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Evaluating A Novel Approach for Type 2 Diabetes Mellitus Patient Education: Modified Team -~ Based Learning

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EVALUATING A NOVEL METHOD FOR TYPE 2 DIABETES MELLITUS PATIENT EDUCATION: MODIFIED TEAM-BASED LEARNING

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ABSTRACT

One of the world's most serious health issues today is the increasing prevalence of diabetes (Chobev, Sotirovska, Mihajilov, 2011). Indeed, the growth of this widespread and pernicious disease has been categorized as epidemic. The antidote for the diabetes epidemic lies in prevention and the use of a chronic care model that focuses on improving diabetes self-management. For both diabetes prevention and self-management, a core component pertains to *knowledge*—and specifically to improved public health literacy, public health education, and patient education. For example, ongoing patient education is a critical factor in helping patients to manage their diabetes and prevent the micro- and macrovascular complications associated with poorly controlled diabetes. Indeed, in the complex and costly health care reform currently underway in the United States, improving diabetes health literacy and the effectiveness of education—public and patient—must be considered key strategies.

For people with diabetes, the need for improving the effectiveness of patient education is great and urgent. In diabetes patient education, many teaching methods are currently in use. However, although these methods may be effective in helping patients in the short-term, long-term success has proven more elusive. The DNP project described in this dissertation will evaluate whether a promising patient education method—modified team-based learning—conducted within a group of peers can be beneficial in helping patients with diabetes to improve self-management problem-solving skills.

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DEDICATION

This work is dedicated to my Father, George J. Blevins, who instilled in me the importance of education. He did however, neglect to tell me when to stop and so I am what we now call a lifelong learner.

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CHAPTER 1. INTRODUCTION

Diabetes is the fastest growing chronic illness in the world (Centers for Disease Control and Prevention (Chorbev, Sotirovska, & Mihajilovin, 2011). In terms of total numbers of residents with diabetes, the United States ranks third among nations worldwide—and is exceeded only by China and India, whose populations are each roughly four times those of the United States (World Bank, 2015). The CDC (2012) has predicted that if current trends continue, by 2050 one in three American adults may have diabetes.

As a long-term chronic condition, diabetes is treated primarily through self-management, of which the cornerstone is patient education. Despite the importance of diabetes patient education in diabetes self-management care (DSME), no single method or approach to DSME patient education has been identified as being optimal. As a step in addressing this deficit in clinical knowledge, a pilot project was conducted to ascertain whether a patient education method using modified team-based learning (TBL) could be effective in helping people with the most prevalent form of diabetes—type 2 diabetes mellitus (T2DM)—to learn and improve self-management skills for controlling their diabetes and preventing the development of comorbid conditions.

Background and Significance

Etiology of diabetes. Diabetes mellitus is a group of metabolic disorders marked by hyperglycemia—an "abnormally high concentration of glucose in the circulating blood" ("hyperglycemia," *Stedman's Medical Dictionary*, 28th ed., 2006, p. 920). Hyperglycemia ensues when the body is unable to produce sufficient insulin for its

metabolic needs or is unable to use the insulin produced. Uncontrolled hyperglycemia results in widespread tissue and organ damage (Fauci et al., 2008; Siegenthaler, 2007).

T2DM: prevalence, risk factors, and comorbidities. Although health care providers and organizations have endeavored to reduce the incidence of T2DM, the condition continues to be a growing threat to public health (American Association of Diabetes Educators [AADE], 2012). In the United States, T2DM accounts for over 90%–95% of diagnosed diabetes cases (U.S. Department of Health and Human Services [U.S. DHHS], National Diabetes Information Clearinghouse [NDIC], 2011). Studies have identified genetic predisposition and lifestyle (e.g., eating patterns and sedentary behaviors that lead to obesity) as risk factors for T2DM. Several **c**omorbidities are associated with T2DM; it is the leading cause of kidney failures, nontraumatic lower limb amputations, and new cases of blindness among adults (Frykberg et al., 2006). T2DM is the major cause of heart disease and stroke and is the seventh leading cause of death in the United States (NDIC, 2011).

Living with T2DM. Lifelong commitment to intensive lifestyle changes (such as increased exercise and diet control) can prevent or delay T2DM—regardless of an individual's age, gender, or race–ethnicity (American Diabetes Association [ADA], 2011; Congressional Diabetes Caucus, 2013; Fauci et al., 2008). Nevertheless, individuals living with T2DM face multiple challenges, including low health literacy skills, inadequate income, a paucity of community resources, and minimal access to health care services (Garcia, Hahn, & Jacobs, 2010).

Diabetes in subpopulations. Diabetes occurs disproportionately in different subpopulations. For example, in comparison with non-Hispanic White adults, non-

Hispanic Black adults have a 77% higher risk of diagnosis of diabetes, Hispanics have a 66% higher risk, and Asian Americans have an 18% higher risk (National Institute of Diabetes and Digestive and Kidney Diseases [NIDDK], 2011). Of the total adult population of 1.9 million Native American and Alaska Natives served by the Indian Health Services (IHS), 16.1% were diagnosed with diabetes. Regionally, diabetes rates have been reported to vary from 5.5% among Alaska Native adults to 33.5%–37% among Native American adults of the Southwest (NDIC, 2011). The population with the unfortunate distinction of having the highest rate of diabetes in the world is the Pima Indians of Arizona, of whom 50% have the disease (NDIC, 2011). In addition to racial-ethnic disparities, diabetes-related disparities manifest in other subpopulations. Thus, older adults, members of lower socioeconomic groups, and women all have higher rates of T2DM-related complications (Sharifirad, Shojaezadeh, Tavsoli, & Azadbakht, 2013).

T2DM and diabetes: The economic burden. The detrimental clinical impact of diabetes-associated complications creates an economic burden not only for the individual with T2DM but also for the health care system as a whole (Gregg et al., 2013). In 2012, the estimated total economic burden of diagnosed diabetes for the United States was $245 billion—a 41% increase over the $174 billion spent in 2007 (ADA, 2013). The cost of care for a person with diabetes is 2.3 times higher than the cost of care for a person who does not have the disease (Yang et al., 2013). Moreover, this elevated cost of care does not reflect the increased societal burden from intangibles such as the pain and suffering of patient and family members and unpaid caregivers (Yang et al., 2013).

Obesity and diabetes in New Mexico. Among states nationwide, New Mexico has some of the highest prevalences of poverty, obesity, depression, and many of the

conditions believed to lead to chronic illness and diabetes. For example, New Mexico's obesity rate is 25%–29%, a statistic approaching the highest rates in the nation (i.e., 35%; CDC, 2013). Among the multiple adverse aspects of obesity is its role as the leading cause of T2DM (CDC, 2011; Ogden, Carroll, Kit, & Flegal, 2012). Indeed, in New Mexico, the state's high prevalence of obesity eventuates as an increased prevalence of T2DM.

Predominant ethnic groups of New Mexico. Of the three largest ethnic groups residing in New Mexico—Hispanic (46.3%), White (40.5%), and Native American Indian (8.5%)—Hispanics and Native Americans experience the effects of diabetes in highest prevalence and greatest severity. Moreover, in comparison with their White counterparts, Hispanics and Native Americans have higher prevalences of diabetes comorbidities, including diabetic retinopathy, renal failure, and peripheral and cardiovascular disease (U.S. Census Bureau, 2010).

Obesity and T2DM in residents of New Mexico. For New Mexico residents who have T2DM and many of the chronic conditions associated with T2DM, the modifiable risk factors are the same. These factors include physical inactivity, unhealthy food choices, and excess weight. Shared risk factors are strongly related to social determinants such as poverty, unsafe neighborhoods, and low education levels (Adler & Stewart, 2007; Yang et al., 2012).

Team-Based Learning

Given that patients are the final decision makers regarding their care as a whole, patient education is the foundation of disease self-management (Funnell & Weiss, 2008). Many patient education approaches and methods have been used for teaching patients

how to manage T2DM—for example, lecture-format presentations, individual counseling, group education, peer-led programs, and community health instructors. One pedagogical method that has received increasing attention in recent years is *team-based learning* (TBL). TBL, which entails teaching and problem solving in small groups, is well substantiated by research evidence (Cooke, Irby, & O'Brien, 2010; Ellis, Bell, Ployhart, Hollenbeck, & Ilgen, 2005). Researchers have reported that TBL enhances both learning and problem solving (Cooke et al., 2010; Ellis, Bell, Ployhart, Hollenbeck, & Ilgen, 2005). As a result of TBL's effectiveness, this method has gained increasing popularity in schools and universities worldwide in the years since TBL's initial development 30 years ago (Cooke et al., 2010).

TBL principles. TBL uses four principles:

- Teams must be properly formed and managed.
- Team members must be made accountable for their individual and group work.
- Team assignments must promote both learning and team development.
- Team members must have frequent and timely feedback.

(Michaelsen et al., p. 28, 2002)

Patient participation and teamwork. Researchers in patient education assert that patient participation, cooperative problem solving, and an interactive teaching strategy result in significantly higher learning gains and better conceptual understanding (Goltz, Heitapelto, Reinsch, & Tyrell, 2007; Knight & Wood, 2005). One context in which individual participation and cooperative problem solving commonly occur is teamwork. In teamwork, individuals who work together on complex tasks require a

dynamic exchange of resources (e.g., information), coordination of effort, and adaptation to changing situational factors (Cooke et al., 2010).

TBL for T2DM patient education. This author believed that a modified TBL method could be a powerful tool for patients with T2DM because patients would be engaged in problem solving in a group of their peers. The project used a novel, modified TBL method in the design of a T2DM patient education course that focused on a small group of T2DM patients who reside in a city in New Mexico. Because the course's enrollment was limited, and the course itself was relatively short (i.e., two 2-hour classes given one week apart), one modification of the course's TBL method entailed accommodation to the group's size and the project's goals. Also, unlike typical educational programs that use TBL, the T2DM course did not require that participants prepare for classes prior to class meetings. As participants in the T2DM modified-TBL classes, the patients worked in teams on problems that they encountered in their daily management of T2DM. Together, team members devised and evaluated solutions for resolving or ameliorating barriers that prevented them from reaching their T2DM self-management goals.

T2DM course design. The T2DM course consists of two modified-TBL classes, "Beginning an Exercise Program for Managing Type 2 Diabetes" and "Diet: How to be prepared to Avoid Poor Food Choices." The course's goal was to help patients achieve good diabetes self-management. To support achievement of this goal, the classes' design was informed by key TBL concepts, including patient empowerment, health literacy, cultural sensitivity, and diabetic self-management education (Schulz & Nakamoto, 2013).

Key Concepts

Patient empowerment. Funnell and Weiss (2008) have defined *empowerment* with reference to diabetes as "helping people discover and use their own innate ability to gain mastery over their diabetes" (p. 75). For some patients, the concept of empowerment can be difficult to understand and embrace. However, because T2DM is primarily a self-managed disease, empowerment is essential for the achievement of recommended outcomes (Funnell, 2013; Funnell & Weiss, 2008). To support patients' empowerment, a patient education intervention that uses a modified TBL method must be designed in a way that helps patients become convinced that the power to control their T2DM abides in them.

Health literacy. An individual's health literacy may explain, at least in part, why the individual not only manages her or his T2DM poorly but also is unable to identify symptoms that might indicate a serious medical problem (Nielsen-Bolhman, Panzer, & Kindig, 2004). *Health literacy* has been defined by the Institute of Medicine (IOM) as "the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions" (Nielsen-Bolhman, Panzer, & Kindig, 2004, p.5). Health literacy comprises multiple competencies, including basic reading, numeracy, speaking, listening, writing, critical analysis, and conceptual abilities (Nielsen-Bolhman et al., 2004). Problems in understanding preventive health measures, one's medical condition, and following a self-care regimen have all been attributed to low health literacy (Wolf et al., 2004).

Cultural sensitivity. In developing a TBL method for New Mexico patients with T2DM, cultural sensitivity must be taken into account—for example, when analyzing problems in management of diet and exercise. In New Mexico, strong Hispanic and

Native American cultural influences are ubiquitous. Leininger's theory of culture care (2002) asserts that culture shapes an individual's thinking, actions, and being. In the context of nursing practice, cultural backgrounds can influence views on health, wellbeing, and illness; these views in turn can influence an individual's perceptions of health care and health care outcomes (Douglas et al., 2011). Accordingly, the design of an effective TBL-based patient education intervention must accommodate the influence of the group's cultural diversity on individual team members and on the team as a whole.

Patient-centeredness in health care. A growing body of evidence indicates that patients who are more engaged in their personal health care have better health outcomes and lower costs (Denzer, 2013). Accordingly, in modern health care, patients are no longer viewed as passive recipients of care. Instead, patients are viewed as being the central participant in a collaborative team effort to achieve shared disease self-management objectives (Bennett, Coleman, Parry, Bodenheimer, & Chen, 2010). This model of health care in which the patient viewed as the central participant in her or his health care is referred to as "patient-centered care." Today, IOM guidelines recommend that all health care should be patient centered.

IOM guidelines for patient-centered care. The IOM (2001) has published its general guidelines for patient-centered care in "Crossing the Quality Chasm: A New Health Care System for the 21st Century." This publication offers recommendations for provision of safe, patient-centered health care, including "Ten Rules for Redesigning and Improving Care." Three of these rules directly guided the designing of the T2DM modified-TBL patient education project described in this dissertation.

- "Care should be customized based on the patient's needs and values." The system of care should be designed to meet the most common needs but should also be adaptable to an individual patient's choices and preferences.
- "The patient should be in control." Patients should be given necessary information and the opportunity to exercise as much control as they choose over health care decisions that affect them. The health system should be able to accommodate differences in patient preferences and should encourage shared decision-making.
- "The system should encourage shared knowledge and the free flow of information." Patients should have unfettered access to their own medical information and to clinical information. Clinicians and patients should communicate effectively and share information.

(IOM, 2001, p. 3)

Patient education in patient-centered care. In order to participate proactively as members of their own health care team, patients must be well informed about their health, health conditions, treatment, and treatment options. Accordingly, as healthcare reform moves forward in uncertain economic times, the need for patient education interventions that more effectively teach and promote self-care—including T2DM self-management—is urgent. However, modern health care is complex, and many patients struggle to interpret and understand information that they receive about their diseases and care—including self-care instructions. In the ongoing search for effective patient education methods, the limited effectiveness of provider-centered education for engaging the patient is well recognized (Fernandes et al., 2010).

Empowerment in patient-centered care. A core component of the IOM recommendations is that, in order to achieve a high level of disease self-management and

better clinical outcomes, health care should promote patient empowerment. In particular, for individuals with T2DM, health care should promote actions performed by individuals to control their T2DM. Following publication of these IOM guidelines, many diabetic interventions now promote patient empowerment. As a methodological element, this promotion of empowerment is congruent with the concept of patient-centered health care.

