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Impact of Culturally-Sensitive Education of a Low-Carbohydrate Diet Using the American
Diabetes Association (ADA) Plate Method on Glycemic Control and BMI in Hispanic Type 2
Diabetic Mellitus Adults in a Primary Care Setting

A dissertation submitted in partial satisfaction of the
requirements for the degree
Doctor of Nursing Practice

by

Jagjiwan Kaur Dhatt

2025

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ABSTRACT OF THE DISSERTATION

Impact of Culturally-Sensitive Education of a Low-Carbohydrate Diet Using the American Diabetes Association (ADA) Plate Method on Glycemic Control and BMI in Hispanic Type 2 Diabetic Mellitus Adults in a Primary Care Setting

by

Jagjiwan Kaur Dhatt

Doctor of Nursing Practice

University of California, Los Angeles, 2025

Professor Su Yon Jung, Chair

Background: The rise of Type 2 Diabetes Mellitus (T2DM) in primary care among minority populations has led to creative ways of addressing nutritional education interventions when dealing with poor adherence, such as utilizing the recommendations of the American Diabetes Association (ADA) plate method.

Purpose: To evaluate the plate method tool as a portion-controlled dietary balance to help control glycemic control and encourage weight loss by focusing on patient-centered care through cultural sensitivity in the Hispanic population.

Methods: Participants were recruited from a primary care clinic in the San Joaquin Valley. The study will be randomized at the clinic, using a pre- and post-test design, between February and July 2025, among Hispanic patients with T2DM living in the San Joaquin Valley, California.

Twenty participants will be randomly selected for this project. This group will receive culturally sensitive support to address language barriers and low literacy through colorful placemats based on ADA guidelines, visual cues, plate method tools, formal health education, and follow-up.

Patients will complete pre- and post-intervention tests. The primary outcomes are HbA1C and weight.

Results: A total of 20 participants completed the study. The educational nutritional intervention significantly lowered A1C levels in all patients. The paired t-test (before vs. after interventions) resulted in $t = 17.586$, $p < 0.001$, indicating a significant reduction in A1C. ANOVA analysis of the percentage change across groups showed $F = 4.323$, $p = 0.030$, indicating significant differences between the groups. Participants gained knowledge of diabetes nutritional guidelines through the plate method tool, which enhanced their self-care and adherence to diabetic management. There was a 50% increase in average responses of feedback by participants post-intervention with a Paired t-Test: $t = -15.00$, $p < 0.0001$, indicating significant improvement.

Conclusion: Previous studies have shown that the ADA plate method is an effective tool for adhering to nutritional intervention, achieving glycemic and weight control. Specifically, this quality improvement project aims to enhance education among patients with limited resources

for addressing cultural sensitivity and health literacy, particularly among Hispanic Adults with T2DM in the primary setting.

The dissertation of Jagjiwan Kaur Dhatt is approved.

Theresa Brown

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Su Yon Jung, Committee Chair

University of California, Los Angeles

2025

This dissertation is dedicated to my parents, whose unwavering belief in the value of education has shaped both my path and my purpose. Their constant emotional and financial support has fueled my journey as a lifelong scholar, and their example of perseverance through adversity has profoundly influenced who I am—both personally and professionally. My passion for this project is rooted in the deep love I have for my father, Hardy S. Dhatt. As his daughter and now a clinician, I am driven by a desire to help him overcome Type 2 Diabetes Mellitus and to extend that same commitment to others in our community in the San Joaquin Valley.

TABLE OF CONTENTS

CHAPTER ONE: INTRODUCTION.....	1
Nutritional Education Intervention.....	3
Clinical Question	4
CHAPTER TWO: THEORETICAL FRAMEWORK.....	4
Social Cognitive Theory	4
Application of Self-Efficacy within SCT	5
Application of SCT by Nurse Practitioners with Cultural Competency.....	6
CHAPTER THREE: REVIEW OF LITERATURE	6
Nutritional Educational Interventional Tool: Plate Method	7
Educational Intervention for T2DM: Plate Method	12
Nutritional Educational Interventional Tool: Portion Control	13
Synthesis of Literature Review	15
CHAPTER FOUR: METHODS	18
Project Design	18
Project Setting	19
Characteristics of Clinic Patients	19
Project Participants.....	20
Ethical Considerations	20
Intervention: The Portion Control Plate Method Tool	21
Data Collection.....	23
Statistical Analysis	25
Timeline	25
CHAPTER FIVE: RESULTS.....	26
Participant Characteristics.....	26
Primary Outcome: Hemoglobin A1C before and after Education Intervention	27

