A COMPARISON STUDY ON THE EFFECT OF COACHING AS A NURSING INTERVENTION ON COMFORT LEVELS AND BLOOD SUGAR LEVELS IN TWO GROUPS OF INDIVIDUALS WITH DIABETES

A DISSERTATION

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Table of Contents

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LIST OF TABLES

Abstract

DISSERTATION: A Comparison Study on the Effect of Coaching as a Nursing Intervention on Comfort Levels and Blood Sugar Levels in Two Groups of Individuals with Diabetes

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The purpose of this comparative study was to investigate the effect of coaching, as a nursing intervention, on comfort levels and blood sugar levels of individuals with diabetes. The hypothesis of the study was that individuals with diabetes who received coaching at specified intervals of time would have higher levels of comfort, as measured by the Diabetes Mellitus Comfort Questionnaire (DMCQ), and lower blood sugar levels, as recorded on the individual's personal glucometer, than individuals with diabetes who did not receive coaching. Prior to conducting the study, approval of the university review board and hospitals was obtained. Participants were solicited from two accredited hospital-based diabetic education programs in a Midwestern city. Participation in the study was voluntary. The participants solicited from one hospital-based diabetic education program received coaching as a nursing intervention throughout the study while the participants from the other hospital-based diabetic education program did not. The participants were enrolled in the study the last day of the diabetic education program

and completed a demographic data form, the DMCQ, and the Self Care Inventory-Revised (SCI-R) to measure compliance. They also documented the average of their daily blood sugar levels from the past seven days as recorded on their personal glucometer. Two and four weeks after enrolling in the study participants from each group repeated the process of completing the DMCQ, the SCI-R, and documenting the average daily blood sugar levels over the past seven days as recorded on their glucometers. One hospital-based diabetic education group received coaching from the researcher via a telephone call two and four weeks after completing the formal diabetic education program and prior to completing the DMCQ, the SCI-R, and documenting their average daily blood sugar from the next seven days. Confidentiality of data collected from the participants was maintained. There was no risk of harm. Of the participants enrolled in the study, there were 30 participants who completed the study for one group and 35 participants who completed the study for the other group. Analysis of variance was used to analyze the data. Results showed no significant difference in comfort levels, compliance scores, or blood sugar levels between the two groups. The hypothesis of the study was not supported. Nonetheless, the information obtained from this study is valuable to nursing by contributing to the growing body of knowledge for developing cost-effective education and supportive strategies for individuals with diabetes to manage their condition.

Chapter I

Introduction

Perspective

The incidence of diabetes mellitus doubled in the United States between 1990 and 2005. There are 23. 6 million people in the United States with diabetes including 5.7 million people undiagnosed. It is estimated that by the year 2050, 48 million people in the United States will have Type II diabetes (http://dagc.org/diastatsUS.asp...retrieved 1/9/2010).

Diabetes mellitus (DM) is a chronic, debilitating condition that requires strict compliance of a patient to an individualized prescribed management regimen in order to obtain a normal blood sugar level, and prevent short and long term medical complications. Education is the foundation for self-care diabetes management. Diabetic education programs have proven to be effective in providing knowledge necessary for managing diabetes (Boren, Fitzner, Panhalkar, & Specker, 2009). Management of DM encompasses dietary restrictions, exercise, weight control, monitoring blood sugar levels, and compliance with prescribed medications (Boren et al., 2009). Individuals with diabetes have difficulty processing carbohydrates in the body resulting in an accumulation of glucose or sugar in the blood. Therefore, individuals with diabetes should follow a low carbohydrate diet because carbohydrates are converted to sugar in the body. Exercise is a key component to lowering blood sugars and achieving a

desirable weight. Maintaining a proper diet and engaging in physical activity is challenging for most diabetics who have traditionally consumed high carbohydrate diets and have led sedentary lifestyles contributing to their current condition. Individuals with diabetes are instructed to routinely monitor their blood sugar levels with a glucometer. A glucometer is a hand-held device that calculates a numerical value for the level of glucose or sugar in the blood from a small blood sample obtained from a finger needle stick. Oral medications and/or insulin are another aspect of diabetes management. Oral medications require timely dosing and have adverse effects such as weight gain, gastrointestinal disturbances, low blood sugars, and fatigue. While often necessary to sustain health, insulin injections are unfavorable to patients because of the discomfort (Dunphy, Winland-Brown, Porter, & Thomas, 2007). Education may be the foundation of diabetes self-care, however, it does not seem education is enough to assist individuals coping with the daily struggles of diabetes management. The diagnosis of diabetes mellitus provokes a range of psychological and emotional responses including anxiety, denial, depression, and shock (Sridhar & Madhu, 2002). Healthcare professionals are challenged to educate (Wallymahmed, 2006) and support diabetic patients in understanding and managing their condition. Formal and informal education and individual and/or group support are necessary to meet the informational and psychoemotional needs of an individual with diabetes (Wallymahmed, 2006). Addressing individual informational and psychological needs is basic to assisting patients to comply with their personalized diabetic care regimens leading to favorable blood sugar control and enhanced well-being (Sridhar & Madhu, 2002). Therefore, it is vital for healthcare professionals to discover effective

means for providing ongoing support and education of individuals diagnosed with diabetes.

According to Kolcaba (2003), providing comfort is an essential aspect of nursing care. She contends there is a positive correlation between enhanced comfort of patients and desirable health seeking behaviors. Coaching, as defined by Kolcaba (2003), is a comfort care intervention provided by nurses for the purpose of offering reassurance, information, hope and help in planning for recovery from illness, integration of disease into daily life, and/or death. Coaching can involve active listening, touching, and positive reinforcement. Various comfort care measures have been studied in research projects and have indicated a positive relationship between comfort care measures and levels of comfort experienced patients (Kolcaba, 2003). Coaching has been determined to be an effective nurse intervention for providing ongoing education and support to individuals diagnosed with diabetes for enhanced comfort in managing their therapeutic regimen resulting in lower blood sugar levels.

Significance of the Problem

Each year 280,000 Americans die from diabetes mellitus (DM) making it the fifth leading cause of death in the United States. Diabetes mellitus is the primary etiology of kidney failure, blindness, and amputations. It is also a major risk factor for stroke and heart disease (http://dagc.org/diastatsUS.asp...retrieved 1/9/2010). In addition to the high morbidity and mortality of diabetes, its financial impact to individuals, families, and society is staggering. Diabetes costs the United States $132 billion dollars yearly (http://www.diabetes.org/diabetes-research/ADA -Research-Foundation/type2-prevention-awa... retrieved 6/17/07).

Diabetes is characterized by improper carbohydrate, fat, and protein metabolism, along with hyperglycemia or sustained elevated blood sugar levels. Elevated blood sugar levels are the result of insufficient or cessation of insulin production (Dunphy et al., 2007). Insulin is an enzyme produced in the pancreas responsible for maintaining normal blood sugar for cellular energy production. Elevated blood sugar levels stimulate insulin production and low blood sugar levels inhibit insulin production (Wallmahmed, 2006). There are two types of diabetes mellitus identified: Type I, insulin dependent diabetes mellitus, and Type II, non-insulin dependent diabetes mellitus (Dunphy et al., 2007). Type I diabetes is the result of cessation of insulin production by the islets of Langerhans in the beta cells of the pancreas (Dunphy et al., 2007; Wallymahmed, 2006). Cessation of insulin production in children and adolescents is an autoimmune response usually to a viral infection while cessation of insulin production in adults can be idiopathic (without a known cause) or a progression of Type II diabetes (Dunphy et al., 2007). Type II diabetes occurs when there is insufficient insulin production and/or cellular resistance to insulin (Dunphy et al., 2007; Wallymahmed, 2006). Risk factors for diabetes include: heredity, ethnicity, diet, obesity, age, delivery of a baby over 9 pounds, elevated blood pressure, high cholesterol, and a sedentary lifestyle. Heredity, age, and ethnicity are uncontrollable risk factors whereas diet, weight, exercise, cholesterol, and blood pressure can be controlled to an extent (Dunphy et al., 2007).

The normal fasting blood sugar level in an adult without diabetes is <100 mg/dL. The normal random blood sugar level in individuals without diabetes is <140 mg/dL. The American Association of Clinical Endocrinologists and American College of Endocrinology set the target goal for fasting blood sugars for individuals with diabetes at

<110mg/dL and the random blood sugar at <140mg/dL (O'Keefe, Bell, & Wyne, 2009). An imbalance in blood sugar levels leads to chronic and episodic problems. Sustained blood sugar levels above the normal range are considered hyperglycemia and blood sugar levels below the normal range are termed hypoglycemia (O'Keefe et al., 2009). "Chronic hyperglycemia affects all body systems…" (Dunphy et al., 2007 p. 843) and can lead to various complications, especially those of the nervous and vascular systems. Although the nerves of the feet are typically involved, nerves throughout the body can be damaged from high blood sugar levels leading to painful sensations of burning and stinging. Nerves of the gastrointestinal track can also be damaged causing problems with digestion. Blood vessels of the heart, eyes, kidneys, and peripheral vascular system deteriorate from elevated blood sugar levels (Dunphy et al., 2007; Wallymahmed, 2006). Hypoglycemia is an immediate complication of diabetes management resulting from alcohol consumption, drug interactions, exercise, inadequate food intake, and/or excess diabetic medication (Dunphy et al., 2007; Wallymahmed, 2006).

Patient adherence to diabetic regimens is central to improving an individual's well-being and preventing short and long term complications of diabetes (Clifford, Barbar, Elliott, Hartley, & Horne, 2004). Education is primary to self-care management of diabetes. Stress (Allbright et al., 2001) and other psychological factors (Ciechanowski, Katon, Russo, & Walker, 2001; Funnell, 2006) have been found to impact patient compliance to diabetic regimens. Providing timely and ongoing reassurance, hope, and help by a trusted healthcare professional can enhance compliance (Ciechanowski et al., 2001).

Background of the Study

The impact of diabetes on the overall health and well-being of Americans and the cost to the United States warrants ongoing attention to means for improving patient care (Clifford et al., 2004; DeCoster & Cummings, 2005). "Education of people with diabetes is aimed at self-management and should be a lifelong process" (Wallymahmed, 2006, p.55). Self-management encompasses diet, exercise, weight control, self-monitoring of blood sugars, problem solving, reducing risk of complications, psychosocial adaptation, and medication compliance with the goal of achieving normal blood sugar levels (Mulcahy et al., 2003). Many individuals newly diagnosed with diabetes attend formal diabetic education programs sponsored by local healthcare agencies. However, formal education programs are not enough for patients to adapt to ongoing lifestyle changes (Albright et al., 2001; Funnell et al., 2010). Reactions and responses of individuals diagnosed with diabetes to diabetic education vary from acceptance and adoption of the therapeutic plan to denial and rejection (Sridhar & Madhu, 2002; Thoolen, de Ridder, Bensing, Gorter, & Rutten, 2006).

"Quality of life is affected by long-standing medical conditions and some patients experience difficulties coping with diabetes, irrespective of the type of treatment they require to manage the condition" (Phillips, 2007b, p. 35). To facilitate acceptance and adoption of a diabetic plan of care, healthcare providers need to be available to patients early on in the process to clarify information, provide support, and discuss realistic measures to adopt the prescribed lifestyle (Peyrot, Rubin, & Siminerio, 2006)).

Coaching was identified by Kolcaba (2003) as a comfort care measure provided by nurses to "relieve anxiety, provide reassurance and information, instill hope, listen,

and help plan realistically for…integration" (p. 84). Kolcaba (2003) defined *comfort* as "the immediate experience of being strengthened by having needs for relief, ease, and transcendence met in four contexts: physical, psychospiritual, sociocultural, and environmental" (p. 251). Kolcaba (2003) developed the General Comfort Questionnaire (GCQ) to measure comfort in general patient populations along with guidelines for adapting the GCQ for specific patient populations, such as individuals with cancer, dementia, and urinary incontinence. For this study the GCQ was adapted according to the guidelines to more accurately measure comfort levels in individuals with diabetes. The Diabetic Mellitus Comfort Questionnaire (DMCQ) is a 28-item self-report Likert scale measuring the various aspects of comfort of individuals with diabetes. Coaching provided periodically to individuals with diabetes after formal education classes can enhance their comfort levels as measured by the DMCQ in managing their prescribed diabetic regimens resulting in improved blood sugar levels as reported on individuals' glucometers.

