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Implementation and Evaluation of Dietary Modification With Gestational Diabetes

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2015

Abstract

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Doctoral Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

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Abstract

Gestational diabetes mellitus (GDM) negatively affects the health of both mothers and babies, and is the most common pregnancy complication in the United States. Many dietary modification programs for pregnant women diagnosed with GDM rely on a one-size-fits-all approach to menu planning. The purpose of this project was to develop a diet modification program for GDM management using a patient-centered approach. The project objective was to develop the policies, procedures, and supporting documents needed to implement a successful GDM management program for pregnant women receiving antenatal care at an obstetrical clinic. The developed program incorporated strategies for clinic nursing staff to involve pregnant patients and their family members in the planning of individualized daily menus addressing social, motivational, and economic factors. Patient understanding of diet management will be evaluated through the administration of written pre and post-tests, which were included with the program materials. Long term program evaluation will be determined through the tracking of maternal weight gain and infant birth weights. This program has the potential to contribute to positive social change through the reduction of complications resulting from inadequately managed gestational diabetes mellitus.

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Dedication

I dedicate this project to my children for their unconditional love, great understanding, words of encouragement, and ultimate support despite my shortcomings. Ashley, Angela, Macaulay, Patrick, and Alice, I am eternally appreciative of your patience throughout my educational journey.

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Wow! What a journey! Firstly, I will like to give all the glory to my Heavenly Father for giving me knowledge, the wisdom, and the strength to continue to move forward. Without your blessings Lord, I am nobody. All the glory, praise and adoration to you, Lord.

To my five children, Ashley, Angela, Macaulay, Patrick, and Alice. You are my true gems from the above. To my rock, Macaulay A Ojeaga, MD, my husband, I truly appreciate the space you granted to me to be whom I want to be in life. You are the best thing that ever happened to me. Will always love you. Whilst am using this medium to express my appreciation for your unconditional love, patience, and words of encouragement. My heart is so full of gratitude and appreciations towards everyone including my committee members, and Dr. Cassandra Taylor, my committee chair, for her great supports and contributions towards my learning experience.

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Section 1: Nature of the Project

Introduction

Gestational diabetes mellitus (GDM), a carbohydrate intolerance of variable severity, is first recognized during pregnancy. Diagnosed in as many as one in four pregnancies (Harling et al., 2012), GDM is a common metabolic complication in pregnancy. This condition occurs when hormonal changes during pregnancy lower insulin production or insulin sensitivity, leading to hyperglycemia in pregnant women (Rajput, Yadav, & Nanda, 2013). GDM prevalence in the United States varies from 1% to 22% of pregnancies, but this largely depends on GDM definition and local screening methods (Setji, Brown, & Feinglos, 2005). Currently, there is no international consensus for GDM screening; however, the World Health Organization (WHO) recommends screening with a glucose challenge test, using 75 grams of glucose at 24 to 28 weeks' gestation. A positive diagnosis is made using the standards set of fasting blood glucose over 7 millimole/liter and/or a 2-hour blood glucose over 7.8 millimole/liter (WHO, 2013).

Problem Statement

The rate of GDM has increased across the globe due to factors such as sedentary lifestyles and the development of poor eating habit (Webb, 2013). For example, in the United States, the GDM rate range between 1.1 and 25.5% depending on the diagnostic criteria (Harling et al., 2012), and the GDM rate increased from 2.45 to 6.8% between 1998 and 2008 in China, (Zhang, et al. 2011). According to Tieu, Crowther, Middleton, and McPhee (2008), GDM consequences include hyperbilirunemia, neonatal hypoglycemia, hypocalcemia, macrosomia, gestational hypertension, and polycythemia.

GDM is linked to long-term adverse impacts such as obesity and Type 2 diabetes (Rajput, et al. 2013). GDM also has economic implications including increased maternal care cost, increased neonatal costs, lost productive hours, and the cost of managing long-term health consequences such as Type-2 diabetes (Chen, et al 2009). Previously dietary modification was preferred to manage GDM; however, this changed with limited effectiveness due to a lack of family support, time constraints, program practicality and accessibility, and affordability of the intervention (Infanti, et al. 2014). Most dietary intervention programs are not designed to address the motivational, economic, and social characteristics of each participant, offering standardized interventions versus tailored.

Purpose Statement and Project Objectives

The purpose of this project was to develop a diet modification program that will enhance the GDM management. The program resulted in a tailored diet modification program. A tailored, or patient-centered, approach to managing GDM provides clinicians with the flexibility to modify interventions to address specific maternal circumstances, resulting in increased program effectiveness. The primary project objective was to develop policies and procedures, including supporting documents, to implement a successful GDM program. The specific program elements included were the following:

1. To increase support for and adherence to dietary modification programs among GDM patients. Evidence indicates dietary modification positively impacts maternal glycemic control (Viana, Gross, & Azevedo, 2014). However, these modification programs are as effective as the patient adherence to the program. Women are often unable to adhere to dietary modification due to a lack of family support, limited comprehension of the requirements, time constraints, the

practicality of programs, accessibility and affordability of the intervention (Infanti**,** et al. 2014). By introducing a planned and tailored dietary plan, patients have increased support and flexibility to adhere to dietary recommendations.

2. To reduce reliance on insulin and other medication-based therapies among GDM patients. In addition to dietary modification, insulin therapy is used to manage GDM. However, insulin therapy has many potential complications including hyperinsulimia, hypoglycemia, and weight gain (Rowan, 2007). Furthermore, insulin therapy does not address lifestyle factors that could lead to GDM in subsequent pregnancies and Type 2 diabetes. Reflecting on this evidence, the project strategy will include encouraging GDM patients to reduce their dependence on insulin in favor of dietary and other lifestyle interventions.
3. To assist GDM patients to maintain appropriate glycemic levels through the pregnancy, as well as, meet their nutritional needs. GDM is a condition characterized by elevated glycemic levels; therefore, practitioners need to help patients manage their glycemic level. In addition, maternal blood-glucose reduction can be balanced with fetal requirements, such as energy and nutrient requirements.

Project Significance/ Relevance to Practice

Through this project, I informed GDM management with evidence-based knowledge organized into a program with interventions. The prevalence of the GDM condition has increased around the globe, with some region having a prevalence rate as high as 18% (Viana, et al. 2014). The increasing prevalence of this condition has caused concern within the health care fields. Medical practitioners are interested in finding ways

to manage this condition. Specifically, in this project, I will apply evidence to improve dietary modification therapy effectiveness as a GDM management strategy.

Characteristically, dietary modification programs achieve behavioral change in the short-term but recidivism in the long-term (Appel, Brands, Sacks, & Karaja, 2006). Program effectiveness is reduced once patients return to their daily routine. Through this project I seek to provide practitioners with strategies demonstrated to facilitate long-term commitment and adherence to the prescribed dietary regimen. This will be accomplished through tailored dietary modification plans. Developing tailored dietary plans addresses the individual patient's lifestyle, including recognizing limitations and barriers, to enhance adherence to the program. Furthermore, the intervention recognizes the value of family member support in both the design and development of a dietary program.

Project Question

1. What is the effect of implementing a tailored dietary modification program on the health outcomes of GDM patients' and the babies?

Evidence-Based Significance of the Project

In this project, I applied evidence to construct a robust dietary modification program to manage GDM. There is mounting support for lifestyle interventions for GDM. More than a few studies have provided evidence to establish the effectiveness of dietary modification to manage GDM **(**Donhorst & Frost, 2002; Mageshwari & Savista, 2013; Tobias, Chavarro & Zhang, 2014**).** Dietary modification efficacy is largely dependent on the level of patient commitment and adherence (Infanti, et al, 2014). Patient's adherences are enhanced by tailoring dietary plan **(**Callaway, 2010; Handelsman, 2011)**,** and the effectiveness is further improved with family support

(Infanti, et al. 2014). In this project, I will apply these recommendations in order to enhance patients' adherence to dietary modification programs.

Implication for Social Change in Practice

This project will improve maternal health. Maternal health refers to the wellbeing of women during the gestational period, including delivery and postpartum. The WHO (2014) estimated in 2013 more than 289,000 women died during pregnancy and childbirth. With GDM being the most common complication, helping pregnant women manage the condition will lead to improved maternal health (DeSisto, Kim, & Sharma, 2010).

