the unavailability, inconvenience, expense, difficulty, or time-consuming nature of a particular action. Often viewed as the blocks or hurdles and personal costs of undertaking a personal behavior. Barriers usually arouse motives of avoidance in relation to a given behavior.

Perceived Self-efficacy—the judgment of personal capability to organize and execute a particular course of action. It is concerned not with the skill one has, but with judgments of what one can do with whatever skills one possesses. A judgment of one's capabilities to accomplish a certain level of performance.

Activity-related Affect—Subjective feeling states that occur prior to, during, and following a behavior, based on the stimulus properties of the behavior itself.

Consists of three components, emotional arousal to the act itself, the self-acting, and the environment in which the action takes place. The resultant feeling state is likely to affect whether an individual will repeat the behavior again or maintain the behavior long-term.

Interpersonal Influences—Cognitions concerning the behaviors, beliefs or attitudes of others. They may or may not correspond with reality. Primary sources of interpersonal influence are families, peers, and health care providers. These influences include norms (expectations of significant others), social support (instrumental and emotional encouragement), and modeling (vicarious learning

through observing others engaged in a particular behavior).

Situational Influences—includes perceptions of options available, demand characteristics, and aesthetic features of the environment in which a given behavior is proposed to take place. Situations may directly affect the behaviors by presenting an environment “loaded” with cues that trigger action. For example, a no smoking environment creates the necessary environment to demand nonsmoking behavior.

Immediate Competing Demands and Preferences—Alternate behaviors that intrude into consciousness as possible course of action immediately prior to the intended occurrence of a planned health-promoting behavior. Competing demands are viewed as those alternative behaviors over which individuals have a relatively low-level of control because of environmental factors, such as work or family care responsibilities. Competing preferences are viewed as alternative behaviors with powerful reinforcing properties over which individuals exert a relatively high level of control.

Health Promotion and Health Promoting Behaviors -continuing activities that must be an integral part of an individuals life style (physical exercise, nutritional eating habits, development of social support, use of relaxation and stress management) directed toward maximizing positive arousal (self-awareness, self-satisfaction, enjoyment and pleasure). Examples of this positive effect according to Pender (1996) are self-awareness, self-satisfaction, enjoyment and pleasure.

Utility of the Health Promotion Model

In establishing a theoretical basis for this study, Pender's Health Promotion Model (1996) was chosen relative to the concepts of interpersonal influences and social support, and the impact they have in assisting patients to adopt health promoting behaviors. It is the belief of this author that health professionals constitute a significant source of interpersonal influence and social support. Because uncontrolled diabetes is determined to be an extremely costly disease in terms of both health complications and health care dollars, it was the focus of this research to determine whether social support was likely to influence the outcomes of diabetic care. By providing access to more intensified education and support programs patients have greater exposure to interpersonal influences that may be more likely to promote the adoption of healthy life styles, and adherence to health-promotive behaviors.

Health- promotive behavior as a key entity in the concept of health promotion has received widespread multidisciplinary attention in research and program development (Palank, 1991). Ascertaining factors that influence the maintenance of health-promoting behavior is the key to the development of effective health promotion programs. Problems with drop-out, noncompliance, and nonadherence typify attempts to engage in long term behavior changes, and have prompted educators to determine how application of specific educational techniques may influence a positive outcome in teaching programs.

In looking at health promotion as a basis for improving outcomes in a clients health status, interpersonal influences, and social support in particular, has been proposed to have a significant impact on adopting health behaviors. Expectations of significant

others, family patterns of health care, and interactions with health care professionals has received support from research findings. In an analysis of the results of studies by Palank (1991) it was determined that utilizing the HPM as a key entity in the concept of health promotion may enable health care providers to ascertain which factors are most likely to effect the likelihood that patients will adopt health promoting behavior.

Summary

Teaching self-management concepts of diabetes are frequently complex challenges for both providers and patients. In diabetes, blood glucose can rise and fall outside the normal range quickly. Daily attention to all the factors involved is necessary to prevent negative metabolic effects, and long term complications. Therefore the issue of self-management, adherence to a prescribed regimen, and good control of diabetes is critical. However, what factors have the most impact on promoting adherence and acceptance of healthy life style behaviors has not been well explained. If it can be determined why certain individuals maintain health-promoting behaviors while others do not, programs that target those influencing factors can be developed (Bottorhoff, 1996).

As stated by Pender (1996) health promotion is directed toward increasing the individual's level of well-being and self-actualization. It focuses on efforts to approach or move toward a positively valenced state of high-level health and well being. It may be true that for some health behaviors, both approaching a positive state (i.e.; working toward diabetic control) and avoiding a negative state, as in the protection-motivation theory (i.e.; preventing complications of long term uncontrolled blood sugar levels), may serve as motivators for adopting health behaviors.

Priorities must be set for diabetes education. Education and knowledge empower patients to control their own self-care, and ultimately, health outcomes. Realistic negotiation reflecting the patient's own priorities is essential in promoting adherence to lifestyle changes. The health care provider as a teacher must determine which methods of diabetic education are most likely to enhance the occurrence of adoption of health promoting behaviors.

It is the belief of the author of this study that the interpersonal influence variable has the greatest impact on the successful outcome of patient education practices. According to Pender (1996), primary sources of interpersonal influence on health-promoting behaviors are families (spouse, parents or siblings), peers, and health care providers. Interpersonal influences include norms (expectations of significant others), social support (instrumental and emotional encouragement), and modeling (learning through observing others engaged in a particular behavior). Individuals vary in the extent to which they are influenced by interpersonal factors. However, when given sufficient motivation to behave in a way for which they will be praised, admired or respected, patients are much more likely to see additional benefits to adapting to the prescribed regimen.

Because the HPM addresses these specific variables, it is hypothesized in this study that providing an educational program for diabetic education that is based on the interpersonal influence variable, and more specifically the aspect of social support, patients are more likely to adopt health promoting behaviors regarding the management of their diabetes.

LITERATURE REVIEW

Historical Perspective

Historically, since the mid-1970s, there have been vigorous federal efforts to promote healthy lifestyles and eliminate destructive personal habits. Rakowski (1992) holds that many research questions about personal health behavior still remain unanswered, primarily because of our limited understanding of the variables that are potential antecedents and predictors of health related actions. The current healthcare environment requires diabetes educators to design their care and education programs around findings in scientific and research based literature. Implementing educational programs based on past practice, position statements, or subjective patient data, as the trend has always been, is no longer appropriate. In spite of all of this knowledge in the professional community, relatively few patients with diabetes have participated in formal diabetic education programs (Johnson, 1996). Little systematic research has actually explored the experience of applying and adapting to a diabetes regimen, and what variables seem to have the greatest impact on achieving a positive outcome of diabetic education programs. In an attempt to view the interrelationships between different educational strategies and diabetic compliance, the following studies were included in the review of literature.

Behavioral Strategies

Behavioral strategies in diabetic education explore the perspectives that integrate biological, social, and psychological sciences in effectively assisting patients to make changes in behavior to improve adherence and obtain better metabolic control.

Behavioral strategies included describing various aspects of a prescribed daily regimen- such as self-monitoring of blood sugar levels, or self-medication monitoring. For example, the patient would place the medication and water for taking the medication in a specific location as a reminder to take the medication.

Boehm et al. (1993) conducted a study to determine the effectiveness of nurses and patients actively participating in behavioral analysis and the implementation of behavioral strategies to improve management of diabetes. The purpose of the study was to determine if patients who (a) practiced and/or participated in behavioral analysis; (b) were taught behavioral strategies; (c) received instruction only; or (d) received a combination of the strategies, had a difference in the outcome of their diabetes management. The subjects were 18 years of age or older, read, spoke and wrote English, had been diagnosed with Type II diabetes and were currently under physician's care. A convenience sample was selected that included 156 patients from a large endocrine outpatient clinic, 22 from a special diabetes care clinic, and 48 from the community at large in response to newspaper advertisements.

Patients were randomly assigned to one of four groups. The control group received routine care and added follow-up by a clinical nurse specialist. The compliance group focused on behaviors directly related to the prescribed medical regimen, i.e.; taking medications. The behavioral strategies group participated in behavioral analysis with the nurse and focused on one of the four behavioral strategies. The behavioral strategies with instruction group received all aspects of care provided to the other 3 groups. Members participated in behavioral analysis with the nurse, focused on the

behavioral strategies, and received classes and programmed instruction about behavioral analysis and behavioral strategies.