Purpose Statement

The purpose of this comparative quasi-experimental study was to compare the effect of coaching on comfort levels, as measured by an adapted questionnaire, and blood sugars levels, as recorded on individuals' glucometers, between two groups of individuals with diabetes who had attended a formal diabetic education program. It was postulated that after the diabetic education program, the group receiving the nursing intervention of coaching in the form of telephone calls would demonstrate higher levels of comfort, thereby, comply with their prescribed diabetic regimen resulting in lower blood sugar

levels when compared to the second group of individuals with diabetes who did not receive coaching.

Research Questions

1. Are there differences in comfort levels as measured by the Diabetes Mellitus Comfort Questionnaire (DMCQ) between Group I individuals with diabetes not receiving coaching and Group II individuals with diabetes receiving coaching at specified intervals of time?
2. Do individuals with diabetes who receive coaching have lower average blood sugar levels over a seven day period as recorded on their individual glucometers at specified intervals of time when compared to individuals with diabetes who do not receive coaching?

Hypothesis

Individuals with diabetes in Group II who received coaching will demonstrate lower blood sugar levels as measured by individuals' glucometers and higher comfort levels as measured by the Diabetes Mellitus Comfort Questionnaire (DMCQ) at specified intervals of time when compared to individuals with diabetes in Group I who do not receive coaching.

Theoretical Framework

The theoretical framework selected for this study was the Comfort Theory because it is pragmatic, holistic, and applicable to all populations (Kolcaba, 2003). It is a mid-range theory based on three premises. First, comfort is a patient-focused effect of nursing care. Second, comfort is an all-encompassing, comprehensive condition experienced in its entirety. Third, components of comfort are interrelated and

challenging to measure individually, but can be evaluated collectively within four contexts: physical, psychospiritual, environmental, and sociocultural (Kolcaba, 2003). Kolcaba (2003) theorized that when "patients and their families are more comfortable, they engage more fully in health-seeking behaviors which include internal behaviors, external behaviors, or a peaceful death" (Kolcaba, Tilton, & Drouin, 2006, p. 540). "Health behavior is the central concern of health promotion and one of the most important factors of disease, since over 50% of chronic diseases are potentially preventable" (Lee, 2001, p. 31). Diabetes mellitus is a chronic, progressive condition (Sridhar & Madhu, 2002) requiring individuals afflicted to adhere to a strict therapeutic regimen impacting all areas of their lives (Thoolen et al., 2006). Hence, nursing care of patients with diabetes must embrace a holistic, comprehensive approach in teaching and supporting self-management (Mulcahy et al., 2003).

Holistic nursing care is patient-centered encompassing the physical, psychological, social, cultural, and environmental aspects of patients' lives. It includes their perceptions of health and illness, functional capabilities, self-care abilities, financial status (Lee, 2001), and personal and professional responsibilities (Hamric, Spross, & Hanson, 2005). Consistent with holism, the Comfort Theory is comprised of four contexts of comfort: physical, psychospiritual, environmental, and sociocultural. Comfort care is the philosophy of nursing care that meets the contexts of comfort. Comfort care is an acceptable nursing intervention or comfort measure delivered in a timely caring manner for the purpose of providing comfort. Comfort measures fall into three categories: technical comfort measures, comfort food for the soul, and coaching. Technical comfort measures are interventions aimed at maintaining physiological

function including pain management actions. Comfort food for the soul measures are basic nursing care actions, such as cool compresses to the forehead. Comfort food for the soul measures are not anticipated or technical in nature; however they fortify patients. Coaching is a culturally sensitive nursing intervention performed for the sake of providing information, offering reassurance, reducing stress, instilling hope, listening, and assisting with the development of realistic plans for the future based on an individual's condition (Kolcaba, 2003). The comfort measure used for this study was coaching and was provided individually to participants via telephone calls. The intent of periodic coaching of the participant was to provide information and psychological support necessary for integrating prescribed diabetic lifestyles changes for the purpose of improved compliance resulting in lower blood sugar levels. The goal of diabetes management is maintenance of blood sugar levels within normal limits for enhanced well-being and the avoidance of short and long term complications (DeCoster & Cummings, 2005; Dunphy et al., 2007).

Physical Comfort.

The first context of the Comfort Theory is physical comfort. Physical comfort encompasses all physiological processes and bodily sensations. A disruption in normal function can result in discomfort or bodily distress. Unstable blood chemistries, imbalance of electrolytes, lack of oxygenation, and poor positioning can cause a disruption in normal physiological function and result in discomfort (Hamilton, 1989). Physical comfort is not merely the absence of pain, but rather a sense of well-being (Kolcaba, 2003). Physical well-being for individuals with diabetes begins with a normal blood sugar level. Abnormal blood sugar levels contribute to an individual's immediate

discomfort by producing sensations of increased thirst, hunger, fatigue, and urination along with other symptoms. Abnormal blood sugar levels over a long period of time can cause discomfort and bodily distress by leading to other costly medical problems, such as infection and delayed healing as well as other conditions such as cardiovascular disease, renal failure, and blindness (Clifford et al., 2004; Dunphy et al., 2007).

Psychospiritual Comfort.

The second context of comfort is psychospiritual. Managing the multifaceted therapeutic rigors of diabetes (Sridhar & Madhu, 2002) and potential or actual physical complications, necessitates effective spiritual and psychological coping skills. "Healthy coping skills are behaviors that eliminate or modify the stressors common to diabetes…which might cause emotional distress and impair self-care" (Stys & Kulkarni, 2007, p. 58). Plagued by feelings of being overwhelmed with dietary restrictions, medications, exercise regimens, weight reduction, financial demands (Lee, 2001), and social limitations leads diabetics to the psychological discomforts of depression and/or anxiety (Foster, 1997; Peyrot, Rubin, & Siminero, 2006; Sridhar & Madhu, 2002). The Comfort Theory addresses the intellectual, emotional, and spiritual aspects of a person in the psychospiritual context. Although an individual's relationship with a higher order or being is a part of spirituality, Kolcaba (2003) clarified that spirituality in this context is not synonymous with religiosity, but is whatever assigns meaning to life for an individual. Psychospirituality encompasses individuality, sexuality, self-esteem, and self-concept (Kolcaba, 2003).

Sociocultural Comfort.

The third context of comfort is sociocultural. Living with a chronic condition hinders one's quality of life (Foster, 1997; Sridhar & Madhu, 2002) necessitating support from significant others in dealing with diabetes. Significant others usually imply family; however, friends, co-workers, and even healthcare professionals can be viewed as support systems (Hamilton, 1989; Phillips, 2007b; Sridhar & Madhu, 2002). The sociocultural context of the Comfort Theory includes family members, medical personnel, social relationships, and involves cultural, financial, educational, and supportive considerations. Cultural considerations are particularly significant in diabetes management since diabetes is more prevalent in ethnic and minority populations, especially African Americans, American Indians, and Hispanics (DeCoster & Cummings, 2005). The dietary restriction of diabetes may be especially troublesome for culturally diverse individuals with diabetes whose diets often consist of high carbohydrates foods. Diabetes is a costly condition to manage with the recommended dietary guidelines, supplies necessary for monitoring blood sugar levels, and medications. In many cases, managing diabetes places a financial strain on the individual and his or her family. Ongoing education and support is necessary to adjust to changes in health and life circumstances (Peyrot, Rubin, & Siminerio, 2006).

Environmental Comfort.

Environmental comfort is the fourth comfort context. Since the time of Florence Nightingale, environment has been identified as instrumental to healing and health promotion. Environment entails immediate external surroundings including "color, noise, light, ambience, temperature, views from windows, access to nature, and natural

versus synthetic elements" (Kolcaba, 2003, p 13). However, Kolcaba (2003) expanded the environment to incorporate all external surroundings, circumstances, and influences. For individuals with diabetes the environment includes their home, neighborhood, and community (Jack, Liburd, Spencer, & Airhihenbuwa, 2004). Individuals with diabetes are more susceptible to infection and impaired healing (Dunphy et al., 2007) warranting that the individual reside in a hygienic, safe home free of potentially harmful environmental factors, such as improper waste removal, damaged structures, poor lighting, insect/rodent infestation, malfunctioning appliances, inadequate heating and cooling, ailing pets, stray animals, and crime. Not only is a safe neighborhood crucial for physical safety, exercise is an essential aspect of diabetes care. Walking is an optimal physical activity for individuals with diabetes (Stys & Kulkarni, 2007) that ideally can be done in one's neighborhood, negating the need for transportation and membership to an expensive exercise facility. Accessible businesses, healthcare agencies, churches, stores, restaurants, public services, exercise facilities, social agencies, and resources are also significant to the environment for an individual with diabetes (Glasgow, Toobert, & Gillette, 2001; Jack et al., 2004). Environmental discomfort can lead to physical and psychological discomforts if not corrected (Brown & Hedges, 1994; Sridhar & Madhu, 2002).

The physical impact, psychological effects, environmental factors, and social support systems of an individual are critical ongoing considerations in diabetes self-care management (Sridar & Madhu, 2002). Kolcaba (2003) recognized that there are not only contexts of experience or comfort, but also types of comfort that must be met through nursing care. Relief occurs when an immediate need of an individual has been met. An

example of providing physical relief through nursing intervention would be giving concentrated sugar to an individual with diabetes who is sweating and feeling shaky, indicating a low blood sugar. Ease is a sense of peace and satisfaction. An example of a nursing intervention resulting in psychospiritual ease for a patient with diabetes would be providing diabetic education on sick-day management so a patient can feel confident in managing their condition when they become ill. Transcendence is when a patient can move beyond his or her condition in order to live a fulfilling life. An example of a nursing intervention to assist a patient with diabetes achieve a sociocultural transcendence state would be providing information on the patient's ethnic group in his or her community and supporting interaction and assimilation (Jack et al., 2004).

Definitions of Terms

Coaching—A culturally sensitive nursing intervention developed for patients to relieve stress, reduce anxiety, provide reassurance, clarify information, instill hope, listen, and help realistically plan for recovery from illness, integration of disease process, or death (Kolcaba, 2003).

Comfort—The perception of a patient of being fortified by having the physical, psychospiritual, social, and environmental needs of relief, ease, and transcendence met (Kolcaba, 2003).

Comfort Care—A culturally-based nursing philosophy of healthcare that focuses on meeting the physical, psychospiritual, sociocultural, and environmental needs of patients in a timely manner with the intent to provide comfort to the patient (Kolcaba, 2003).

Comfort Needs—An unmet physical, psychospiritual, sociocultural, or enviromental need of a patient for a sense of relief, ease, and transcendence (Kolcaba, 2003).

Contexts of Comfort—The causes and circumstances of how comfort is experienced or perceived by a patient (Kolcaba, 2003).

Physical Comfort—The bodily awareness and components of homeostasis experienced by a patient that may or may not be related to a specific medical condition (Kolcaba, 2003).

Psychospiritual Comfort—The components of life which give meaning to a patient and entails self-esteem, self-concept, sexuality, and his/her relationship to a higher order of being (Kolcaba, 2003).

Environmental Comfort—The physical surroundings, external conditions, circumstances, and influences experienced by a patient (Kolcaba, 2003).

Sociocultural Comfort—A patient's association with others including family, friends, co-workers, ethnic groups, and other societal relationships which can involve finances, education, culture, and support (Kolcaba, 2003).

Discomfort—A physical, psychospiritual, sociocultural, or environmental element inhibiting a patient from having a sense of well-being (Kolcaba, 2003).

Ease—A sense of satisfaction and peace a patient experiences after a physical, psychospiritual, sociocultural, or environmental need has been met (Kolcaba, 2003).