Moreover, the project will contribute to the enhanced management of newborn complications. According to the WHO (2014), birth complication, such as birth asphyxia and newborn infections, account for 80% of the global neonatal mortality. Furthermore, GDM is linked to other birth complications including more than normal birth weight, hypoglycemia, and birth asphyxia. This project will enhance GDM management of the GDM and reduce newborn complications.

In addition, the project will contribute to the management of Type 2 diabetes, the most frequent type of diabetes. GDM is a risk factor for the development of Type 2 diabetes among women (McElnay & Elnour, 2006). Type 2 diabetes is associated with physical impairment, kidney failure, stroke, hypertension, and heart failure (NHIS, 2012). Additionally, Type 2 diabetes contributes to social and economic implications including reduced productivity, high cost of care, and diminished ability to perform various functions. This program will reduce the prevalence of Type 2 diabetes by helping women to manage their GDM. The dietary modification program will encourage women with

GDM, with their families, to adopt healthy dietary behaviors to reduce their risk of developing diabetes.

Furthermore, this project will contribute to the management of obesity. Obesity is a condition typified by excessive body fat and body mass index. GDM is a risk factor for the development of obesity among infants. Mothers who fail to manage the GDM condition often give birth to overweight babies (Nilson, 2013). Obesity is also linked to diabetes, heart disease, kidney failure, stroke, and hypertension (Reilly, Methven, Kelnar, Hacking, & McDowell, 2003). In additional to physical implications, obesity has a psychological and social impact including decreasing self-esteem and self-confidence, as well as, exposing people to abuse and bullying. In some cases, the weight problem among infants persists even as the child grows up. This project will prevent obesity by helping patients to manage their GDM condition.

This project will result in behavioral change that will help individuals contribute to society by reducing the prevalence of lifestyle diseases. As the dietary modification is tailored to encourage long-term change in behavior, the patient with GDM and her family may continue eating well following the program. Moreover, with long-term behavior change the program can positively impact other lifestyle related diseases, such as heart disease, cancer, and stroke.

Definition of Terms

BMI index: This is a metric for measuring body weight that is computed by dividing a person weight, in kilograms, by the square of his height in meters (Goran, Ball, & Cruz, 2003).

Gestational diabetes mellitus (GDM): This is a health status that is typified by fasting blood glucose over 7 millimole/liter and/or 2-hour blood glucose over 7.8 millimole/liter during pregnancy (WHO, 2013).

Hyperglycemia: This is a medical term that refers to the presence of high-sugar level in the blood stream **(**Ray, Vermeulen, Shapiroand & Kenshole, 2001**).**

Hypoglycemia: This is a medical term that refers to the presence of lower than normal quantity of sugar in the blood stream **(**Ray, Vermeulen, Shapiroand &Kenshole, 2001**).**

Macrosomia/Above Normal Birth weight: weight of newly born babies that exceed 4000 grams (Nilson, 2013).

Neonatal Death: Death that occur a few weeks after delivery (Nilson, 2013)
Stillbirth: This refers to deliver that occurs after the fetus has died in the womb (Nilson, 2013).

Obesity: This is medical status that typified by a BMI index that is above the 85th percentile of gender and age (Goran, Ball, & Cruz, 2003).

Preterm Delivery: This refers to the delivery of a baby within less than 37 weeks of gestation **(**Ray, Vermeulen, Shapiroand & Kenshole, 2001**).**

Stillbirth: This refers to deliver that occurs after the fetus has died in the womb (Nilson, 2013).

Type 2 diabetes: This is a metabolic disease that is characterized by chronic hyperglycemia originating from defects in insulin secretion (Craig, Hattersley & Danaghue, 2009).

Stillbirth: This refers to deliver that occurs after the fetus has died in the womb (Nilson, 2013).

Working Assumption and Limitations

The primary working assumption was that the health practitioners planned to provide evidence-based GDM services to produce positive patient outcomes. The support of health practitioners is critical to the successful implementation of this plan. It is my assumption that medical practitioners at the private medical office/clinic want the best for the patients and, therefore, supported this project so as to improve the well being of their patients.

Another key assumption was that the patients want to reduce reliance on intrusive insulin therapy in the management of GDM. Many GDM patients have to be dependent on insulin treatment to maintain appropriate glucose levels. This method of managing GDM is intrusive and has a potential effect on the future health of the mother. I assumed that the GDM patients wanted to reduce their reliance on this intervention. The last working assumption was that GDM patients are inherently social and interdependent. I assumed that the patients seek support and companionship in families and friends. Therefore, balancing the right to autonomy and the need to involve family members in developing dietary plan will have a positive effect on patients adherence to the program.

Several limitations were anticipated. The first limitation is the availability of resources, as tailoring requires incremental resources in the form of equipment, people, and finances. The lack of additional resources may negatively impact the implementation of this project. Furthermore, time can be a significant limitation as developing individualized plans requires additional planning and clinical interactions. .

Section 2: Review of Literature and Theoretical and Conceptual Framework

Introduction

Different scholars have described GDM in various ways. Tieu, et al. (2008) described GDM as a form of diabetes that transpires during pregnancy that can cause adverse short and long-term impacts for both the mother and the child. Kim, (2014) defined GDM as a condition that reflects a defect in insulin secretion that resulting from the metabolic demands of pregnancy. In recent years, landmark studies have been conducted on the subject of GDM. In this section, I presents a review of these studies and their implication on the current project.

Literature Search Strategy

A systematic search of articles was conducted using many databases including CINNAHL, Medline, Medscape, Google scholar and Pub Med. The terms/phrases “diabetes”, “pregnancy”, “gestational diabetes, and” “diet, were used to search for articles published from 2000 – to date. No authors’ names or specific journals were requested. A total of 24 articles were retrieved from the databases. Search details include ("gestational diabetes"[MeSH Terms] OR ("diabetes"[All Fields] AND "pregnancy"[All Fields]) OR "gestational diabetes"[All Fields]) AND ("diet"[MeSH Terms] OR "diet"[All Fields] OR "diet"[All Fields]) AND gestational [All Fields] AND diabetes [All Fields]. In CINAHL the following limiters were used, English language, 2011-2012, excluding Medline records, and full texts. I retrieved 40 articles. The search is summarized as ("gestational diabetes [Mesh Terms] OR ("pregnancy"[All Fields] AND "errors"[All Fields]) OR "gestational diabetes" [All Fields]) AND ("diet"[MeSH Terms] OR "diabetes"[All Fields] OR "pregnancy"[All Fields]).

General Literature

There is growing concern for the increased prevalence of GDM and the negative impact on mothers and their children. For example, between 2000 and 2010, the GDM rate in Australia increased from 3.6% to 4.45% (Hayes, 2014); between 1998 and 2008, in China, the GDM rate increased from 2.45% to 6.8% (Zhang, et al. 2011); and between 2000 and 2006, in Finland, the rate for GDM was 10-11% between 2000 and 2006 (Lamberg, Raitanen, Rissanenand, &Luoto, 2012). In the United States, the GDM rate ranged between 1.1% and 25.5%, depending on the diagnostic criteria (Harling et al., 2012). Webb, (2013) attributed the increasing prevalence of GDM to the increase in the obese and overweight population and the number of women conceiving later in life.

GDM prevalence varies by setting depending on the presence of GDM risk factors. GDM is a condition associated with several risk factors, such as sedentary lifestyles, trait anxiety, high levels of perceived stress, depressive symptoms, and low levels of education (Chasen-Taber, Buonnaccorsi, Markenson, &Collenberg, 2010). Also, GDM is also inked to factors such as age, socio-economic status, educational level, family history of hypertension or diabetes, weight gain, pre-pregnancy weight and BMI, and history of GDM (Rajput, et al. 2013).