The outcome variables to be measured were percentage of change in glycohemoglobin, and percentage of change in weight. Negative changes in both measures were desirable. However, patients who focused on compliance behaviors or behavioral strategies (Groups 2, 3, and 4 combined) did not demonstrate significantly better changes in glycohemoglobin or weight than did those in attention control groups (Group 1). Patients who focused on behavioral strategies (Group 3) did not demonstrate significantly better changes in glycohemoglobin or weight than did those who focused on compliance behaviors (Group 2). Patients who focused on behavioral strategies and received instruction in behavioral analysis and strategies (Group 4) did not demonstrate significantly better changes in glycohemoglobin or weight, than did those who focused on behavioral strategies and did not receive instruction. No differences were seen between groups relative to glycohemoglobin or weight loss.

This study is felt to be pertinent to this literature review because there was no mention of the interpersonal aspect of the interventions. The interventions were described as being clinically oriented, without evidence of instrumental or emotional encouragement factors cited. It is felt by the author of this report this may be an issue related to the failure of the study to support the hypothesis, and no differences were seen in the groups relative to better diabetic control, as indicated by glycohemoglobin measurement, or weight loss.

Social Support

The extent to which Pender's Health Promotion Model (1996) can explain lifestyle patterns or specific health promoting behaviors has not been fully studied. But because it was based on research, there is empirical support for many of the variables. According to the model, the likelihood that a health-promoting behavior or lifestyle will occur is determined by a combination of individual cognitive-perceptual factors, and modifying factors (Pender, 1996). One of the concepts of the HPM seen as playing a role in promoting adherence to healthy behaviors is the interpersonal influence variable of social support. Social support is associated with a reduction of complications in hypertension and diabetes, and increased follow up in abnormal Pap tests (Crane, 1996).

In a study conducted by Crane (1996) the relationship between social support and adherence behavior was examined in a population of low-income, public health department patients with abnormal Pap smears. All women of white, black, and Latino ethnicity whose Pap smears were abnormal were included in the study. In an attempt to increase the likelihood of follow up care after a positive or abnormal Pap test result, the study was done to determine what factors most impacted the decision to seek care.

Following review of the medical records, trained female interviewers attempted to contact each patient to complete an in-depth interview regarding adherence behavior. Others who could not be contacted by phone were sent certified letters to the patients address. After eight telephone attempts and/or two home visits, three additional letters were sent to the patients address requesting that she contact the study office by telephone

or mail. The comparison groups were classified at that point as either respondents or non-respondents.

The variable of social support was conceptualized as falling into three general types of support- informational, emotional, and instrumental. It was then divided into groups of those respondents who received the support and those who had not received the social support, as well as non-respondents who had not received social support. Receipt of social support was consistently related to adherence behavior, as 86.2% of respondents who received social support were adherent to follow up care compared to 13.8% of non-respondents who did not receive social support but were adherent to follow up care.

The results of this study indicated a strong relationship between the three types of social support and adherence behavior. In addition, there was a dose-response relationship (those who received the informational, emotional and instrumental support) , with greater amounts of received support resulting in higher adherence rates.

A study by Tillotson and Smith (1996) was conducted to assess the ability of internal diabetes locus of control and social support to predict adherence to a weight control regimen among persons with non-insulin-dependent diabetes. A community based sample of 465 patients with NIDDM was interviewed. Subjects were obtained through health-agency referral and self-referrals of person who were willing to participate. Locus of control had its origin in social learning theory that states behavior can be predicated from knowledge of how individuals view a situation, expectations of their behavior and the value they place on outcomes. Internal locus of control attributes behavioral outcomes on to personal control, whereas external dimension attributes

outcomes to either control of powerful other people or forces such as luck, fate or chance. Social learning theory describes social support as an external motivator that either reinforces behavior directly or influences a person's expectations for reinforcement.

To examine the nature of the interaction, the sample was divided into high and low social support groups based upon a median split of the social support measurement used. The correlation between control beliefs and adherence was computed for each of these two groups. In the high social support group, the correlation was not significant ($r = .04$), however in the low social support group the correlation was significant and negative ($r = -.21$, $P < .01$). This was interpreted to mean that when support is low, and the stronger one's beliefs in control, the less likely the individual was to report compliance with a weight management program. If social support is high, one's control beliefs are not related to reported adherence.

A large proportion of the respondents perceived themselves as having high diabetes internal locus of control, socioemotional support, and weight control adherence. Regression analyses revealed that internal locus of control and social support were modest but statistically significant predictors. The beta weight for internal diabetes locus of control was $-.12$ ($p < .05$) and for social support was $.09$ ($p < .05$). Correlation analyses showed that internal locus of control was not related to weight control in the high social support group ($r = .04$). In the low social support group, however, a stronger locus of control was not associated with weight management ($r = -.21$). The ways in which internal locus of control and social support work together were not clear. The

findings do suggest, however, that these two factors are advantageous for promoting regimen adherence.

Maxwell, Hunt and Bush (1992) studied the effects of a social support group and diabetes training on metabolic control and psychosocial outcomes. The purpose of the study was to evaluate a social support group as an adjunct to an intensive outpatient diabetes training program for insulin dependent and non-insulin dependent diabetics. Outcome measures included several measures of metabolic control and also variables previously found to be related to metabolic control, such as adherence to different self-care behaviors, emotional adjustment to diabetes, and perceived health locus of control.

Two hundred four patients who attended the intensive Diabetes Outpatient Training and Education Center were enrolled in the study. To evaluate the effect of the diabetes support group, outcomes obtained at a 7-month follow-up of patients in the control group who received diabetes training only were compared with outcomes of patients in the experimental group, who in addition to education, were attending support groups. At baseline, patients in the control group did not differ from those in the experimental group in metabolic control, diabetes knowledge, frequency of management behaviors or psychosocial measures.

At 7 month follow-up, measures of metabolic control were obtained. The extent of the changes in metabolic control, diabetes knowledge, diabetes management behaviors, emotional adjustment to diabetes, and perceived health locus of control were not significantly different between the two groups, even though there was improvement in all areas in each group. At a 7 month follow-up metabolic control improved in the patients in the control group in terms of fasting serum glucose and Hgb A1c ($P < .001$).

In the experimental group fasting serum levels decreased in the patients who attended one to three meetings, ($P < .0001$) but not in the patients who attended four to eight meetings. On the other hand, Hgb A1c levels decreased significantly in both experimental subgroups. Knowledge scores improved ($P < .001$) in all patients at the posttest, which was taken on the last day of the course (mean ranged from 8.0 at pretest to 10.6 at posttest), but the decrease was significant only in patients who attended four to eight meetings in any of the experimental groups. Patients reported that they performed a list of diabetes management behaviors more frequently at a 7 month follow up than they reported at baseline in both the control and experimental groups.

Although the study was not done to evaluate the diabetes training program, it was believed that the improvements in knowledge, metabolic control, and reported self-care behaviors were a result of the diabetic training and awareness of the need for improved self-care measures. A subjective evaluation of the participants was done at a second seven month interval. Although no additional improvement was seen in the outcome measures in either the control group or patients who attended support group meetings, results showed that those in the support group experienced more positive feelings (were more comfortable with managing their diabetes) that may contribute to better patient health in the long term.

The objective of a study done by Pieber, Brunner, Schnedl, Schattenberg, Kaufmann and Krejs (1995) was to determine the safety and efficacy of a structured diabetes teaching and treatment program in patients with insulin dependent diabetes in an outpatient setting. The sample was taken from 243 patients with IDDM who were referred to the diabetes clinic. Teaching in a structured course was delivered by a

diabetes nurse and a dietitian to groups of 5-8 patients of comparable age. The structured education program lasted Monday to Friday and included 24 hours of group teaching. The overall goal of the group was to aim for near normoglycemia, and to avoid hypoglycemia. Medical exams, screening and transfer to intensive insulin treatment were done individually by an assigned diabetatologist.

Of 205 patients, Hgb A1c decreased significantly from 8.7 to 7.5, frequency of severe hypoglycemia decreased from a mean of 0.46 to 0.13 per patient per year. Hospital admissions due to metabolic disturbances decreased, from 4.5 ± 11.1 to 1.4 ± 6.7 days/patient per year. There were positive improvements in diabetes knowledge, body mass index had an average decrease, as well as a decreased incidence of diabetic nephropathy. These results again, indicate a structured diabetes teaching and treatment program is able to improve overall metabolic control and decrease the frequency of overt diabetes complications.