Health— The physical, psychospiritual, sociocultural, and environmental condition of a patient impacted by their health seeking behaviors (Kolcaba, 2003).

Health Seeking Behaviors (HBSs)—The internal or external actions in which patients consciously or subconsciously engage in, and which can move them toward well-being or a peaceful death (Schlofeldt, 1975).

Mid-Range Theory—A theory with a concrete conceptual framework that involves a small number of measurable concepts and relationships which are adaptable to a wide range of practices and experiences (Whall, 1996).

Relief—The experience of a patient who has had an immediate and specific physical, psychospiritual, sociocultural, or environmental need met (Kolcaba, 2003).

Transcendence—The state in which a patient's needs have been met allowing them to rise above their problems or pain and adapt to their condition (Kolcaba, 2003).

Limitations of the Study

1. The convenience sample populations of the study were small, hindering statistical analysis and generalizations to large populations.
2. The Diabetes Mellitus Comfort Questionnaire was developed for this study and has not proven to be valid and reliable.

Assumption of the Study

The effect of short term coaching on comfort and blood sugar levels is reflective of long term comfort and blood sugar levels.

Summary

The incidence and cost of diabetes mellitus is increasing yearly. Diabetics struggle to comply with a medically prescribed management plan because the plan encompasses all aspects of their lives: diet, weight control, activity/exercise, and social

events. Compliance to the prescribed medical regimen is vital to normalize an individual's blood sugar level and avoid short and long term complications. Ongoing education and psychological support are imperative for individuals with diabetes to adapt to the lifestyle changes warranted by diabetes.

Within this context, nurses find themselves challenged to find effective strategies for assisting diabetics to manage their diabetes so they can be healthier and avoid serious medical complications of the disease. As noted earlier in this chapter, a theoretical framework has been established for comfort that has shown promise in guiding the development and use of intervention strategies. As shown in the following literature review, coaching, when conducted using this theoretical framework and performed by a trusted and knowledgeable professional, can be a cost-effective strategy for providing ongoing support for diabetics and for enhancing their compliance to a regimen for controlling their blood sugar levels.

Chapter II

Review of Literature

Perspective

The cornerstone of diabetic self-care management is patient education focusing on aspects of self-care. Self-care involves following the recommended diet, exercising, medication compliance, problem-solving diabetic issues, blood sugar monitoring, and preventing complications. As with most chronic illnesses, there is a psychological, emotional, and social strain in coping with the condition. It is incumbent upon healthcare professionals working with individuals diagnosed with diabetes to have a firm understanding and continuing empathy of the psychological, emotional, and social impact the diagnosis of diabetes has on individuals.

Individuals with diabetes often suffer from anxiety, depression, and stress. The psychological impact compounded by the knowledge needed to effectively manage diabetes can be overwhelming for them. They must gain knowledge about how diabetes affects their body, diet, exercise, weight control, and medications used to treat diabetes. Diabetic education is usually provided in a formal setting by a healthcare agency. It seems many patients benefit from individual education and support as well. Education and support is the cornerstone of patient adherence to diabetic management plans. As a result, healthcare professionals must develop strategies to enhance adherence or compliance with the prescribed therapy for diabetic patients.

Psychological, Emotional, and Social Considerations of Patients with Diabetes

When exploring these strategies to help diabetic patients, a number of considerations must be made according to the literature. The most important identified have been psychological, emotional, and social. In one study, Peyrot, Rubin, and Siminerio (2006) examined the psychosocial methods primary care physicians and nurses used in managing their diabetic patients and methods used by psychosocial specialists managing referred diabetic patients. Data were retrieved from the multinational Diabetes Attitudes, Wishes, and Needs (DAWN) study. Psychosocial methods were measured by the provider's personal provision of psychosocial support. A list of psychosocial methods were provided to each participant and they were asked to designate on a scale of 4 (often) to 1 (seldom) how often they employed the strategy in caring for patients with diabetes. Some of the methods of psychosocial support included discussing issues with their family, problem solving financial constraints with others, and talking with their caregiver about their everyday routines" (Peyrot et al., 2006, p. 1258). Provider's referral for psychosocial specialist care was the measure of psychosocial specialist care. Providers rated the percentage of their patients who suffered from psychosocial problems including depression, anxiety, denial, stress, and burnout. Respondents indicated on a scale of 1 (fully agree) to 6 (fully disagree) the impact of psychosocial problems on compliance along with their ability to identify patients' psychosocial needs. Results indicated nurses and diabetic specialists employed psychosocial strategies more frequently than primary care physicians, especially when compliance was determined to be an issue. Psychosocial outcomes were better when nurses assessed the ongoing psychological status of patients and integrated psychosocial measures into patient care.

Most importantly, Peyrot, et al. (2006) found ". . . diabetic education incorporating coping skills training produced improved clinical and psychosocial functioning" (p. 1263).

Whereas the preceding study focused on the value of nurses or diabetic specialists paying attention to and integrating psychosocial measures into patient, the following study explored these measures in relation to the timing of intervention between two groups-one receiving the usual care and the other intense treatment. Thoolen, de Ridder, Bensing, Gorter, and Ruttan (2006) used a cross-sectional design to investigate the psychological patient outcomes in relationship to time since diagnosis and treatment intensity. A major Danish-Dutch diabetic screening program in the Netherlands was initiated between 2001-2004 for the purpose of early identification and treatment of individuals with diabetes to prevent diabetic-related morbidity and mortality. The Anglo-Danish-Dutch Study of Intensive Treatment and Complication Prevention (ADDITION) identified 56,978 individuals with diabetes Type II. Two groups were developed based on random assignment. One group received intensive multifactorial therapy (lifestyle advise, cholesterol, and blood pressure control with a designated antihypertensive and protocols for blood sugar control) while the other received *usual care* based on national guidelines (parameters not defined). It is important to note that the defined intensive multifactorial therapy is considered standard therapy in the United States. Of the participants in the ADDITION study 206 without co-morbid conditions were recruited and agreed to participate in a self-management intervention that included psychological assessments. Participants were divided into four groups based on years since diagnosis (<1 year or 2-3 years) and treatment (intensive or usual care). The psychological

outcomes measured were anxiety, depression, diabetes-related distress, perceived seriousness and vulnerability, self-care, and self-efficacy. The study found varied emotional and cognitive outcomes based on time since diagnosis and treatment. Patients diagnosed in less than 1 year and receiving intensive treatment reported more distress and less self-efficacy compared to patients receiving usual care and diagnosed within the past 2-3 years. Such a finding suggests newly diagnosed patients experience significant difficulty adjusting to the regimen. Further, intensively treated patients did not report better self-management than those receiving usual care leading the researchers to conclude, "If medical professionals consider lifestyle changes to be an essential part of diabetes self-management, then patients, apparently need more support" (Thoolen et al., 2006, p. 2264). The fact that newly diagnosed patients felt more distress and less self-efficacy was a particularly important result in that it appeared to be a potentially critical barrier that must be addressed in developing educational interventions.

Another study looked exclusively at the issue of perceived barriers. Simmons, Lillis, Swan, and Haar (2007) conducted a cross-sectional study utilizing an open questionnaire survey to discover the perceived barriers of diabetes care by patients and healthcare providers. Barriers to Diabetes Care is a 4-item tool customized for patients or various healthcare providers (physicians, nurses, dieticians), asking such questions as: "What do you feel prevents you/your patients from looking after your/their diabetes," and "Are you worried about your/your patients' diabetes—if so why/why not?" Healthcare providers and patient participants were solicited from a New Zealand district of 317,751 people. The number of healthcare providers who responded to the questionnaire was not provided. The number of patient participants was 6, 225. The overall response rate was

69% with 17,000 comments received. The study concluded low adherence to diabetic regimen in DM I (46%) and DM II patients (39%). However, DM II patients reported higher rates of self-care (blood sugar monitoring) and lower lifestyle behaviors (exercise). Nurses and patients identified the least number of barriers to diabetes care. General practitioners and patients reported perceived psychological barriers most frequently. Patients rated educational barriers lowest in contrast to healthcare professionals who rated education high. Patients indicated with a high degree of frequency the strictness of regimen as a barrier. Such findings suggest patients do not need education as much as they need psychological support with the diabetic regimen. "The extent and importance of psychological issues among patients suggest a major unmet need" (Simmons et al., 2007, p. 495). Understanding which psychological barriers that different groups perceive as important in regard to diabetes care can be instructive for designing programs for them.

Sridar and Madhu (2002) furthered the research on psychological issues affecting individuals with diabetes by examining psychosocial and cultural issues impacting patients with diabetes with particular attention to the diabetic population in India. A variety of psychological responses to the diagnosis of diabetes have been reported, including denial, anger, guilt, depression, and acceptance. Acceptance and adaptation to lifestyle changes may take up to 12 months after diagnosis. Not only does the diagnosis of diabetes impact diabetics psychologically, it also impacts their quality of life. Quality of life is a broad multidimensional concept, difficult to define but encompasses all aspects of one's life. Studies have found that quality of life is significantly impacted by poor blood sugar control and complications in patients with DM Type II. Perceived

support by significant other in managing diabetes was found to be useful in improving compliance and enhancing quality of life resulting in positive measurable patient outcomes. Effective coping skills are essential in managing diabetes. Studies cited by Sridar and Manhu indicated that men cope more effectively than women, and older individuals adjust to therapy better than younger patients. Support from family and health care providers augments feelings of self-efficacy and coping. Sridar and Manhu discussed various instruments and their effectiveness in measuring the psychological adjustment to the disease along with means to assist individuals in coping with their condition. Ideally, psychologists should be utilized to provide psychological support, assist in compliance strategies, and instruct on stress management.

Glasgow, Toobert, and Gillette (2001) supported the contentions of Sridar and Manhu in their literature review on psychosocial barriers to diabetes quality of life and self-management. Most studies reviewed demonstrated a positive correlation between social support and indicators of self-care, namely a blood sugar test. Family and friends could be a help or hindrance in providing information and dietary compliance. Self-management instructions must be consistent with the patient's values in order to gain compliance. Interestingly, one study indicated patients who received more than desired support were less likely to comply with the prescribed regimen.

DeCoster and Cummings (2005) did not focus on the psychological or emotional impact of diabetes but rather explored evidence-based interventions useful in managing adult patients with diabetes. The majority of the interventions (48%) addressed psychological considerations such as motivation, coping skills, adjustment measures, efficacy, stress management, and problem solving. Following close behind psychological

considerations were educational strategies (37%) and emotional support (25%). One of the most noteworthy interventions entailed intensive small group training sessions on coping skills. Also, highly effective in gaining compliance and reducing blood sugar levels were 10 weekly group sessions focusing on diabetic issues and emotional support. Recorded and monitored exercise, diet, and self-blood sugar monitoring improved activity levels. The extensive attention in the literature of the stress experienced by diabetic patients exemplifies the need for effective psychological and emotional support. Monitored personalized management plans and support groups can be cost-effective means of improving compliance and reducing complications.

Diabetic Education

The organization, nature of, delivery, and importance of diabetic education have been widely discussed in the literature. Wallymahmed (2006) contended that formal and informal education is a crucial aspect of self-management for patients with diabetes. Instruction should be organized, patient-centered and provided by a healthcare professional with knowledge in adult education methods. Group and individual education programs are beneficial to diabetic patients. Group discussions permit mutual support and practical exchanges of information on issues confronting diabetic patients, such as food selection in restaurants. Individual instruction is often informal but useful in learning specific skills, such as proper injection technique necessary for optimal blood sugar control. "However, not everyone is happy in a group situation and most will benefit from a combination of individual and group-based sessions" (p.56).

Two corresponding studies conducted by Phillips examined education for self-management of diabetic patients switching to insulin therapy. In one of these studies

Phillips (2007a) investigated the phenomenon of eight Type II diabetic patients switching to insulin therapy and discovered nine themes. A major theme that emerged with patients was activities of daily living. Of the activities of daily living most difficult for diabetic patients to manage were the dietary changes. Switching to insulin therapy provoked closer adherence to dietary restrictions than had previously been practiced. Information and support was another theme identified. Participants stressed the importance of sound support and information from healthcare providers and indicated poor communication with healthcare providers was a significant problem for diabetics. Negative attitudes expressed by healthcare providers especially in relationship to elevated blood sugar levels elicited feelings of guilt. Educational materials were found to be useful ongoing resources.