Diabetes self-management education. Patient education about interventions to improve control of diabetes (i.e., diet, exercise, medication compliance) is referred to as *diabetes self-management education* (DSME). One of DSME's important objectives is that patients with T2DM should learn effective (albeit complex) problem-solving skills that are related to management of their chronic disease (ADA, 2011). Through mastery of these skills, individuals become empowered to control their condition. Although a large body of evidence substantiates the finding that is DSME efficacious and results in improved outcomes in the short term, long-term improvement is more elusive (Sabaté, 2003). The results of failure to maintain lifestyle modifications for prescribed diabetic treatment and management are increased rates of microvascular and macrovascular complications (Sabaté, 2003; WHO, 2003).

The DNP Project

The DNP project described in this dissertation entailed creating a patient education intervention to develop and improve T2DM self-management skills; the intervention used a modified, patient-centered TBL method that promoted patient empowerment. In the intervention, small groups of patients operated as teams of peers who worked together to solve common problems

Statement of the problem. Funnell (2006) asserts that patients with diabetes often do not achieve optimal self-care goals because of difficulty in following recommendations for diet and exercise. Furthermore, education often occurs in brief point-of-care encounters in which time constraints preclude consistency and engagement of the patient (Funnell, 2006).

One of the many impediments to patients' understanding of their disease is inadequate health literacy. Similarly, inadequate health literacy may also partially explain patients' inability to sustain self-management. The long-term consequences of inadequate health literacy include poorer health, diminished quality of life, and rising health care costs (U.S. DHHS, Office of Disease Prevention and Health Promotion [ODPHP], 2010).

In the early-mid 1900s, Carl Rogers introduced the concept of *learner-centered education*. One tenet of learner-centered education is that no one method or approach is "best." Rather, to accommodate the unique learner's unique needs, teachers are advised to use a range of educational approaches flexibly and selectively (Rogers, 1951). The ADA (2011) has endorsed several principles for effectively educating patients about diabetes self-management. Since the 1990s, patient education has gradually evolved from

the traditional lecture model to an empowerment model that has stronger substantiation in evidence-based theory (ADA, 2011). Despite this change in approach to learning, researchers have yet to identify the most effective learning strategy for patient education (Funnell & Weiss, 2008). Recognition of this deficit in pedagogical knowledge provided impetus for the pilot project for teaching patients about T2DM using modified TBL.

Purpose of the DNP project. The purpose of this pilot project was to design, implement, and evaluate a T2DM patient education intervention that used a modified TBL method. The objectives of the intervention were to help patients with T2DM improve their management of their illness by learning about diet (e.g., being prepared for meals, portion control) and exercise.

An important outcome of this project was the finding that the use of a modified TBL method for patient education increased patients' knowledge of T2DM; this finding was revealed as an increase in participants' test scores from pretest to posttest.

As the project's investigator, this author hoped and anticipated that through this interactive method to learning, participants would improve their health literacy and strengthen their self-efficacy regarding application of new problem-solving skills to the complex management of T2DM. This author intended that this pilot project would add to the existing body of data on methods of patient teaching.

Project objectives. The aim of project was to teach patients with T2DM problem-solving approaches for reducing or ameliorating barriers to initiating and adhering to exercise and dietary regimens (e.g., being prepared for meals, portion control).

Specific objectives included

- applying a modified TBL structure to develop and present two classes on exercise and nutrition. (The classes focused on fat, carbohydrate, and portion control.)
- increasing self-efficacy in problem-solving relative to how patients approach barriers to exercise, fat and carbohydrate consumption, being prepared for meals, and portion control;
- determining whether learning occurred—via use of a pretest–posttest instrument and patient evaluation that would measure T2DM patient satisfaction the TBL classes.

CHAPTER 2. LITERATURE REVIEW

A Review of the Literature on Type 2 Diabetes Mellitus

Introduction to the Review

In presenting her health promotion model (HPM), nursing theorist Nola Pender (2011) argued that the best way to treat diabetes is to prevent it from developing. By practicing effective self-care, patients can often prevent diabetes and comorbid diseases and ensure that they have better overall health and quality of life (Pender et al., 2011). However, despite all that is known about diabetes self-care and prevention, diabetes continues to be a major health problem globally; indeed, the condition is becoming pandemic (Al-Kawaldeh, Al-Hassan, Froelicher, 2012; Colagiuri, 2010; Hjelm, Mufunda, Nambosi, & Kemp, 2003).

Today, the number of people with diabetes worldwide has reached 366 million. In 2014, 9% of adults 18 years of age and older had diabetes (WHO, 2015). More than 80% of diabetes deaths occur in low-to-middle-income countries (WHO, 2015). A synthesis of published literature has shown that, in the coming decades, one of the world's greatest increases in absolute burden of diabetes will occur the Middle East. The increasing incidence of diabetes in this region will mainly affect the economically productive age group that is 45–65 years of age (Esteghamati et al. 2008; Javanbakht et al. 2011; Wild et al. 2002; Zhang et al., 2010).

Type 1 and Type 2 Diabetes

Type 1 diabetes, type 2 diabetes, and age. The two most common forms of diabetes are type 1 diabetes (T1DM) and type 2 diabetes (T2DM). Although in the past age was viewed as being a factor in the differentiation of these two forms of diabetes,

today age is no longer a diagnostic criterion. Thus, in the past, T1DM was seen mainly in the pediatric and adolescent population; now, however, T1DM is seen in all age groups. Similarly, T2DM formerly manifested primarily as a condition of maturity; now, however, T2DM is seen with increasing frequency in the obese pediatric and adolescent populations (Fauci et al., 2008; McCance & Huether, 2009; Siegenthaler, 2007).

Etiology of T1DM and T2DM. Diabetes is the most common endocrine disorder and is one of a group of endocrine disorders marked by hyperglycemia (high level of circulating blood sugar). Genetic predisposition combines with precipitating environmental factors to cause insulin deficiency or insulin resistance as the body becomes unable to use the insulin produced. Both of these mechanisms lead to metabolic disturbances of lipids, amino acids, and glucose (Fauci et al., 2008; McCance & Huether, 2009; Siegenthaler, 2007).

For T1DM and T2DM, the mechanisms of development are substantially different. T1DM is thought to be an autoimmune inflammatory process whereby the beta cells of the islets of Langerhans in the pancreas are progressively destroyed and insulin production fails. T2DM is currently considered a non-autoimmune chronic disease characterized by insulin resistance, excessive hepatic glucose production, and abnormal fat metabolism (Fauci et al., 2008). In people with T2DM, the deposition of visceral fat is of particular concern.

Prevalence and incidence of T1DM and T2DM. Notably, the prevalence and incidence of both T1DM and T2DM are on the rise. In the past, the prevalence of T1DM exceeded that of T2DM in the pediatric population. Thus, from 1978 to 2004, the incidence of T1DM in the age group 0–17 years of age increased 2.7% per year (Vehik et

al., 2007). Prior to 1980, the prevalence of T2DM in the pediatric population was 2.0% of all diabetic cases in this age group (Nathan, 2007). However, with increasing rates of obesity in childhood and increased sedentary habits, T2DM has been rapidly overtaking T1DM in the child and adolescent population—a reflection of our lifestyle choices from very early on.

Similar trends have been noted elsewhere in the world. In Japan, for instance, up to 80% of all new cases of pediatric diabetes are T2DM (Pinhas-Hamiel & Zeitler, 2005). Given the rising rates of T2DM and obesity, it is believed that T2DM will become the predominant form of diabetes among children from a variety of ethnic backgrounds globally (Alberti et al., 2004). Moreover, this trend will eventually impact the prevalence of adult diabetes: the CDC (2011) predicts that a failure to reduce current trends could result in one in three adults' having diabetes by 2050.

Prevalence of T2DM as a function of race–ethnicity. In the pediatric population, the incidence of T2DM varies significantly according to race–ethnicity. Data collected in the United States in 2002–2003 show that among all new diabetes cases in young people 10–19 years of age, the incidence of T2DM was, for Caucasians, 14.9%; for Hispanics, 46.1%; for African Americans, 57.8%; for Asian/Pacific Islanders, 69.7%; and, for American Indians, 86.2%. (Writing Group for the SEARCH for Diabetes in Youth Study Group et al., 2007).

The economic burden of T2DM. In 2012, the economic burden of diabetes in the United States was $245 billion, with direct medical costs of $176 billion and indirect costs of $69 billion. According to the ADA (2013), the components of this economic burden are as follows: medical and inpatient hospital care, 43%; antidiabetic medications

and supplies, 12%; medications to treat the complications of diabetes, 18%; physician office visits, 9%; and nursing facilities, 8%. A person diagnosed with diabetes at age 50 incurs, on average, $180,000 to $250,000 in direct and indirect costs and dies 8 years earlier than does someone without diabetes (Franco, Steyerberg, & Hu, 2007). Additional components of societal burden for which no figures were available, come as a result of pain and suffering of the individual family members and friends, reduced quality of life for everyone involved, the burden associated with undiagnosed diabetes and unpaid caregivers—family and friends (ADA, 2012). In addition, indirect economic costs result from increased absenteeism, diminished productivity at work and at home, reduced productivity from those unemployed due to diabetes and related disability, and lost productivity due to premature death (ADA, 2013). Finally, non-quantifiable components of societal burden come as a result of pain and suffering of the individual, family members, and friends; reduced quality of life for everyone involved; the burden associated with undiagnosed diabetes; and the burden resulting from unpaid caregiving—often, from family members and friends (ADA, 2012).

T2DM as a metabolic syndrome. The focus of the DNP project discussed in this dissertation is type 2 diabetes mellitus, which accounts for 90%-95% of all diabetes cases (NDIC, 2011). As a metabolic syndrome, T2DM is marked by central obesity, elevated arterial hypertension, and dyslipidemia; also, T2DM confers an elevated risk of developing cardiovascular disease (Fauci et al., 2008; McCance & Huether, 2009; Siegenthaler, 2007).

Complications of T2DM. The complications of T2DM are classed as *microvascular* (e.g., retinopathy, nephropathy, neuropathy) and *macrovascular* (i.e.,

atherosclerotic changes of the vasculature of the body). These complications occur as poorly controlled hyperglycemia persists over years (Fauci et al., 2008; McCance & Huether, 2009; Siegenthaler, 2007). Research has consistently shown that with tight glycemic control, complications can be prevented (AADE, 2012; Clement, 2009; Fauci et al., 2007; McCance & Huether, 2009; Siegenthaler, 2007). Prevention of macrovascular complications requires control of lipids and hypertension in addition to tight glycemic control. However, to prevent macrovascular and microvascular complications, the single most important lifestyle modification is weight reduction (AADE, 2012; Fauci et al., 2007; Fowler, 2011; McCance & Huether, 2009; Siegenthaler, 2007).

Diabetes Self-Management Education

One of the most important—indeed, critical—elements of care for people with diabetes diabetic self-management education (DSME; AADE, 2012; Funnell et al., 2006; Mensing et al., 2007; Skinner et al., 2008; Sperl-Hillen et al., 2013). Patients living with T2DM have the burden of responsibility for lifestyle modifications that are central to DSME; these modifications include improving diet, increasing physical activity, and increasing adherence to medication regimes (Dorlan & Liddy, 2014; Sigurdardottir, Jonsdottir, & Benediktsson, 2007). Standardized, evidenced-based DSME guidelines are reviewed and updated every 5 years (AADE, 2012; Mensing et al., 2010; New, 2010). The DSME curriculum includes learning what diabetes is, how to safely care for diabetes on a daily basis, and how to actively collaborate with one's health care team (Funnell & Anderson, 2004; Funnell et al., 2007). In addition, patients are informed about various treatment options, the benefits and costs of the different treatment options, how to make

changes in behaviors, and how to do complex problem-solving on a daily basis (AADE, 2012; Funnell & Anderson, 2004; Funnell et al., 2007).

Among the dramatic changes currently occurring in the U.S. health care system, one of the important changes is a profound transformation of the health care model, this change has seen a shift—from an acute care model to a chronic care model. The general realization is that the system is poorly configured to treat diabetes (Bennett et al., 2010; Funnell & Anderson, 2004; Østbye et al., 2005; Sabaté, 2003). The health care provider can prescribe the medication, give diet, and exercise instructions, but ultimately it is up to the patient to accept and adhere to the regimen (Klein et al., 2013). In the acute care model, the provider was viewed as the authority and the patient was viewed as the passive recipient of prescriptive education (e.g., "Do as I say;" Bennett et al., 2010; Funnell & Anderson, 2004). The new chronic care model calls for patient visits structured as15-minute encounters; these encounters are expected to include patient education and counseling (Champion & Skinner, 2008; Glanz, Rimer, & Viswanath, 2008; Østbye et al., 2005). Providers struggle to meet these demands, and patients come away not understanding what they must do to achieve good diabetes self-management, which, in the chronic care model, is critically important (Bennett et al., 2010; Funnell & Anderson, 2004; Funnell et al., 2007; Østbye et al., 2005).

As of mid-2007, plans for health care reform required that the patient to become more active in diabetes self-care, problem solving, and decision-making (ADA, 2007). These patient skills demand that, to provide adequate education and development of problem-solving skills for all aspects of diabetes self-management, clinicians must competently use a variety of pedagogical strategies and techniques (ADA, 2007).

Furthermore, a review of the pertinent literature reveals that, in order for patients to be able to receive essential T2DM patient education, they must have adequate health literacy. Given that in the general population health literacy is typically low, the need to improve health literacy is urgent.

Patient Education Pedagogy

For the DNP patient education project described in this dissertation, three pedagogical issues are particularly relevant: the effectiveness of traditional methods and approaches to patient education, the use of alternative methods and approaches, and the comparative effectiveness of both traditional methods and non-traditional methods.

Traditional patient education. Various teaching methods have been developed to educate patients with T2DM. Because of the substantial amount of time and other resources required to assess needs and write curricula, many DSME programs are delivered using traditional pedagogical methods that are formalized, structured, and/or unidirectional. In this regard, "unidirectional" refers to "teacher-centeredness"—learning dynamic that places greater emphasis on the teacher's imparting of knowledge than on the learner's acquisition of knowledge. A principal example of the unidirectional, teacher-centered method is the lecture method (New, 2010). Freire (1985) argued that the lecture method of patient education is ineffective for many types of learners, including people with T2DM. Specifically, as a pedagogical method, lecturing does not develop critical thinking and perception of the learners' "social reality"—cognitive functions that are necessary for adapting to diabetes (New, 2010, p. 316).