<i>A1C Changes in Subgroups</i>	27
Secondary Outcome: Participants' BMI before and after Education Intervention	29
Covariate Outcome: Patients' knowledge.....	31
Secondary Outcome: Patients' Satisfaction Questionnaire for Nutrition & Diabetes Care Outcomes	32
Covariate: Patients' Diabetes Self-Management Outcomes:	33
CHAPTER SIX: DISCUSSION	34
Project Limitations and Strengths	35
Implications for Clinical Practice.....	37
Application of Doctor of Nursing (DNP) Essential	39
Role of DNP Leadership.....	40
Interdisciplinary Practice	40
CONCLUSION.....	41
APPENDICES	44
Appendix A	45
Appendix B	46
Appendix C	47
Appendix D	48
Appendix E.....	49
Appendix F.....	50
Appendix H	52
Appendix I.....	53
Appendix J	54
Appendix L.....	57
Appendix M	67
Appendix N	69
TABLE OF EVIDENCE	71
REFERENCES	75

List of Figures and Tables

Figure 1: Average Percentage Change in A1C by Baseline Group	27
Figure 2: Percentage Change in A1C by Baseline Group	28
Figure 3: BMI Before and After Intervention	30
Figure 4: Patient Knowledge Quiz for Diabetes	31
Figure 5: Patient Satisfaction Questionnaire	32
Table 1: Participant Characteristics at the project enrollment (n = 20)	26
Table 2: A1C Education Effect on subgroups based on baseline A1C levels.....	27
Table 3: Summary statistics of A1C Levels and Changes	29
Table 4: Comparison of BMI Before and After Intervention.....	29
Table 5: Patient Knowledge Quiz for Diabetes	31
Table 6: Patients' Satisfaction Questionnaire for Nutrition & Diabetes Care Outcomes	32
Table 7: DSME-R Questionnaire Responses.....	33

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 - Dhatt, J. (2017, April 18). The Fight Against Diabetes. Stockton Record. Pub Status: Published.
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CHAPTER ONE: INTRODUCTION

Approximately 38.4 million people in the United States (U.S.) are living with diabetes, and an additional 97.6 million are prediabetic. This equates to one-third of the population being affected by diabetes, leading to a significant economic burden on the healthcare system (Centers for Disease Control [CDC], 2021). According to the American Diabetes Association (ADA), in 2022, the healthcare cost annually was \$412.19 billion, including \$306.60 billion in direct medical costs and \$106.30 billion in indirect costs, with a direct medical cost of diabetes increase of 7% between 2017 and 2022 (Parker et al., 2023). Thirty-five percent of Americans have a lower-than-average health literacy, which leads to poorer health outcomes, increased cost and usage of the healthcare system, and health disparities (Yen & Leasure, 2019). When addressing the high prevalence of diabetes, it is essential to consider the health inequalities among different patient populations and the associated financial burdens, such as the cost of medication, follow-up care, and management of complications. As noted, low literacy can affect patient outcomes, resulting in difficulty fully comprehending health-related materials (HHS, 2020). Many patients receive patient education material that is not equivalent to their reading level. Hispanics have a higher prevalence of low literacy rates due to minimal formal education in the United States and language barriers, where English is not their native language (Standage-Beier et al., 2022). Racial and ethnic minority subpopulations, such as Hispanics, have a higher prevalence of diabetes compared to whites (CDC, 2021; Hopcraft, 2023). The conditions in which individuals are born, live, work, and play—known as social determinants of health—disproportionately contribute to diabetes prevalence among Hispanic people (Hopcraft, 2023). The socioeconomic determinants are critical factors for diabetic prevalence in minority and underserved populations, demonstrating that high income and education levels are inversely associated with diabetes.

Further, there is a lack of information regarding the barriers to diabetic self-management among minorities and whether interventions effectively control these populations' high prevalence of diabetes (CDC, 2021; Marquez et al., 2019). Therefore, the gaps in the treatment of the T2DM Hispanic population stem from low health literacy and food insecurities, where there is a lack of communication between providers and patients, and a further need for management, such as culturally sensitive education.