Clinic Based Diabetic Education

To the extent that diabetes is coming to be recognized as a public health problem, cost effective interventions capable of reaching a broad population are required. The difficulty has been in determining how best to provide diabetic interventions that are most effective and result in the best outcome for diabetic control. While some health care providers are combining diabetic education that includes aspects of social support as previously described, others are attempting to achieve good control with clinic or office based interventions.

Conget et al. (1995) evaluated the effects of an individual intensive educational control program for insulin dependent diabetics with poor glycemic control. The goal of

the study was to evaluate the efficiency of an individual educational control program.

Fifteen insulin dependent diabetic patients with poor metabolic control were included. At entry to the study, hemoglobin A1c, knowledge of diabetes, insulin schedule, technical skill, and self glucose monitoring were evaluated.

Patients were seen individually on a weekly basis by a team composed of a physician and a nurse for the specific purpose of intensive diabetic education therapy. After one month the program produced a significant decrease in A1c values, and an increase in knowledge scores. The improvement in control and knowledge persisted after 12 and 24 months. Moreover, at 12 and 24 months follow up there were no changes in dietary intake and insulin schedule. Also, participants tested their blood more frequently than when they entered the program. This study demonstrates that an individualized intensive educational control program is useful as a tool to improve metabolic control of insulin-dependent diabetic patients at short and long-term follow up.

Using a randomized design, Glasgow, Toobert, and Hampson (1996) evaluated the effects of a brief office based intervention for diabetes care based on behavioral issues relevant to self-management of diabetes. The intervention was evaluated in the office of two internists who were primary care providers and part of a large medical group. The intervention was based on a combination of social learning theory and systems approaches to diabetes self-care. The intervention also resulted from previous research that identified factors that influence diabetes self-management (e.g., self-efficacy, barriers, problems solving skills, social support) and in developing interventions that target those factors.

The primary purpose of the study was to evaluate the effectiveness of the brief office base intervention, secondary purposes were to evaluate the long term impact of intervention on quality of life outcome. A sampling of 206 adult diabetes patients were randomized to usual care or brief intervention, which consisted of touch screen computer-assisted assessment to provide immediate feedback on key barriers to dietary self-management, goal setting and problem solving counseling for patients. Follow up components to the single session intervention consisted of phone calls and interactive video or videotape instruction as needed.

Results of the study revealed that the brief intervention produced greater improvements than usual care on a number of measures of dietary behavior (e.g., fewer calories from saturated fat), (treatment group range = 29.4 - 34.0 vs. usual care range = 31.9 - 33.6, $P = 0.008$), fewer high fat eating habits and behaviors treatment group range = 1769 to 1590 vs. usual care- 1824 to 1767, $P = < .01$)There were also significant differences favoring intervention on changes in serum cholesterol levels (treatment group range = 216 to 207 vs. usual care range = 223 to 231, $P = < 0.001$) and patient satisfaction and quality of life, but not on Hgb A1c. Lowering of cholesterol levels is an important dietary behavior which in effect decreases the risk of serious diabetic complications.

A prospective controlled cohort study was done by de Sonnevile et al. (1997) to assess the intermediate term (2 years) effect of structured diabetes care in general practice with and without 'diabetic service'. The diabetes service was supervised by a diabetologist, a dietitian, and diabetes nurse educator. Outcomes observed were glycemic control measured through Hgb A1c, fasting total cholesterol, HDL-cholesterol,

and triglycerides, as well as general well-being and treatment satisfaction. Subjects included 350 known diabetic patients over 40 years of age, who were regular patients in the primary care practice group. The control population were those randomly selected patients who did not receive the diabetes service care, but instead were given diabetes care from their primary care physician.

In the study population, the control group patients experienced a lowering of Hgb A1c within 1 year, and were then able to maintain that level. The percentage of patients with poor glycemic control fell from 21.4% to 12.%, while in the control group glycemic control did not improve and in fact, the Hgb A1c tended to rise. Mean diastolic blood pressure and the number of cigarette smokers in both groups dropped significantly (87.4% to 83.0% and 22.0% to 18.0% respectively). In the second year total cholesterol and triglyceride levels in patients of the study group decreased (6.1% to 5.8%), partly due to prescription of lipid modifying drugs. However, after two years of follow-up target values for blood pressure and lipid levels had still not been reached in most patients.

A lasting improvement in blood glucose control in a large population of diabetic patients was achieved in primary health care as a result of implementing a structured diabetes program. Good control, defined as a Hgb A1c between 5.5% and 7.2%, was achieved in the majority of patients, and the percentage of poor control was nearly halved to $\pm 12\%$. In the control population it proved difficult to implement protocolized guidelines. More than a quarter of the patients in the control group remained poorly regulated. Results of this study clearly show that implementation of structured care in general practice results in sustained good glycemic control.

A study by Ho, Marger, Beart, Yip, & Shekelle (1997) was done in an effort to compare the quality of ambulatory diabetes care delivered by physicians in the diabetes clinic versus the general medicine clinic of a university-affiliated Veterans Administration (VA) medical center. This was a retrospective study that involved the review of medical records against predetermined process of care criteria.

A total of 112 patients with diabetes were randomly selected, of whom 56 were cared for in the general medicine clinic and 56 in the diabetes clinic. The main outcome measures that were examined included (a) the compliance with individual criteria; (b) the proportion of patient visits in each clinic receiving a blood pressure measurement, a record of type of hypoglycemic medication, a Hgb A1c within the past year, a urinalysis within the past year, an ophthalmologist visit or optometrist eye exam in the past year or scheduled within the next six months, and a record of change in therapeutic management and a scheduled return visit.

In order to determine quality of care, guidelines from the American Diabetic Association for standards of diabetes care were adopted and modified for local use by diabetatologists and general internists. The quality of care was considered “good” if documentation of all clinically appropriate process-of-care variables where applicable were found in the chart. A smaller set of minimally acceptable criteria was created by the clinical authorities at the West Los Angeles VA Medical Center. Seven criteria were documentation on any given routine diabetes visit of (a) blood pressure measurement, (b) the type of glycemic medication, (c) an HgbA1c value within the previous year, (d) a urinalysis performed within the previous year, (e) comprehensive eye exam performed by

an ophthalmologist, (f) the change if any, in therapeutic management, and 7) a scheduled return appointment.

The diabetic management clinic performed significantly better than the general medical clinic on the following criteria: the self-monitoring of blood glucose levels, a foot examination, regular comprehensive eye examinations, and a referral for diabetic education when glycemic control was poor. Poor control was defined as a Hgb A1c > 10%, and the diabetic clinic had fewer referrals than the general clinic (73% vs. 52%, $P=0.02$). None of the records from either clinic passed with “good” quality of care criteria.

Authors of this study concluded that patients cared for in intensive diabetic education programs receive better quality of diabetes care than do patients cared for by physicians in the general medical clinic. The authors also recommend that if patient care is to be shifted from specialists to generalists, additional attention needs to be paid to ensure that generalists have the knowledge and system resources necessary to deliver an acceptable quality of diabetes care..

Summary

After a review of this literature, it is apparent that all of the studies agree that interpersonal influence, and social support in particular, are important factors in increasing the likelihood of health-promoting behaviors of individuals with diabetes. It is also evident that the degree to which these variables impact outcomes greatly differs. However, little information exists that defines how to best influence patients to adhere to, or choose health-promoting behaviors. While social support has been shown to be a

factor in adopting health promoting behaviors, how to best provide the support still requires further study. It is in view of these ideas that this research is being conducted.

Because the trend in the health care environment is based in terms of patient outcomes, educators must be confident that what they do impacts, and makes a difference in those outcomes. Health promotion behavior as a key entity in the concept of health promotion has recently more received widespread attention in research and program development. Because of the current focus to increase public awareness of life style practices, emphasis on healthy behaviors and change techniques for improving health has become a major issue for all health care professionals (Palank, 1991). According to Pender (1996) modifying factors such as demographic, biologic, interpersonal, situational, and behavioral variables impact the decision making phase of action by influencing individual perceptions. Many studies address the impact of individual perceptions, yet few contribute to understanding the effects of modifying factors on individual perceptions or behavioral outcomes. Although individual beliefs and perceptions may influence the decision to adopt health behavior, modifying factors may provide the foundation that enables or constrains the decision to engage in the desired behavior.