Alternative patient education methods. Other pedagogical methods used in T2DM patient education include: conventional individual counseling, group education,

peer-led programs, and instruction by community health educators. The focus of conventional individual counseling is on goal setting and problem solving, two skills that can encourage clients to identify realistic diabetes goals and thereby improve diabetes outcomes. Conventional individual counseling is limited by the patient's narrow knowledge of the disease, and the degree of patient health literacy determines the patient's ability to engage in shared decision making. The effectiveness and outcomes of counseling are also limited by the amount of time available to counsel the patient and by the amount of time the patient is willing to devote to the counseling sessions (Corser et al., 2007; Denzer, 2013; Osborn et al., 2007; Utz et al., 2008).

In group education, intervention is based on a sharing of experiences, and this sharing is conducive to patient empowerment. In particular, within the group, empowerment is catalyzed by problem sharing with those who share similar problems (Deakin, McShane, Cade, & Williams, 2009; Ho, Berggren, & Dahlborg-Lyckhage, 2010; Tang, Funnell, & Anderson, 2006). In peer-led programs, peers provide social support and practical information rather than theoretical knowledge (Paul et al., 2007; van der Wulp, de Leeuw, Gorter, & Rutten, 2012). In instruction by community health educators, trained residents of a community go out into the community each day and knock on doors to directly talk to residents about diabetes and to screen for the disease (West, 2013).

Comparative effectiveness of pedagogical methods. Although patient education is an integral to diabetes care, the relative effectiveness of various pedagogical methods and methods has not been determined by research (Duke et al., 2009). Few studies have investigated the impact of the specific educational formats used to deliver

diabetic information about diabetes (Duke et al., 2009; Tang et al., 2006). Furthermore, many methods have been found to yield short-term improvement in patient health outcomes—but, as stated earlier, long-term continuation of good diabetes behaviors has proven problematic (Sabaté, 2003). Some methods are considered to be more cost effective than others; for example, group enables educators to counsel multiple individuals simultaneously. West (2013) makes a compelling case for the value of community health educators by showing that the money saved by preventing renal failure, blindness, or lower limb amputation for even a single patient exceeds the full-time salary and benefits paid to nearly an entire front-line preventive care team.

Team-Based Learning

The DNP study will evaluate whether a T2DM modified-TBL patient education method can help patients with T2DM increase their health literacy, self-efficacy, and problem-solving ability. Accordingly, the design of the study's T2DM classes will be informed by patients' need to develop these three cognitive abilities; the class's design will also be informed by TBL concepts and by the concepts of empowerment and patient-centeredness.

Development of the TBL method. Larry Michaelsen is credited with developing TBL in 1979 at University of Oklahoma; his inspiration for developing TBL came when his class size tripled from 40 students to 120 in a single year (Goltz, Reinsch, & Tyrell, 2007; Michaelsen, Knight, & Fink, 2002; Sweet & Michaelsen, 2012). When teaching smaller classes, Michaelsen had used a discussion method of teaching, which he preferred; when faced with a much larger class size, he was able to continue to use the discussion format by dividing his students into small groups. Michaelsen's success with

this small-group format led to further refinement of this method and eventually to his development of the TBL method. TBL itself proved highly effective in facilitating learning not only *about* concepts, but more important, how to *apply* concepts (Sweet & Michaelsen, 2012). As a result of this method's effectiveness, TBL has become an increasingly popular form of small-group learning; today, this method is used in classrooms worldwide (Team-Based Learning Collaborative, 2013).

Individual learning and group transformation. TBL is an advanced form of teaching with small groups. According to Michaelsen et al. (2002), one factor in TBL's effectiveness is that in TBL discussion teams, students develop their initial understanding of concepts through their own efforts. However, research has found that when learning occurs in teams, the growth in individual students' concept understanding is typically greater than the growth achievable by the individual learning in isolation (Senge, 1990; Team-Based Learning Collaborative, 2013). The power of TBL derives from a single factor: the high level of cohesiveness that can be developed within student learning teams. In this development, a team's evolution from a loosely associated assembly of individuals to an empowered cohesive learning unit is a transformational process. This transformation of team cohesiveness is nurtured by the TBL method and by results in a variety of other positive outcomes (Michaelsen et al., 2002).

Dialogue. Senge (1990, p. 28) used the word "dialogue" to explain what happens in the team learning process. The word dialogue comes from the Greek phrase *dia logos,* to which, Senge gives his interpretation as a free flowing of ideas, allowing for discovery of insights not easily attained by the individual (Senge, 1990). Dialogue relies on the ability of the team members to suspend assumptions and to think together (Senge, 1990).

TBL is an increasingly popular form of small-group learning (Team-Based Learning Collaborative, 2013). When learning occurs in teams, the growth is potentially greater than the growth that could have been achieved by the individual alone (Senge, 1990; Team-Based Learning Collaborative, 2013).

TBL principles. Michaelsen et al. (2002) described four TBL principles that are essential for ensuring the success of change efforts implemented by organizations:

- Teams must be properly formed and managed;
- Team members must be made accountable for their individual and group work;
- Team assignments must promote both learning and team development; and
- Students must have frequent and timely feedback.

In the DNP project described in this paper, these principles were used to inform the design of the learning method and setting in which the T2DM modified-TBL patient education was conducted. These principles are described below as they were applied in the design of the intervention.

Principle 1: Groups must be properly formed and managed. This principle refers to the proper formation of the team to avoid forming a group whose characteristics will interfere with the team's cohesiveness. For example, one factor that can affect team cohesiveness is possible interpersonal relationship between team members in contexts other than (and possibly prior to) that of the team (i.e., relationships in marital, family, friendship, work, or social contexts). Although the clinician–researcher did not have a large number of participants, she was mindful of establishing diverse groups. However, in the academic setting, the teacher appoints participants to their respective teams and

these teams become permanent groups, lasting the entire semester or longer (Michaelsen, 2008; Team-Based Learning Collaborative, 2013)

Principle 2: Student must be accountable (Readiness Assessment). For group cohesion to progress, students must be accountable for preparing before arriving to class for example, completing assigned readings. Such preparation is expected in an academic setting, where students receive grades based on their performance. In academic applications, students involved in a TBL format are given a reading assignment prior to class. On arrival to class, students are administered an "*individual readiness assessment test*" (IRAT). The same IRAT is taken a second time as a group; this test is called *a group readiness assessment test* (GRAT). In general, there is better performance as a group (Team-Based Learning Collaborative, 2013). In the clinic setting of this DNP project where patients formed the groups this principle was modified. Basic information was given in class with an emphasis on being accountable to one's group with contribution (Michaelsen, 2008; Team-Based Learning Collaborative, 2013). No IRAT was administered, as no pre-assigned homework was given. In the DNP project, a pre-test was given to ascertain team members' pre-teaching knowledge, and a posttest to see if scores improved after teaching; the pretest and posttest was identical.

Principle 3: Team assignments must promote both learning and team participation. The most common problem in TBL is a single team members' taking responsibility for completing class assignments for the whole team. In such instances, team members who do not do the work are unprepared for class; this lack of preparation results in conflict (Michaelsen, 2002; Team-Based Learning Collaborative, 2013). In the DNP project, the clinician presented the participants (patients) with a brief lecture and

provided handouts. The purpose of this presentation is to give everyone enough information to participate successfully in the class. When a team member responds correctly, the team member's confidence will increase, learning will be stabilized, and the team member will become more empowered in T2DM self-care.

Principle 4: Students must receive immediate, frequent feedback. Immediate, frequent, and discriminatory feedback is important for learning and team development. This feedback enables learners to identify effective and ineffective strategies and to distinguish between good and bad choices (Michaelsen et al., 2002; Team-Based Learning Collaborative, 2013). Completing the GRAT and performing the exercises will give all participants immediate information on how well they understand the content and are able to apply it in different situations.

In the DNP project, the clinician witnessed group problem solving within teams of patients as an avenue to learning and empowerment. In the context of interactions between team members, opportunities arose for participants to learn about the true nature of problems. For example, such problems might pertain to feelings about particular problems, identification of barriers that prevent patients' goal setting and attainment, patients' perceptions of how they sabotage their best efforts, and what can be done to remedy these situations (Ho et al., 2010).

Using patient experiences, future curriculum will use patient experiences to design educational classes that are relevant to the needs of the group (Deakin et al., 2005; Funnell & Anderson, 2004; New, 2010; Ho et al., 2010). In TBL, the person who conducts team meetings functions as a facilitator of high-quality learning rather than as an authoritarian dispenser of knowledge (Sibley, 2012; Sweet & Michaelsen, 2012;

Team-Based Learning Collaborative, 2013). The objective of this DNP project is to determine whether TBL can be as effective for patients who must learn about diabetes in order to successfully self-manage their condition as TBL is for students in academic contexts.

Health Literacy

Health care management is becoming increasingly complex. The broadening usage of the term *health literacy* has led to confusion and debate over the term's definition; different audiences define the term in substantially different ways (Baker, 2006; Berkman, Davis, & McCormack, 2012; Schulz & Nakamoto, 2013). Ratzan and Parker (2000) defined health literacy as ''the degree to which individuals have the capacity to obtain, communicate, process, and understand basic health information and services needed to make appropriate health decisions" (Osborn, 2013, p. 1)

Few authorities deny that health literacy is vital for managing one's personal health at all points along the health care continuum (DeWalt, Berkman, Sheridan, Lohr, Pignone, 2004; Osborne, 2013; Parker, Ratzen, & Lurie, 2003; Schloman, 2004; Schulz & Nakamoto, 2013). A number of factors can contribute to patients' difficulty in understanding health information: cultural discordance, emotional issues, low health literacy, debility related to age, physical disability, and cognitive learning differences (Osborne, 2013). Patients who have less face-to-face time with providers must be able to process information quickly; these patients are expected to be active consumers of health care, to perform self-care tasks of greater complexity, and a larger number of complex self-care tasks (Osborne, 2013). Increasing one's health literacy enhances one's ability to make good health-related decisions and to dynamically participate in the decision-making

process (Schulz & Nakamoto, 2013). As DNP project coordinator, I believed that using this modified TBL as a health pedagogical method gave individuals more time and support to process and learn information necessary for improving their health literacy.

Empowerment

Patient empowerment is associated with patient education that requires greater patient involvement. *Patient empowerment* is defined as a process by which people gain mastery over their lives (Funnell & Anderson, 2004; Rappaport, 1987; Schulz & Nakamoto, 2013). Plank et al. (2004) built on this definition, noting that empowerment validates patients as experts on their condition, thereby enabling them to become confident managers of their disease (Booker et al., 2007; Funnell & Anderson, 2004).

Using the empowerment approach in education requires collaboration between the patient and the health care provider so that patients can assume a more active role in their care (Funnell & Anderson, 2004; Schulz & Nakamoto, 2013). Schultz and Nakamoto (2013) have described empowered patients as those who emerge from an education session extracting the relevant information, then choosing and enacting behaviors appropriate to their health needs. The definition of empowerment that Feste and Anderson proposed in 1995 is a working definition today. It is an approach to education that seeks to increase patient autonomy and expand the patient's choices. Empowerment is achieved by "enabling people to acquire and/or enhance the social, problem solving, and communication skills to manage their own health in a variety of life situations" (Feste & Anderson, 1995, p. 140). A method or approach to education within the empowerment framework must incorporate interactive strategies that will also address cultural and psychosocial needs; these needs can be attended to using the TBL teaching

strategy (Funnell & Anderson, 2004). T2DM patient education that uses a modified-TBL method catalyzes the empowerment of patients with diabetes by strengthening their conviction that they can succeed in making the lifestyle improvements necessary for controlling their diabetes and for preventing comorbid conditions. This empowerment comes through patients' experience of increasing health literacy and successful problem solving (i.e., problem-solving efforts that that yield desired results).

Patient Centeredness

Patient-centered care—a definition. Every patient is unique and has a unique social and cultural background. Every patient has different learning needs and priorities and has encountered different challenges over a lifetime (Tang et al., 2008). A report by the IOM (2001) included a discussion of the quality of care and defined the standards for quality of care. One of the key standards is care that is patient-centered (IOM, 2001). *Patient-centered care* is defined by the IOM (2001) as "care that is respectful of and responsive to individual patient preferences, needs, and values and ensuring that patient values guide all clinical decisions" (pp. 5–6). In designing modified TBL classes for small groups of people in New Mexico, patients' cultural beliefs about diet and exercise will be an important consideration. The concept of patient centeredness views the patient–provider relationship as an empowerment-oriented partnership (Tucker et al., 2011; Tucker et al., 2007). This care is unique because it holds the views and desires of culturally diverse patients as being primary and the views and desires of health care professionals as secondary (Tucker et al., 2011).

Patient centeredness in T2DM patient education. An education intervention's patient-centeredness derives from clinicians' recognition that patients are individuals

whose unique learning preferences and proclivities are shaped both by personal considerations and by cultural background. Designing a tailored patient education plan that incorporates (a) individuals' learning preferences and proclivities and (b) TBL problem-solving techniques ultimately helps patients with T2DM to learn, adopt, and adhere to lifestyle modifications. This patient-centered method accommodates the patient's experience, preferences, and cultural considerations and is grounded in evidenced-based standards (IOM, 2001; McLaughlin & Kaluzny, 2006).

Cultural Sensitivity

In the absence of symptoms, behavior change is difficult to achieve in the absence of symptoms. Behavior change becomes even more challenging when suspicion of illness is rooted in cultural and religious or spiritual beliefs (Melnyk & Morrison-Beedy, 2012; Menon, 2012). The concepts of health literacy and empowerment take on a deeper meaning in the context of culture. Attitudes and beliefs are shaped by cultural, social, and family attitudes and therefore affect health literacy (Betancourt, Green, Carrillo, Ananeh-Firempong, 2003). For individuals who have strong cultural beliefs, information is filtered through cultural attitudes, beliefs, and experiences to arrive at knowing, comprehension, and the ability to make informed decisions based on valid data regarding their health (Spector, 2013). Culturally sensitive health care has been described as care that reflects "the ability to be appropriately responsive to the attitudes, feelings, or circumstances of groups of people that [*sic*] share a common and distinctive racial, national, religious, linguistic, or cultural heritage" (U.S. DHHS, Office of Minority Health, 2001, p. 131). Culturally sensitive health care has also been described as care in

which health care providers offer services in a manner that is relevant to patients' needs and expectations (Majumdar, Browne, Roberts, & Carpio, 2004).

Cultural sensitivity was particularly important when considering the ethnic diversity found in New Mexico. Las Cruces, New Mexico, located in Doña Ana County, has one of the highest proportions of Hispanics in the United States—20% higher than the state of New Mexico as a whole. Two thirds (67.7%) of these individuals are of Hispanic origin, while 30.1% are non-Hispanic White; the state has very few people of other racial–ethnic backgrounds (National Safety Council, 2010). A modified TBL method can provide the mechanism for patients to succeed at self-management because the model can be made to accommodate the patients' needs, goals, and lifestyles through group problem solving. The group learning experience is underscored by shared experiences of managing diabetes, highlighting that empowerment can be facilitated through reassurance from others in the same situation (Ho et al., 2010).