Rajput, et al. (2013) collected data from 607 women-attending antenatal care clinics at a given tertiary institution. These risk factors were prominent among women who were diagnosed with GDM. These findings were reinforced in a later study that was conducted by Crete and Anasti, (2013) among 1,700 women who received antenatal care and delivered their babies in a community hospital, in Eastern Pennsylvania. The researchers found that the patient's age, BMI, family and personal history were the main

risk factors for the development of GDM. Ages 30 to 34 had an odds ratio of 1.95, 95% confidence level while those over 35 years had an odds ratio of 3.87. People with a BMI of over 30 had an odds ratio 1.95, and those with prior GDM had an odds ratio of 2.82 CI (1.55, 5.13).

Caughey, Cheng and Stotland, (2010) found that paternal and maternal ethnicity is closely associated with the occurrence of GDM. Caughey, et al. (2010) conducted a retrospective cohort study among 139,848 American women of diverse racial and ethnic backgrounds. Outcomes of the study revealed that Asians had the highest rate (6.8% at $P<0.01$) of GDM followed by Hispanics (4.9%) and Caucasian Americans (3.4%). African Americans had the lowest rates (3.2%). A significant explanation that the authors gave for findings that links ethnicity to GDM condition is that ethnicity influences other risk factors such as education level, socio-economic status, pre-pregnancy weight and BMI, and family history of diabetes and hypertension. This explanation is confirmed by Chasen-Taber, Fortner, Buonnaccorsi, Markenson, and Collenberg, (2010) who concluded that these risks factors were more prevalent among Hispanic Americans than among non-Hispanic whites. Tieu, et al. (2008) also discovered that GDM was highly prevalent among indigenous Australian, Pacific Islanders, South and East Asians, Native Americans, and Black and Hispanic Americans.

Another factor that has been linked to the development of GDM is the woman's birth weight, a chief determinant of metabolic abnormalities that occur later in life (Ognoswski, Maizgowsji, & Engel, 2013). In their retrospective study, Ognoswski et al. (2013), collected data from medical reports belonging to 801 healthy women and 787 women with GDM. The researcher analyzed and compared data regarding age, birth

weight, family history, prior GDM, and pre pregnancy weight between the two groups of participants. Surprisingly, the women's birth weight was inversely correlated with the occurrence with GDM. The risk of GDM increased by 11% for each decrease in birth weight of 500 grams. This finding means that as birth weight declined, the prevalence of GDM increased. Research findings concerning GDM risk factors have momentous implications for practice and this project. Identifying risk factors can enable healthcare practitioners to direct preventative measure to high-risk populations, hence avoiding the development of the condition.

Healthcare practitioners focus on GDM because the condition is associated with health risks for both mother and child. A significant perinatal concern in GDM is macrosomia, a condition typified by a baby weight of greater than 4,000 grams (Nilson, 2013). Nilson, (2013) found that the BMI of boys born of GDM patients was higher than that of girls at ages 7 to 10 years while the BMI of girls born of DGM patients was higher than that of boys at ages 4 to 12 years compared to the reference group. Macrosomia leads to several birth complications including shoulder dystopia, fractures, and nerve palsies. Tieu, et al. (2008) also associated GDM with the development hyperbilirunemia, neonatal hypoglycemia, hypocalcemia, and polycythemia among the delivered babies. According to these authors, these conditions occur due to utero exposure to high levels of glucose. Utero exposure to hyperglycemia also increases the risk of future obesity and Type 2 diabetes. Ray, et al. (2001) also found that women with GDM are at heightened risk of cephalopelvic disproportion, shoulder dystocia, toxemia, and gestational hypertension.

GDM is also associated with increased rates of pre-eclampsia and caesarean delivery, in the mothers. Mohammad, et al. (2012) reported a high rate of cesarean delivery among GDM patients as compared to normal pregnancies from a retrospective study of pregnancies (n=37,997) between 1980 and 2009, in Tehran. The study also revealed that the most frequent risk factors for cesarean delivery were dystocia, failed induction, and repeat cesarean section. McElnay and Elnour, (2006) also linked GDM with the mother's risk of developing Type 2 diabetes in the future. McElnay and Elnour conducted a cohort study of women diagnosed with GDM (n=165) at the Al Ain Hospital, UAE. After conducting regular screenings12 weeks before and after delivery, 20.6% (n=34) were diagnosed with postpartum diabetes. Similarly, Lee, Hiscock, Walker, Wein and Permezel, (2007) reported 25.8% of GDM patients developed Type 2 diabetes at 15 years after being diagnosed with GDM. The study also revealed a 9.6 times higher rate for developing diabetes among women who had a history of GDM. Lee, et al (2007), collected data using a retrospective cohort study design where 5,460 GDM patients and 783 control subjects underwent postnatal follow-up at a given hospital between 1971 and 2003.

GDM has economic implications for individuals and society, including increased maternal and neonatal costs, increased cost of managing long-term health consequences, and the cost of lost productivity. Chen, Quick, Yang, Zhang, Baldwin, Moran, Moore, Sashay, and Timothy (2007) reported costs, on average for GDM during the first year, increased by $3,305 per pregnancy and increased by $209 per infant. Furthermore, the authors extrapolated the data to find GDM increased national health expenditure on health by $636 million. In addition, GDM patients have more emergency caesarean

sections and neonatal unit admissions, increasing costs by 34% (Gillespie, Cullinan, O'Neill, & Dunne, 2013).

Dietary modification is a strategy for helping women with GDM to manage their condition. Other intervention programs include: Insulin therapy; the use of oral hypoglycemic agents, and exercise (Setji, Brown & Feinglos, 2005). GDM interventions seek to assist GDM patients to control their glucose level. Proper glycemic control during pregnancy can reduce the risks of neonatal death, stillbirth, congenital malformation, and miscarriage (Kaygan, 2013). The intervention also seeks to assist women to control their weight.

Specific Literature

Dietary/nutritional interventions largely focus on carbohydrate intake regulation. Dietary intervention programs are intended to reestablish the balance between secreted insulin and the insulin resistance created by the placental hormones (Tieu, Crowther, & Middleton, 2008). In a survey study of carbohydrate intake of pregnant women (n=21,411), Bao, Olsen, Tobias, Chavarro and Zhang, (2014) found an association between low-carbohydrate dietary pattern with high fat and protein from animal-food sources and GDM risk. . In survey study with a food-adequacy instrument, Mageshwari and Savista, (2013) evaluated the nutritional adequacy of 504 GDM patients. The authors found most GDM women had diets that were not balanced in terms of quality and quantity of nutrients.

Evidence points toward the effectiveness of dietary intervention in the management of GDM. Donhorst and Frost, (2002) conducted a systematic review of studies that have explored the application of dietary in the management of GDM. The

review led to the conclusion that dietary alterations reduce the rates of accelerated fetal growth. However, Donhorst, and Frost, (2002) noted that evidence that support this claim is limited. Moses, Shand and Tapsell, (1997) found a relationship between insulin resistance and fat intake among women with recurring GDM. Moses (1997) collected data among women with and with no recurrence of GDM. Results showed that women with recurrence of GDM had higher fat intake than women with no recurrence. This finding led to the conclusion that dietary modification of fat intake before and during pregnancy can reduce the recurrence of GDM. These findings have reinforced by a recent study conducted by Park, Daily and Kim, (2011) to investigate the effect of low weight-gain on maternal and infant's health outcomes among women with GDM.

Park, Daily, and Kim (2011) collected prospective data concerning body weight, lipid profiles, insulin treatment, maternal and infant outcomes and glucose levels from 215 women with GDM. Results connote that women that gained excessive weight had increased Macrosomia and postprandial blood glucose level. The results also revealed that women that had low weight-gain had better glycemic control with few women requiring insulin treatment, as well as, better neonatal outcomes as compared to women who gained a lot of weight. These results led to the conclusion that dietary modification may be an effective method of eliminating adverse effects of GDM. In another study, Tieu, Crowther and Middleton, (2008) examined the effect low-glycemic index (LGI) diets and high fiber diet among 107 GDM patients. Results showed that women on LGI diet had fewer overweight babies than women on high-glycemic index diet. Results for the high fiber diet were inconclusive. Oostdam, Poppel, Wouters and Mechelen, (2011) also found that LGI diets reduce the risk of macrosomia and other GDM incidents.

However, Oostdam, Poppel, Wouters, and Mechelen, (2011) also investigated the effect of LGI diets on maternal and infant outcomes in GDM but found that LGI diet have no significant effect on health outcomes. These findings have implication on practice and the proposed projects as it highlights the type of diets that can be used to manage the GDM condition.