As an example, interpersonal factors proposed to influence health promotion behaviors include the expectations of significant others. Although all of the modifying factors receive empirical support as determinants of health promotion behaviors, the most evident theme appears to be perceived social support. Structural characteristics of social support include (a) where the person lives; (b) frequency of social contacts; and (c) participation in group activities with social networks. The notion that social networks,

such as families, and interactions of health professionals influence the decision to adopt healthy behaviors has now been proposed by some researchers (Palank, 1991).

The Health Promotion Model (Pender, 1996) suggests that the likelihood a lifestyle or health promoting behavior will occur is determined by a combination of individual cognitive-perceptual factors and modifying factors. If it can be shown that adherence is increased and patient outcomes improved through planning health education, including diabetic teaching, based on health promotion techniques, many of the challenges to developing educational guidelines will be much easier to address. The importance of implementing intensive educational programs in all types of health care settings may be recognized as the key to long term reduction of lost health dollars, and prevention of complications for chronic disease.

Implications

Diabetes management is a difficult task. Nevertheless, some patients seem to do an outstanding job, while others have continuous difficulties. Healthcare providers need tools that might help identify those at greatest risk for poor diabetes control and target them for special interventions (Deeb, 1996). Many research questions about personal health behavior still remain unanswered primarily because of limited understanding of the variables that are potential antecedents and predictors of health related actions in patients with chronic health problems.

According to Boehm, Schlenk, Raleigh, and Ronis (1993) assisting the patient with diabetes to change lifelong behaviors in order to adhere to the prescribed regimen has long been recognized as an important part of nursing practice. Health care providers who use the perspective that integrates biological, social, and psychological sciences are

in a unique position to effectively assist the patient in making behavior changes that improve adherence and allow better metabolic control.

While patient education about diabetes has begun to receive attention in literature, less attention has been given to which strategies will assist the patient to practice the new and expected behaviors related to management of diabetes. As previously stated, it is the intent of this study is to determine the degree to which specific educational interventions increase the likelihood that a patient will engage in health promoting behaviors, that includes adherence to a prescribed diabetes regimen. In order to explore the impact of interpersonal factors as described in the HPM a comparison study of educational techniques will be done in two health care clinics. It is the expectation of this researcher that the client who has an increased exposure to interpersonal influences, (i.e.) social support, through increased interaction with health care providers, will have a higher adherence to prescribed protocols and improved outcomes of their diabetes management.

Research Question

The research question is : Do patients who receive diabetic education through an intense program of nutritional support, and frequent follow-up from trained diabetes educators have better control of their diabetes with improvement in Hgb. A1c, creatinine and blood urea nitrogen levels than patients who receive provider based diabetic education?

Definition of Terms:

For the purpose of this study the variable from Pender's Health Promotion model that was examined was interpersonal influences, and specifically, social support

provided through increased contact with health care providers. The modifying factors or variables involved are related to type of education and interaction with health care professionals (interpersonal), availability of education type and intensity to be provided (situational), and the clients prior knowledge of diabetes management (behavioral). Demographic characteristics of age, gender, ethnicity, marital status were examined as well.

The following definitions were used for this study:

Diabetic Education Methods -

- a. Preventive Services: an intense, outpatient based type of teaching that is provided by a group educators specifically trained in diabetic teaching, nutrition, exercise, and obtaining supplies and equipment needed for diabetic management. The client is scheduled with each of the educators to receive more intense and detailed instruction on a regular basis.
- b. Provider based education: Education that is completed in the provider's office during a regularly scheduled office visit. All aspects of the diabetic education are managed by the provider (physician, nurse practitioner, physician's assistant, etc.). Clients are scheduled on an as needed basis, and are encouraged to call the office for an appointment for any further questions or problems that may occur before the next scheduled visit.

Diabetic Clients-Patients who have been diagnosed with diabetes mellitus based on a blood glucose level above the established normal of 120 as described by the American Diabetic Association; and who require some type of intervention to control this level.

Health-promoting-behaviors- continuing activities that must be an integral part of an individual's lifestyle (physical exercise, dietary habits, medication management) directed

toward maximizing positive arousal (self-awareness, enjoyment and pleasure) (Pender, 1987).

Disease Management-Maintaining a blood sugar level within the desired level, or a Hgb A1c of 6.5% to 7.5%, that will prevent the client from incurring complications of the disease (such as renal impairment, cardiovascular impairment, skin disorders, visual impairment, etc.) through adherence to a prescribed regimen of diet, exercise, and medication.

CHAPTER 3

METHODS

An ex post facto retrospective group comparison design was used for this study. It was conducted in two separate health care clinics in rural counties of northern Michigan. Approval of the Human Subjects Committee and Nursing Research Committee was obtained. The study evaluated two methods of diabetic education provided in two separate primary care institutions, and the effects they had on disease management and prevention of complications in diabetic patients. Clinic A provides education through a comprehensive Preventive Services program that includes a group of educators specifically trained in diabetic teaching. Clinic B offers provider based education that is completed in the provider's office during a regularly scheduled office visit. The independent variable was the type of education provided to the client. The dependent variable was the outcome and level of diabetic control obtained by the patient.

Sample

The research data for this study was obtained from a total of 40 clients records treated in two clinic settings, 20 from each setting, in which the diagnosis of diabetes mellitus has been identified. Charts were chosen using a random number table, and included those subjects who were between the ages of 40 and 70, either male or female, and whose primary language was English. Additional selection criteria included having been diagnosed with Type I or Type II diabetes for at least one year, and being non-insulin dependent at the time of initial diagnosis. Both Type I and Type II diabetics were included because the primary goal of education is to prevent complications of disease.

All patients were treated in the same setting for their diabetes during the entire interval of care. Those charts excluded from the study were those of patients who had Medicaid insurance, because these patients are often limited in the number and type of visits that can be provided. They would not have been expected to receive care similar to other patients. All information included was from data obtained from patient records inclusive of January 1 to December 31, 1997.

Settings

Both clinics were located in rural areas of Northern Michigan. Clinic A was federally funded clinic in a resort area that serves a high population of retirees, but also provides general family practice. The clinic served approximately 150 diabetic clients per year. The clinic was staffed with General Family Practice physicians, a pediatrician, an obstetrician. Additionally, the staff includes several mid-level providers, a Physician's Assistant, and two Nurse Practitioners. A Preventive Services department was available and was staffed with a Registered Dietician, a trained Diabetic Educator, and a trained medical assistant who was also available for consultation, blood sugar monitoring and triage.

Clinic B was also located in a resort area, that supports a high number of retirees, but also had an increasing population of young families. This clinic was a privately owned corporation, that received some state funding due to a rural health status, and was also classified as being in a medically underserved area. The clinic served approximately 275 diabetic patients per year. The clinic was staffed with General Family Practice Physicians, and Nurse Practitioners. All patient education was done through the individual provider at a regular office visit.

Instrument

The instrument used for this study was the Diabetes Quality Assurance Checklist (DQA) adapted with permission from the original checklist developed by Judith Wylie-Rosett, EdD; Marjorie Cypress, RN, ANP, CDE; and Charles Basch, PhD at Albert Einstein College of Medicine, Bronx New York (1992). The checklist was developed to measure adherence to minimal American Diabetic Association standards of care focusing on long-term complications of diabetes. A letter for permission to use the tool was obtained and is attached as an Appendix to this report.

Validity of the instrument was established using a panel of seven diabetic experts who reviewed the items on the DQA Checklist, the scores assigned to each item, and the chart review protocol. The reliability of the DQA Checklist was established using sample charts selected from two distinct locations, a primary care clinic, and a Diabetes Research and Training Center, both located in New York City, New York. The chart reviews were conducted by health psychology graduate students who did not have any advanced diabetes training or clinical experience related to diabetes. The reviewers used a specific protocol that was developed to standardize chart review procedures. Inter-rater and intra-rater reliability were assessed. The inter-rater reliability compared the DQA Checklist scores obtained by two reviewers at the same point in time, thereby assessing how well the scoring procedure can achieve the same results if charts are scored by more than one individual. The intra-rater reliability compared the scoring of the same charts by the same reviewer at two different times, with the chart review encompassing a specified year of care. Intra-rater reliability assessed how well the scoring procedure can be replicated when the same reviewer sees the same chart at two different points in time

(Time 1: $r = 0.94$, 97%; Time 2: $r = 0.91$, 95%). Pearson correlation coefficients and analysis of variance were used to assess consistency in mean scores between raters and over time. The inter-rater reliability coefficients indicated a high degree of agreement between the reviewers with correlation coefficient values ranging from 0.73 to 0.94. The intra-rater reliability coefficients indicated consistency over time with 'r' values ranging from 0.60 to 0.97.