CHAPTER 3. CONCEPTUAL FRAMEWORK

The foundation of the process for interpreting research results is conceptual activities that range from abstract to concrete (Mateo & Kirchhoff, 2009). The framework guiding the T2DM modified-TBL patient education project described in this paper is the health belief model (HBM) developed by Irwin Rosenstock. The HBM was chosen primarily for its ease of use in developing classes to help individuals learn how to problem-solve in T2DM self-care management. In addition, a large body of research evidence substantiates the HBM's utility as an effective framework for developing health education strategies (Carpenter, 2010). Through the use of this model, results were interpreted to explain changes in the behaviors of small groups of patients with T2DM who participated in the patient education project.

The Health Belief Model

The HBM is a conceptual framework used for understanding human behavior and for promoting behavior changes conducive to prevention of undesirable health outcomes. The HBM originated in social psychology and disease prevention—specifically, from Rosenstock's research on why people refrain from participating in programs to prevent and detect disease (Champion & Skinner, 2008; Glanz et al., 2008; Hochbaum, 1958; Rosenstock, 1960, 1974). Since the introduction of the HBM in the 1950s, the model has come to be been widely used and has been expanded (Champion & Skinner, 2008). Proponents of the HBM assert that the model's concepts explain why people adopt certain behaviors and take actions to prevent, screen for, or control illness. According to

this framework, the primary motivation for taking action is avoidance of negative health outcomes.

Key HBM Constructs

In the HBM's current form, six constructs are used to explain why individuals take action to screen for, prevent, or control disease: perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy (Champion & Skinner, 2008; Glanz et al., 2008).

HBM constructs in the original model. Rosenstock's (1960) original HBM included five constructs. *Perceived susceptibility* refers to an individual's beliefs about personal susceptibility to a particular disease. People who believe that the likelihood of developing an illness is low are not likely to screen for the illness (Glanz et al., 2008). *Perceived severity* refers to an individual's belief regarding the consequence of contracting an illness. In the HBM framework, the ultimate motivator of human health-related behavior is avoidance of negative health outcomes. People who believe that the severity of a given disease is low are less likely to participate in screening for disease (Glanz et al., 2008). *Perceived benefits* refers to the benefits of adopting a behavior that is conducive to better health or to disease prevention. People who believe that screening is a means of avoiding negative outcomes from a disease are more likely to screen for the disease than are people who do not share this belief (Glanz et al., 2008). *Perceived barriers* refer to individuals' beliefs regarding barriers to adopting a health-promoting behavior. For example, an individual's fear of the expense, pain, or inaccuracy of a test may decrease the likelihood of the individual's seeking screening for an illness that is potentially revealed by the test. The term *cues to action* refer to external cues (e.g., mass

media) or internal cues (e.g., developing symptoms of a disease) that may motivate a person to act. People who see a poster that announces a screening (i.e., a cue to take action) are more likely to participate in screening for a disease than are people who do not perceive a cue (Glanz et al., 2008). Examples of internal cues include (but are not limited to) chest pain, shortness of breath; examples of external triggers include (but are not limited to) information presented in newspapers, Internet content, and advice from friends or family.

The construct of self-efficacy in the current HBM. The construct of self-efficacy was not included in Rosenstock's (1960) original conception of the HBM. The original model was simply concerned with having people accept screening tests or preventative measures (immunizations), and these actions were not viewed as complex behaviors. In 1988, however, Rosenstock and others added the construct of self-efficacy to the HBM—to explain the challenges presented by increasing unhealthy habitual behaviors such as overeating, poor food choices, sedentary lifestyle, and smoking (Glanz et al., 2008). Bandura (1977) has defined *self-efficacy* as "the conviction that one can successfully execute the behavior required to produce the outcomes" (p. 49).

Taken together, these key HBM constructs explain why people adopt certain behaviors and take actions to prevent, screen for, or control established illness.

Needs Assessment

Population Identification

As discussed earlier, research has found that T2DM is the fastest growing chronic illness in the world—and some researchers describe the problem as a pandemic (Al-Kawaldeh et al., 2012; Colagiuri, 2010; Hjelm et al., 2003). In the United States, both

obesity and T2DM are on the rise, and this rise is mirrored in the City of Las Cruces, New Mexico. Las Cruces is located in Dõna Ana County, in south-central New Mexico. Dõna Ana County has a population of 209,233 people (U.S. Census Bureau, 2010). The county is bordered by El Paso County, Texas, to the east and southeast, and the state of Chihuahua, Mexico, to the south; the county shares approximately 53 miles of its border with Mexico. Las Cruces, located in the middle of the county, is home to half of the county population. The county's remaining residents live outside the city limits, predominantly in rural communities with limited access to health care services (Doña Ana County, 2012.).

Dõna Ana County includes 37 of New Mexico's 55 federally designated underdeveloped communities, also referred to as *colonias* (Doña Ana County, 2012). According to the Doña Ana County Health and Human Services Department (2012), 97% of *colonias* residents are Hispanic; these residents have an average annual income of $5,000. Approximately 85% of *colonias* residents are U.S. citizens. In the county, the rural areas lack safe, affordable housing, potable water, sewer service, and drainage systems (Doña Ana County, 2012).

Diabetes in Doña Ana County. The incidence of diabetes in Doña Ana County is similar to that of the state of New Mexico (25%–29%) and to the United States as a whole (30%; CDC, 2011). Also, in New Mexico and the United States generally, the incidence of diabetes in Doña Ana County increases with age. In the county, state, and nation, the incidence of diabetes is higher among Hispanics and other ethnic groups than among non-Hispanic Whites. Also, the incidence is higher in lower income groups than

in higher income groups. Furthermore, the incidence of diabetes is higher among those who are obese and among those whose lifestyle is sedentary (Flores & Nevarez, 2010).

The DNP projects clinical site. The DNP T2DM modified-TBL patient education project was conducted in an internal medicine clinic located in Las Cruces, New Mexico. As clinician project leader of the DNP project, this author was aware of the clinic owner–operator's interest in providing innovative and comprehensive treatment to the clinic's clients; the author was also aware that this particular practice has served patients in Las Cruces for 30 years and has a robust client base. The author received conditional approval to use the facility as a test site prior to receiving the university institutional review board's (IRB) approval. On receiving IRB approval on June 2, 2014, an internal chart review was conducted. Approximately 25% of the clinic's patients were identified as receiving treatment for T2DM and associated comorbidities and were thus potentially eligible for participation in the T2DM modified-TBL patient education intervention.

Project Sponsor and Key Stakeholders

The project sponsor has been identified as an internist and her clinic; the internist owns the clinic and has been in practice for 30 years. Additional stakeholders are two medical assistants who both hold master's degrees in public health education (MPH). The two medical assistants are identified as being likely to assume responsibility for patient education if the T2DM modified-TBL classes continue in the future.

To gain the support of the project's principal stakeholders, a meeting was held to present the ideas for the pilot project and the project's objectives and goals.

Subsequently, during the months leading up to the presentation of the classes, all principal stakeholders engaged in frequent discussions about the project.

Organizational Assessment

The internist's patient diagnosis and care process is grounded in evidence-based guidelines. The internist and her medical assistants are determined to create a culture of quality and continuous improvement to help patients achieve the best possible control of their chronic conditions. As a result, these health care providers continuously try to innovate ways to help patients assume more responsibility in their personal health care, such as decisions about care. Believing that everyone should be able to have affordable health care, the internist provides care to a large number of people who lack insurance. She spends the time she feels is necessary to treat her patients, and the patient education that she provides at the point of care is time-consuming. As an intervention to educate patients about diabetes, the T2DM modified-TBL patient education course will enable the internist and her clinic to reach more people in individual sessions and will enhance the effectiveness of the point-of-care education sessions.

Available Resources

All equipment and supplies were available at no charge to the clinic or the patient. The internist provided to this author a letter of conditional permission to use the clinic's education patient classroom for the T2DM modified-TBL pilot project, After approval to conduct the classes was granted by the UNLV IRB (on June 2, 2014), the classes were scheduled and recruitment of participants began.

CHAPTER 4. PROJECT PLAN AND EVALUATION PLAN

This chapter describes the project plan and evaluation plan that have guided the implementation of the T2DM modified-TBL patient education project described in this DNP dissertation.

Project Plan

Setting

The T2DM modified-TBL patient education intervention was conducted in a patient education classroom in an internal medicine physician's clinic in the city of Las Cruces, New Mexico. Las Cruces is located in Doña Ana County in southern New Mexico. In 2013, the population of Las Cruces was estimated to be 101,324 (U.S. Census Bureau, 2013).

Population of Interest

The eligibility criteria for intervention participation were (a) registration as a patient receiving care at the internal medicine clinic, (b) male or female, (c) diagnosis of T2DM, (d) 18–68 years of age, (e) ability to speak, read, and write in English, and (f) ability to provide informed consent. Participants were recruited from patients in the internist's medicine practice by the internist, the clinic's two medical assistants, and this author (as the project's investigator and T2DM course instructor). The T2DM course was also advertised via posters placed in the patient waiting room and each of the clinic's examination rooms (see Appendix A).

Sample Size

The participant recruitment effort's initial goal was to enroll a sample of 20–30 participants—a sample size that the author's thesis committee had deemed large enough to identify changes in pretest posttest results.

Stakeholders

The DNP project's key stakeholders were the internist and two medical assistants, both of whom hold master's degrees in public health in health education. All of these clinicians had experience and interest in diabetic patient education. Also, all of the clinicians had expressed a serious interest in starting a patient education program in the future, in seeking certification as diabetic educators, and in conducting research. The clinicians identified a need in their clinic for an ongoing patient education program to help their patients improve their health literacy, empowerment, diabetes self-management, and complex problem-solving abilities.

Overview of the T2DM Modified-TBL Patient Education Intervention

Measures. A pretest–posttest instrument was used to evaluate the efficacy of the T2DM modified-TBL patient education intervention—specifically, to evaluate the intervention's efficacy in improving problem–solving skills and in increasing empowerment in patients with diabetes. Pretest–posttest instruments are often used to evaluate the effectiveness of patient education programs—and in particular, to measure changes in the patient's understanding of diabetes self-care activities (Dimitrov & Rumrill, 2003). At the beginning of the T2DM modified-TBL course's first class (i.e., Class 1), participants completed a pretest that assessed their general knowledge of T2DM. The pretest–posttest instrument had 12 multiple-choice questions (see Appendix

B). The questions were designed by this author and approved by the internist. The questions pertained to information provided to every patient diagnosed as having diabetes and on subsequent patient–provider encounters. At the conclusion of the Class 2, the same test was administered as a posttest to ascertain whether learning had occurred. The differences between pretest scores and posttest scores and the evaluation of the T2DM modified-TBL course were used to the determine intervention's effectiveness.

Evaluation. The instrument used to evaluate the pedagogical method, content, and course participants' perceptions of TBL used a 5-point Likert response scale with responses ranging from *strongly agree* to *strongly disagree*. Higher scores indicated a more positive participant attitude (see Appendix C).

As described earlier, the T2DM modified-TBL patient education intervention was a course consisting of two 2-hour classes. The objective of Class 1: Beginning an Exercise Program for Managing Type 2 Diabetes was to help patients with T2DM learn about why exercise is important for proper management and control of blood sugars. Exercise is important to prevent the onset of serious chronic diseases associated with diabetes (ADA, 2013). The objective of Class 2: Diet: Being Prepared to Avoid Poor Food Choices was to help participants learn about (a) diet for managing T2DM and (b) being prepared to eat so that poor decisions are avoided.

The classic TBL method includes having the student complete assigned pre-readings or other advanced preparation and, at the first class meeting, completing the multiple-choice Individual Readiness Assurance Test (IRAT). The rest of the first class focuses on having students solve problems using the 4-S framework. The "Ss" of the 4-S framework are

- *significant problem*—authentic, relevant problems that capture student interest;
- *same problem*—teams work on the same problem, case or question;
- *specific choice*—use of course concepts to make a specific choice; and
- *simultaneous report*—reporting choices simultaneously.

(Cook & Levine, 2012).

During the problem-solving process, the author, as course facilitator, had opportunities to provide brief expert clarification of concepts that were particularly challenging for the learner–patients. Both classes concluded with a short clinician-led review and closure activity.

The TBL method used in the T2DM patient education intervention differed from that of the classic TBL method in three respects. First, participants were not required to complete the "pre-readings" that are a normal component of programs that use the standard TBL pedagogical method. Instead of reading pre-class content, at the beginning of each of the two T2DM modified-TBL classes, participants dynamically engaged in a "live," interactive lecture that included a Power Point presentation. Second, in the modified-TBL course, participants were not required to complete an IRAT. Third, the number of participants in the T2DM classes was much smaller than that of typical programs that use the standard TBL method; as a result, in the T2DM classes, the learner-instructor ratio was much smaller than that of typical TBL programs. In view of these three innovations to the standard TBL method, the pedagogical method used in this T2DM intervention is referred to as "modified TBL." However, the core of the T2DM

course's learning experience was that of standard TBL. In particular, in the T2DM course, enhanced learning outcomes were achieved by shifting the focus of pedagogical method from the traditional teacher-centered focus on knowledge transmission to the TBL focus on learners' knowledge application (Cook & Levine, 2012; Michaelson, 2008).

Instruments

Group Readiness Assurance Test (GRAT). Participants completed a 10-question multiple-choice GRAT (test; see Appendix D). Answers to the questions were recorded on an IF–AT (immediate feedback–assessment technique) card, a special type of *scratch-and-win* testing card. The team questions were reviewed by having the team's leader report the team's answer. If team members' answers did not agree, the discrepancies were addressed by asking the teams to defend their answers.

Application Exercise Instrument. Once this author (as course instructor) felt that the T2DM course participants had mastered a class's core concepts, the participants moved on to engage in the class's application exercise, in which the participants in their teams discussed a T2DM scenario about a person with diabetes who faced a common but complex problem—regarding either exercise or diet. The team members first read a handout that described an authentic diabetes self-management problem scenario; then, in discussion, the team members made collective decisions about how the scenario's protagonist should respond to certain aspects of the problem. The course participants' responses to these problematic aspects were elicited from a set of multiple-choice questions that were stated in the scenario handout) (Appendix E&F). This discussion and group decision-making exercise gave participants an opportunity to apply newly acquired

knowledge to complex authentic problems encountered in T2DM self-management. The application exercise questions were designed to be more challenging than the GRAT questions—for example, in requiring problem-solving skills beyond that of simply recalling relevant information. Then, team leaders indicated their team's answers via simultaneous reporting (i.e., all team leaders' simultaneously held up their team's card, with answers indicated by the team leaders' having written "A," "B," "C," "D," or "E" on the card). Next, the course instructor (i.e., this author) reviewed each question and asked the teams to discuss, defend, and analyze their answers to the questions.