In a related study Phillips (2007b) conducted an exploratory qualitative study on procedures employed by diabetic nurse educators in converting Type II diabetic patients to insulin. Nurses' feelings and views on converting patients to insulin therapy were also explored. Four female diabetic nurse specialists employed by the same agency were interviewed for the study. Two were diabetic educators for over 10 years while the other two had less than two years experience in diabetic education. The 30-minute taped interviews were semi-structured and conducted at the worksite. Field notes were taken. Analysis of the interviews and notes revealed nine patient-centered themes ranging from initial reaction to converting to insulin therapy to reasons for contacting the diabetic nurse educator. One diabetic nurse educator preferred group education while the others found individual education and support more favorable. The individual attention provided enhanced patient conversion to insulin therapy and mastery of self-injection.

The researcher acknowledged the small number of homogenous participants as a major limitation of the study but did not feel results were compromised. Both of these studies emphasized the importance of education, support, and communication.

Conceptualizing the components of education for self-care, Mulcahy et al. (2006) outlined a framework for diabetic education and diabetes self-management education (DSME) evolving around seven self-management indices. The indices were: self-monitoring blood glucose, exercise, diet, medication compliance, problem-solving, reducing risks of complications, psychosocial health, and adaptation are components of diabetic patient education for which benchmarks, barriers, and individual outcomes are to be assessed routinely. From their point of view routine assessments should occur yearly or at intervals deemed appropriate. Self-management indices begin with knowledge, skill, and barrier resolution. Various measures such as physiological measures (blood glucose), self-reports observation, and demonstration are used to evaluate achievement of established standard. Healthcare professionals work collaboratively with patients to identify appropriate self-management behavior(s), provide education on achieving desired behavior, assist in resolving barriers, and evaluating outcome of behavior(s).

A similar look at components of self-care was explored by Stys and Kulkarni (2007) who employed a case study approach in identifying measures to assist patients in adapting to lifestyle changes necessary for diabetes management. They noted education is the cornerstone to diabetic care, stressing that education regarding diet, exercise, problem solving, medications, and prevention of complications is essential. Other important considerations they identified were: dietary restrictions and carbohydrate counting are very challenging for many patients; individual attention to label reading and

caloric and carbohydrate counting are useful measures to assist patients in understanding what they are eating and how to make adjustments; the ability to problem solve in the event of illness or missed dosages of medication is an essential component of diabetic care education; and it is incumbent upon educators to discover and facilitate engagement in physical activity enjoyable to the individual. They concluded that diabetic education can be frustrating for educators because of a high incidence of noncompliance. "It is important to support patients at whatever stage they are in their self care regimen and to not underestimate the value of patient-educator interaction, even if it seems as though the patient is not following up on goals" (p. 57).

Compliance of Diet, Exercise, and Medication Regimen

Patients are notorious for being non-compliant in many aspects of diabetic management. A number of studies have examined methods for improving this situation. Clifford, Barber, Elliott, Hartley, and Horne (2005) conducted a randomized controlled assessment in the United Kingdom of 500 patients with newly prescribed medication(s) for a chronic condition, including diabetes, with the intent of discovering non-adherence issues. Clifford et al. (2005) contended that "non-adherence to new medicines for chronic conditions develops rapidly . . ." (p. 166) and a timely intervention would improve adherence. The intervention in the study was a telephone interview conducted two weeks after the patient filled a new prescription for a chronic condition. Participants were opportunistically recruited as a convenience sample from one of the largest pharmacy chains in England when they filled a new prescription. They were randomly assigned to the intervention group or the control group. Pharmacists were trained to conduct semi-structured telephone interviews with patients focusing on problems with

adherence, advice and reassurance on managing their medication problems. Four weeks after recruitment participants in the intervention and control groups were mailed questionnaires on demographics, a measure of health, a measure of beliefs of new medications and a self-report on adherence. The study found there was less non-adherence and fewer reported problems with medications in the intervention than the control group at the four-week assessment. In this study the use of telephone calls as an intervention strategy appeared to have a positive influence on compliance.

In another study examining factors influencing compliance Albright et al. (2001) conducted a cross-sectional survey of 397 Type II diabetic patients from six residency programs affiliated with the University of Texas Health Science Center at San Antonio. The purpose of the six month study was to determine the relationship between self-care behaviors and four identified components related to self-care: patient characteristics, doctor-patient relationship, psychological stress, and social context. A 60-item instrument was constructed with English and Spanish versions and included demographics, satisfaction with diabetes care, overall health status, barriers to self-care, and self-care behaviors. Diet, exercise, blood sugar monitoring, and medication compliance represented self-care and were the dependent variables of the study. Responses to questions reflecting the self-care items were answered as "often," "sometimes," or "never." The independent variables were the demographics, stress, social context, and doctor-patient relationship. A 5-point Likert scale was used to rate the independent variables. The study resulted in many significant findings. Of the demographic predictors the one that was most surprising was uninsured patients were more likely to exercise than insured patients. Patients' satisfaction with their physician

positively correlated with all self-care behaviors but most significantly with diet adherence. As patients reported increased stress levels, attendance to diet and exercise decreased. There was a strong positive correlation between social context and three of the four self-care behaviors. Patients with supportive families adhered to diet, exercise, and medication therapy more closely than those with minimal or low levels of support. Furthermore, a family's empathy and support is often more predictive of positive self-care behaviors than the patient's level of commitment. The researchers also identified the value of positive reinforcement by physicians (healthcare provider) as a means to increase desired behaviors. The most important ways to enhance compliance resulting from this study were strong support from the healthcare provider and from their families.

Another perspective on compliance has focused on the psychological theory of adult attachment. Ciechanowski, Katon, Russo, and Walker (2007) researched the theory of adult attachment in relationship to treatment adherence of diabetic patients. Four types of attachment were adopted by adults based on previous care-giving experiences. Adults who had consistently experienced emotionally unresponsive care-giving adopted a dismissing attachment. Adults with dismissing attachment do not trust others and are uncomfortable with intimacy. Adults with preoccupied attachment received inconsistent care-giving and consequently developed low self-esteem and high dependency on others. Fearful individuals comprised the third type of attachment. Fearful individuals are similar to preoccupied people in that they seek approval from others while combating feelings of rejection. It is thought fearful individuals received harsh, judgmental care giving early on. Secure attachment occurred when adults encountered consistently positive care giving. Adults with secure attachment can readily relate and rely on others.

The researchers' hypothesized patients with dismissing attachment would not be capable of working with healthcare providers, resulting in poor blood sugar control. Type I and Type II diabetic patients were solicited by mail to participate in the cross-sectional study from two clinics. Participants completed seven valid and reliable self-report instruments to measure attachment approach, healthcare provider communication, depression scale, presence of complications, and diabetic knowledge assessment. Three hundred and sixty-seven Type I and Type II diabetic patients consented to participate and completed the questionnaires. The groups varied significantly in age, gender, education, depression, and treatment regimens. The researchers found a significant effect of attachment approach and blood sugar levels. As hypothesized, patients who demonstrated dismissing attachment had higher blood sugar levels than patients with secure, preoccupied, and fearful attachment. Patients with a dismissing attachment approach also viewed provider communication as poor. There were no significant differences in blood sugar levels of patients with other attachment approaches. Overall, the study supported previous research indicating the significance of a positive relationship between healthcare provider and compliance of diabetic patients.

Walker et al. (2006) looked at compliance for the prevention of the development of diabetes when they conducted the Diabetes Prevention Program (DPP) study examining two interventions for preventing or delaying the development of Type II diabetes. First, the effect of metformin was compared with a placebo medication on delaying the development of Type II diabetes in persons with impaired glucose tolerance. Second, the researchers examined the effect of an intensive lifestyle intervention in reducing the incidence of developing Type II diabetes. Of the 3,234 individuals at risk

for developing Type II diabetes 2,155 participated in the medication arm of the study. Participants assigned to a medication were blind to whether they were receiving metformin or placebo as was staff. Adherence to medication therapy was determined by quarterly pill counts and recorded as >80% or <80%. During the quarterly pill counts, researchers assisted patients in problem solving to enhance adherence and believed to have contributed to the high adherence rate for the three years of the study. Over 60% of participants reported no barriers to complying with medication regimens. Of those who did report barriers 22% forgot to take the medication, 8% noted side effects as the reason for not taking the medication, and 8% indicated a disruption in routine led to not complying with medication regimen. Helpful adherence strategies identified in the study were time of day routine (in the morning), reminder device (pill box), and activity association (brushing teeth) with more participants employing such strategies as the study progressed. Compliance of taking metformin was found to reduce the risk of developing diabetes in comparison to noncompliance with taking metformin. "Early adoption of medication adherence was predictive of continuing adherence. This emphasizes the need for early interventions to promote optimal adherence . . . ." (p. 204).

In another study focusing on compliance Grant et al. (2007) conducted a prospective cohort analysis to determine the relationship between medication adherence and medication intensification in Type II diabetic patients. Medication adherence was determined by the number of pills of a first oral hypoglycemic drug dispensed and number of days during a specified time frame. Medication intensification was defined as an increased dose or added medication. Adherence was measured by a serum blood test distinct for diabetic control three months after initiation of therapy (time for changes in

blood level to be detected). A convenience sample of 2,065 participants from a New England Health Maintenance Organization participated. The study indicated patients adhering to one oral agent were more likely to adhere to medication intensification. Most significant was the observation that patients who responded positively (indicated by serum testing) early in the course of treatment (one agent) may benefit from intensification sooner in the course of management. Grant et al. (2007) contended from this study ". . . those patients with worse adherence to their first prescribed oral hypoglycemic drug were less likely to have their regimen intensified after initial elevated A1C than similarly hyperglycemic patients with good baseline adherence" (p. 811). This study, along with the others, demonstrates how critical compliance is diabetes self-management.

Telephone Interventions for Improved Diabetes Management

The use of the telephone for contacting and coaching Group II diabetic patients was a major component in this researcher's study. The following studies were found to be informative, in this regard. Glasgow, Toobert, and Gillette (2000) conducted a randomized study of patients with Type II diabetes on the effect of brief structured telephone calls and/or enhanced community resources on various outcomes of diabetes self-care management. The outcome measures included behavioral assessments along with physiological assessments of hemoglobin A1C, weight reduction, and reduction in cholesterol. Participants were assigned to one of four groups: basic care, basic care with telephone calls, basic care with enhanced community resources, and combined basic care, telephone calls and enhanced community resources. The telephone intervention involved a nurse making three to four structured telephone calls over a six month period of time to

offer support, reinforce education, and assist with problem solving. The researchers found no significant reduction in the physiological outcomes of hemoglobin A1C or cholesterol.

In the following study a longer period of time was used for calls and more calls were made than in the former one. Piette, Weinberger, Kraemer, and McPhee (2001) conducted a year-long comparative study with Type I and Type II diabetic patients from a Veteran Affairs Clinics on the use of telephone calls for enhanced compliance and improved glycemic control. Compliance was based on the American Diabetes Association's measures that included foot inspections, self-monitoring blood sugar, less reported symptoms of poor diabetic control, and cholesterol checks. Glycemic control was measured with blood sugars and hemoglobin A1C. Patients were randomly assigned to the telephone group or the control group. Biweekly automated telephone calls were made to remind patients of prescribed self-care measures. During the calls, patients with health care problems were identified and contacted by a nurse to address specific identified needs. No significant differences were found in reduction in hemoglobin A1C or improved blood glucose levels between groups. Patients in the telephone group reported higher compliance with self-care behaviors than the control group.