Lima, Rosado, Neves, Sauders, Oliveira, and Machado, (2013) summarized the studies on the effectiveness of dietary therapy on GDM in their systematic review. In the review, it was found that most studies give evidence that support the use of nutritional therapy in the management of GDM. Evidence in the reviewed studies suggest that nutritional interventions have a positive effect in terms of reducing excessive gestational weight, need for cesarean delivery, eclampsia, need for insulin therapy, neonatal hypoglycemia and shoulder dystocia. The review suggests that the use of nutritional therapy should be supported in antenatal setting for women with GDM.

The use of dietary interventions in the management of GDM is not a new phenomenon. Dietary interventions have been implemented in various setting with varying degree of success being reported. Several factors appear to hinder the effectiveness of dietary intervention in managing GDM. Infanti, O'Dea, Gibson, McGaire, Connolly and Dunne, (2014) linked the effectiveness of dietary intervention programs to insulin use during pregnancy and age at delivery. Infanti, O'Dea, Gibson, McGaire, Connolly and Dunne, (2014) collected data from 410 women with the intent of establishing factors that motivate them to participate or fail to participate in lifestyle programs for GDM. The authors found that women who required insulin use during pregnancy were least likely to participate in lifestyle programs. Similarly, older women

(more than 34 years) were more likely to participate than young women. Other reasons that were cited during the study include lack of time, lack of social support, lack of concern about diabetes risks, and health too poor to participate in lifestyle programs.

Scholars have noted the limitations associated with dietary and other lifestyle interventions in managing GDM. Consequently, a number of landmark studies have been conducted to assist medical practitioners to overcome these limitations. O'Brien, McCarthy, Gibney and McAuliffe, (2014), in the study, recommended the use of communication technology to enhance the effectiveness of lifestyle intervention in the management of pregnant women. These authors noted that the effectiveness of lifestyle interventions is undermined by high demand for resources. The implementation of lifestyle intervention requires substantial investment of time, finances, and materials on the part of the patients and healthcare providers. This demand for resources limits the number of patients and healthcare providers that can afford to implement these programs.

Miksch, Cheng and Roth (1996) recommend the adoption of a patient-centered approach in designing medical interventions as most systems and processes are designed for the convenience of the healthcare providers, ignoring patients' needs and preferences. These authors suggest that a patient-centered approach will assist patients to get clear insight into their health condition and to cope with advice and instructions on a day-to-day basis. These views are supported by the National Standards for Diabetes Self-Management Education and Support Task Force, which emphasized the need to individualize management plans for diabetic people (Haas et al., 2012). According to the taskforce, medical practitioners should evaluate the needs and demand of each patient in order to develop an individualized plan that will support behavior change. The Diabetes

UK 2011 Guidelines also lay emphasis on the use of flexible approaches in the management of nutritional intake and weight loss (Dyson, Dhatariya, Rees, Dyer, & Hamersley, 2011). The American Association of Clinical Endocrinologists Medical Guidelines also echoes the same view for Developing Diabetes Comprehensive Care Plan (Handelsman, 2011).

Callaway, Colditz, Linqwood, Rowlands, and Mclntyre, (2010) focused on examining the feasibility of an individualized exercise program in preventing GDM among obese women. They used a randomized control method where 25 women were exposed to individualized program while another 25 women were subjected to the usual program. The researchers found that the individualized program promoted modest increase in physical activity. Sixteen of the 25 women in the intervention group achieved more than 900 kcal/ week of exercise-based activities at week 28 as compared to only 8 of the 25 women in the control group. Some scholars also propose an increase in family participation in the development and implementation of dietary program as a strategy for enhancing the effectiveness of the program. Infanti, O'Dea, Gibson, McGaire, Connolly, and Dunne (2014) cite lack of family support as one of the major barrier to successful adherence to dietary programs among GDM patients. Zehle, Smith, Chey, Cheung, Bauman, and McLean, (2008) found that family food preference is a significant determinant of the eating habits of GDM patients. These authors used telephone surveys to examine the dietary behaviors social support and perceived barriers to health eating among a 226 women. Results showed that only 5% of the women consumed 5 servings of vegetables per day, and only 44% of the women consumed more than 2 servings of fruit in a day. Fruits and vegetable consumption was positively associated to self-efficacy

when the patient is busy and when not reporting a dislike of healthy foods by other family members. These findings highlight the need to involve family members in the development and implementation of dietary modification program for GDM patients.

Conceptual Framework

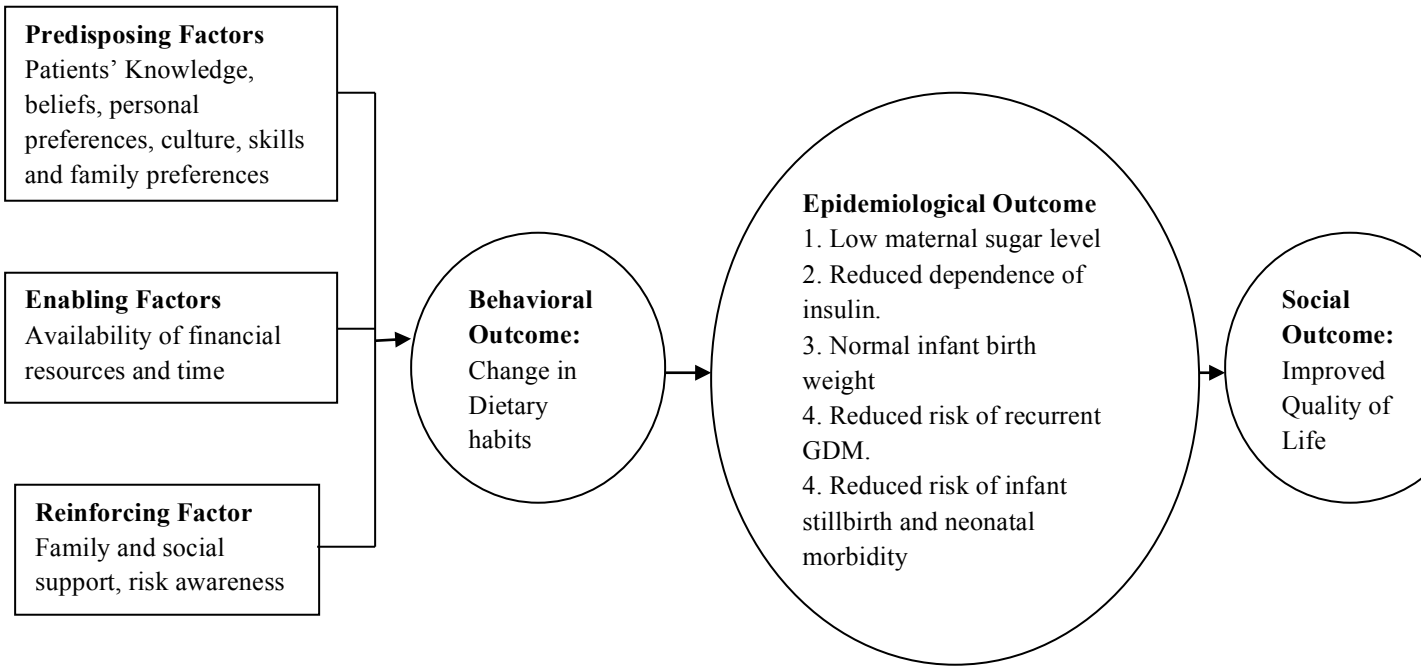

Figure 1 **Conceptual framework modified from Green's PRECEDE-PROCEED Model**

PRECEDE-PROCEED is a framework that is used for designing and implementing behavioral interventions (Matlo, 2012). Developed by Green (1970), the PRECEDE model, predisposing, reinforcing and enabling constructs in education and environmental development, is based on the assumption that an educational diagnosis needs to precede a behavioral intervention.

Predisposing factors refer to personal characteristics that encourage certain behaviors. In this project, the factors that drive patient dietary habits are the focus, including beliefs, culture, knowledge, personal preferences, family members' preferences

and many others (Gallani, Cornelio, Agondi & Rodrigues, 2013). Since these factors differ with each patient individualized dietary plans are necessary.