The discussions between teams provided an opportunity for the participants to challenge each other's decisions, defend their own thinking and thoughtfully examine decision-making processes used by the other teams and by their own team. In many cases, discussions focused on participants' thinking that led to their team's decisions, rather than on the correctness of a given choice.

Course Activities

Before starting the activities for Class 1, participants heard a brief description of how the course would be conducted and an explanation of how the course differed from previous patient education courses or classes that they had attended. Participants were asked to read and sign consent forms that verified their willingness to participate in the course.

Class plans. The meeting plans for the two T2DM modified-TBL classes (described below) were similar.

Class 1: Beginning an Exercise Program for Managing Type 2 Diabetes.

1. Participants complete the pretest.
2. Participants dynamically engage in a Power Point presentation (Appendix J).
3. Topics
    a. Introduction
    b. Objectives
    c. What is type 2 diabetes?
    d. What is the main cause of T2DM?
    e. How can exercise help control diabetes?
    f. How much exercise is necessary for good control of T2DM?
    g. What kind of exercise is best for you?
    h. How should we prepare for exercise?
4. Team work
    a. Participants complete the GRAT (multiple-choice exercise test),
    b. Participants engage in the Application Exercise—Scenario)
5. The clinician concludes the class by reviewing the class's salient points to reinforce learning.

Class 2: Diet: How to be Prepared to Avoid Poor Food Choices

Class 2 followed the same template as exercise and built on what was learned in Class 1.

1. No pretest
2. Participants dynamically engage in a Power Point presentation on food learning how to make healthy choices in a busy schedule and how to make healthy choices when eating outside the home.
3. Teamwork

a. Participants complete the GRAT (multiple-choice food test)

b. Participants engage in the Application Exercise for Diet

4. Participants discuss the outcome of team solutions.
5. Participants complete the posttest (i.e., same test as the pretest)
6. Participants complete the course evaluation.

T2DM modified-TBL Course Objectives and Goals

Objectives

At the end of the two classes participants will be able to

1. identify three causes of T2DM,
2. define T2DM,
3. identify three complications of uncontrolled diabetes,
4. identify two symptoms of hypoglycemia that may be experienced when exercising
5. describe actions that should be taken if one experiences hyperglycemia while exercising,
6. identify two ways in which exercise can help participants improve their T2DM self-management,
7. state two reasons why diet is the is the most important component of diabetes management,
8. identify two ways that diet plays a very important role in the control of blood sugars,
9. identify ways to make smart choices when eating outside the home.

Goals

The goal of the classes was to encourage and facilitate health behavior change by helping the participants understand why beginning an exercise program and better dietary control can improve the symptoms of diabetes.

Resources and Support

The financial resources and supplies required for this project were provided by this author, as the clinician conducting the classes. Course resource costs included printing costs for course materials, pre- and posttest evaluations, and pencils (see Table 1. Project Resources and Budget).

Table 1. Project Resources and Budget

Item	Approx. cost
teaching materials for the Power Point Presentations requiring a projector and laptop computer and projector the clinician's property. Printing costs: printed copy of Power Point with space to take notes. Printing costs for pretest–posttest copies and sample menus	$25
folders for preloading with the application activity work sheets, reporting cards and any other materials	$10
#2 lead pencils, 2 packs	$6
drinking water, 2 cases	$12
participation fee for each participant: $25.00	$450
scratch off cards, 1 pack	$80
recruiting posters	$90
Total costs	$673

The course location—a classroom located at the clinic—was provided at no charge.

T2DM Modified-TBL Patient Education DNP Project Timeline

August 6, 2013

- Defense of project proposal
- Defense accepted

September 2013

- Submitted application for UNLV IRB approval and revisions to proposal

October 2013

- Submitted revisions to IRB

November 2013

- Obtained letter of conditional approval to conduct the TBL project at the sponsoring clinic (Appendix L), pending approval from University of Nevada Las Vegas Institutional Review Board UNLV IRB.
- Submitted approval letter to IRB

January 2014

- Submitted revisions to IRB

June 2014

- Received IRB Approval (Appendix M)

July 12, 2014

- Met with sponsoring internist–principal stakeholder to show plans for modified TBL modules and solicit any additions or subtractions.

August–September 2014

- Met with sponsoring internist–principal stakeholder to review activities for the TBL classes and to determine dates. All course materials and protocols were

reviewed with the internist for her approval.

- Distributed solicitations to attract identified diabetic patients at the sponsoring clinic (posters in waiting room and in each exam room)
- Data collection source was patient evaluations of learned information and pretest–posttest

September 19, 2014

- Conducted Class 1. Beginning an Exercise Program for Managing Type 2 Diabetes

September 26, 2014

- Conducted Class 2 Diet: How to be prepared to Avoid Poor Food Choices

October–December 2014

- Decided with stakeholders to give the course again—using the same curriculum
- New posters announcing second T2DM modified-TBL classes were posted in office waiting room and in all examination rooms.
- Chart review to identify 50 patients who meet inclusion criteria. Made phone calls and follow-up phone calls to patients who wanted to participate.
- November 13, 2014: Repeated Class 1 Beginning an Exercise Program for Managing Type 2 Diabetes
- November 20, 2014: Repeat Class 2 Diet: How to be prepared
- December 5, 2014: Project implementation complete
- Review tests results and evaluations and gathered data

January–July 2015

- Performed data analysis

- Developed justifications for conclusions: interpreted test scores and prepared recommendations
- Completed the dissertation's final chapter
- Shared lessons learned with stakeholders

August 20, 2015

- Project Defense
- Completed of program evaluation report.

Evaluation Plan

Evaluation of the TBL classes gauged the impact of the TBL method by measuring the degree of improvement of participants' knowledge following implementation of the two T2DM modified-TBL patient education course. Evaluation of the T2DM classes gauged the impact of their modified-TBL method by measuring the degree of improvement of participants' knowledge following implementation of the two T2DM modified-TBL patient education course.

Pretest–posttest study designs are used for comparing groups and for measuring change resulting from, in this case, participation in a modified TBL method to increase problem-solving and decision-making ability in T2DM self-care. The definitive characteristic of this design is that two measurements will be made on the same group of participants. The pretest will occur prior to any lecture or TBL activities and the posttest will be administered after the conclusion of Class 2. Although researchers have used the proposed research design for years, the comparative utility and appropriateness of statistical methods for analyzing the data collected remains undetermined (Barry, 2003). The anticipated method to be applied to this project was GLM with covariate. A general

linear model framework, with pretest scores as the covariate, is typically the preferred method for analyzing pre–post design data because the use of this model eliminates systematic bias and reduces error variance (Barry, 2003). Due to small sample size a paired *t*-test was the chosen method for statistical analysis.

The variables considered with this project included improvement in scores from pretest to posttest; improvement in these scores indicated increased learning. An additional variable that was evaluated was participants' satisfaction with the TBL pedagogical method; here, participant satisfaction was measured via the 5-response Likert questionnaire.

CHAPTER 5. IMPLEMENTATION AND RESULTS

The T2DM modified-TBL patient education project described was conducted from September 2014 to December 2014 at an internal medicine office in a small city in New Mexico. The course's goal was to increase patients' T2DM self-management skills by increasing their knowledge of T2DM and DSME. This chapter describes the project's implementation and results.

Implementation

The T2DM modified-TBL patient education project was implemented in two phases: the pre-intervention administrative preparation and the presentation of the T2DM course itself.

Pre-intervention Preparation

Administrative preparation completed prior conducting the T2DM modified-TBL course consisted of three components: (a) introduction of the T2DM modified-TBL intervention to the staff of the clinic that served as project site, (b) application for institutional review board approval, and (c) initial recruitment of participants.

Introduction of the T2DM course to clinic staff. In August 2014, discussions with an internist and her medical assistants helped determine the dates and procedures for the project implementation. Also, the internist was informed of the intervention protocol and anticipated outcomes. During the preparatory period, all learning materials were presented to the internist, and her questions and concerns were addressed.

Institutional review board approval. The University of Nevada Las Vegas (UNLV) DNP project committee approved the project in August 2013. Prior to the

project's implementation, the UNLV Biomedical Institutional Review Board Office of Research Integrity–Human Safety (IRB) granted expedited approval on June 2, 2014.

Initial participant recruitment. From August 2014 to September 2014, potential participants in the T2DM patient education course were recruited from an internal medicine practice in Las Cruces, New Mexico. Three issues were salient in this recruitment: participant eligibility, sample composition, and the recruitment effort itself.

Participant eligibility. Eligibility criteria for participation in the T2DM sessions were (a) having a diagnosis of T2DM, (b) being 18–68 years of age, and (c) being a patient of the project's internist.

Sample. A total of 18 eligible patients (median age, 53 years) were enrolled as study sample members. In addition, two other individuals who wished to take the classes, but who did not meet sample eligibility criteria, were allowed to audit the classes. One of the auditing participants was 86 years of age (and thus ineligible for inclusion in the sample). The other auditing participant did not have diabetes but was permitted to attend the classes to support her husband, who was a sample member. All of the individuals who attended the T2DM modified-TBL classes (i.e., the 18 sample members and two auditing participants) completed both classes. The data compiled for the study came only from sample members (n=18).

T2DM course announcement to potential participants. To recruit participants for the upcoming T2DM modified TBL patient education classes, posters announcing the classes were placed in the clinic waiting room and in all examination rooms. Patients wishing to inquire about the intervention, voice concerns, or enroll in the intervention could do so by calling the investigator.

Implementation of the Intervention

During the T2DM modified-TBL intervention's implementation phase, key activities include presentation of the T2DM TBL intervention, obtaining participant consent, administration of pre-course testing, assignment to team, presentation of course topics, and course activities.

Presentation of the T2DM modified-TBL intervention. Class 1 and Class 2 of the T2DM modified-TBL patient education course were first conducted in 2014 on September 19 and September 26, respectively. Despite the project's recruitment and enrollment efforts, actual attendance of this September course was small; only seven people completed the first intervention—five sample members and two auditing participants. Therefore, the T2DM modified TBL classes were presented a second time—on November 13 and November 20, 2014, respectively. For the second presentation of the intervention, potential participants were recruited through poster advertising and through recruitment phone calls made to 50 patients whose T2DM eligibility had hitherto been determined via medical record examination (i.e. verification of the patients' T2DM ICD9 250.000 code diagnosis). The November course had larger attendance (n = 13). The project was completed on December 5, 2014. The two presentations of the T2DM modified-TBL course were identical in all respects (i.e., in format and content), and therefore the data for the two presentations could subsequently be combined for data analysis purposes.

Consent, pre-course testing, and assignment to team. After patients were informed of their eligibility for the intervention, all of the patients provided signed consent forms verifying their willingness to participate (see Appendix K). All participants

then completed a multiple-choice pre-intervention test with 12 questions that assessed their general knowledge of diabetes. Next, all participants engaged in an introductory presentation and discussion that explained the TBL method that would be used in the T2DM classes. Following the introductory discussion, this author, as project investigator, assigned the participants to specific teams. Team assignment ensured that any participating family members, friends, and spouses would be on different teams. This assignment-to-team provision optimized team diversity and promoted better team interaction (Michaelsen, 2002). (In the T2DM course, better team interaction meant, for example, that participants who were ordinarily less vocal in conversations with family members were typically more vocal in conversations with TBL team members who were not family members.) Participants in the September course presentation (Group I, $n = 7$) had one team of three members and one team of four members; participants in the November course presentation (Group II, $n = 13$) had three teams of three members each and one group of four members.

Class topic presentations and post-presentation testing. As mentioned, the design of the T2DM patient education intervention was informed by Michaelsen's TBL method and pedagogical method (see Appendix D for a detailed outline of the T2DM class activities). Following assignment to their teams, participants actively engaged in a topic presentation that was relevant to the particular class topic (i.e., in Class 1, a presentation on exercise; in Class 2, a presentation on diet); the topic presentation included a Microsoft PowerPoint presentation. Following the class's topic presentation, participants completed the Group Readiness Assurance Test (GRAT), a 10-question instrument that assessed their knowledge of the presentation in which they had just

participated (see Appendix G). The team's completion of the GRAT proceeded in two steps. First, team members discussed each of the GRAT multiple-choice questions and collectively chose a best answer; then each team leader held up a card with a letter (i.e., "A," "B," "C," "D," or "E,") to indicate the team's answer. Correct answers were confirmed to be correct, and team members were praised for contributing correct answers; incorrect answers were also discussed.

Roles and Responsibilities

The investigator. This author was the intervention's principal investigator. For this pilot project, the investigator performed all tasks involved in implementation of the T2DM modified-TBL patient education intervention: (a) design of PowerPoint presentations for diet and exercise; (b) creation of all tests, scenarios, evaluations, posters, and lecture format; (c) administration of test instruments; (d) teaching–facilitation of the classes; and (e) data analysis and report generation.

The internist. The internist at whose clinical facility the project was conducted was the project's primary stakeholder—by virtue of the fact that the outcomes of the T2DM patient education intervention could potentially affect her patients, her staff, and the internist herself. In addition, to giving permission to use her facility, the internist also helped recruit participants from her patient panel, contributed to discussions, and offered support, evaluation, and observations of the team dynamic.

The classes did not require overtime for any office personnel because this author, conducted the classes. Also, the patient education intervention required no rescheduling or disruption of clinic schedule.

Monitoring the Project

As mentioned above, the participating internist, who attended all of the T2DM patient education classes, contributed to discussions and offered support, evaluation, and observations of the team dynamic. She subsequently stated that the pedagogical method promoted active learning, and that she was surprised by the degree of dynamic exchange that transpired between team participants.

Threats and Barriers to the Project

The pilot project had several barriers and associated threats.

Barriers that limited sample size. First, the brevity of the pre-intervention implementation—2 weeks—precluded adequate advertising of the course and constrained otherwise-interested patients' ability to make scheduling adjustments that would have enabled them to participate in the intervention. Also, for some interested patients, lack of transportation was a barrier. As a result of these time and transportation barriers, the project's participant sample was small ($N = 18$).

Second, for some participants, conflicts between long-established dietary habits and T2DM-related dietary recommendations may have imposed a barrier. A few participants stated that changing their diet from a traditional Mexican diet to a diabetic diet was difficult because (a) the Mexican diet was less expensive than the diabetic diet, (b) they were accustomed to and preferred Mexican food, and (c) they lacked family support that was critical for dietary compliance. Some commented that family members lacked knowledge necessary to support a healthy diet. For these and other reasons, the foods that were available in a participant's home were not always ideal.