In the following study even more regular calls were made than in the former studies. Kim and Oh (2003) conducted a study on the effect of telephone call on glycemic control with Korean patients with Type II diabetes. Telephone calls were made on a biweekly basis the first month then weekly for two more months with each participant receiving approximately 16 telephone calls over a three month period. There was found to be a significant improvement in the hemoglobin A1C for the intervention

group compared to the control group. However, there were no significant differences in fasting glucose levels and post-prandial levels between the two groups after a three-month period. While more regular phone calling appeared to provide improvement for the intervention group, like the other studies reviewed there were no significant differences in the blood sugar levels.

Another study on phone calling as an intervention had similar results. Maljanian, Grey, Staff, and Conroy (2005) conducted a study with 507 Type II diabetic patients on the effect of intensive telephone calls on glycemic control as measured by the hemoglobin A1C. After attending a structured diabetes disease program, participants were randomly assigned to the control group or the intervention group. The intervention group received weekly telephone calls for three months reinforcing information, offering encouragement and assisting with problem solving. The control group did not receive telephone calls. Glycemic control was assessed three months and twelve months following the intervention. There was no significant difference in the hemoglobin A1C between the control group and the intervention group at the three month or twelve month measurement.

Unlike the preceding studies where a trained nurse or diabetic educator served as the communicator with patients, in the following study a different approach was used. Young et al. (2005) studied the effect of telephone calls on glycemic control in patients with Type II diabetes. The researchers utilized trained non-medical staff to conduct structured telephone calls with diabetic patients addressing knowledge, management of change, medications and adherence issues. When problems were identified during telephone interviews a diabetic nurse was consulted for direction. The number of

telephone calls varied based on determined patient needs. The year-long study found a significant improvement in glycemic control with a 0.3% reduction in hemoglobin A1C with baseline hemoglobin A1C of 7-9%**.**

Summary

Individuals diagnosed with Diabetes Mellitus face a lifetime of adaptation and integration of disease management into daily living. The preceding review of literature has shown different approaches to providing educational and psychological support to diabetic patients. Differences in the research have included, for example, the background and experience of the educator, the scope of resources provided, the method for selecting patients, timing of the intervention, and frequency of intervention. Nonetheless, literature supports formal and informal education on diet, exercise, weight management, medications and effective coping skills have found to be beneficial in assisting patient self-manage their diabetes. Furthermore, the reality of dealing with DM and the potential complications can be psychologically devastating. Individuals with diabetes can suffer from anxiety, depression, stress and burn out along with physical problems of cardiovascular disease, kidney disease, neuropathy and blindness. Therefore, healthcare professionals must find strategies to provide educational and psychological support to individuals with diabetes.

The results of these studies have influenced the design of this study in several ways. Similar to other studies where the sample groups studies were a part of a diabetic education program, in this study samples were solicited from participants in two separate diabetic education programs that encompassed the aspects of diabetic care necessary to manage their diabetes. The most successful outcomes in the studies reviewed

emphasized the importance of integration of psychological support, in addition to education. Accordingly, psychological support was an important component of the telephone call intervention in this study. Having a person with strong clinical knowledge work with diabetic patients and develop a rapport with them was shown in the literature to enhance compliance, resulting in lower blood sugar levels. This researcher, a nurse practitioner, met this criterion. Finally, while research on telephone calls as an intervention has had mixed results, it was decided that taking a further look at this approach would make an important contribution to the literature.

Chapter III

Methodology

Perspective

Healthcare for individuals with diabetes is constantly evolving and includes new pharmacological agents, ongoing monitoring of health status, and prevention and/or early detection of complications. Attention should also be directed toward measures to enhance patient compliance to diabetic management regimens. Coaching as a nursing intervention has been identified as a means to improve compliance and was the focus of this study.

Participants

Adults, defined as individuals 21 years or older, with diabetes mellitus (DM) Type I or Type II, are the target population of the study. The samples were comprised of adults diagnosed with DM I or II recruited from two different hospital-based diabetic education programs in the same Midwestern city. No selection process was employed for including or excluding participants in the study. Participation was voluntary and informed consent was obtained. There was no risk of physical, emotional, or mental harm to the participants. Prescribed diabetic regimens and established diabetic education programs were not being altered in any way.

Fifty participants enrolled in the study from one diabetic education program comprising Group I who did not receive telephone calls. Of the 50 enrolled participants in Group I, 30 completed all data and returned it to the researcher. Sixty-six participants enrolled in the study from the other diabetic education program and comprised Group II that received telephone calls. Of the 66 enrolled participants in Group II, 35 completed and returned all data to the researcher. The attrition rates for Group I and Group II were 40% and 47%, respectively.

The sample groups were overall homogenous. Approximately half of the participants in each were male and half were female. In both groups, the highest number of participants was in the age group of 60-69 years old. The overwhelming majority of each group was Caucasian with only seven minority participants in Group I and one minority participant in Group II. Eighteen participants, which was the majority for each group, reported the highest level of education obtained was a high school diploma. Income level was not indicated by some participants. Those indicating income level were fairly evenly dispersed between <$10,000 to $41,000-$50,000 per year for both groups. Most interesting of the demographic information was the number of years since diagnosed with diabetes. There were two clusters of participants in both groups. One cluster was the less than one year since diagnosis and the other was those diagnosed over five years ago with diabetes. Participants in both groups indicated oral agents most frequently as their anti-diabetic medication. See Table 1 for demographic data.

Table 1
Demographic Data

	Group I (Blue) No Call *N*=30	Group II (Green) Call *N*=35
Sex		
Male	15	14
Female	15	21
Marital Status		
Married	23	25
Single	2	1
Divorced	3	2
Widow	2	7
Age Group		
18-29	0	0
30-39	0	2
40-49	3	5
50-59	7	7
60-69	15	12
70-79	6	7
80-89	0	1
Race		
Caucasian	23	34
African American	6	1
Asian	1	0
Hispanic	0	0
Education		
8th Grade	4	1
HS	18	18
AD	5	10
BS	1	3
MS	3	2
DOC	0	0
Income		
<$10,000	3	5
$11-$20,000	5	3
$21-$30,000	6	8
$31-$40,000	7	7
$41-$50,000	4	4
$51-$60,000	0	0
$61-$70,000	1	5
$71-$80,000	1	0
$81-$90,000	0	0
>$91,000	0	0

Years with DM		
<1	10	13
1 Y	1	1
2 Y	2	2
3 Y	0	3
4 Y	2	2
5 Y	2	0
>5Y	14	12
Medication Management		
Oral Agents	12	20
Insulin	5	4
Oral and Insulin	6	8
Diet/Exercise	2	2

Note: Discrepancies in the number of responses in various categories were the result of some participants not selecting a response in the category or selecting more than one response for a category.

Instrumentation

Kolcaba (1992) identified the concept of comfort as a basic patient need through her nursing practice. She discovered three levels of comfort: relief, ease, and transcendence, and four contexts: physical, psychospiritual, environmental, and sociocultural. Kolcaba depicted her comfort concept with a taxonomic structure (TS). The TS was used to develop the General Comfort Questionnaire (GCQ) to measure the level and context of comfort in patients. After some research, Kolcaba recognized the GCQ would not adequately measure comfort in all patient populations; therefore, she developed guidelines for the adaptation of the GCQ to specific patient populations. The GCQ contains 48 self-report items on a 6-point Likert scale with 6 indicating "strongly agree," and 1 indicating "strongly disagree." The adaptability of the GCQ to various patient populations made it a desirable instrument for this study.

The Diabetes Mellitus Comfort Questionnaire (DMCQ) was derived according to guidelines from the General Comfort Questionnaire (GCQ) developed by Kolcaba (2003). Questions from the 48-item GCQ were deleted and revised to reflect diabetes specific content related to comfort. Despite Kolcaba's (1992) caution to avoid using the same taxonomic structure, this researcher found the GCQ taxonomic structure suitable for the DMCQ with positive and negative questions consistent with the GCQ. The DMCQ was used to measure comfort levels at the beginning of the study, two weeks after the diabetic education program, and four weeks after the diabetic education program.

Approximately 120 Accu-Check Aviva Blood Glucose monitors and Accu-Check Active Blood Glucose Monitoring Strips were donated by a pharmaceutical company for the study. Each enrolled participant was given a glucometer and 30 strips for his or her

personal use for the study. Patients were instructed on the proper use of the glucometers at the time of initiation into the study. If an instrument malfunctioned during the study, participants were instructed to contact the researcher and the instrument would be replaced. Participants kept the glucometer upon completion of the study. Unused glucometers and strips were donated to a local indigent clinic.

To measure patient adherence or compliance to the prescribed diabetic regimen, the 15-item Self Care Inventory-Revised (SCI-R) was used. Written permission from the author was obtained (See Appendix, F). The SCI-R is a self-report instrument utilizing a 5-point Likert scale to address blood glucose monitoring, diet, exercise, emergency precautions, and insulin regulation for Type I diabetics. The SCI-R has been found to be appropriate for Type I and Type II diabetics. The length of the instrument and use of Likert scale for weighing compliance allows for ease of completion. (Weinger, Butler, Welch, & LaGreca, 2005).

All forms were color-coded and numbered beginning with number one. At the beginning of the study, participants completed a demographic form addressing sex, age, marital status, highest educational level achieved, income, number of years since diagnosis with diabetes, and diabetic medications. Also included on the demographic form was contact information of telephone numbers and addresses.

Procedure

The study began in March 2008 and concluded in October 2008. Prior to conducting the study, approval of the university and health care agencies was obtained. The convenience sample was solicited from two hospital-based diabetic education programs within the same Midwestern city. The diabetic classes were ten hours in length

with the first hour being devoted to an individual assessment, followed by nine hours of content in a group setting. Content covered included dietary instructions focusing on label reading and carbohydrate counting, activity/exercise, weight management, sick-day management, foot care, and psychological aspects of dealing with diabetes. All classes were taught by certified diabetic educators and licensed dieticians. The researcher attended both programs prior to beginning the study to become familiar with the course content of each program. The researcher was a certified family nurse practitioner with over 10 years of primary care practice experience working with diabetic patients. Class times and sizes varied according to enrollment with a limit of 10 participants per each class. There were limited classes available in June, July, and August for both programs because of a history of low participation in the summer months. Spouses and/or significant others were welcomed to attend, however, were not eligible to participant in the study. Both programs had resources available to allow individuals to participate if insurance did not cover the classes.

Upon completion of the diabetic education program, the purpose of the study was explained and participants were asked to voluntarily participate in the study. At that time baseline information was gathered. Participants completed the color-coded and numbered demographic sheet and instruments. If the participants agreed to participate, they tested their blood sugar level with the donated glucometer and their personal glucometers and compared the results. If the blood sugar levels were within five points of the two glucometers, participants were asked to record the average blood sugar from the past seven days as recorded on their personal glucometers. Individuals who had a more than five point difference in the blood sugar levels from the two glucometers were

given the option of not participating in the study, or using the donated glucometer for seven days to obtain an average. Upon obtaining the seven-day average blood sugar level they would complete the DMCQ and SCI-R and mail the forms in a self-addressed, stamped envelope to the researcher. Two weeks after the baseline data were collected, Group I was mailed a cover letter explaining the study again along with the DMCQ and SCI-R. Group I participants were asked to complete the forms, document their average blood sugar level over the past seven days in the designated area on the DMCQ, and return the completed forms to the researcher in the self-addressed, stamped envelope. The process was repeated four weeks after beginning the study. Group II received individual coaching via telephone calls by the researcher two weeks and four weeks after beginning the study. Following each coaching session, the participants were mailed the DMCQ and SCI-R. Group II participants were asked to complete the forms, document their average blood sugar level from the past seven days in the designated area on the DMCQ, and return the completed forms to the researcher in the self-addressed, stamped envelope. It took the participants approximately 15 minutes to complete the forms in class and it is assumed to have taken a similar amount of time at the repeated measures. Only the researcher and diabetic educator for the respective programs had access to the information provided by the participants. The forms were kept in a portable locked file in a secured room. Confidentiality of information was maintained. Upon receipt of all interval data, participants were mailed a $10 merchant gift card in appreciation for their time and participation.