Procedure

The data collection tool was used to determine demographic data, current treatment, basic assessment information, such as length of time since diagnosis, general care and instruction given, assessment of risk factors, and interventions. Also included were data regarding measurement of outcomes such as Hemoglobin A1c, blood creatinine levels, blood urea nitrogen, and outcomes related to complications of diabetes: hospitalization, skin or foot ulcer, amputation, diabetic retinopathy, or death.

Diabetic education was provided in both primary care settings. Clinic A implemented the Preventive Services protocol for education, while Clinic B implemented provider based education. Data were collected by the author of this study from an equal number of patient records from each clinic using the adapted DQA Checklist. All data collected were kept confidential using identification numbers to maintain accuracy and assure confidentiality. Reliability was established through inter-rater reliability. Three random chart samples were evaluated to determine agreement between two separate reviewers who obtained the information pertinent to the instrument used. The percentage of degree of agreement used was 90% set as criteria for reliability. Each chart was reviewed individually by both reviewers. After data were obtained, comparison was made

as to which data resulted in the same findings from both reviewers. Degree of agreement for charts 1, 2, and 3 were 96%, 100% and 94% respectively. The mean percentage of agreement on data collected for the three charts was 97%, which did meet the criteria for reliability set for the data collection procedure.

Description of the Sample

The sample consisted of 40 records of diabetic patients in rural health clinics in northern Michigan, 20 subjects each from two separate clinics as described earlier in this report. The subjects studied were 50% male, and 50% female, all Caucasian, with ages ranging from 40 to 70 with a mean age of 63.58 (SD =6.63). Length of time the patients had been receiving health care in the particular clinic setting ranged from 12 months to 98 months with a mean of 36.7 months (SD = 20.90). The mean number of visits to the office during a one year period of time was 6.95 (SD = 5.01) with a range of 1 to 20. Additionally, 45% (n = 18) of the clients had both Medicare and private insurance, 32.5% (n = 13) had private insurance only, and 22.5% (n = 9) had Medicare only. It was also determined that 92% (n = 37) had been diagnosed with Type II Diabetes, and 7.5% (n = 3) were diagnosed with Type I diabetes.

In the sample, number of years patients had been diagnosed with diabetes ranged from 2 to 31 (M = 6.95, SD = 5.30). Blood glucose management was varied, with 75% (n = 30) using oral medication only, 10% (n = 4) oral medication plus insulin, 7.5% (n = 3) using insulin only, and 7.5% (n = 3) using diet only. The number of times glycohemoglobin was measured in the office ranged from 1 to 7 (M= 2.85, SD = 1.18). The aspects of home management instruction documented are listed in Table 1.

Table 1

Demographics of Diabetic Home Management

Management activity	Instruction Documented	No Documentation
Home glucose monitoring	42.5%	57.5%
Dilated eye exam	62. 5%	37. 5%
Instructed in diet intervention	100. 0%	00.0%
Nutrition consultation offered	57. 5%	42. 5%
Exercise or activity instruction	72. 5%	27. 5%
Referral for additional education	62. 5%	37. 5%
Instructed on self foot care	87. 5%	12. 5%

Specific diabetic related complications that included hospitalization, skin ulcers, amputation, retinopathy, addition of insulin to their diabetic care regimen, or death were assessed and listed in Table 2. Of the complications listed, 27.5% (n = 11) had been hospitalized, 15.0% (n = 6) developed skin ulcers, none required amputation of any extremity or limb, 20% (n = 8) developed retinopathy, 10% (n = 4) were required to add insulin to their diabetic regimen, but none were expired at the end of the year.

Table 2

Diabetes Related Complications

Complication Type	Number of occurrences	Percentage
Hospitalization	11	27.5%
Developed skin ulcers	06	15.0%
Amputation	00	00.0%
Retinopathy	08	20.0%
Added Insulin	04	10.0%

The data obtained also included information regarding co-morbidities , and other medications required to manage the disease processes. Of the sample described in this report, 77.5% (n = 31) had cardiac disease, 5.0% (n = 2) had renal disease, 5.0% (n = 2) had respiratory disease, 62.5% (n = 25) had hypertension, and 50.% had other types of co-morbid disease processes. See Table 3. With regard to medications required for medical management other than diabetes medications, 70.0% (n = 28) required cardiac drugs, 5.0% (n = 2) required medication for treatment of renal disease, 5.0% (n = 2) required medication for treatment of respiratory disease, 62.5% (n = 25) required medication for hypertension, and 52.5% (n = 21) required medications for other unspecified disease processes. See Table 4.

Table 3

Co-Morbid Disease

Disease Type	Number of Occurrences	Percentage
Cardiac Disease	31	77.5%
Renal Disease	2	5.0%
Respiratory Disease	2	5.0%
Hypertension	25	62.5%
Other	20	50.0%

Table 4

Additional Medications Required for Medical Management

Medication Class	Number requiring medication	Percentage
Cardiac	28	70.0%
Renal	2	5.0%
Respiratory	2	5.0%
Hypertension	25	62.5%
Other	21	52.5%

Protection of Human Subject

Prior to data collection, the research proposal was presented to Grand Valley State University Human Research Review Committee and it's procedures for protection

of human rights were approved. Confidentiality was maintained for the study participants by removing all identifying descriptors upon receipt of the information. Only a numerical code, kept separate from the data and destroyed on completion of the analysis was used. Due to the nature of this study there did not appear to be any risk posed to the subjects of the institution only in that there was a small risk of breach of confidentiality. However, as there was no human contact, and all information was numerically coded to protect confidentiality, this risk was minimal. Because there was no contact with human subjects, there were no direct benefits. In the long term, benefits may be experienced by other patients because providers learned additional information regarding what factors enhance the likelihood the patients will adopt health promoting behaviors. It is also a potential means of encouragement for providers to focus on what types of education are most effective, and which approach is most conducive to success.

Summary

This study was done via chart review and examined the effect of specific educational techniques on the management and prevention of complications in diabetic patients. A random sample of 20 charts at each clinic setting were reviewed. The procedure for sample selection and data collection were outlined within this study. The proposal was approved by the Grand Valley State University Human Research Review Committee prior to data collection.

CHAPTER 4

Data Analysis

Data were analyzed using the Statistical Package for the Social Sciences (SPSS) for Windows. Independent t-tests were calculated for interval data to test the hypothesis that the more exposure diabetic clients have to interpersonal factors, including social support of peers, family and health care providers with regard to diabetic education, the greater the likelihood of adopting healthier lifestyles which result in improved patient outcomes. This analysis also included paired t-test statistics to determine differences within the group, Pearson's correlation coefficients to determine relationships among the demographic variables, and ANCOVA to control for any factor that may have indicated having an effect on the outcome of the data. Level of significance was established at $p < .05$.

Data were collected using a table of random of numbers to decrease bias in selecting the sample. Analysis of the data was performed on a total of 40 patient records, 20 in each respective clinic setting. This chapter includes a description of the findings of outcomes of diabetic education and a summary of the findings in terms of those outcomes related to type of diabetic education received.

Description of the Findings

The research question was based on determining the outcomes of diabetic care of patients in each clinic. The results of the first lab testing for 1997 was obtained from each patient record for glycohemoglobin (Glyco), blood urea nitrogen (BUN), and serum creatinine (Creat) levels, and was then obtained at the end of the year. These values were

used since they are pertinent indicators for overall control and of pending complications related to diabetic management.

Normal parameters for glycohemoglobin used in this study were 4.8 - 7.8 %. The baseline glycohemoglobin of clients in the study ranged from 5.6% to 16.7% ($M = 8.71\%$ $SD = 2.41$). At the time of the baseline Glyco, 67.5% of the patients were above what is considered normal values for good diabetic control.

At the end of the year, the final Glyco was again evaluated for all patients in the study. The range was 5.4% to 12.9% ($M = 7.79\%$, $SD = 1.65\%$) with 52.5% of the patients having results above the normal value. These data did indicate overall improvement of the glycohemoglobin in the entire sample population obtained in this study when evaluating the overall change in lab values after one year time period.