Reinforcing factors are issues that encourage the desired behaviors such as GDM risk awareness, family and social support. Enabling factors refer to physical attribute or skills that facilitate the implementation of the desired change. These factors may include patient economic resources, time resources, and access to healthy foods.

In 1991, the model was revised with the addition of the PROCEED in recognition of the environmental factors that determine health behaviors and health outcomes. PROCEED, an acronym for policy, regulatory, organizational and educational constructs in environmental and educational development, posits for a behavioral program to be effective, it must be supported by policies, regulations, organizations and program (Green & Ottoson, 2006). The PRECEDE-PROCEED model comprises of four stages of planning, one stage of implementation and 3 stages of evaluation.

The first stage, social diagnosis involves analyzing the social problem that has an impact on the quality of life of the patient. This project is already past this stage. Phase two, epidemiological, environmental and behavioral diagnosis, is preoccupied with analyzing and determining a precise health issue affecting a given community, as well as, environmental and behavioral factors associated with this health issue (Gallani, Cornelio, Agondi, & Rodrigues, 2013). The current project has also passed this stage. Stage three, educational and ecological diagnosis, is concerning with identifying factors which when changed can affect the health issue identified in stage two positively. These factors are classified as reinforcing, enabling and predisposing factors. The last planning stage is known as the administrative and policy diagnosis phase. This phase is concerned with

analyzing organizational and administrative concerns that must be addressed in order to implement the intervention.

Once these planning stages are completed, the investigator implements the intervention. The implementation stage paves the way to the three evaluation stages. The first evaluation phase is the process evaluation, which is concerned with determining whether the program is being executed in line with the pre-established protocols. This evaluation stage helps the project team to identify deviances and implement corrective measure. It also helps the project team to identify areas that need modification. The second evaluation stage, impact evaluation, determines the effectiveness of the program in terms of delivering the intermediate goals. The final evaluation, outcome evaluation, assesses whether the program has delivered the intended long-term health and social benefits.

Bandura's social cognitive theory will also be applied in developing the dietary intervention plan. This theory highlights the significance of self-efficacy in determining behavioral change. Bandura defined self-efficacy as "the conviction that one can successfully execute the behavior required to produce the expected outcomes" (Caldwell, 2013). Self-efficacy influences three fundamental processes of behavioral change: the initiation of new behavior patterns, the generalization of these behaviors, and the maintenance of the new behavior patterns in the long-term. Self-efficacy is a critical determining factor in the adoption of health-promoting behaviors and the elimination of unhealthy habits among women with GDM (Limruangrong, Sinsuksai, Ratinthorn & Boriboonhirunsaran, 2011). The social cognitive theory emphasizes the significance of

evaluating the self-efficacy of patients and designing tailored programs for responding to the patients' level of self-efficacy.

Section 3: Methodology

Project Design/ Methods

I proposed to plan the administration of this intervention in the antenatal care clinic (ANC) in one of the healthcare establishments within the city. I chose this environment because this is the best place to find women with the GDM condition. The individualized dietary modification plans were developed in partnership with family members of the participants. The intervention began with screening patients with GDM during pregnancy for duration of 6–12 weeks post-delivery to determine their glucose status. Biweekly telephone calls were scheduled; bi-monthly office visit were arranged; participants were instructed to perform blood glucose checks while fasting, and 2-hours postprandial on a daily basis.

Population

The target population for this evidence-based DNP project comprised of pregnant women diagnosed with GDM, who were antenatal care at Womankind OB/GYN Clinic. The clinic serves an average of 1,500 pregnant women every year. Women receiving antenatal care at the clinic are of diverse ethnic origin; Hispanic Americans accounts for a high percentage of women who receive care at the clinic, followed by Caucasian and Native American respectively. As of 10thAugust 2014, there were a total of 32 pregnant women who were diagnosed with GDM and were being closely monitored at the clinic.

Develop Implementation Plans

Following IRB approval by Walden University, the program was developed at the Woman Kind OB/GYN clinic located in McAllen, Texas. I proposed a dietary-modification program that supported the development of plans that reflect the patients'

economic condition, food preferences, nutritional needs, and body type. I first presented the provisional planning for the implementation to the project team, which lead to full implementation and evaluation of the dietary education plan. I worked together with the obstetrician, an endocrinologist, a physician assistant, a dietician, an ultra-sonographer, a lab technician, and medical assistants in developing the program**.** The clinic staff, namely the nurses and the physician assistant, will carry out the implementation and evaluation.

Budget

In the budget section, I presented a quantitative expression of the dietary modification plan. I highlighted the number of resources that the project team intended to commit towards the project and how these resources were obtained (Mitton, Dionne & Donaldson, 2014). In this section, I present a summary of the projects budgets.

Cost Sources

It was projected that the project would incur costs that originated from various sources. Development was one of these sources. Development referred to all costs that would be incurred in developing the dietary modification program. This cost included time spent preparing for screenings and educational session, money spent communicating to patients and employees, money spent on training, money spent developing diet program guides and many others.

Another source of expenditure projected was screening and education. Cost would be incurred in screening the patients for GDM. Screening was conducted on the participants at several points within the project duration. Project expected to expend resources in acquiring the screening materials and the services of screening experts. Additional resources would be expended in the education and training of medical

practitioners and participants. I enlisted the assistance of antenatal care staff in the planning process. The educational exercise required an investment of time and training materials. My plans included the needs to educate the patients and their families concerning the dietary modification plans. The exercise would also require an investment of time and training materials.

Documentation would also be a source of cost. I needed to document interventions administered to each participant, as well as, the outcomes observed on each participant. Therefore, I incurred costs associated with time spent on documentation, acquisition of documentation materials and human resource. Costs were also incurred on supplies.

Revenue Sources

The project has three main sources of revenue. The first source of revenue is the screening fee. All eligible patients underwent an initial screening procedure for GDM. Patients who exhibited symptoms of GDM underwent advanced screening. A small payment was levied for these screening procedures. Patients enrolled in the dietary modification program paid a small fee to offset the cost of providing education. A grant proposed and was awarded by Woman Kind OB/GYN and this formed the second source of revenue.

Table 1

Cost and Revenues Tables

Costs and Revenues for the Diet Modification Program (in $)	
Costs	
Development by DNP student	0
Screening supplies	450
Education materials	200
DNP student's salary	0
Total	650

Revenue:	
Screening/Enrollment	150
Grant- Woman Kind OB/GYN	500
Total	650
Surplus/ Deficit	0

Develop Project Evaluation Plan

Evaluation is a systematic process of collecting and processing data to determine the efficiency and effectiveness of the progress (Silverman, 2013). Two types of evaluation were implemented for this project, formative and summative. Formative evaluation or process evaluation will determine the degree to which project activities are completed as planned. Formative evaluation data collection was completed with an observational method. In this case, I planned the development of a dietary modification program for GDM patients, and the processes and procedures will be followed by the implementation of the project by the clinic/office staff. The formative evaluation

process also enables the project team to initiate corrective measures when the project activities are not observed or accomplished as specified.

Summative evaluation determines whether or not the project results in the intended outcomes (Suvedi & Morford, 2003). The summative evaluation process is divided into two categories: impact evaluation and outcome evaluation. Impact evaluation is an analysis to determine if the intermediate project objectives were achieved, including increased support and dietary program adherence; reduced reliance on insulin therapy, and better management of patients' glycemic level. These intermediate objectives were evaluated using patients' medical data regarding blood-sugar level and the number of patients on insulin patients' medical data.

Outcome evaluation is focused on determining if the long-term/ overall project objectives where achieved. The evaluation process for this project will focus on indicators to include the following: Record of daily diet intakes, record of self-monitoring blood glucose, number of normal delivery versus caesarian section; perinatal and neonatal morbidity; birth weight; maternal weight gain; cases of pre-diabetes, and the number of other perinatal complications.

Summary

Unless accompanied by significant changes in GDM management strategies, more pregnant women with GDM will experience preventable complications that have a financial impact on society. From the costs associated with more clinic visits, additional prenatal testing, early induction of labor, possible cesarean section, and neonatal complications, these additional expenses are largely preventable. A plan to implement and evaluate dietary modification in women with gestational diabetes has been proposed

to reduce this implication using evidence-based approach through literature review. The objective of this project is developing policies and documents for the proposed program.