Research Design

The study design was a comparative quasi-experimental pretest-posttest design with repeated measures. One of the dependent variable of the study was comfort as measured by the Diabetes Mellitus Comfort Questionnaire (DMCQ). The other dependent variable was blood sugar levels as recorded on the individual's personal glucometer. Coaching was the independent variable of the study. Coaching was the intervention provided by the researcher and involved listening, providing information on diabetes, offering reassurance, instilling hope, and assisting in planning realistic diabetes management strategies (Kolcaba, 2003). Group II received coaching via telephone calls two weeks and four weeks after completion of the diabetic classes and enrolling in the study. Group I did not receive coaching. Compliance or adherence to the medically prescribed diabetic regimen was an extraneous variable measured by the Self Care Inventory-Revised (SCI-R) at the specified time intervals.

Validity and Reliability

The General Comfort Questionnaire (GCQ) has a Cronbach's alpha = .88. Reliability coefficients for the subscales are as follows: physical .70, spiritual .78, environment .80 and social .66. After development of the DMCQ a pilot study of the 28-item instrument with nine individuals with diabetes was conducted and resulted in a Cronbach's alpha of .48. Kolcaba reviewed the DMCQ and taxonomic structure for validity and provided guidance in instrument revisions. The certified diabetic educators of the hospital-based diabetic education programs also reviewed the DMCQ and offered suggestions on pertinent content and wording. Feedback resulted in adaptations to questions to more accurately reflect measurement of variables.

The mean scores for each level of comfort as measured by the DMCQ for this study were computed upon completion of the diabetic education program, two week after completion of the diabetic education program, and four weeks after the diabetic education for both groups. Cronbach's alpha for the levels of comfort over the three intervals of time ranged from .484-.745 which limited the strength of the instrument.

The high validity and reliability scores made the use of the SCI-R in this study appropriate. The SCI-R demonstrated internal consistency with the Cronbach's alpha = 0.87 and reliability Cronbach's alpha = 0.85 for Type I and Type II DM patients. Validity scores were checking blood sugar r = 0.49, diet r = 0.50, and exercise r = 0.38 with a p <0.001(Weinger, Butler, Welch, & La Greca, 2005).

The SCI-R was computed upon completion of the diabetic education program, two weeks after completion of the diabetic education program, and four weeks after completion of the diabetic education program for both groups. The Cronbach's alpha ranged from .577-.611 over the three intervals of time.

Data Analysis

Results were analyzed using a univariate repeated measures analysis of variance (ANOVA) for comfort levels, compliance, and blood sugar levels. All participants had completed a formal diabetic education program as previously described. Upon completion of the respective diabetic education programs, participants completed the initial measures of the DMCQ, SCI-R, and recorded their average blood sugar level from the past seven days as recorded on their personal glucometer. Two weeks following the program both groups completed the DMCQ, SCI-R, and documented their average daily blood sugar from the past seven days as recorded on their glucometer. The process was

repeated again four weeks after concluding the diabetic education program and beginning the study. One group received the intervention of coaching prior to completing the instruments at weeks two and four, respectively. The other group completed the instruments, but did not receive the coaching intervention. Measurements were completed upon initiation into the study then two and four weeks later for the purpose of assessing the effect of coaching. The assumption of sphericity was assessed for each analysis. If a violation occurred the Huynh-Feldt correction was used to adjust the resulting F tests.

Summary

Adults with diabetes were solicited from two hospital-based diabetic education programs in the same Midwestern city to participate in a study comparing the effect of coaching, as a comfort care intervention, on comfort levels as measured by the Diabetes Mellitus Comfort Questionnaire (DMCQ), and blood sugar levels as recorded on their personal glucometers between two groups. Demographic data was collected at the beginning of the study and demonstrated that both groups were comparable in all aspects. The DMCQ was developed according to established guidelines from the General Comfort Questionnaire (GCQ). The Cronbach's alpha of the GCQ = .90. Reliability for the subscales ranged from .66-.80. The adaptability of the GCQ and the high reliability made it a desirable instrument for this study. Adherence to the medically prescribed diabetic management was measured using the SCI-R with a Cronbach's alpha = .85 with subscale validity scores ranging from r = .38-5.0. The ease of completion of the SCI-R along with the high validity and reliability made the selection of the instrument for this study an appropriate choice. Blood sugar levels and instruments were completed at three intervals

of time. The results were analyzed using the univariate approach of ANOVA. The assumption of sphericity was assessed at each analysis.

CHAPTER IV

Results

The purpose of this study was to compare the impact of coaching on comfort levels and blood sugar levels in two groups of individuals with diabetes. Two comparable groups of individuals completed the scales measuring comfort and compliance along with recording their blood sugar levels at three intervals of time.

The research hypothesis was stated as follows: Individuals with diabetes in Group II who received coaching at specified intervals of time will demonstrate lowered blood sugars as measured by individuals' glucometers and higher comfort levels as measured by the Diabetes Mellitus Comfort Questionnaire (DMCQ) at specified intervals of time when compared to individuals with diabetes in Group I. The hypothesis was tested by computing each level of comfort (relief, ease, and transcendence) as measured by the DMCQ for both groups at three specified intervals of time. The higher the score of the DMCQ, the more comfortable one is with the diabetic management regimen. Analysis of variance was computed to determine differences. The results follow.

Comfort Levels

The DMCQ depicts three levels of comfort; relief, ease, and transcendence. Within each level there is physical comfort, psychoemotional comfort, environmental comfort, and sociocultural comfort. The mean scores at each level of comfort were

computed for each group. The overall mean scores for the relief comfort level at the three specified intervals of time for Group I were: 4.11 at time 1; 4.19 at time 2; 4.26 at time 3. The overall mean scores for the relief comfort level at the three specified intervals of time for Group II were: 4.10 at time 1; 4.33 at time 2; 4.38 at time 3. The scores of the two groups for the relief comfort level were comparable at all three time intervals and demonstrated minimal improvement over the time period.

The overall mean scores of the ease comfort level at the three specified intervals of time for Group I were: 4.78 at time 1; 4.68 at time 2; 4.73 at time 3. The overall mean scores of Group II for the comfort level of ease at the three specified intervals of time were: 4.91 at time 1; 4.84 at time 2; 4.86 at time 3. The scores of the two groups for the ease comfort level over the specified interval of time were comparable and did not indicate significant change in the level of comfort over the specified period of time.

The overall mean scores of the transcendence level of comfort for Group I over the three specified intervals of time were: 4.54 at time 1; 4.49 at time 2; 4.41 at time 3. The overall mean scores of the transcendence level of comfort of Group II over the three specified intervals of time were: 4.53 at time; 4.57 at time 2; 4.70 at time 3. The scores of the two groups for the transcendence comfort level were comparable and did not indicate a significant change in level of comfort over a period of time.

The sphericity assumption was not violated. Based on the ANOVA no main effect or interactions were found to be statistically significant for the relief, ease, and transcendence subscales of the DMCQ. Results of the DMCQ for each level of comfort did not demonstrate higher levels of comfort for Group II at any specified time interval in comparison to Group I. The results of the study did not support the first part of the

research hypothesis. See Table 2 for means and standard deviations by group and time. See Tables 3, 4, and 5 for ANOVA of levels of comfort.

Table 2

Comfort Levels of Relief, Ease, and Transcendence for Group I and Group II

Overall Comfort Level At Specified Times	Group	*M*	*SD*	α
Relief Time 1	Group I	4.11	.834	.584
	Group II	4.10	.906	
Relief Time 2	Group I	4.19	.762	.629
	Group II	4.33	.817	
Relief Time 3	Group I	4.29	.884	.638
	Group II	4.38	.770	
Ease Time 1	Group I	4.78	.714	.484
	Group II	4.91	.594	
Ease Time 2	Group I	4.68	.859	.686
	Group II	4.84	.692	
Ease Time 3	Group I	4.73	.795	.625
	Group II	4.86	.695	
Trans Time 1	Group I	4.54	.828	.754
	Group II	4.53	.842	
Trans Time 2	Group I	4.49	.858	.761
	Group II	4.57	.774	
Trans Time 3	Group I	4.41	.846	.759
	Group II	4.70	.806	

Table 3

ANOVA for Comfort Level of Relief

Epsilon Corrections: Sphericity Assumed					
Source	*SS*	*df*	*MS*	*F*	*p*
Time	1.495	2	.747	2.78	0.66
Group	.328	1	.328	.214	.645
Time*Group	.207	2	.103	.386	.681
Error(time)	33.274	124	.268		

Table 4

ANOVA for Comfort Level of Ease

Epsilon Corrections: Sphericity Assumed					
Source	*SS*	*df*	*MS*	*F*	*p*
Time	.230	2	.115	1.165	.315
Group	.942	1	.942	.682	.412
Time*Group	.016	2	.008	.080	.923

Table 5

ANOVA for Comfort Level of Transcendence

Epsilon Corrections: Sphericity Assumed					
Source	*SS*	*df*	*MS*	*F*	*p*
Time	0.28	2	0.14	0.91	.913
Group	.673	1	.673	.389	.535
Time*Group	.755	2	.377	2.437	.092
Error (time)	19.519	126	.155		

Blood Sugar Levels

Blood sugar levels were obtained for both groups at the initiation into the study, two weeks after completion of the diabetic education program, and four weeks after completion of the diabetic education program. The mean blood sugar levels for Group I at the three specified periods of time were: 139.2, 131.2, and 129.0. The mean blood sugar levels for Group II at the three specified periods of time were: 148.1, 133.1, and 137.1. There was no significant difference in the reduction in the blood sugar levels in either group with both groups having approximately a ten point reduction in blood sugar over the study period F (2, 124) = 2.786, p = 0.66. There was an increase in the mean blood sugar level in Group II between the second and third measurement period. The biggest change in blood sugar levels for both groups was between the first and second measurement. However, based on ANOVA time was not statistically significant for blood sugar for either group or the interaction within the group. In addition, sphericity was violated (Mauchly's Test = .321 p <.001), so the Huynh-Feldt Correction Epsilon was use to adjust the resulting F tests. The second part of the research hypothesis was not supported. See Tables 6 and 7 for blood sugar levels for Group I and Group II. See Table 8 for ANOVA of blood sugar levels within groups.

Table 6

Blood Sugar Levels of Group I and Group II Over Specified Period of Time

Blood Sugar Level At Specified Times	Group	*M*	*SD*
Blood Sugar Time 1	Group I	139.2	45.0
	Group II	148.1	57.5
	Combined	143	
Blood Sugar Time 2	Group I	131.2	32.9
	Group II	133.1	36.4
	Combined	132	
Blood Sugar Time 3	Group I	129.0	28.1
	Group II	137.1	36.8
	Combined	133	

Table 7

Mean and Standard Error for Combined Blood Sugar Levels Over Time

			95% Confidence Level	
Time	*M*	*SE*	Lower Bound	Upper Bound
1	143	6.492	130.7	156.6
2	132	4.341	123	140.8
3	133	4.177	124	141.3

Table 8

ANOVA for Blood Sugar Levels Within Groups

Source	*SS*	*df*	*MS*	*F*	*p*
Time	5284.9	1.2	4330.1	4.09	.039*
Group	1934.1	1	1934.1	.516	.475
Time*Group	470.7	1.2	385.6	.365	.590
Error(time)	81352.0	7.6	1058.0		

**p* < .05

Compliance Scores

The Self Care Inventory-Revised (SCI-R) was used to assess compliance or adherence to the medically prescribed diabetic regimen. Compliance was measured because of the potential impact on blood sugars. Overall compliance scores as measured by the Self Care Inventory-Revised (SCI-R) were calculated at the three specified intervals of time for both groups: initiation into the study, two weeks after completion of the diabetic education program, and four weeks after completion of the diabetic education program. Compliance scores for Group I was: 3.72, 3.72, and 3.76 at initiation into the study, 2 weeks following the education program, and 4 weeks following the education program, respectively. During the same specified period of time, Group II scores for compliance were: 3.66, 3.66, and 3.71. There were no significant differences between compliance scores between Groups I and II over the specified period of time. Based on ANOVA no significant main effects or interactions were found to be statistically significant. The sphericity assumption was not violated. See Table 9 for mean and standard deviations for compliance scores and Table 10 for ANOVA for compliance.