Threat to sample size. Sample size or participation by larger numbers was affected by the course's 40% "no-show" rate. ("No show" refers to instances in which a patient agreed to attend but subsequently did not attend.) Although the T2DM course's no-show rate was high, the course's no-show rate was similar to the physician's patient appointment no-show rate. Participants who had not attended a class were subsequently called to ascertain ways to improve participation. In these telephone calls, most responders spoke of the need for childcare or stated that extended family members necessitated a last-minute change of plans. Other common responses indicated the participants forgot about classes, did not feel well enough to attend classes, or had holiday season activities that precluded class attendance.

Barriers to behavioral change. The participants may have entertained specific attitudes that were barriers to behavioral change. Such attitudinal barriers can be understood in terms of the health belief model (HMB) and by the concept of self-efficacy, which Bandura (1977) defined as "the conviction that one can successfully execute the behavior required to produce the outcomes" (p. 49).

Application of the Health Belief Model

As discussed in Chapter 3, the HBM's conceptual framework and constructs can be used to elucidate understanding of why people are willing or unwilling to participate in the T2DM modified-TBL patient education intervention. The comments in the education program highlight some of the reasons that patients were willing to make the necessary lifestyle and behavioral changes. The model's constructs that were applicable in the T2DM modified TBL patient education intervention were the following:

- *perceived seriousness of the disease*. For example, through classroom discussion. One of the participants stated that she was newly diagnosed with diabetes. Earlier, as a 12–year-old child, she had witnessed her grandmother's amputated gangrenous leg; this memory had left a lasting perception of the participant's potential susceptibility to diabetes and its complications. The participant's goal was to learn as much about the disease in order to preclude her becoming as ill as her grandmother.
- *belief about personal susceptibility to disease.* Participants in the class remarked that in the initial stages of diabetes they did not perceive that their disease was serious, because they had no significant symptoms. When they began to experience serious complications of the disease, they recognized its seriousness.
- *perceived benefits derivable from adopting prescribed behaviors.* One of the participants in the class stated that she felt her 40-pound weight loss had helped her understand the benefits of following prescribed behaviors as her HbA1c and other labs improved. Lifestyle changes are difficult under the best circumstances. If a patient must work hard to make lifestyle changes but feels physically well, making changes may not be a priority.
- *perceived barriers to implementing prescribed behaviors* (e.g., expense, pain, time). A 30–year-old Hispanic male course participant who had had diabetes for many years stated that it was almost impossible for him to make necessary dietary changes because he lived at home and his mother who was from Mexico and who cooked only traditional Mexican food. He was also worried about her because she

showed the signs of diabetes but refused to go to the doctor. He also explained that alternative healthy foods were more expensive than traditional Mexican food.

- c*ues to action.* Potential cues to action take many forms, including advertisements, media, and materials aimed at encouraging the public to take action to control diabetes from its inception or earlier (i.e., before complications arise), reminders from friends and family (perhaps regarding a relative who had a slow painful death from the disease). In this T2DM modified-TBL project, all of the participants received cues to action—either from the posters announcing the classes or a verbal recommendation from the internist and medical assistants. Also, during the project, in order to achieve weight loss, one participant modified her diet—because she had witnessed family members who had suffered with complications from diabetes.
- *self-efficacy.* With regard to an individual with T2DM, the term *self-efficacy* refers to the individual's conviction that she or he can successfully implement behaviors to control T2DM. As described above, the participant with newly diagnosed T2DM manifested increased self-efficacy and empowerment by having recently losing 40 pounds and by improving A1c and other labs. She stated that because her knowledge of T2DM (i.e., her T2DM health literacy) was so deficient, she was very anxious to learn as much as she could about the disease.

Data Collection

A total of 18 sample members completed a pretest at the beginning of Class 1, and the same test was given as a posttest after completion of Class 2. The pretest–posttest format was used to measure differences in scores before and after the patient education

intervention that used a modified TBL pedagogical method and the classes on diet and exercise. To maintain privacy and confidentiality of the participants who were recruited from the internal medicine practice, participants were not required to disclose personal identifying information. A unique identifier system was used to compare each participant's pretest and posttest results. Data were analyzed to determine changes in scores from pretest to posttest.

Data Analysis

Purpose. The purpose of the DNP pilot project was to measure any difference in pretest–posttest scores after patients participated in two 2-hour T2DM modified TBL classes held one week apart.

Research question and hypothesis. The pilot project's research question was "Is there a significant change in participants test scores following the T2DM modified TBL intervention?" The research hypotheses were

- *null hypothesis:* Participants' test scores did not significantly change following participation in the T2DM modified-TBL patient education intervention.
- *alternative hypothesis:* Test scores improved significantly following patient participation in the T2DM modified-TBL patient education intervention.

Tables 3, 4, and 5 present the intervention's paired samples statistics (in Table 3), paired samples correlations (in Table 4), and paired samples test (in Table 5).

Table 2. Paired Samples Statistics

		M	*N*	*SD*	*SEM*
Pair 1	Test before TBL	65.1667	18	26.47363	6.23989
	Test after TBL	88.3889	18	3.95770	.93284

Note. TBL = team-based learning intervention. *M* = mean. *N* = sample size. *SD* = standard deviation. *SEM* = standard error of the mean.

Table 3. Paired Samples Correlations

		N	*r*	Significance
Pair 1	Test before TBL intervention & Test after TBL intervention	18	.402	.098

Note. TBL = team-based learning intervention. *N* = sample size. *r* = correlation.

Table 4. Paired Samples Test

		Paired Differences					*t*	*df*	Signif. (2-tailed)
					95% CI of the Difference				
		M	*SD*	*SEM*	Lower	Upper			
Pair 1	Test before TBL - Test after TBL	-23.22222	25.14559	5.92687	-35.72683	-10.71761	-3.918	17	.001

Note. Significant difference ($p < .001$) t = Student's *t* distribution. *df* = degrees of freedom. *CI* = confidence interval. TBL = team-based learning intervention. *M* = mean. *SD* = standard deviation. *SEM* = standard error of the mean.

To test the hypothesis that scores improved after the intervention, the participants' pre- and posttest scores were entered into SPSS Version 22. Use of a paired-samples *t*-test (dependent samples *t*-test) revealed a significant difference in the scores from pretest ($M = 65.16$, $SD = 26.47$) to posttest ($M = 88.38$, $SD = 3.95$) t (3.91) =, $p = <. 001$.

The paired samples correlation indicates the results were approaching significance and moderately correlated ($r = 0.4$, $p = 0.098$) which supports the *t*-test findings.

Therefore, the null hypothesis is rejected. These results suggest that the two 2-hour T2DM modified TBL given one week apart resulted in improved test scores; this improvement in test scores suggests that learning occurred.

Study Limitations

Limitations of this pilot study include the sample's small size and racial-ethnic homogeneity; in addition, the study was conducted in a single type of clinic setting and at a single geographic location. All of these factors diminished the pilot study's external validity. In future studies, to determine intervention efficacy, strengthen external validity,

and broaden generalizability of findings and conclusions, samples should be larger and demographically more diverse. Also external validity and generalizability would also be stronger with follow-up studies conducted with patient recruitment from multiple–locations and clinic.

Evaluation Data

All sample members ($N = 18$) completed a 10-item evaluation instrument (see Appendix C, questions 3, 4, and 11). Seven of the items used a Likert scale to evaluate the program; three items were open-ended questions that solicited patient opinions. Participants' responses to these questions provided valuable data for evaluating the modified-TBL intervention activities and information should these patients participate in future T2DM modified-TBL patient education events.

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The T2DM course's evaluation data were compiled from participants' comments regarding their experience in the TBL process and recommendations for (a) subsequent offerings of the T2DM modified-TBL patient education classes, (b) additional classes for the T2DM intervention (i.e., classes on other diabetes-related topics—e.g., effects of diabetes on the eyes), and (c) interventions pertaining to other illness conditions. The participants' rating of the modified-TBL method to learning ranged from *satisfied* to *extremely satisfied*. For this project, the evaluation data from the open-ended questions were compiled as follows:

- 33% ($n = 6$) indicated that they liked the team experience.
- 11% ($n = 2$) appreciated being taught in understandable language (i.e., in "layman's term").

- 55% (*n* = 10) found the information well-presented, organized, informative, liked explanation of material, power point, and handouts.
- 11% (*n* = 2) thought the second class was too long.
- 5% (*n* = 1) was physically in pain from chronic back pain and stated, "chairs too hard."

Data Interpretation

Judging from the participants' test results, opinions provided in the evaluations, and observations by the project investigator, the participants' primary motivation for attending the T2DM modified-TBL patient education classes appears to be the desire to avoid negative health outcomes. Thus, several patients described their desire to avoid the past experiences of a close relative with diabetes who had suffered slow debilitating complications and died. This conclusion is also in concert with the HBM and with research that has substantiated the model. The data indicated that overall, participants' evaluation of their TBL experience was good and that they desired future classes using the interactive TBL method.

Dissemination and Use of Results

Plans to disseminate findings from the data analysis and recommendations for continuation of the intervention began with reporting to the project's participating internist and medical assistants. In the near future, the project's findings will also be provided to agencies and other service providers (primary care providers, pharmacists) who serve patients with T2DM in the community via newsletter or announcement for classes. Dissemination will emphasize the uniqueness and effectiveness of the TBL method. Other agencies in the community that treat the project's target population of

people with T2DM will receive study findings in the form of an article in the health section of the city's local newspaper. The small local newspaper often will publish an article on an issue important to the community, and the topic of diabetes and increasing one's health literacy and DSME capabilities is certainly of great import.

Another future plan is to conduct more T2DM modified-TBL classes in order to collect more data and report findings in a manuscript that this author would submit for journal publication.

Use of T2DM modified-TBL Intervention for Migrant Workers

During the recruitment process, the critical need for T2DM patient education classes became known as directors of two rural government-sponsored care facilities inquired about having the classes at their facilities. It was stated that these programs are urgently needed by government-sponsored care facilities in metropolitan and urban regions that have large migrant worker populations with T2DM. The clinic staff members and this author were informed that these workers often receive a diagnosis of T2DM, are given medications, and shortly after that migrate in search of work to another geographical area. Typically, the patient and family are given very little information and in many cases do not understand T2DM patient education information about they are given. When they migrate to their next place of work, the continuity of their education is disrupted.

Examination of Alternative Pedagogical Approaches and Methods

In addition to researching T2DM patient education interventions that used a modified-TBL method, this author is also examining other patient education approaches, methods, and techniques that may attract more participants—such as the use of posters in

key areas (e.g., small markets that are health oriented and larger grocery stores). A food market that specializes in offering health food has recently opened in the community; this market has a fully equipped demonstration kitchen. The potential for this healthy food market to serve as a venue for future classes piqued my interest after one of the group participants inquired about the possibility for demonstration classes on healthy food preparation. Another participant requested a class in which recipes could be exchanged.

Conclusion

Although this pilot project did not attract its intended number of participants, the project nevertheless was judged to be successful among this sample—in terms of the significant improvement in pretest–posttest scores and the favorable tenor of the patient evaluations. The intervention's effectiveness was also substantiated by observations of the participants' enthusiastic engagement in their teams and by participants' requests for more offerings of the T2DM patient education classes. Although the results indicate the the intervention was successful among this sample,followup studies with more subjects and clinics are necessary.

The participating internist (as primary stakeholder) was highly encouraged by what she observed in the classroom. She expressed desire to pursue opportunities for future presentations of the T2DM modified-TBL classes.

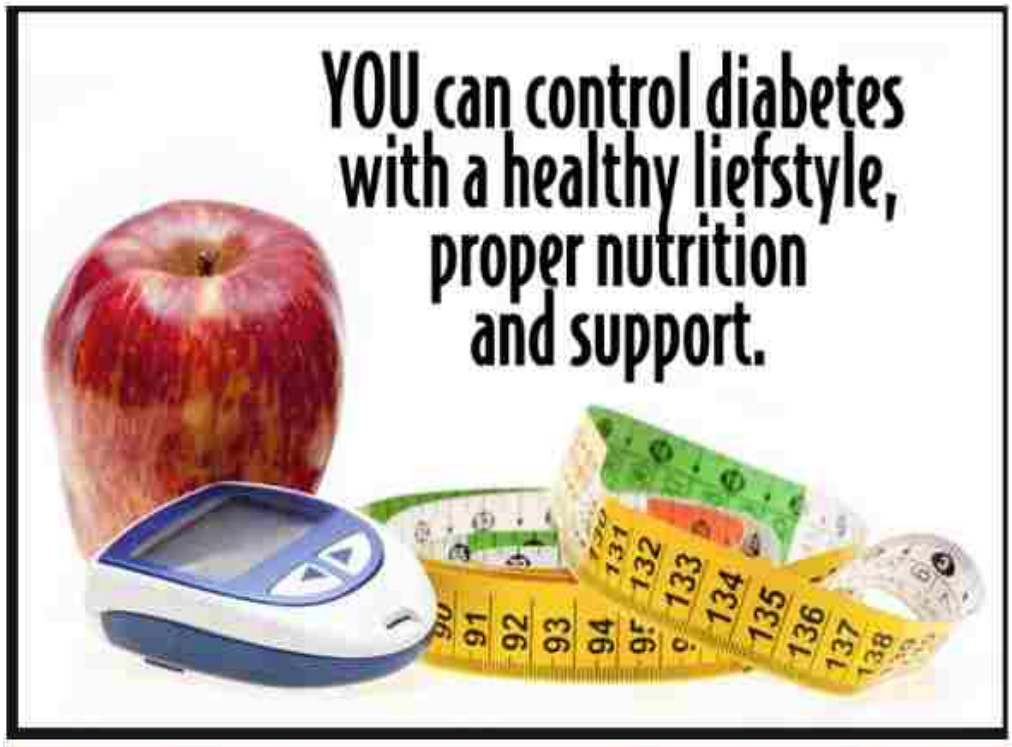
Recommendations

In the future, additional patient education interventions using a TBL method should be open for all people who wish to attend regardless of age or diabetes diagnosis status. (Notably, although the individual who was 86 years old was beyond the age for inclusion as a sample member, she proved to be a positive role model for the group and

among all participants scored highest on both pretest and posttest.) In future T2DM patient education programs, class activities should be abbreviated (e.g., via elimination of the multiple-choice pretest–posttest). However, for the purpose of gathering information for a future publication, this author would use this tool again.

APPENDICES

Appendix A. Patient Recruitment Poster



Come join us for two classes and learn about Type 2 Diabetes and how to keep from developing serious side effects

There will be a $25.00 cash award for participation

[Date]

Call Corine Lazaro 575-5227676 to sign up

Research study from UNLV: Conducted by Dr.Michele Clark, RN, PhD, and Corine Lazaro, DNPc, FNP-BC

Ann Mercer's Office: 2801 Missouri Ave.