Section 4: Findings, Discussion, and Implication

Introduction

The purpose of this DNP project was to plan for the implementation and evaluation of individualized dietary program among GDM patients. The primary project objective was to develop policies and procedures, including supporting documents, to implement a successful GDM program. The specific program elements included were as follows:

1. Increased support for and adherence to dietary modification programs among GDM patients.
2. Reduced reliance on insulin and other medication-based therapies among GDM patients. In addition to dietary modification, insulin therapy is used to manage GDM. However, insulin therapy has many potential complications including hyperinsulimia, hypoglycemia, and weight gain (Rowan, 2007). Furthermore, insulin therapy does not address lifestyle factors that could lead to GDM in subsequent pregnancies and Type 2 diabetes. Reflecting on this evidence, project strategy including encouraging GDM patients to reduce their dependence on insulin in favor of dietary and other lifestyle interventions, was not only limited to exercise and other physical activities to maintain appropriate glycemic levels through the pregnancy, but also met their nutritional needs.

GDM is a condition characterized by elevated glycemic levels; therefore, practitioners need to help patients manage their glycemic level. In addition, maternal blood-glucose reduction can be balanced with fetal requirements, such as energy and nutrient requirements.

The DNP project was designed for WomanKind OB/ GYN healthcare workers to implement on the population of GDM patients who are receiving treatment at the facility. The facility is located in McAllen, Texas. The goal of the individualized dietary modification program was to reduce reliance on insulin in the management of GDM and improve clinical outcomes for GDM patients.

Discussion

The project commenced with a meeting between me and WomanKind OB/ GYN healthcare workers. I explained the goal of the project and elaborated on the plan to develop individualized diet modification plans for GDM patients. The implementation team encompassed an endocrinologist, an obstetrician, a dietician, a diabetic educator, physician assistants, an ultrasound technician, a lab technician, and medical assistants and was formed after I received approval from the facility's stakeholders and the Walden Institutional Review Board. Educational material from the American Diabetes Association was modified to produce a plan based on individual women's prenatal profile, the patient weight, previous pregnancy history, baby birth weight, and the typical daily food intake. I developed a portfolio that contained material required for the implementation and evaluation of individualized diet modification program. Each binder contained procedures for developing individualized diet programs, pretest for the patient (Appendix A), posttest procedures (Appendix B), nutritional guidelines for GDM handout (Appendix C), evaluation form (Appendix D), recommended weight gain table (Appendix E). The pretest was to assess the women's knowledge on food that increases blood sugar levels in gestational diabetes and measures to prevent complications. The posttest was to evaluate the women's newly acquired knowledge regarding diet and

exercise. The implementation team invited newly diagnosed patients and patients with a previous history of GDM to the program. The intervention team then held individualized face-to-face sessions with these patients on a weekly basis where they developed a daily menu tailor-made for each patient. The patients and family members were encouraged to be actively involved in the development of the diet plans so as to capture the social, motivational, and economic conditions of the patient. The implementation team did follow-up meetings during each patients' antenatal care session. The intervention team collected data regarding the patient attitude towards the program, the patient adherence to the program, the patient weight, and glycemic levels. A summative evaluation exercise was conducted approximately 12 weeks after the development of the individualized diet plan to examine the impact of the product on clinical outcomes such as normal delivery, infant birth weight, and maternal weight gain. The diet composition of the menu also comprised of the most recent dietary recommended intake. The assigned facilitator assumed the role of the team leader to monitor and review the progress of the program participants. I expressed my availability for questions or verifications of steps during implementation and evaluation of the program.

Implication for Evidence-Based Practice

Dietary interventions are preferred to medication when it comes to the management of GDM (Infanti**,** et al. 2014). This DNP project has the potential to increase the effectiveness of diet modification programs in the management of GDM by promoting adherence to these programs. Existing diet modification programs use a one-size-fits-all model of developing daily menu; hence, they do not capture unique social, motivational, and economic circumstances of the patient. The successful implementation

of the project will promote the implementation of individualized diet modification plans in the management of GDM. This project will influence practice by encouraging healthcare practitioners to adopt individualized approaches when developing diet interventions for GDM patients. The DNP project will also make a significant social change by reducing neonatal and perinatal mortality and morbidity rate, decreasing the cost of managing GDM, reducing rates of obesity, as well as, the rate of Type-2 diabetes.

Strengths, Limitations, and Recommendations

A significant limitation of this project is that the individualized diet plan requires more time and resources to prepare, leading to increased costs of administering the program. The project calls for the development of a tailor-made daily menu for each GDM patient. The project team may need to hold face-to-face sessions with the patients and their family members in order to develop diet plans that fit their needs. Consequently, the process may require additional personnel, materials, and physical space. Another limitation of the project is that women with GDM are required to learn and master the tasks of diabetes self-management, in a very short time, to reduce the risk of hyperglycemia to the fetus.

One of the recommendations for future evidence-based project is the implementation of the individualized diet modification program to a larger population. Applying the program to a wider population will validate the findings of the current project and support the adoption of this practice in all healthcare facilities across the country. Another recommendation entails the implementation of individualized exercise programs for women with GDM. Exercise programs are also popular interventions for

managing the GDM condition. Since physical activity is also a behavioral intervention, a strategy that enhances the effectiveness of a diet intervention program which also has the potential of increasing the effectiveness of physical therapy programs.

Analysis of Self

The DNP program seeks to prepare nursing professional for the leadership role by providing them with tools and skills. This DNP project has provided me with essential skills that will make me a better nursing leader. A significant skill that I have acquired from this exercise is project management skills. Projects are essential in any discipline as they assist entities to move from the current situation to the desired situation (Hughes, 2008). Consequently, leaders need to possess project management skills in order to propel their organizations and filed to the desired level. This DNP project has provided me with an opportunity to learn and apply essential project management skills such as objective setting, strategy development, problem solving, and time and resource management. During the project, I encountered numerous challenges that called for the application of problem-solving skills. I also had to work with a multidisciplinary team, which required the application of people skills such negotiation, team development, and conflict resolution. I can now manage projects better than before when I began the DNP project. The DNP project also equipped me with skills that are essential to the implementation of evidence-based practice projects. Evidence-based practice projects are essential in the nursing discipline as they promote the advancement of the field by developing best practices for nursing (Stevens, 2013). They enable nursing professional to apply evidence in nursing practice. Through the DNP project, I have learned how to

apply evidence in a systematic approach so as to come up with findings that are acceptable.

Summary

GDM is the most prevalent pregnancy complication and, if not well managed, it can lead to premature births, stillbirths, overweight babies, and development of type-2 diabetes in the future. The disease also has a significant economic implication on both the patient and the society. The good news is that GDM patients can manage this complication with ease by changing their eating habits and physical activities. Implementing individualized diet modification programs will improve the management of GDM by promoting patient's adherence to these programs. The individualized diet modification programs will ensure that practitioners develop meal plans that capture the patients' economic, motivational and social condition; thereby, making these plans more practical. Planning for this project improved my skills in project management and the implementation of evidence-based practice projects. It also offered me the chance to become a change agent in the society.

Section 5: Scholarly Product
Project Summary and Evaluation Report

There is clear evidence that 80-90% of GDM cases can be adequately controlled through the modification of the patient's eating habits (Gilmartin, Ural & Repke, 2008). Despite this evidence, inadequate control of GDM continues with insulin therapy remaining the treatment of choice (Magon & Seshiah, 2011). Reliance on insulin poses a number of challenges including difficulties in the administration with the drug requiring multiple injections, potential hypoglycemia, and the risk of trans-placental passage of the drug. The ineffectiveness of diet modification in the management of diabetes is as a result of patients' non-adherence to these programs. This DNP project proposed an evidence-based practice change that will increase GDM patients' adherence to diet modification program. The change entails introducing individualized diet modification program so as to make the diet plan responsive to patients' economic, motivational and social conditions.