Table 9

Compliance Scores for Group I and Group II Over Specified Period of Time

Compliance Scores At Specified Times	Group	*M*	*SD*
Compliance Time 1	Group I	3.72	.550
	Group II	3.66	.504
Compliance Time 2	Group I	3.72	.550
	Group II	3.66	.504
Compliance Time 3	Group I	3.76	.582
	Group II	3.71	.469

Table 10

ANOVA for Compliance

Epsilon Corrections: Sphericity Assumed

Source	*SS*	*df*	*MS*	*F*	*p*
Time	.069	2	.035	1.255	.289
Group	.140	1	.140	.181	.672
Time*Group	.001	2	.001	.026	.975
Error(time)	3.195	116	0.28		

Summary

The purpose of this study was to compare comfort levels and blood glucose levels of individuals with diabetes who receive coaching as a nursing comfort measure to individuals with diabetes who do not receive coaching. The hypothesis of the study stated individuals with diabetes who receive coaching will indicate higher degrees of comfort, as measured by the Diabetes Mellitus Comfort Questionnaire (DMCQ), and have lower blood sugars levels, as recorded on their individual glucometers, over a period of time in comparison to individuals with diabetes who do not receive coaching. The hypothesis of the study was not supported by the data. The DMCQ was used to measure the three levels of comfort at three specific intervals of time. There were no significant differences at any level of comfort between the two groups over the course of the study. Adherence to diabetic management regimen was measured using the Self Care Inventory-Revised (SCI-R). The SCI-R was completed at the three specific intervals of time. Compliance scores were comparable between the two groups throughout the study. Blood sugar levels were obtained on the individuals' glucometer and recorded at three specific intervals. The blood sugar levels in both groups showed a ten point improvement over the study period. However, the group not receiving the coaching intervention showed a steady improvement in lowering the blood sugar levels, while the group receiving the coaching intervention had an improvement at the second recorded interval, but had an elevated blood sugar at the third interval.

CHAPTER V

Discussion

Findings

With the rising cost of healthcare and severely limited third party reimbursement, healthcare providers are challenged to find ways to assist patients in managing their chronic conditions. The prevalence of diabetes and rising cost of managing diabetes necessitates improved measures of assisting individuals with diabetes manage their condition from diagnosis to death (Boren, Fitzner, Panhalkar, & Specker, 2009). Coaching by nurses via telephone calls can be a cost-effective means of providing ongoing education and support to individuals with diabetes. This was the context within which this study was undertaken.

It was hypothesized that: Individuals with diabetes in Group II who received coaching would demonstrate lower blood sugar levels as measured by their individual glucometers and higher comfort levels as measured by the Diabetes Mellitus Comfort Questionnaire (DMCQ) at specified intervals of time when compared to individuals with diabetes in Group I who did not receive coaching. An analysis of variance of all three comfort levels--relief, ease, and transcendence--at the beginning of the study, two weeks after initiation into the study, and four weeks after the study began did not indicate

higher levels of comfort as measured by the DMCQ in individuals with diabetes who received the nursing intervention of coaching in comparison to individuals with diabetes who did not receive the coaching intervention. An analysis of variance of the average blood sugar level from the past seven days, as recorded by the individual's glucometer, did not indicate lower levels in the group of individuals with diabetes who received the intervention of coaching at two weeks after initiation into the study or at four weeks after initiation into the study in comparison to the group who did not receive coaching. There were no significant differences within both groups over the period of the study nor were there difference between the groups over the course of the study. An analysis of variance of the Self Care Inventory-Revised at initiation, two weeks after initiation into the study, and four weeks after initiation into the study of both groups did not indicate a difference in compliance scores. The hypothesis was not supported.

The three comfort levels of both groups as measured by the DMCQ were comparable at initiation of the study. At first this appeared remarkable, but upon further examination was understandable, given that participants from the study had just completed a formal diabetic education program empowering them to successfully self-manage their diabetes. Adherence scores were also significantly comparable for the same reason. The comfort scores and adherence scores remained equivalent at the other measured times suggesting that the coaching intervention that one group had received prior to completing the DMCQ and SCI-R may appear to have been ineffective. However, it may be the groups remained empowered from the diabetic education program, and therefore compliant and comfortable with self-management with the diabetic regimen resulting in low blood sugar levels. Perhaps extending the length of the

study may have resulted in differences in comfort levels, compliant scores, and blood sugar levels between the two groups at the other measured times. In other words, the impact of the coaching intervention may have been evident at a later time had the intervention continued.

An unexpected, yet important finding of the study was the low blood sugar levels of both groups at the time of enrollment into the study, two weeks after the formal diabetic education program, and four weeks after the formal diabetic education program. Group I's average daily blood sugar over the past seven days at the beginning of the study was 139 mg/dL, two weeks later it was 131 mg/dL, and after four weeks was 129 mg/dL. Group II's average daily blood sugar over the past seven days at the beginning of the study was 148 mg/dL, two weeks later was 133 mg/dL, and after four weeks was 137 mg/dL. Neither group had significantly high blood sugar levels at any time during the study. In fact, both groups were under the American Association of Association of Clinical Endocrinology and American College of Endocrinology's target random blood sugar level of <140 mg/dL.

This finding was the first possible explanation for the lack of the expected improvement of comfort levels and blood sugar levels between the group of individuals receiving coaching and the group that did not. Substantial improvements in blood sugar levels and other indices of glycemic control may be difficult to obtain when the levels are near normal at the beginning of the study. When baseline blood sugar levels are considerably higher than the normal blood sugar level, differences may be more apparent after the coaching intervention. Piette et al. (2001) and Young et al. (2005) found greater improvement in hemoglobin A1C in the groups who received telephone interventions

than the usual care group but their baseline hemoglobin A1C levels were higher at baseline.

A second possible explanation for the lack of improvement in comfort levels, compliance levels, and blood sugar levels was the lack of an established patient-provider relationship between the researcher and participants. Albright et al. (2001) found that positive feedback from physicians and satisfaction with the physician increased patients' compliance with desired behaviors. Establishing a caring relationship prior to conducting the study may have resulted in higher comfort scores in the group receiving the coaching intervention. The lack of an established relationship did not explain why the group not receiving coaching indicated comparable comfort levels and compliance levels to the group that received coaching at both baseline comfort levels and compliance levels. An explanation for the lack of any change may again be the result of continued empowerment from the diabetic education program. Another possible reason might have been that participants may have perceived ongoing data collection as a form of monitoring their compliance and blood sugar levels. They may have been concerned about repercussions, if they did not comply with diabetic regimens.

A third explanation may have arisen from the fact that the majority of participants in both groups were married. Some had their spouses attend the diabetic education program with them. Comfort and compliance may have been increased at initiation into the study and throughout the study period in individuals who were married and had spouses involved in the patients' diabetic regimen.

A fourth explanation emerged from the fact that the coaching intervention did not adequately meet the participants' needs. The coaching intervention entailed two

unscripted telephone calls of varying lengths of time based upon participants' responses to general questions regarding compliance to medically prescribed regimens. More frequent telephone calls with specific questions regarding diabetes management have been found to enhance compliance and improve glycemic control (Kim & Oh, 2003; Walker et al, 2011). In addition to the scripted and more frequent telephone calls, it may have been beneficial to provide a telephone number and allow patients to contact their coach with questions and concerns, as desired.

A fifth explanation of why a change in comfort levels and blood sugar levels was not evident in the group that received coaching was that half of the participants in both groups had been diagnosed with diabetes over five years ago. It can be assumed that these participants had some understanding of diabetes self-management and were attending the diabetic education program to update their knowledge. Having a sound fundamental knowledge of diabetes and the measures necessary to effectively manage it would likely enhance one's comfort level.

A sixth explanation for comparable comfort levels, compliance scores, and blood sugar levels between the two groups throughout the study was a perceived obligation the participants may have felt to the study. Receiving a free glucometer for participation in the study may have elicited feeling of obligation to the researcher and study. The free glucometers may have been an incentive for some participants to comply with their diabetic regimen resulting in improved blood sugars.

A final possible explanation as to why there were no significant differences between the two study groups was the homogeneity of the samples. The study participants of both groups were predominantly Caucasian, middle-class individuals with

a high school education from the same Midwestern city. Had the groups been more diverse, the results may have been different. For example, a study by Kim and Oh (2003) found Korean individuals with diabetes to have a significant reduction in hemoglobin A1C with the use of telephone call interventions. Coaching may have a greater impact on comfort levels and blood sugar in minority and lower socioeconomic populations where diabetes is prevalent, i.e., Hispanic, African American, and American Indian.

In comparing the findings from this study with others there were similarities and differences. Findings from this study were consistent with the study of Maljanlan et al. (2005) who found no significant difference in reduction of blood glucose levels between groups of diabetics, one receiving telephone calls and the other not. It was also consistent with the findings of Piette et al. (2001) who studied the effect of biweekly automated phone calls over a year on hemoglobin A1C levels in Type II diabetics. Although patients were found to adhere more closely to their prescribed diabetic regimen, a reduction in hemoglobin A1C was not evident. Sacco et al. (2008) found regular "coaching" telephone interactions were useful in improving many aspects of diabetic self-care management including, reduction in diabetic symptoms, dietary compliance, exercise, and foot care. However, they did not find a significant reduction in blood sugar levels despite improved self-care.

The findings of this study contradict the findings of other studies using telephone intervention for improved glycemic control. Walker et al. (2011) found telephone interventions at four to six week intervals over a year modestly improved hemoglobin A1C levels and medication adherence in low income ethnic populations. The telephone intervention focused on diabetes medication compliance, adaptation measures for

lifestyle changes, problem solving, and goal setting. Walker et al. (2011) utilized written materials to supplement the telephones and provided more telephone calls over a longer period of time. All participants received up to 10 calls at four to six week intervals for over a year. Kim and Oh (2003) found telephone calls to be significantly effective in reducing the hemoglobin A1C over a three-month period. A nurse called diabetic patients twice a week for the first week and called once a week for the next eight weeks. Topics addressed during the telephone calls included diet, exercise, blood sugar monitoring, and medications. Piette et al. (2001) studied the effect of automated telephone calls with a nurse follow up call to address diabetic issues in English and Spanish speaking adults with diabetes. However, Piette et al (2001) found follow up hemoglobin A1C and blood sugar levels to be modestly lower.

Implications

From this study and the review of literature three apparent implications surfaced. One was the role that efforts to help individuals with diabetes manage their condition may play. As was noted earlier, the blood sugar levels recorded at the beginning of the study were within the American Association of Clinical Endocrinology and the American College of Endocrinology's target random blood sugar level of <140 mg/dL. While maintaining a near-normal blood sugar level at the beginning of the study and throughout study was not significant for the purposes of this study, it was important, nonetheless, for both groups in order to prevent the short and long term complications of hypo and/or hyperglycemia, which is the intent of assisting individuals in managing their diabetes (Dunphy, et al., 2007; Wallymahmed, 2006). The comparable comfort levels, compliance scores, and near-normal blood sugar levels in both groups upon completion

of two different certified diabetic education programs demonstrates the impact such programs have on self-care management of diabetes.

Maintaining near-normal blood sugar levels for diabetics with various treatment plans is clinically significant by indirectly evaluating the effectiveness of those individualized regimens and the patients gaining insight into how positive health behaviors can result in favorable measurable outcomes. Furthermore, comparable comfort levels, compliance scores, and near-normal blood sugar levels in both groups upon completion of two different certified diabetic education programs supported the benefit of diabetic education in providing the knowledge and support necessary for patients to effectively manage their diabetes. Formal diabetic education has been shown to be helpful for individuals to learn about their condition and how to properly manage it. Diabetic education programs should follow established national guidelines for optimal patient outcomes. Incorporated into a formal diabetic program should be ongoing clarification of information and psychological support (Funnell et al., 2010).