Appendix B. Pretest-Posttest

Name_____ Date_____

Pretest Post-test for Modified Team-based learning project teaching diet and exercise as a way to managed diabetes (blood sugars, weight and prevention of complications of diabetes)

Directions

15 Multiple Choice Questions

Use the scratch card for answers

1.Diabetes is a condition of the body that is a result of:

- **a.** Too much insulin in the body
- **b.** Not enough insulin or the body is unable to use the insulin
- **c.** Eating too much sugar and other sweets
- **d.** Eating greasy/fat foods
- **e.** I don't know

2. What is the main cause of diabetes?

a. Being too fat
b. Being too skinny
c. Inactivity
d. Genetics
e. I don't know

3. What is an A1c?

a. Tests your blood count
b. A vitamin supplement good for protecting your heart
c. A special test that shows what your blood sugars have averaged over the last 2-3 months
d. A special test that shows what your blood sugars have averaged over the last week
e. I don't know

4. What is a normal range for fasting blood sugar?

a. 100-130
b. 110- 128
c. 70-100
d. 150-200
e. I don't know

5. All of the following are complications of diabetes except:

a. Cirrhosis of the liver
b. Blindness
c. Kidney failure
d. Heart disease
e. I don't know

6. If you have diabetes and are overweight, losing weight may do what?

a. Lower your risk for heart attack and stroke
b. Lower your blood sugar
c. Help your body to use insulin better
d. All of the above
e. I don't know

7. What are some of the symptoms of low blood sugar?

a. Confusion
b. Weakness
c. Shakiness
d. All of the above
e. I don't know

8. What should you do if you feel like you have low blood sugar?

a. Go for a walk
b. Take a nap
c. Take some orange juice, lifesavers, or glucose pills
d. Take some deep breaths and drink some ice cold water
e. I don't know

9. What is the best way to take care of your feet?

a. Look at them, wash and dry them every day
b. Massage them with alcohol every day
c. Nothing special
d. Buy shoes a size larger and wear black socks
e. I don't know

10. What effect does exercise have on blood sugar?

a. None or slightly raises the blood sugar
b. Lowers the blood sugar
c. Helps your body to use insulin more efficiently
d. Both B and C
e. I don't know

11. Numbness and tingling of the feet may be signs of:

a. Diabetic eye problems
b. Kidney problems
c. Nerve disease
d. Cirrhosis of the liver
e. I don't know

12. Diabetic food planning uses four (4) food groups which of the following is included?

a. Sugar group, salt (sodium) group, fiber group, cholesterol group
b. Fats, proteins, carbohydrates, and free foods
c. Fast food group, convenience group, junk food group, salad group
d. Low Fat group, Reduced fat group, full fat group, low sodium group
e. I don't know

Appendix C. Course Evaluation

Modified Team-Based Learning for Type 2 Diabetes

The purpose is to obtain feedback for a modified team-based learning strategy to teach patients about diabetes and problem solving

1. Overall, how would you rate the classes?

Excellent

Very good

Fairly good

Mildly good

Not good at all

2. How likely are you to recommend the class to a friend?

Extremely likely

Very likely

Moderately likely

Slightly likely

Not at all likely

3. What did you like about the way this class was taught?

4. What did you dislike about the class?

5. How unique was the class?

Extremely unique

Very unique

Fairly unique

Slightly unique

Not at all unique

6. How organized was the class?

Extremely organized

Very organized

Somewhat organized

Slightly organized

Not at all organized

7. How friendly was the staff?

Extremely friendly

Very friendly

Somewhat friendly

Slightly friendly

Not at all friendly

8. How helpful was the staff?

Extremely helpful

Very helpful

Somewhat helpful

Slightly helpful

Not at all helpful

9. How safe did you feel at participating in the class?

Extremely safe

Very safe

Somewhat safe

Slightly safe

Not at all safe

10. Was the class length too long, too short, or about right?

Much too long

Somewhat too long

Slightly too long

About right

Slightly too short

Somewhat too short

Much too short

11. Is there anything else you'd like to share about the class?

Appendix D. Group Readiness Assurance Test (GRAT)

1. How much should a person exercise?
    a. 20 minutes every other day
    b. 30-60 minutes everyday
    c. 10 minutes a day
    d. 3 times a week
2. Where do I start if I have never exercised?
    a. Go out and run a mile and see how you feel
    b. Start slowly: walk for 10 minutes (5minutes out and 5minutes home)
    c. Consult with your health care provider to make sure you are ok to begin an exercise program and get suggestions where to start.
    d. Pick an activity you think you would like to try
    e. B, C, & D
3. Why is exercise important for a diabetic?
    a. Weight control
    b. Helps you look good and feel good
    c. Better control of Blood sugars
    d. Prevents diabetic nerve pain or slows its progress
    e. All of the above

4. I'm overweight and have pain when I do any exercise, even walking. What should I do?

    a. Power through the pain: “no pain no gain”
    b. Find ways to gradually increase the amount of energy you use (park farther away from the store or take the stairs, get up and change the channel instead of using the remote.)
    c. Try activities that are not weight bearing (swimming, water aerobics, bicycling)
    d. Just give up and don’t do anything.
    e. B &C
5. My legs and feet hurt too much to exercise. What should I do?

a. Talk to my health care provider to see why I have pain and plan how to begin to exercise.
b. Talk to your health care provider to see if you qualify for some physical therapy and work with the physical therapist to find forms of exercise that will work
c. Don't exercise it will make the pain worse.
d. Try doing exercise that does not require weight bearing (swimming or recumbent stationary cycling)
e. A, B, & D

6. Which of the following statements are true about Diabetes and exercise?
   a. Dancing, biking, walking, gardening, housework are all good forms of exercise.
   b. 60 minutes is the absolute minimum amount of exercise per day.
   c. You need to get your heart rate to at least 150.
   d. A only
   e. B &C
7. If I take my blood sugar before I exercise and it is 100 or less, I should...
   a. Eat a full meal
   b. Eat 2 carbohydrate servings (total 30gm) before exercising
   c. Don't exercise
   d. Check your blood sugar after you stop exercising
   e. B & D
8. What are some ways to insure that you stick with an exercise program?
   a. Start with small short-term goals that can be easily reach
   b. Seek support from family and friends
   c. Find an exercise partner
   d. Listen to music while you exercise
   e. All of the above
9. How can I make time to exercise if I have a really busy life?
   a. Schedule exercise as if it is one of the activities you must do each day.
   b. Try to exercise in the morning this way your plans are less likely to get derailed.
   c. Don't worry about it if you are too busy, don't exercise

d. Don't be all or nothing. If you can do 10 minutes today but you want to do 60, do the 10 minutes. Something is better than nothing.
e. A, B, & D

10. What are some other ways to get in a little extra activity during the day?
    a. Take the stairs instead of the elevator
    b. Park your car farther away from the store
    c. If you take the bus get off one stop before and walk the rest of the way.
    d. Take a little walk around the block after you eat lunch at work
    e. All of the above.

Appendix E. Application Exercise: Scenario for Exercise Module

A 42-year-old woman has type 2 Diabetes. Her weight is 160 lbs. And her height is 5'3". Her A1c at her last visit was10 (normal is below 7). She works a part-time job as a cashier at Wal-Mart. She is married and has three teenagers. Today she had a particularly stressful day at work and when she gets home she is feeling like she deserves a treat.

She has been told by her Doctor and her diabetic educator that she needs to lose weight, exercise, and follow the healthy diet the educator gave her, and she was feeling very motivated to following the doctor's recommendations. However, today she is so tired and frustrated by the day. She is thinking that maybe just this once it is not going to hurt anything if she just relaxes and gives herself a little treat. She feels she just could not pull enough energy together to go for a walk, and she is really feeling hungry.

After viewing the Power Point and drawing on your knowledge of diabetes you would tell this woman to:

1. Go lay down on the couch and watch her favorite program.
2. Go to the refrigerator and get some birthday cake left over from yesterday.
3. Call her friend, she has not talked to in a while, and share her day and frustration.
4. Go to the mall and walk around window-shopping.

Please give the reason for your choice.

Appendix F. Application Exercise Scenario for Diet Module

Mitchel Sanchez is a 41-year-old male who has been diabetic for 15 years. Mitchel is 5'9" and at 195lbs is overweight. He takes 10 units Novolog 10 minutes before meals and Levemir 20 u at bedtime. He also suffers from peripheral neuropathy, proteinuria, hypertension, retinopathy, and has recently experienced swelling of the feet and legs. A recent A1c was 15. He is married and has two teenage sons who are active in baseball. The boys are not old enough to drive and both parents are involved and supportive of the sons' athletic activities. Mitchel works three jobs: one job he does on the weekend as member of a band playing 'gigs' around town and within a 40 mile radius. The jobs with the band extend late into the night and he knows he looses sleep. His other jobs are performing cleaning services for a clinic and surgical center and working as a preoperative medical assistant three times a week.

His A1c is not well controlled and he does not do exercise stating that by the time his day is finished he is exhausted, has no energy, and since they have not planned for dinner they end up making unhealthy food choices. He enjoys Hispanic food because that is what he grew up eating and in addition there is a predominance of Mexican food in Las Cruces. So it is hard to avoid the temptation.

He has, with the help of his doctor, identified that he needs to (A) lose weight, (B) eat more healthy food, and (C) start exercising. The doctor has also counseled him that adequate rest is important for good immune function and one of the things we know about diabetes is immune systems are low and people with diabetes are more prone to infection.

Based on what you have learned in this module on diet and what you know from having diabetes what would be the best choices for Mitchel and his family to make?

1. Do nothing…make no changes
2. Reassess priorities about which activities and jobs are important to continue
3. Set small goals to start exercising and eating healthy. Along with this will be keeping a journal of progress and goal attainment and do this as a family.
4. Make dietary changes only
5. Make plans to exercise, but change nothing else

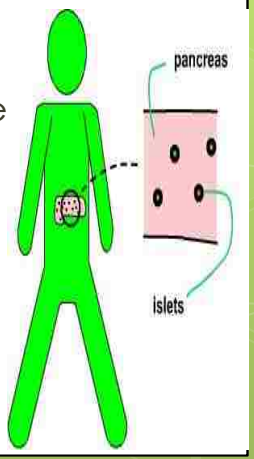
   More that one answer may be appropriate so choose the best answers that apply and be prepared to give your reasons for choices.

Appendix G. Exercise Power Point Presentation

Question

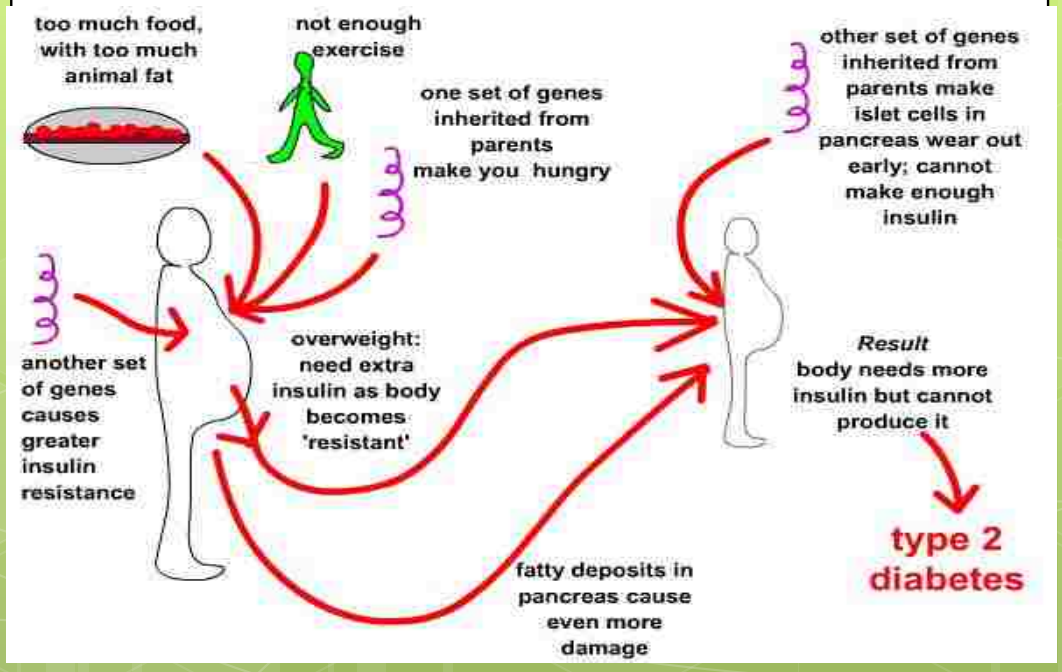
What is TYPE 2 Diabetes

- Type 2 diabetes was once known as 'adult onset' or 'middle age onset'.
- It is a chronic condition which affects the way your body uses sugar or glucose (body's main fuel) is used
- There are four particular problems
  - Shortage of Insulin
  - Insulin Resistance
  - Genetics
  - Stress
  - **But remember the main cause of T2DM is being Overweight and inactive**



Objectives for this class

- Identify what diabetes is
- Identify the ways in which exercise can improve your diabetes and improve overall heath and well being
- State how to get started with an exercise program
- Identify problems that keep you from getting started
- Identify solutions to those problems



WHAT YOU NEED TO KEEP IN MIND **THE MAIN**

CAUSE OF TYPE 2 DIABETES IS BEING **OVERWEIGHT**

AND

INACTIVITY

This is what uncontrolled T2DM causes

The following are some of the outcomes 0f poorly controlled T2DM

How can Exercise help you control T2DM & improve you life?

- lowers blood pressure and cholesterol
- lowers your risk for heart disease and stroke
- burns calories to help you lose or maintain weight
- increases your energy for daily activities
- helps you sleep better
- relieves stress
- strengthens your heart and improves your blood circulation
- strengthens your muscles and bones
- keeps your joints flexible
- improves your balance to prevent falls
- reduces symptoms of depression and improves quality of life
- If you have not been exercising you will experience some of these changes immediately

How Much Should You Exercise?

- It is recommended that you set a goal to exercise 30 minutes per day five days a week.
- This is 150 minutes per week.
- You can divide this up and do 10 minutes after each meal

What kind of exercise should I do?

- **There are several types of activity:**
- Aerobic exercise
  walking, running, treadmill, swimming, dancing,
- Strength training
- Flexibility exercises/stretching
- Balance exercises
- Activity throughout the day
  Gardening, shopping, housework

What kind of exercise should I do?