In evaluating the serum creatinine levels of all subjects included in the study, a baseline level was also obtained. The normal value for serum creatinine used for this study was 0.5% to 2.0%. Values of the baseline measurement ranged from 0.6% to 1.6%, ($M = 0.9\%$, $SD = 0.2\%$). At the time of the baseline measurement all subject's serum creatinine levels remained within the normal range.

At the follow up measurement, serum creatinine levels ranged from 0.5% to 1.8%. Two cases had missing data, having not had a follow up level determined. While all subjects maintained a level within normal parameters, there was a slight increase in the mean which was determined to be 1.0% ($SD = 0.3\%$) which was increase of 0.1%.

The final outcome measurement assessed was the BUN. Normal range for BUN level was determined to be 10.0% to 20.0%. Values for the baseline BUN level ranged from 8.0% to 25.0%, ($M = 15.2\%$, $SD = 4.49\%$), with 10.0% of the sample having BUN measurements outside normal parameters.

As with the creatinine values, 2 cases had no follow-up lab results by the end of the year. For the other subjects measurement of the BUN for the ranged from 8.0% to 30.0%(M = 16.2%, SD = 5.1%).Of the 38 subjects with complete data, 23.7% of the sample patients had BUN levels outside of normal parameters.

The research question, “ do patients who received diabetic education through an intense program of nutritional support, and frequent follow-up from trained diabetes educators have better control of their diabetes with improvement in Hgb. A1c, creatinine, and blood urea nitrogen levels than patients who receive provider based diabetic education?” guided the following discussion of findings. In order to compare the groups, chi square statistics found no significant differences between the groups with regard to gender, ethnicity, or method of payment for services. Groups were also similar in diabetes type, type of treatment received, number of co-morbidities, and medication regimen.

In this study, independent t-tests were used initially to evaluate results of baseline lab values, amount of change from baseline to final lab values, and the mean score of final lab values between patients who attended Clinic A and Clinic B. The change value was computed by subtracting the follow-up lab values from the baseline values. The comparison of these values was used to determine if there was better diabetic control indicated in either Clinic A or Clinic B.

In evaluating the baseline score, there was no significant difference in baseline scores between patients who attended Clinic A compared to Clinic B (see Table 5). In comparing the change in lab values from baseline to follow-up, there was no significant difference in the amount of change that occurred between clinic A and Clinic B (see Table 6). However, as seen in Table 7, at one year follow-up there was a significant difference in the final lab value for glycohemoglobin and creatinine, between Clinic A and Clinic B. There was a significant improvement in values at the one year follow-up in Clinic A for those values of Glyco and Creat. In fact, values for creatinine levels for patients who attended Clinic B were higher at the follow-up than at the time of baseline lab values. There was no significant difference in the follow-up score for BUN between patients who attended Clinic A versus Clinic B.

It was then necessary to determine why follow-up scores were significantly different regarding Glyco and Creat between patients who attended Clinic A versus Clinic B, when there was no significant difference in baseline scores, and no significant difference in the amount of change that occurred. Paired t-tests were used for the variable of glycohemoglobin, creatinine, and blood urea nitrogen to examine for any differences within the group.

When looking at outcomes from Clinic A, the lab values for glycohemoglobin from time A (baseline) to time B (follow-up) did show a significant change with a decrease in glycohemoglobin, no significant change in Creat or Bun. Outcomes for Clinic B show that there was a slight improvement in Glyco, from time A to time B, but it was not significant, and there was no significant change in BUN. However, Creat levels were actually worse from time A to time B (See Table 8).

Table 5

Comparison of baseline lab values

Lab	Clinic A	Clinic B	t	df	p
Glyco	M = 8.11 (SD = 2.50)	M = 9.31(SD = 2.21)	-1.60	38	.118
Creat	M = .835 (SD = .160)	M = .935 (SD =.276)	-1.40	38	.169
BUN	M = 15.6 (SD = 4.85)	M = 14.7 (SD = 4.16)	.63	38	.532

Table 6

Change in Lab Values from Baseline to Follow-up

Lab	Clinic A	Clinic B	t	df	p
Glyco	M = 1.28 (SD = 2.11)	M = .56 (SD = 1.26)	1.32	31.06	.196
Creat	M = -.0111 (SD = .123)	M = -.1100 (SD = .177)	1.97	36	.056
Bun	M = -1.055 (SD = 2.98)	M = -.6000 (SD = 3.33)	-.44	36	.661

Table 7

Comparison of 1-Year Follow- up Lab Values

Lab	Clinic A	Clinic B	t	df	p
Glyco	M = 6.83 (SD = 1.08)	M = 8.75 (SD = 1.57)	-4.49	38	.000
Creat	M = .856 (SD = .134)	M = 1.05 (SD = .363)	-2.17	24.53	.040
Bun	M = 17.16 (SD = 5.25)	M = 15.30 (SD = 4.95)	1.13	36	.266

Table 8

Paired t-tests for Lab Values in Clinics A & B

	Mean (SD)	t-value	df	p-value
<u>CLINIC A</u>				
GLYCO 1	M = 8.11 (SD = 2.50)	2.72	19	.014
GLYCO 2	M = 6.83 (SD = 1.08)			
CREAT 1	M = .844 (SD = .158)	-.38	17	.707
CREAT 2	M = .855 (SD = .134)			
BUN 1	M = 16.11(SD = 4.73)	-1.50	17	.151
BUN 2	M = 17.16(SD = 5.25)			
<u>CLINIC B</u>				
GLYCO 1	M = 9.31 (SD = 2.12)	1.98	19	.062
GLYCO 2	M = 8.75 (SD = 1.57)			
CREAT 1	M = .93 (SD = 2.77)	-2.77	19	.012
CREAT 2	M = 1.04 (SD = .363)			
BUN 1	M = 14.7 (SD = 4.15)	-.81	19	.430
BUN 2	M = 15.3 (SD = 4.94)			

To continue to attempt to explain the findings, independent t-tests were used to look for any significant differences in demographic data between the groups. The only demographic data that did appear to show significant differences between patients who attended Clinic A versus Clinic B were related to number of visits made to each clinic during the year, amount of time in months each patient had been established in the office, and age of the patient (See Table 9).

It is of interest to note, that there appears to be a very large difference in the amount of time patients had been established at each clinic, but it should be noted that this time was computed in months. When using a mathematical equation, and converting months to years, while the information is still statistically significant, the spread does not appear quite as large- Clinic A- $M = 46.9$ months or 3.91 years ($SD = 21.53$ months), Clinic B- $M = 226.50$ months or 2.21 years ($SD = 14.63$ months).

To determine if there was a relationship between the number of visits made, time in number of months established as a patient in the clinic, and age of patient and lab values for follow-up Glyco, Creat, and Bun , correlation coefficients were determined. The only significant relationship was for age and glycohemoglobin, with a p-value of .002, and an 'r' value of -.465 that indicates a moderate relationship. However, since the 'r' value is a negative number, the relationship is inverse. The only relationship that is indicated with this statistic that may be explained appears to be that either the older the diabetic patient is, the lower the glycohemoglobin, or the younger the patient, the higher the glycohemoglobin.

Table 9

Comparison of Visit Frequency, Age of Patients and Time in the Clinic in Months

Demographics	Clinic A	Clinic B	t-value	df	p
Visit Freq.	$M = 3.9$ ($SD = 2.17$)	$M = 10.0$ ($SD = 5.22$)	-4.82	25.40	.000
Time/Months	$M = 46.9$ ($SD = 21.5$)	$M = 26.5$ ($SD = 14.6$)	3.50	38.00	.001
Age of Pt.	$M = 66.5$ ($SD = 3.6$)	$M = 60.6$ ($SD = 7.6$)	3.14	38.00	.004

To determine whether or not the factor of age was significant to the outcome of the final glycohemoglobin, a test of significance using analysis of covariance (ANCOVA) was done. After controlling for age, and the age factor being removed as a variable, there was still a significant difference in the follow-up lab values for glycohemoglobin in Clinic A (See Table 10).