A second implication was the most desired approach to measuring glycemic in research studies of this nature. This study differed from many other studies in the predominant physiological outcome measured to determine glycemic control. Other studies using telephone interventions measured hemoglobin A1C at 90-day intervals rather than blood sugar levels. Hemoglobin A1C is a laboratory test indicating the average daily blood sugar level over the past 90 days (O'Keefe et al., 2009). Most healthcare professionals and researchers use the hemoglobin A1C to assess physiological changes of diabetes management (Glasgow et al., 2000) because short term or episodic changes in health behavior practices do not influence the test result as can be the case

with blood sugar levels (O'Keefe et al., 2009). Even so, there are inherent problems with using the hemoglobin A1C for research purposes. Interventions delivered concurrently within the 90-day period of time may not be reflected in a change in the hemoglobin A1C. The hemoglobin A1C is laboratory test that is costly and inconvenient for patients. If the hemoglobin A1C is obtained from a patient's healthcare provider, the test results may not be obtained within the desired research time frame. Most importantly, patients do not receive timely feedback regarding the positive or negative influences of their health behaviors.

A final implication focuses on the role that nurses play in assisting individuals with diabetes to manage their disease. All studies reviewed utilizing telephone interventions involved participation of nurses in providing educational and psycho-emotional support, thereby demonstrating the recognition by researchers of the significant contributions nurses make in managing patients with diabetes. This study supported the contention that nurses at all levels are an integral part of diabetes self-care management. "Health care policy makers and payers, faced with considerable resource constraints, are increasingly focused on interventions that work well and do so for a reasonable cost" (Boren et al., 2009, p.74). Nursing research is necessary to discover cost-effective nursing interventions to enhance patient compliance with health promoting behaviors for optimal patient outcomes. With diabetes affecting over 23 million individuals a year, it is imperative for healthcare providers to assist patients with practicing self-care measures based on their medically prescribed diabetic regimens while managing their daily lives and responsibilities.

Recommendations for Future Research

Several potential studies emerged from this study that might enhance the literature on the subject. A study that would begin with an initial baseline blood sugar level preceding the diabetic education program might be more reflective of patients' actual practices and blood sugar levels. It might result in higher levels of compliance or different changes in levels of blood sugar. Having a larger and more diverse population for study would provide another useful study. Including, for example, a sample of persons not engaged in a diabetic education program, but selected from persons at doctors' offices, healthcare clinics, or pharmacies who might participate in a more informal, yet systematic coaching intervention established on their terms might provide interesting results. Using technology for coaching offers another possible research approach. The use of technology has been employed as a means to assist diabetic patients manage their strict regimens (Fischer & Dickinson, 2011). "New types of technology-based interventions focus on the use of telephone, Internet, mobile communicators . . . (for) better medication adherence and improved glycemic control" (Fischer & Dickinson, 2011, p. 240). The advent of social networks and the dramatic growth in participation in them make tweets, texts, wikis, blogs, and other approaches to communications interesting prospects for studying coaching. Given the networking aspect of social media, "peer coaching" might be a unique topic for study. While studying new communications devices appears intriguing, the telephone remains the most widely used device. Accordingly, further research on the use of telephone calling for research is more viable. Calls made more frequently and over a longer period of time than was the case in this study might provide different and important results. A study

that combined telephone calling with regular tweets or texts--a hybrid approach for communication--might also hold promise for enhancing both coaching support and patient compliance. A study that focused on cost analysis and the efficiencies of these new media, when applied to coaching, might also provide fruitful results.

Summary

As noted in this discussion, the findings from this study were similar to some preceding studies and different from others. Mixed results have been characteristic of this field of research. In retrospect, having measured the blood sugar levels of participants in the study prior to their involvement in an education program may have provided more significant results. A more diverse population, in terms of race and ethnicity, may also have contributed to different, if not more significant results. These, of course, are matters for further research.

Practical implications of this study underscore the importance of following national guidelines in designing programs for diabetic patients, using devices for measuring blood sugar levels that are easy to use and to read, and to make certain that professionals serve in the role of coaching diabetic patients. These implications should be seriously considered in designing further research studies in this area.

Clearly, continuing research on the best possible approaches for encouraging diabetic patients' greater compliance to blood sugar management regimens is necessary. The health and well-being of these individuals is at stake. The mixed results from this study and preceding ones warrants further research. Of particular intrigue is the unstudied and unique opportunities that emerging media might provide as an intervention strategy with diabetic patients.

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Appendix A

Script for Solicitation of Volunteers

I am Anita Kerrigan a graduate student at Ball State University conducting a research study of the comfort level of individuals with diabetes managing their condition. The study has been approved by (health institution) and the Ball State University Internal Review Board.

Your medications, diet, exercise, sick day management, and all other aspects of your prescribed diabetic regimen will not be altered in any way. There is no risk of harm in participating.

Participation is voluntary. If you decide to participate, and then want to drop out of the study at time, you may do so without any consequences.

The information you provide will be kept confidential by the researcher and instructor.

Participation includes completing 2 questionnaires and a demographic form with personal and contact information today. Two (2) and four (4) weeks from now, the same 2 questionnaires will be mailed to you with a stamped addressed envelope to return the questionnaires to the researcher. Answer the questionnaires and mail them back to the researcher. (For quasi-experimental group: You will receive phone calls from the researcher 2 and 4 weeks post-educational program to offer support and guidance in managing your diabetes). In addition to completing the questionnaires, you will be asked to record your average blood glucose levels for the previous week. The questionnaires will take approximately 15 minutes to complete each time.

Upon receipt of all completed questionnaires you will receive a gift card to a local merchant in gratitude for your time.

Thank you for participating in this study.

Appendix B

The Effect of Coaching as a Nursing Intervention on Comfort and Blood Glucose Levels in Individuals with Diabetes

The purpose of this research project is to determine the effect of coaching as an intervention on the comfort level and health seeking behaviors in adults with diabetes mellitus. For this project, you will be asked to provide contact information and complete a demographic form and a series of questionnaires along with your blood glucose as indicated on your glucometer. It will take you approximately 15 minutes to complete the questionnaires.

The information provided will be color and number coded to maintain confidentially. The investigators will secure the information.

There are no foreseeable risks or ill effects from participating in this study. A benefit you may gain from your participation is a better understanding of diabetes management.

Your participation in this study is completely voluntary and you are free to withdraw from the study at anytime for any reason without penalty from the investigator. Please feel free to ask any questions of the investigator before signing the Informed Consent form and beginning the study, and at any time during the study.

For one's rights as a research subject, the following person may be contacted: Ms. Melanie Morris, Coordinator of Research Compliance, Office of Academic Research and Sponsored Programs, Ball State University, Muncie, IN 47306, (765) 285-5070.

I,_____, agree to participate in this research project entitled,

"The Effect of Coaching on Comfort and Blood Glucose Levels in Individuals with Diabetes Mellitus." I have had the study explained to me and my questions have been answered to my satisfaction. I have read the description of the project and give my consent to participate. I understand that I will receive a copy of this Consent form to keep for future reference.

_____ _____

Participant's Signature

Date

Principal Investigator:

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Appendix C

Demographic Information for Research on Diabetes

Name_____

Mailing Address_____

City_____ Zip code _____

Male_____ Female_____

Marital Status:

Married _____ single _____divorced _____ widowed_____

Age in years

18-29 _____50-59 _____80-89 _____

30-39 _____60-69 _____

40-49 _____70-79 _____

Race

Caucasian____

African American_____

Asian_____

Hispanic_____

(OVER)

Education

8th grade or less_____

High School diploma_____

Technical/associate degree_____

4 year college degree_____

Master's degree_____

Doctorate degree_____

Income level per year

Less than $10,000_____

$11,000-$20,000_____

$21,000-$30,000_____

$31,000-$40,000_____

$41,000-$50,000_____

$51,000-$60,000_____

$61,000-$70,000_____

$71,000-$80,000_____

$81,000-$90,000_____

$91,000-$100,000_____

Over $100,000_____

Time since diagnosis of diabetes

less than 1 year _____

1 year ago_____

2 years ago_____

3 years ago_____

4 years ago_____

5 years ago_____

over 5 years ago_____

Diabetic medications

oral medication(s)_____

insulin _____

oral medication & insulin_____

Appendix D

Diabetes Mellitus Comfort Questionnaire

Number_____

Please record your average blood sugar for the past 7 days_____

6 strongly agree-------5--------4---------3----------2---------1 strongly disagree

1. My body is strong right now------6 5 4 3 2 1

2. I feel in control of my life---6 5 4 3 2 1

3. My condition gets me down---- 6 5 4 3 2 1

4. I can make the necessary changes in my life to manage my diabetes

---- 6 5 4 3 2 1

5. I am inspired by knowing that I am loved--- 6 5 4 3 2 1

6. No one understands me----6 5 4 3 2 1

7. I feel overwhelmed----6 5 4 3 2 1

8. I am unhappy when I am alone-----6 5 4 3 2 1

9. My faith helps me to not be afraid----6 5 4 3 2 1

10. I do not feel healthy right now-----6 5 4 3 2 1

11. My insurance does not cover my testing supplies---- 6 5 4 3 2 1

12. I feel depressed---6 5 4 3 2 1

13. I can prevent complications of my diabetes----6 5 4 3 2 1

14. I am nervous about the changes I should make because of my diabetes

----6 5 4 3 2 1

15. I can perform my usual activities---6 5 4 3 2 1

16. I cannot eat out because they do not have food on my diet

----6 5 4 3 2 1

17. The local diabetes support group provides help when I need it

--- 6 5 4 3 2 1

18. My friends support me in living with diabetes--- 6 5 4 3 2 1

19. I need to be better informed about my diabetes---6 5 4 3 2 1

20. I need to feel good again-----6 5 4 3 2 1

21. There are those I can depend on when I need help------- 6 5 4 3 2 1

22. I cannot afford my medicines----6 5 4 3 2 1

23. There is healthy food at home---- 6 5 4 3 2 1

24. My diabetes is difficult to manage----6 5 4 3 2 1

25. I feel peaceful----6 5 4 3 2 1

26. The diabetic education program has been helpful---6 5 4 3 2 1

27. I am motivated to follow my diet----6 5 4 3 2 1

28. I am worn out----------6 5 4 3 2 1

Appendix E

Self Care Inventory-Revised Version (SCI-R)

This survey measures what you *actually do*, not what you are advised to do. How have you followed your diabetes treatment plan in the past 1-2 months?

		Never	Rarely	Sometimes	Usually	Always	
1.	Check blood glucose with monitor	1	2	3	4	5	
2.	Record blood glucose results	1	2	3	4	5	
3.	If type 1: Check ketones when glucose level is high	1	2	3	4	5	Have type 2 diabetes
4.	Take the correct dose of diabetes pills or insulin	1	2	3	4	5	Not taking diabetes pills or insulin
5.	Take diabetes pills or insulin at the right time	1	2	3	4	5	Not taking diabetes pills or insulin
6.	Eat the correct food portions	1	2	3	4	5	
7.	Eat meals/snacks on time	1	2	3	4	5	
8.	Keep food records	1	2	3	4	5	
9.	Read food labels	1	2	3	4	5	
10.	Treat low blood glucose with just the recommended amount of carbohydrate	1	2	3	4	5	Never had low blood glucose
11.	Carry quick acting sugar to treat low blood glucose	1	2	3	4	5	
12.	Come in for clinic appointments	1	2	3	4	5	
13.	Wear a Medic Alert ID	1	2	3	4	5	
14.	Exercise	1	2	3	4	5	
15.	If on insulin: Adjust insulin dosage based on glucose values, food and exercise	1	2	3	4	5	Not on insulin

Appendix F

Self Care Inventory-Revised Version (SCI-R) Permission

From: "Reyes, Elizabeth"
Date: March 22, 2011 10:55:07 AM EDT
To: "Weaver, Roy, A."
Cc: "LaGreca, Annette M."
Subject: RE: Self-care inventory/Anita Kerrigan

Hi Dr. Weaver,
Dr. La Greca says that she grants Anita her permission to use the Self Care Inventory-Revised Version (SCI-R) in her study.
Best Wishes,
Liz