Background, Purpose, and Nature of the Project

Gestational diabetes mellitus (GDM), a carbohydrate intolerance of variable severity, is first recognized during pregnancy. Diagnosed in as many as one in four pregnancies (Harling et al., 2012), GDM is a common metabolic complication in pregnancy. This condition occurs when hormonal changes during pregnancy lower insulin production or insulin sensitivity, leading to hyperglycemia in pregnant women **(**Rajput, Yadav, & Nanda, 2013**).** GDM prevalence in the U.S. varies from 1% to 22% of pregnancies, but this largely depends on GDM definition and local screening methods (Setji, Brown, & Feinglos, 2005). The World Health Organization (WHO) recommends

screening with a glucose challenge test, using 75 grams of glucose at 24–28 weeks' gestation. A positive diagnosis is made using the standards set of fasting blood glucose over 7 millimole/liter and/or a 2-hour blood glucose over 7.8 millimole/liter (WHO, 2013).

The rate of GDM has increased across the globe due to factors such as sedentary lifestyles and developing of poor eating habit (Webb, 2013). For example, in the United States, the GDM rate range between 1.1 and 25.5 percent depending on the diagnostic criteria (Harling et al., 2012), and GDM rate increased from 2.45 to 6.8% between 1998 and 2008 in China, (Zhang, Dong, Hu, Yang, Yu, Tuomilehto, Sun, & Gao, 2011). According to Tieu, Crowther, Middleton and McPhee (2008), GDM consequences include hyperbilirubinemia, neonatal hypoglycemia, hypocalcemia, macrosomia, gestational hypertension, and polycythemia. GDM is linked to long-term adverse impacts such as obesity and Type 2 diabetes (Rajput, Yadav& Nanda, 2013). GDM also has economic implications including increased maternal care cost, increased neonatal costs, lost productive hours, and the cost of managing long-term health consequences such as Type-2 diabetes (Chen, Quick, Yang, Zhang, Baldwin, Moran, Moore, Sahai & Dall, 2009).

Evidence has shown that 80-90% of GDM cases can be adequately managed through diet- modification (Gilmartin, Ural & Repke, 2008). Park, Daily, and Kim (2011) collected prospective data concerning body weight, lipid profiles, insulin treatment, maternal and infant outcomes and glucose levels from 215 women with GDM. Results connote that women that gained excessive weight had increased Macrosomia and postprandial blood glucose level. The results also revealed that women that had low

weight-gain had better glycemic control with few women requiring insulin treatment, as well as, better neonatal outcomes as compared to women who gained a lot of weight. These results led to the conclusion that dietary modification may be an effective method of eliminating adverse effects of GDM. In another study, Tieu, Crowther, and Middleton, (2008) examined the effect low-glycemic index (LGI) diets and high fiber diet among 107 GDM patients. Results showed that women on LGI diet had fewer overweight babies than women on high-glycemic index diet. Results for the high fiber diet were inconclusive. Oostdam, Poppel, Wouters, and Mechelen, (2011) also found that LGI diets reduce the risk of macrosomia and other GDM incidents.

Despite the vast evidence regarding the effectiveness of diet modification therapy in the management of GDM, insulin therapy remains the treatment of choice (Magon & Seshiah, 2011). This situation has resulted from the fact that many patients experience difficulties in adhering to diet modification therapies due to a lack of family support, time constraints, program practicality and accessibility, and affordability of the intervention (Infanti, O'Dea, Gibson, McGaire, Connolly, & Dunne, 2014). Most dietary intervention programs are not designed to address the motivational, economic, and social characteristics of each participant, offering standardized interventions versus tailored.

Purpose Statement and Project Objectives

The purpose of this project was to develop a diet modification program that would enhance the GDM management. The program resulted in a tailored diet modification program. A tailored, or patient-centered, approach to managing GDM provides clinicians with the flexibility to modify interventions to address specific maternal circumstances, resulting in increased program effectiveness. The primary project objective was to

develop policies and procedures, including supporting documents, to implement a successful GDM program. The specific program elements include:

1. To increase support for and adherence to dietary modification programs among GDM patients.

   Evidence indicates dietary modification has positively impacts maternal glycemic control (Viana, Gross & Azevedo, 2014). However, these modification programs are as effective as the patient adherence to the program. Women are often unable to adhere to dietary modification due to a lack of family support, limited comprehension of the requirements, time constraints, the practicality of programs, accessibility and affordability of the intervention (Infanti, O'Dea, Gibson, McGaire, Connolly, & Dunne**,** 2014). By introducing a planned and tailored dietary plan, patients have increased support and flexibility to adhere to dietary recommendations.

2. To reduce reliance on insulin and other medication-based therapies among GDM patients.

   In addition to dietary modification, as insulin therapy is used to manage GDM. However, insulin therapy has many potential complications including hyperinsulimia, hypoglycemia, and weight gain (Rowan, 2007). Furthermore, insulin therapy does not address lifestyle factors that could lead to GDM in subsequent pregnancies and Type 2 Diabetes. Reflecting on this evidence, project strategy will include encouraging GDM patients to reduce their dependence on insulin in favor of dietary and other lifestyle interventions.

3. To assist GDM patients to maintain appropriate glycemic levels through the pregnancy, as well as, meet their nutritional needs.

GDM is a condition characterized by elevated glycemic levels; therefore, practitioners need to help patients manage their glycemic level. In addition, maternal blood-glucose reduction can be balanced with fetal requirements, such as energy and nutrient requirements.

Miksch, Cheng and Roth (1996) found that using patient-centered approach in the management of GDM assists patients to get clear insight into their health condition and to cope with advice and instructions on a day-to-day basis. These views are supported by the National Standards for Diabetes Self-Management Education and Support Task Force, which emphasized the need to individualize management plans for diabetic people (Haas et al., 2012). The task force called for the evaluation of the needs and demand of each patient in order to develop an individualized plan that will support behavior change. The Diabetes UK 2011 Guidelines also lay emphasis on the use of flexible approaches in the management of nutritional intake and weight loss (Dyson, Dhatariya, Rees, Dyer, & Hamersley, 2011). The same view was echoed by the American Association of Clinical Endocrinologists Medical Guidelines for Developing Diabetes Comprehensive Care Plan (Handelsman, 2011). The goal of the DNP project is to plan for the implementation and evaluation of an individualized diet modification program in a clinical setting. The goal of the individualized dietary modification program is to reduce reliance on insulin in the management of GDM and improve clinical outcomes for GDM patients.

Project Design and Setting

The DNP project was designed to be implemented by the nurses of WomanKind OB/ GYN, located in McAllen Texas. The project began with a meeting between the DNP student and WomanKind OB/ GYN healthcare workers. The student explained the goal of the project and elaborated the plan to develop individualized diet modification plans for GDM patients. The stakeholders which encompassed an endocrinologist, an obstetrician, a dietician, a diabetic educator, physician assistants, an ultrasound technician, a lab technician, and medical assistants was formed after the student received approval from the facility's stakeholders and the Walden Institutional Review Board. The DNP student developed a binder that contained material required for the implementation and evaluation of individualized diet modification program. The binder contained procedures for developing individualized diet programs, pre-tests for the patient, post-test procedures, and an evaluation form. The student elaborated the procedures involved in the implementation and evaluation of the project.

Presentation of Results

The intervention team will hold individualized face-to-face sessions with the patients where they will develop daily-menu tailor-made for each patient. The patients and family members will be actively involved in the developed of the diet plans so as to capture the social, motivational, and economic conditions of the patient. The implementation team will make follow-ups during each of patients' antenatal care session. The intervention team will collect data regarding the patient attitude towards the program, the patient adherence to the program, the patient weight, and glycemic levels. A summative evaluation exercise will be conducted six months after the development of the

individualized diet plan so as to examine the impact of the product on clinical outcomes such as normal delivery, infant birth weight, perinatal and neonatal morbidity, and maternal weight gain. The diet composition of the menu should also comprise of the most recent dietary recommended intake.