Table 10

Analysis of Covariance for Patient Age

	Obs. Mean Glyco.	Adj. Mean Glyco
Clinic A	6.83	7.01
Clinic B	8.75	8.56

Analysis of Covariance : $F(2, 39) = 10.99$; $p = .002$

Other Findings of Interest

Another area of interest was related to BUN scores. Although not found to be statistically significant, it was interesting to note that while Clinic A had better lab values regarding Glyco and Creat which indicated better glycemic control, baseline scores for BUN were higher in Clinic A than Clinic B (Clinic A - $M = 15.6$, $SD = 4.84$, Clinic B - $M = 14.7$, $SD = 4.15$), and follow-up BUN lab values for Clinic A were higher than Clinic B and had actually gotten worse (Clinic A - $M = 17.16$, $SD = 5.25$, Clinic B - $M = 15.3$, $SD = 4.94$). Also of interest was the fact that no co-morbidities of renal disease had been reported, and none of the patients were on medication specifically for renal disease.

It was also of interest that while Clinic A had the more intensive program of diabetic education, and access to follow-up care, the number of visits per patient per year were considerably lower than that of Clinic B. Although the scores did not reflect a significant relationship to outcomes relative to the number of visits made to each clinic, this may be a topic for further study. An explanation for the lower visit rate, with improved metabolic control could be that more time was spent at the initial visit, allowing patients to have a better understanding of how to manage their diabetes. Patients

may have sensed a higher or more consistent level of social support from the health care provider, and were therefore more motivated to adhere to the regimen. This could have indicated that an increased amount of interpersonal influence, thereby social support, allowed patients to feel more secure and confident in self-management of their diabetes.

Summary

Independent t- tests, paired t-tests, correlation coefficient and Ancova analysis were used to evaluate lab values that are indicative of diabetic control in patients who received care from two different diabetic education environments. Results showed that while there was no difference between the groups in the baseline lab values, and no significant difference in the amount of change from baseline to final lab values after one year, there was a significant difference in the final results in lab values. Patients in Clinic A who received more intensive diabetic care had improvement in glycohemoglobin (lower lab values), and lower serum creatinine levels at the end of one year, while patients who attended Clinic B actually had higher levels of glycohemoglobin and creatinine levels than the baseline. There was no significant change in BUN values.

Chapter 5

Discussion and Implications

The purpose of this study was to determine if providing an intensive, structured diabetic education program resulted in better diabetic control than a program that offered less intensive, provider based care and education. Independent t-tests were used to compare the relationship between baseline lab values, the amount of change from baseline values and a one year follow up, and the final lab values for patients in each setting. Paired t- tests were used to evaluate any significant differences within the group. Correlation coefficient and ANCOVA analysis was also used to evaluate the relationship of variables. This chapter includes a review of the demographics of the sample, a discussion of the findings, implications for nursing, and recommendation for research, education, and practice.

Discussion of Findings

Diabetes education programs have been associated with improved metabolic control. Results of this study suggest that providing an intensive program of diabetic education intervention will have a significant impact on a patient's ability to maintain better diabetic control. Baseline values, amount of change from baseline to final values, and final lab values at the end of one year for glycohemoglobin, serum creatinine and blood urea nitrogen levels were obtained. It was determined that there was a significant improvement in the final lab values for Glyco, and Creat at the end of the one year period of time in the patients who attended the clinic that provided intensive diabetic education.

These results parallel the findings in a study by de Sonnaville (1997) who assessed the intermediate term effect of structured diabetic care in general practice with and without 'diabetes service' support. The diabetes service included a diabetologist, consultation facilities of a dietitian and a diabetes nurse educator. In the study group who

received the structured education over a 2 year time period, the mean glycohemoglobin fell from 7.4% to 7.0%, and rose in the control group from 7.4% to 7.6% during follow up ($p = 0.004$). The patients with poor control shifted from 21.4 to 11.7% in the study group, but from 23.5 to 27.9% in the control group ($p = 0.008$). The de Sonnaville study strongly suggested that the two most likely explanations for better results in the study group were firstly, the structured therapy that was followed by the providers, and secondly, individual diabetes education by the nurse and diabetic educator may have enhanced self-care and patient compliance. The study did clearly show that implementation of structured care in general practice resulted in good, sustained glycemic control.

Cognet (1995) also evaluated the efficiency of an individual intensive educational control program on improving the metabolic control of diabetic patients at short and long term follow-up. According to the initial evaluation, individual goals were stipulated and monitored in weekly visits. Patients were then monitored and seen through ambulatory clinics for outpatient visits. Thereafter, patients were followed at 1, 6, 12, and 24 months. After 1 month, the program produced a significant decrease in Glycohemoglobin ($M = 7.6$, $SD = 1.3$) from entry levels ($M = 9.9$, $SD = 1.2$, $p = < 0.05$). The 6-month evaluation reflected similar benefits when compared to values at entry. The improvement in metabolic control persisted after 12 and 24 months, and supported the idea that an intensive educational control program is useful as a tool to improve metabolic control of diabetes at short and long term follow-up.

In this research project, it is also apparent that the group of subjects in Clinic A who did receive the more intensive diabetic education had improved metabolic control in

the long term. Differences in baseline characteristics in the individual sample groups do not explain the observed difference in metabolic control. There were no significant differences in demographic information that might have accounted for the outcomes, other than age which was determined to have an inverse relationship to the outcome. Data strongly suggests that those patients who had an increased level of social support and interpersonal influence through the intensive diabetic education they received had significantly better outcomes in regard to diabetic management.

Relationship to Conceptual Framework

Pender's Health Promotion Model supports the idea that interpersonal influences, and social support in particular, have an impact on assisting patients to adopt health promoting behaviors. Health professionals constitute a significant source of interpersonal influence and social support. Diabetic education is a very specific and potentially powerful tool to improve long term outcomes of diabetic management and prevention of complications. This study is based on the hypothesis that in providing the opportunity for structured, intense education, patients receive an increased amount of social support that promotes adoption of health promoting behaviors with regard to diabetic care.

According to Pender (1996) interpersonal influences include the concept of norms (expectations of others), social support (instrumental and emotional encouragement), and modeling (vicarious learning through observing others). In providing diabetic education based on those ideas, patients may have been more motivated to adhere to the recommended regimens as they are exposed to those interpersonal influences on a more intensive basis. When given sufficient motivation to

behave in a way for which they will be praised, admired, or respected, patients are much more likely to see additional benefits to adapting the prescribed regimen.

The findings in this study seem to support the proposition of the theoretical framework. By providing additional social support through the more intensive educational program, patients did indeed have improvement in metabolic control of their diabetes, and will be less likely to develop complications related to uncontrolled diabetes.

Limitations of the Study

This study was a small convenience sample. Small samples and individual data collection settings are less representative of the population being studied and limit the ability to generalize the findings (Polit & Hungler, 1995). Limitation of convenience sampling is due to the use of available subjects, who may or may not be typical of the study population. Using a sample with only Caucasian, English-speaking adults, with no racial differences that could have an impact on the level of diabetic control may increase the risk of bias and make the study less generalizable.

Another limitation to this study was that the instrument did not examine socio-economic factors that could impact outcomes of diabetic care. As this could play an important role in the management of diet therapy, obtaining medications, as well as even being able to have any follow-up care. Also educational level was not addressed in this study. This could also be a significant factor when addressing diabetic education and the likelihood that the patient will be able to comprehend the teaching that is given. An appropriate version of the instrument would include data that looks at income level and education level as possible variables that might impact the outcome of this study.

One other limitation to this study that may have been significant and was not addressed was the patients prior knowledge of diabetes management. For example, Cognet (1995) found that prior knowledge of diabetic education did have a significant relationship to long term results of lab values for glycohemoglobin.

Implications for Nursing Practice

The modest results of this study have several implications for nursing practice. Although patients have the primary responsibility for maintaining treatment objectives and management of their diabetes, nurses need to help implement the original training and education, and then help patients maintain the regimen. Perceptions of supportive significant others, that may well include nurses and health care providers may enhance regimen adherence.

There is a need for nurses as diabetes educators, and health care providers, to assume a major role in expanding support resources that can be provided for patients with diabetes. Education and support needs of diabetes patients require health care professionals to develop new kinds of partnerships to improve patient self care. The educational process should be expanded to include each phase of diabetic care.

In light of spiraling health care costs and the fact that patients with diabetes account for a disproportionate amount of those health care dollars, there is an urgent need for cost effective diabetes management. Since diabetic education programs have been associated with improved metabolic control, as indicated in this study, nurses have an opportunity to intervene, motivate and ultimately influence the patient's outcomes through teaching and counseling skills.