Advanced Practice Registered Nurses (APRNs) must be aware of barriers to patient self-care, especially chronic disease management. Understanding the patient's needs takes a comprehensive approach, including consideration of the home environment, cultural competency, and personal health beliefs in which they live (Dragomanovich & Shubrook, 2021). As a chronic disease, managing uncontrolled diabetes in primary care may be challenging with barriers within the healthcare system, creating a financial burden for both the patient and the healthcare system. A 240% increase in cost from \$16.9 billion to \$57.6 billion annually between 2005 and 2017 correlates with increased cost-related distress, nonadherence, and adverse health outcomes (American Diabetes Association Professional Practice Committee, 2022). Primary care becomes essential in regulating or decreasing costs by treating the patient's disease (Herges et al., 2021). Further, primary care providers (PCPs) and patients must build rapport and communication to improve patients' adherence to their diabetic management. This is especially true among minority patient populations, where the mismatch in universal language between provider and patient can be a barrier to effective healthcare management due to a lack of cultural competency (Dragomanovich & Shubrook, 2021). The role of cultural sensitivity in healthcare cannot be overstated. PCPs can increase cultural awareness, improve the quality of care and

patient outcomes, and, most importantly, make their patients feel valued and respected by emphasizing cultural sensitivity.

Problem Statement

As the prevalence of diabetes continues to rise, more substantial self-management capability is needed. The focus of nutritional education is vital to help control diabetic patients' glucose levels and control their weight. PCPs can provide patient-centered communication and education to improve patients' knowledge further and set patient-specific goals (Bemker & Ralyea, 2018). Establishing short-term goals between the patient and provider can further promote trust within the relationship, and implementing interventions adapted to the patient's culture demonstrates the PCP's cultural competency. This Doctor of Nursing Practice (DNP) quality improvement (QI) project aims to address gaps in diabetic care by 1) including standardized nutritional education, 2) introducing the plate method to focus on low carbohydrate diet, portion control, and calorie restriction, and 3) using culturally sensitive food options to optimize diabetic management for glucose control and weight loss in the primary care setting.

Nutritional Education Intervention

This QI project will introduce evidence-based nutritional education to improve compliance with a well-balanced low-carbohydrate diet, portion-size control, and calorie restriction. Expected outcomes will be measured by the biomarkers hemoglobin A1c (HgbA1c) and body mass index (BMI), which will demonstrate the impact of type 2 diabetes (T2DM) education using the plate method. The QI project will also evaluate patient satisfaction for acceptability, such as convenience and ease of nutritional education in primary care settings, including the impact of cultural sensitivity on self-management of dietary change. Mulcahy et al. (2003) outlined the core outcomes for diabetes self-management education. (Appendix A).

The standard of care for nutritional and physical activity guidance for T2DM comes from the ADA and is reviewed and updated annually (ElSayed et al., 2023). However, it is not routine for PCPs to incorporate education addressing the importance of adequate nutrition and exercise into diabetic care by integrating healthcare interdisciplinary teams such as diabetic educators, dietitians, and pharmacists (Foroughi et al., 2018). As a universal tool for diabetic education, the portion control plate method can be used by multiple disciplines to achieve similar goals of glycemic control of an A1C below 7% within the diabetic patient population in primary care, which is one of the clinical strengths of this project. Health education programs can increase diabetes knowledge for patients, and adopting lifestyle modifications such as increased physical activity and a healthier dietary pattern is essential to controlling glucose levels and preventing complications. In particular, low-carbohydrate diets are more favorable in controlling blood glucose levels. Past research studies have emphasized that dietary change makes a positive outcome since medication alone cannot completely manage diabetes (Foroughi et al., 2018).

Clinical Question

Using the population, intervention, comparison, outcome, and time framework, the PICOT question is: “In Hispanic adults who are diagnosed with Type 2 Diabetes Mellitus (P), how does culturally-sensitive education of a low carbohydrate diet using the ADA plate method (I) compared to no dietary education (C) impact glycemic control, as measured by hemoglobin A1C and BMI (O) over three months (T)?”