- **There are several types of activity:**
- Aerobic exercise
  walking, running, treadmill, swimming, dancing,
- Strength training
- Flexibility exercises/stretching
- Balance exercises
- Activity throughout the day
  Gardening, shopping, housework

What to do when you get home

- Remove your shoes and socks and check your feet
- Drink water
- Have a snack or meal depending on time of day.
- Check blood sugars as recommended by primary care provider

Team work

- Now we will divide in to our teams and work on the problem you identify as the barriers you face in order to be able to exercise.
- You will have 20-30 minutes to come up with solutions and to help each other solve this problem.
- You will appoint a spokesperson who will tell the entire group what solutions your group has come up with

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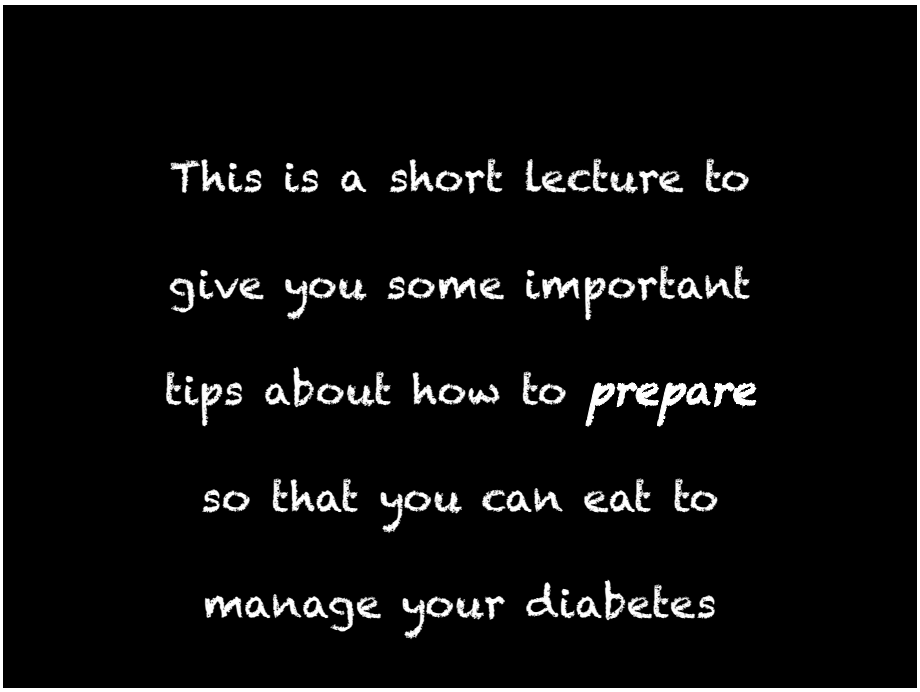
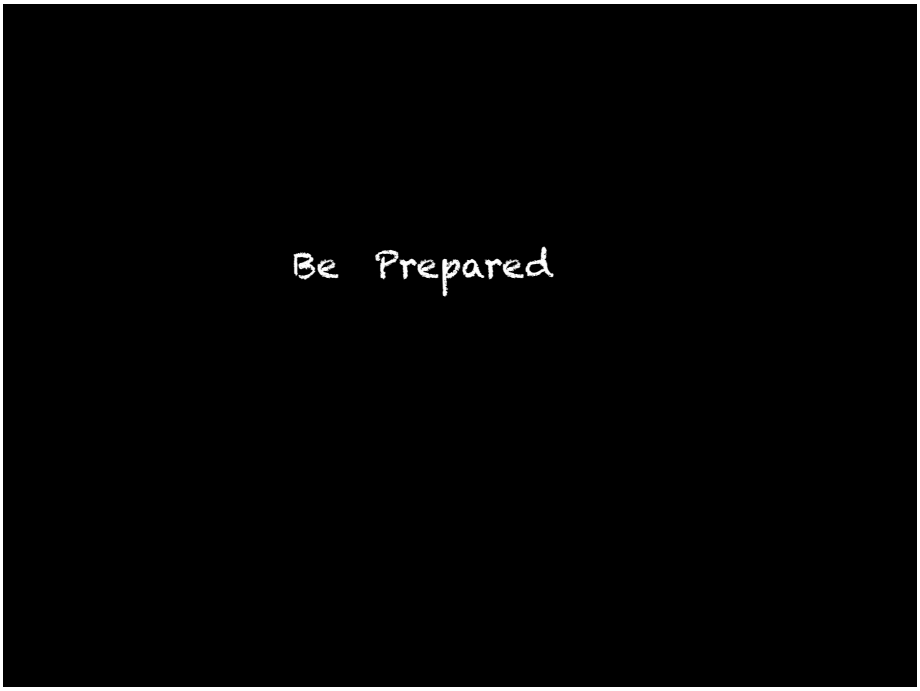
Appendix H. Diet: Being Prepared PPT





Preparation is Key

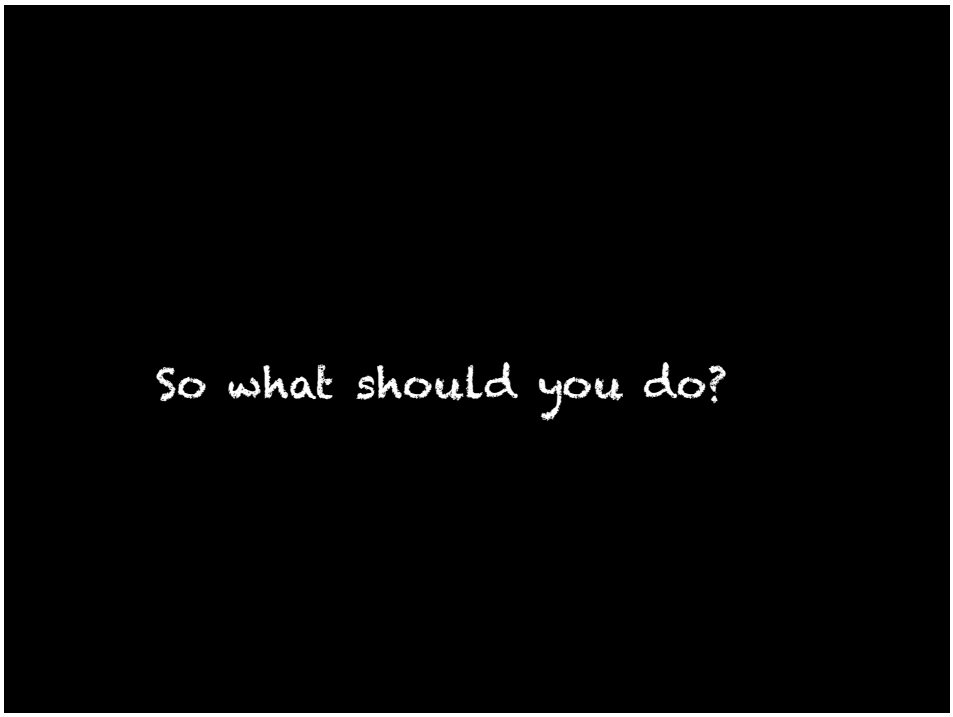
For helping to manage Type 2 Diabetes the single most important element is the food you eat! The next thing after this is being prepared.

Preparation is key...

- The Time to think about what you are going to eat is not when you are tired, hungry, or in a rush

Preparation is key

- Going to a restaurant when you are tired and hungry- not a good idea either


So what should you do?


Be Prepared

Being Prepared

Make your kitchen and cupboards healthy.

a) Get rid of all the snacks (cookies, chips, crackers, ice cream, white bread etc.)
b) Stock up on vegetables, fruit, low-fat yogurt, nuts, beans, whole grains & brown rice
c) Plan& prepare meals ahead of time

Meat

- If you like meat just remember:
  a) Choose lean meat (chicken, turkey, fish, lean beef)
  b) Baked, broiled, grilled, or stewed
     NO FRIED
  c) Portion size is about the size of the palm of your hand
  d)Limit the bread

Deserts

- Save deserts for a special occasions...instead have a piece of fruit like an apple, some cherries or other berries
- When you decide to treat yourself to a desert try having your friend or partner share with you, or just take a few bites.

Fluid Intake

- Eliminate sodas from your diet
- Drink your eight glasses of water a day
- Alcohol has no nutritional value alcohol as a simple sugar
- Coffee and tea are fine

Portion size

References

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Appendix I. Letter of Conditional Approval to Conduct the TBL project

Ann S. Mercer, M.D.
2801 East Missouri, Suite 12
Las Cruces, NM 88011
(575) 522-6900

Office of Research Integrity – Human Subjects
University of Nevada Las Vegas
4505 Maryland Parkway Box 451047
Las Vegas, NV 89154-1047

Subject: Letter of Authorization to Conduct Research at the office of Ann S. Mercer, MD

Dear Office of Research Integrity – Human Subjects:

This letter will serve as authorization for the University of Nevada, Las Vegas ("UNLV") researcher/research team, Corine Lazaro RN, MSN, FNP-BC to conduct the research project entitled **Evaluating a Novel Educational Project for Type II Diabetics** at 2801 East Missouri, Suite 12, Las Cruces, New Mexico, the Internal Medicine Office of Ann S. Mercer, M.D. The Facility acknowledges that it has reviewed the protocol presented by the researcher, as well as the associated risks to the Facility. The Facility accepts the protocol and the associated risks to the Facility, and authorizes the research project to proceed. The research project may be implemented at the Facility upon approval from the UNLV Institutional Review Board.

If we have any concerns or require additional information, we will contact the researcher and/or the UNLV Office of Research Integrity – Human Subjects.

Sincerely,

Ann Mercer MD
Facility's Authorized Signatory

11-25-13
Date

Ann S. Mercer, M.D.
Printed Name and Title of Authorized Signatory

Appendix J. IRB Approval Notice

UNLV
UNIVERSITY OF NEVADA LAS VEGAS

Biomedical IRB – Expedited Review
Approval Notice

NOTICE TO ALL RESEARCHERS:

Please be aware that a protocol violation (e.g., failure to submit a modification for any change) of an IRB approved protocol may result in mandatory remedial education, additional audits, re-consenting subjects, researcher probation, suspension of any research protocol at issue, suspension of additional existing research protocols, invalidation of all research conducted under the research protocol at issue, and further appropriate consequences as determined by the IRB and the Institutional Officer.

DATE: June 2, 2014

TO: **Dr. Michele Clark**, School of Nursing

FROM: Office of Research Integrity - Human Subjects

RE: Notification of IRB Action
Protocol Title: **Evaluating a Novel Education Project for Type 2 Diabetes**
Protocol #: 1310-4587
Expiration Date:June 1, 2015

This memorandum is notification that the project referenced above has been reviewed and approved by the UNLV Biomedical Institutional Review Board (IRB) as indicated in Federal regulatory statutes 45 CFR 46 and UNLV Human Research Policies and Procedures.

The protocol is approved for a period of one year and expires June 1, 2015. If the above-referenced project has not been completed by this date you must request renewal by submitting a Continuing Review Request form 30 days before the expiration date.

PLEASE NOTE:
Upon approval, the research team is responsible for conducting the research as stated in the protocol most recently reviewed and approved by the IRB, which shall include using the most recently submitted Informed Consent/Assent forms and recruitment materials. The official versions of these forms are indicated by footer which contains approval and expiration dates.

Should there be *any* change to the protocol, it will be necessary to submit a **Modification Form** through ORI - Human Subjects. No changes may be made to the existing protocol until modifications have been approved by the IRB. Modified versions of protocol materials must be used upon review and approval. Unanticipated problems, deviations to protocols, and adverse events must be reported to the ORI – HS within 10 days of occurrence.

If you have questions or require any assistance, please contact the Office of Research Integrity - Human Subjects at IRB@unlv.edu or call 895-2794.

Office of Research Integrity - Human Subjects
4505 Maryland Parkway • Box 451047 • Las Vegas, Nevada 89154-1047
(702) 895-2794 • FAX: (702) 895-0805

324pt

UNLV
UNIVERSITY OF NEVADA LAS VEGAS

INFORMED CONSENT Department of Nursing

TITLE OF STUDY: Evaluating a Novel Education Project for Type 2 Diabetes INVESTIGATOR (S): Michelle Clark, RN, PhD and Corine B. Lazaro RN, MSN, FNP-BC

For questions or concerns about the study, you may contact **Michelle Clark at 702-895-5978 or Corine Lazaro at 575-522-7676.**

For questions regarding the rights of research subjects, any complaints or comments regarding the manner in which the study is being conducted, contact **the UNLV Office of Research Integrity – Human Subjects at 702-895-2794, toll free at 877-895-2794 or via email at IRB@unlv.edu.**

Purpose of the Study

You are invited to participate in a research study. The purpose of this study is to determine if a modified team-based learning strategy can be used to help patients with Type 2 Diabetes Mellitus (T2DM) learn to do better problem solving within teams of their peers.

Participants

You are being asked to participate in the study because you fit these criteria: have received the diagnosis of type 2 diabetes, are between the ages of 18-68.

Class Format

You will be attending class in a classroom with other patients who also have Type 2 Diabetes. These classes are designed to test a unique learning format to determine whether using a team-based learning approach can enhance the learning and problem–solving abilities of people with diabetes.

Procedures

If you volunteer to participate in this study, you will be asked to do the following: Attend two classes lasting about one and one half hours. One class is about exercise and one is how to be prepared to eat to avoid bad food choices. You will be asked to take a test before beginning the first class and a test after the last class. The questions are very general questions about diabetes, eating healthy foods, and exercising. Also as part of the group learning method we are testing, after each teaching session you will read with your group a story about a person with Type 2 Diabetes. You will try to solve the problem presented in the story and answer four multiple-choice questions. This you will do as a group exercise.

Benefits of Participation

There will be direct benefits to you as a participant in this study as you learn how to better care for your diabetes. In addition, we hope to learn whether this teaching approach is helpful in educating people about controlling diabetes.

Approved by the UNLV IRB. Protocol #1310-4587 Received: 06-02-14Approved: 06-02-14Expiration: 06-01-15

Risks of Participation

There are risks involved in all research studies. This study may include only very minimal risks associated with patient participation in the planned educational modules. This risk is identified as minimal discomfort in answering survey questions and participating in the classroom.

Cost /Compensation

There is no financial cost to you to participate in this study. The study will take 1&1/2 hours on 2 days one week apart. You will be compensated for your time $25.00 after completion of the second class and completion of evaluation. If you attend only one class, partial compensation of $12.50 will be awarded.

Limited Consent

Limited consent is given to the investigators for access to patient records for the purpose of documenting most recent A1c and BMI results.

Confidentiality

All information gathered in this study will be kept as confidential as possible. No reference will be made in written or oral materials that could link you to this study. All records will be stored in a locked facility at UNLV for three (3) years after completion of the study. After the storage time the information gathered will be shredded.

Voluntary Participation

Your participation in this study is voluntary. You may refuse to participate in this study or in any part of this study. You may withdraw at any time without prejudice to your relations with UNLV. You are encouraged to ask questions about this study at the

beginning or any time during the research study.

Participant Consent:

I have read the above information and agree to participate in this study. I have been able to ask questions about the research study. I am at least 18 years of age. A copy of this form has been given to me.

_____ _____ _____ _____ _____
_____ _____ _____

Signature of Participant Date Participant Name (Please Print)

_____

Approved by the UNLV IRB. Protocol #1310-4587 Received: 06-02-14Approved: 06-02-14Expiration: 06-01-15

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