The purpose of health promotion and disease prevention programs is to initiate interventions that will at least diminish, if not halt long term complications of disease processes. Now that nurses are assuming broader roles in the health care arena, and are being thought of as specializing in health promotion, the opportunity exists for educating and teaching patients about these concepts even before a diagnosis of diabetes is made. Nursing education and the nurse-patient relationship provide opportunities unavailable to other disciplines.

Suggestions for Further Research

Even though there is more interest in diabetic management, there is still a very significant need to understand how psycho-social factors influence adherence behavior in diabetic management. There continues to be a need to identify variables that affect the individual's ability to maintain a prescribed diabetic regimen. There is also a need to develop a method of diabetic education that is cost-effective, and yet comprehensive. Relative to the results of this study, it was interesting to note that patients could actually be seen less frequently in the provider's office, yet have improved results in diabetic management according to levels of glycohemoglobin. This is an area for further research, that would look closely at the specific interventions that were used.

In order to find a means of diabetic education that satisfies all of those needs, further research is needed to continue an attempt to determine what factors are most likely to result in positive outcomes regarding diabetic care. With the emphasis so strong toward health promotion, it would be valuable to repeat this study in a much larger sample, and take into account socio-economic status, education level, and to determine what factors actually motivate a person to attempt adherence to a diabetic regimen.

The patients in this study were drawn from a small sample. Recommendations for research would be to conduct studies using a larger and more demographically varied sample. In this way the study would be more consistent to the general population.

A second recommendation is to include various factors that are seen as barriers to adherence to diabetic management, and the impact they have on diabetic control.

This study also indicated that blood urea nitrogen lab values were an unstable factor in diabetic patients and their care. It was noted that although those values were high, and could be an indicator of poor control and complications of diabetes, there was no indication of corresponding diagnosis and treatment of renal disease. Implications for further study related to how closely diabetics are being monitored for renal disease may give relevant information toward improving diabetic outcomes.

Summary

In conclusion, it was determined in this study that a program that offers a more structured diabetic education program does result in better long range lab values that are an indicator of glycemic control. The findings were discussed in terms of lab values at a baseline time, a comparison between the baseline score and one year later, and the final lab value after one year. Lab values were better at the end of one year in a clinic that offered a structured intensive diabetic education program.

In order to understand more clearly which factors were the most influential in promoting those results, more research is clearly indicated. What is clear in this study, is that by providing additional social support from a health care perspective, through structured diabetic education, patients can have better glycemic control. Long term

control of complications will result in a decrease in lost health care dollars, and an improvement in the quality of life.

APPENDIX A

APPENDIX A

ALBERT EINSTEIN COLLEGE OF MEDICINE
OF YESHIVA UNIVERSITY
JACK AND PEARL RESNICK CAMPUS

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Depart. of Epidemiology & Social Medicine
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Debbie Provoast, RN, MSN
791 N. Lakeview Drive
Hale, Michigan 49839-9400

Dear Ms. Provoast:

Please feel free to modify the Diabetes Quality Assurance Checklist to meet the needs of your study. I give permission on behalf of the authors for use in your project. Our only request is that the article be cited.

I wish you the best in your study. Please let me know if I can be of further assistance.

Sincerely,



Judith Wylie-Rosett, Ed.D., R.D.
Professor

APPENDIX B

APPENDIX B



1 CAMPUS DRIVE • ALLENDALE, MICHIGAN 49401-9403 • 616/895-6611

December 7, 1998

Debra Provoast
791 Lakeview Drive
Hale, MI 48739

Dear Debra:

The Human Research Review Committee of Grand Valley State University is charged to examine proposals with respect to protection of human subjects. The Committee has considered your proposal, "*Effects of Education on Disease Management and Prevention of Complications in Diabetic Patients*", and is satisfied that you have complied with the intent of the regulations published in the Federal Register 46 (16): 8386-8392, January 26, 1981.

Sincerely,



Paul Huizenga, Chair
Human Research Review Committee

APPENDIX C

APPENDIX C

GRAND VALLEY STATE UNIVERSITY KIRKHOF SCHOOL OF NURSING

RELEASE AND CONSENT FORM

I, Julian Keake RN PhD., hereby give permission to the Grand Valley State University, Kirkhof School of Nursing MSN student named below to obtain information through chart audit and review related to research in obtaining data for a thesis project. I also give permission to copy or reproduce the following material(s) for educational purposes by the student from said institution:

- a. Educational materials used for diabetic education of clients
- b. Data obtained from the chart audit

I understand that this is a study of the outcomes of diabetic clients who have received diabetic education in this institution, and will be used in a comparative study that reflects how type and intensity of education impacts the results of the education program. The knowledge gained from this study is expected to assist health care providers in learning how to best provide education to diabetic clients.

I also understand that:

- 1. this study will involve chart review done by Grand Valley State University students, and will be done at your convenience.
- 2. it will not lead to any physical or emotional risk to any human subjects
- 3. the information that is provided will be kept strictly confidential and the data will be coded so that identification of individual participants of medical information obtained from the chart will not be possible.

I acknowledge that:

"I have been given an opportunity to ask questions regarding this research study, and that these questions have been answered to my satisfaction"

"In giving my consent, I understand that my participation is voluntary and that I may withdraw at any time by contacting the GVSU nursing office

"The investigator, Debbie Provoast, has my permission to release information obtained in this scientific study to scientific literature. I understand that this institution will not be identified without obtaining further approval from me.

"I have been given the phone numbers of the researcher and the chairperson of the Grand Valley State University Human Research Review Committee. I may contact them at any time if I have questions.

I acknowledge that I have read and understand the above information, and that I agree to participate in this study.

[Redacted Signature] Institution NORTHERN MICHIGAN
Participant's Signature HEALTH SERVICES

1-13-98
Date

[Redacted Signature]
Witness [Redacted Signature]
1-13-98
Date

APPENDIX D

APPENDIX D
GRAND VALLEY STATE UNIVERSITY
KIRKHOF SCHOOL OF NURSING

RELEASE AND CONSENT FORM

I, Ellen Smith, Admin., hereby give permission to the Grand Valley State University, Kirkhof School of Nursing MSN student named below to obtain information through chart audit and review related to research in obtaining data for a thesis project. I also give permission to copy or reproduce the following material(s) for educational purposes by the student from said institution:

- a. Educational materials used for diabetic education of clients
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"I have been given the phone numbers of the researcher and the chairperson of the Grand Valley State University Human Research Review Committee. I may contact them at any time if I have questions.

I acknowledge that I have read and understand the above information, and that I agree to participate in this study.

<div style="background-color: black; height: 20px; width: 100%;"></div> Participant's Signature	<div style="background-color: black; height: 20px; width: 100%;"></div> Institution <u>Primary Care Practice</u>	<div style="background-color: black; height: 20px; width: 100%;"></div> Witness
<u>1-13-98</u> Date		<u>1/13/98</u> Date

APPENDIX E

APPENDIX E

Data Collection Instrument for Diabetic Education Study

Clinic: A B

Chart # _____ Number of visits in 1997 _____ Time in office in Months _____

D.O.B. ___/___/___

Gender: Male = 1 Female = 2

Ethnicity: 1 = White, non-Hispanic 2 = Black, non-Hispanic 3 = Hispanic
4 = Native American 5 = Asian 6 = Other

Method of Payment: 1 = Private Insurance 2 = Medicare 3 = Both 4 = None

Diabetes Type: 1 = Type I 2 = Type II Years since diagnosis _____

Treatment: 1 = Insulin 2 = Oral only 3 = Oral + Insulin 4 = Diet Only

Number of times glycohemoglobin monitored in 1997 _____

Does patient do home glucose monitoring?	Y	N
Received dilated eye exam within 1 year?	Y	N
Diet intervention specified?	Y	N
Nutritionist consulted?	Y	N
Exercise / Activity Prescribed?	Y	N
Referred for Diabetic Education?	Y	N
Self-foot care?	Y	N

During calendar year 1997 did this patient have:

Hospitalization	Y	N
Foot or other skin ulcer	Y	N
Amputation	Y	N
Diabetic Retinopathy	Y	N
Expired related to Diab Complications	Y	N
Added Insulin to Medication Regimen	Y	N

Co-morbid diseases: _____

Medications _____

CLINICAL MEASURES:

Glycohemoglobin 1st (Base) _____ 2nd (End) _____ Creatinine 1st _____ 2nd _____
(Normal Range: 4.8 - 7.8%) (Normal Range: 0.5%- 2.0%)

BUN 1st _____ 2nd _____
(Normal range: 10 - 20)

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