CHAPTER TWO: THEORETICAL FRAMEWORK

Social Cognitive Theory

Social Cognitive Theory (SCT), developed by Bandura (1986), describes human behavior in terms of a three-way interconnected model, where personal factors, environmental influences,

and behavior are constantly interacting (Butts & Rich, 2022). SCT creates strategies and themes from cognitive, behavioristic, and emotional models of behavior change that can commonly be used when creating nutritional interventions for disease prevention and management (Butts & Rich, 2022). Through the SCT framework, learned experiences and observational learning with positive outcomes create behavior change in individuals. The four critical criteria that support SCT for health behavior interventions are observational learning, reinforcement, self-control, and self-efficacy (Butts & Rich, 2018). A focused SCT narrows down to three constructs: self-control, reinforcement, and self-efficacy (Butts & Rich, 2018). Self-efficacy is defined as a person's confidence in their ability to act, such as behavioral change, even when there are challenges (Butts & Rich, 2018). The framework of SCT focuses on increasing self-efficacy through setting small achievable goals, enhancing motivation, formalizing behavioral patterns, and reinforcing goals through rewards and positive outcomes (Butts & Rich, 2022). Reciprocal determinism is a constraint used in SCT to increase healthier behavior where the individual can be both the change and the respondent to change through the observation of the environment, role models, and reinforcement (Butts & Rich, 2022). The Social Cognitive Theory (SCT) has been applied to examine areas of adherence and self-management. Dietary intervention studies have shown that the SCT framework can measure one's ability to participate in beneficial nutritional behavior using strategies such as self-regulation and self-efficacy (Young Hong et al., 2016). (see Appendix C & D).

Application of Self-Efficacy within SCT

Self-efficacy is a significant component of SCT-supporting interventions that deal with behavioral changes and self-management, such as behavioral domains of weight loss through dietary change (Butts & Rich, 2022). One strategy applied in dietary self-management is verbal

persuasion to increase self-efficacy. Also, creating an environment that supports and adopts healthier behavior increases self-efficacy. Overall, the self-efficacy of achieving behavior change is increased when an environment is adapted towards healthier behavior and reinforcement is provided.

Application of SCT by Nurse Practitioners with Cultural Competency

Nurse Practitioners (NP) have utilized many interventions implemented by SCT. One of the specific strategies is self-monitoring, which can be used to increase the patient's awareness of his or her current behavior before the change (Butts & Rich, 2022). The specific goals can be set by the patient and NP, where self-monitoring provides feedback to the patient on the progress of the specific goal (Butts & Rich, 2022). Therefore, the follow-up can provide self-attribution for achieving short-term goals for the patient, and progression in behavior change becomes more consistent. NPs have contributed to patient care through role modeling SCT by displaying skills, knowledge, or behavior that is reliable and identifiable to the patient (Butts & Rich, 2022). The cultural sensitivity of the provider can increase patient adherence when the provider is provided with education or foods related to the patient's culture or eating preferences at home. Using the plate method, placemats that display different cultural foods can demonstrate sensitivity when communicating with a diverse patient population. Best practices when recommending dietary changes based on specific foods to the patient's culture and personal beliefs will also enhance patient-centered communication (Dragomanovich & Shubrook, 2021). (see Appendix C).

CHAPTER THREE: REVIEW OF LITERATURE

A thorough literature analysis was performed to explore dietary therapies in patients with T2DM. The search utilized the Cumulative Index to Nursing and Allied Health Literature (CINAHL) Plus, PubMed, and Embase. The search criteria were meticulously chosen to

guarantee the papers' relevance to this project's PICOT topic, concentrating on the Hispanic or Latin population—the evaluation sought to address this demographic's distinct challenges and requirements in managing T2DM with a searching strategy employing Boolean Operators (OR and AND). Searching details are (HgbA1C OR and BMI OR glycemic control OR T2DM), weight management AND patient dietary education, (reduced carbohydrate OR ADA plate technique), (portion control, OR carbohydrate counting), AND (Hispanic OR Latino). Only English-language publications were included to ensure research quality, whereas meta-analyses and systematic reviews were eliminated. The review concentrated on studies addressing adult patient education using behavioral health interventions for weight management, emphasizing diets incorporating reduced carbs, portion control, and plate approaches. In detail, the nursing literature search initially yielded eighty-five articles; Specific terms related to T2DM, and the ADA plate method were included from the search engines to enhance the diversity of articles that included Hispanic or Latin Mexican populations undergoing nutritional interventions in ambulatory settings. Of the sixty-five papers acquired, one adult-only study was excluded. Subsequently, studies were reduced to four articles by excluding those without a plate method or portion control education and/or those focused on other than T2DM. Of those, only four articles met the stringent inclusion criteria for this literature review, focusing on the plate method, portion control, weight management, and T2DM from 2018 to 2024. Refer to Appendix A, the Prisma Diagram. The following is a summary of the selected four studies.