Interpretation of Findings

A significant strength of the project is that the proposed intervention is founded on evidence and theoretical underpinnings relating to the implementation of diet interventions. The implementation of individualized diet program is support by Miksch, Cheng and Roth (1996), Dyson, Dhatariya, Rees, Dyer, & Hamersley (2011), Handelsman, (2011), and Callaway, Colditz, Linqwood, Rowlands, and Mclntyre, (2010). The project is also supported by Bandura's social cognitive theory. The diet modification plans are designed to fit the unique needs of each patient; thereby, enhance patient adherence. Another point of strength in this project is the application of the pretest-posttest method in the evaluation of outcomes and impacts. The pretest-post test method enhances the validity of the evaluation process as it reduces the probability having outcomes that occur by chance.

A significant limitation of this project is that the individualized diet plan will require more time and resources to prepare leading to increased costs of administering the program. The project calls for the development of tailor-made daily menu for each GDM patients. The project team will have to hold face-to-face sessions with the patients and their family members in order to develop diet plans that fit their needs. Consequently, the process may require additional personnel, materials, and physical space. Another limitation of the project is the relatively small sample involved in the project. Due to the

small size of the health facilities, only 27 GDM patients enrolled in the diet modification program, a fact that can undermine the validity of the project findings.

One of the recommendations for future evidence-based project is the implementation of the individualized diet modification program to a larger population. Applying the program to a wider population will validate the findings of the current project and support the adoption of this practice in all healthcare facilities across the country. Another recommendation entails the implementation of individualized exercise programs for women with GDM. Exercise programs are also popular interventions for managing the GDM condition. Since physical therapy is also a behavioral intervention, a strategy that enhances the effectiveness of a diet intervention program also has the potential of increasing the effectiveness of physical therapy programs.

Implication for Evidence-based Practice

Dietary interventions are preferred to medication when it comes to the management of GDM (Infanti, O'Dea, Gibson, McGaire, Connolly, & Dunne, 2014). **T**his DNP project has the potential of increasing the effectiveness of diet modification programs in the management of GDM by promoting adherence to these programs. Existing diet modification programs use a one-size-fits-all model of developing daily menu; hence, they do not capture unique social, motivational, and economic circumstances of the patient. The successful implementation of the project will promote the implementation of individualized diet modification plans in the management of GDM. This project will influence practice by encouraging healthcare practitioners to adopt individualized approaches when developing diet interventions for GDM patients. The DNP project will also make a significant social change by reducing neonatal and

perinatal mortality and morbidity rate, decreasing the cost of managing GDM, reducing rates of obesity, as well as, the rate of type-2 diabetes.

After the presentation of the individualized diet modification plan, a meeting was held between the DNP student and the healthcare workers to discussed the feasibility of the project. The healthcare workers were impressed with the project and were motivated to implement the project. The facility formed a team that would be responsible for implementing the project.

Conclusion

GDM is the most prevalent pregnancy complication and, if not well managed, it can lead to premature births, stillbirths, overweight babies, and development of type-2 diabetes in the future. The disease also has a significant economic implication on both the patient and the society. Healthcare practitioners need more effective approaches of managing GDM. This DNP project proposes the development of individualized diet modification programs so as to facilitate patients' adherence to the diet plans.

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Appendix A: Pre test

Name:_____ Date_____

1. Carbohydrates are found in the following foods except:
    a. Potatoes
    b. Rice
    c. Chicken
    d. Tortilla

2. Sweets, cookies, soda typically have large amount of carbohydrate
    a. True
    b. False

3. Maintaining safe blood sugar levels requires distribution of foods between three meals and two three snacks daily
    a. True
    b. False

4. With gestational diabetes, body is not producing enough insulin and it can lead to high-sugar in the blood and create problem for the baby
    a. True
    b. False

5. High-fiber foods are bad for you
    a. True
    b. False

6. Skipping meals will help maintain blood sugar levels
    a. True
    b. False

7. Fast walking, swimming, going up and down the stairs are bad ways of increasing the heart rate
    a. True
    b. False

Appendix B: Post test

Name:_____ Date_____

1. Carbohydrates are found in the following foods except:
    a. Potatoes
    b. Rice
    c. Chicken
    d. Tortilla

2. Sweets, cookies, soda typically have large amount of carbohydrate
    a. True
    b. False

3. Maintaining safe blood sugar levels requires distribution of foods between three meals and two three snacks daily
    a. True
    b. False

4. With gestational diabetes, body is not producing enough insulin and it can lead to high-sugar in the blood and create problem for the baby
    a. True
    b. False

5. High-fiber foods are bad for you
    a. True
    b. False

6. Skipping meals will help maintain blood sugar levels
    a. True
    b. False

7. Fast walking, swimming, going up and down the stairs are bad ways of increasing the heart rate
    a. True
    b. False

Appendix C Patient Information

Nutritional Guidelines for Women With Gestational Diabetes

Eat 3 meals and 3 snacks daily.

- Space snacks so that there is no more than 3 hours without eating.

Omit foods high in sugar and concentrated sweets.

- Avoid adding sugar (white sugar, brown sugar, or honey) to foods. Avoid soda pop, lemonade, and sweetened yogurt.

Omit juices, but instead use whole pieces of fruit (apples instead of applesauce).

Spread carbohydrates out throughout the day.

- If after-breakfast blood glucose levels are outside the target range, you may be asked to shift some carbohydrates (starch and fruit) to other snacks or meals.

Choose foods high in fiber: whole grains, whole fruits and vegetables, beans and legumes, oats.

Choose foods low in fat and avoid adding extra fat, such as oil, margarine, or butter. Choose low-fat meat selections, such as lean cuts of beef, pork, and lamb. Emphasize more fish and poultry (without the skin). Choose:

- baked, broiled, or roasted instead of fried chicken or fish
- low-fat yogurt instead of butter and sour cream on a potato
- herbs to season vegetables instead of cream or butter sauces
- low-calorie salad dressings instead of mayonnaise or salad dressing on tossed salads
- pretzels, unbuttered popcorn, or bread sticks instead of foods fried in oil, such as doughnuts, chips, and french fries.

Limit foods from fast-food restaurants. Ask for nutritional information on menu selections, and choose foods that are low in fat. Be careful to gain at least 1/2 lb/week.

Appendix D: Evaluation Form Part I

Name: _____ Date: _____

1. How often have you been told to check your blood sugar?
   _____

2. How often did you follow that schedule for checking blood sugar during the past week?
   a. ☐None of the time ☐Some of the time
   b. ☐A good bit of the time ☐All of the time
   c.
3. What type of meal plan have you been told to follow to manage your diabetes?

   ☐Small frequent meals ☐Plate Method

   ☐Five a day ☐Food Guide Pyramid

   ☐Counting Carbohydrates ☐Other (please specify) _____

4. Thinking about your meal plan, how often did you follow this plan during the past week?
   a. ☐None of the time ☐Some of the time
   b. ☐A good bit of the time ☐All of the time
   c.
5. During the past week, how often did you participate in regular exercise, and for how long did you exercise each time?

   Number of times Length of time Type of exercise

_____
_____
_____

_____

6. What do you find to be the hardest part of the Education Program with GDM?

Appendix D: Evaluation Form Part II

How confident are you doing the following:

1. All the things necessary to manage the blood glucose on a regular basis?

Not at all confident	1	2	3	4	5	6	7	8	9	10 Completely confident

2. To follow your meal plan even when you have to prepare or share food with other people.

Not at all confident	1	2	3	4	5	6	7	8	9	10 Completely confident

3. Choosing the appropriate foods to eat when you are hungry (for example, snacks)?

Not at all confident	1	2	3	4	5	6	7	8	9	10 Completely confident

4. Exercise at least 15 to 30 minutes a day, 4 to 5 most days of the week?

Not at all confident	1	2	3	4	5	6	7	8	9	10 Completely confident

5. Know when to substitute foods with high sugar contents with low sugar contents?

Not at all confident	1	2	3	4	5	6	7	8	9	10 Completely confident

6. Control your blood glucose level so that it does not interfere with the things you want to do?
7.

Not at all confident	1	2	3	4	5	6	7	8	9	10 Completely confident

Appendix E: Weight Gain Table

Table 1. Recommended Weight Gain in Pregnancy[15]

Pre-pregnancy weight status	Recommended range of weight (lbs)
A. Twin pregnancy	35–45
B. Underweight	28–40
C. Normal weight	25–35
D. Overweight	15–25
E. Obese	15