Nutritional Educational Interventional Tool: Plate Method

Gelberg et al. (2019) conducted a randomized controlled trial (RCT) comparing the effectiveness of the MyPlate intervention against calorie counting (CC) for obesity treatment, due to 31.8% of adults in the United States being overweight with a BMI of 25 to 29.9 kg/m²

and 39.8% of adults being obese with a BMI > 30 kg/m². The participants primarily consisted of low-income African Americans, about 13% and Latino adults, 76% who received primary care services at a federally funded community clinic since the groups have higher rates of obesity compared to other ethnic groups based on demographic data obtained by the state of California before the study (Gelberg et al., 2019). The intervention tools consist of two different behavior changes that implement restricted calories from all foods using the CC method and staying within the daily calorie goal based on the current body weight, versus the MyPlate method, portion-controlled plate that focuses on four food groups with dairy on side, where 50% of the consumption is fruits and vegetables, 25% protein and 25% carbohydrate; that is more simplified and visual aid (Gelberg et al., 2019). Researchers incorporated aspects of the Diabetic Prevention Program (DPP) and the Dietary Approach to Stop Hypertension (DASH) into their study and interventions. The daily calorie intake is estimated based on weight, adapted from DPP. If less than 250 lbs., participants are encouraged to eat 1200-1499 kcal/day, and if greater than 251 lbs., then 1500-1800 kcal/day (Gelberg et al., 2019). In both groups, the Community Health Workers (CHWs) leaders emphasized 150 minutes per week of physical activity. The MyPlate group was given written material with recipes to incorporate fruits and vegetables into their meals (Gelberg et al., 2019). Study results indicate that when participants received both weight control approaches and the CC and MyPlate method, the retention rate was 78 to 86% at one-year follow-up (Gelberg et al., 2019). The study enrolled 261 participants, predominantly Hispanic (86%), African American (8%), and other (6%). There were 11 sessions: two in-home teaching sessions, two group education sessions, and seven telephone coaching sessions. The primary objectives were assessments of satiety and post-meal hunger by trained CHWs since previous studies (Batis et al., 2011; Liu et al., 2012; Reininger et al, 2017) measured weight

reduction achieved over 12 months but did not sustain over four or more years due to increased hunger in relation to calorie restriction in the CC group compared to the MyPlate method with the fruit and vegetable approach (Gelberg et al., 2019). Indeed, the MyPlate method encourages the intake of foods that provide high satiety and satiation without further need for calorie counting by emphasizing balanced portions of different food groups for healthier choices. On the contrary, the CC method focuses on calorie deficit by limiting daily calorie intake using psychological self-regulation strategies that include social support and self-reward for maintaining desirable weight based on the SCT that is adapted by the study (Gelberg et al., 2019). Of note, the CC approach focuses on the intervention on food choices based on calorie counting, rather than on healthier options.

Gelberg et al. (2019) stated that the overall measurements of the baseline findings between CC and MyPlate indicated minimal differences except in the sugary beverage intake and the DASH dietary quality score. At the end of the study, the MyPlate method resulted in under one sugary beverage per day (0.97 frequency) compared with 1.3 sugary beverages per day (1.29 frequency) for CC participants. DASH dietary score was higher in the MyPlate than the CC intervention, with a chi-square of 9.75 and $P=0.008$. Secondary outcomes indirectly observed the dietary quality of food choices and calories by utilizing the DASH score previously incorporated into the MyPlate Method approach in other studies (Batis et al., 2011; Liu et al., 2012; Reininger et al, 2017), showing evidence that scores were higher in the MyPlate intervention than in CC, even with randomization and food insecurity. Also, food insecurity is substantial in the participants' lives, with a prevalence of 13.8 % of all participants, which did not change throughout the trial for the low-income population (Gelberg et al., 2019). Also, MyPlate resonated with immigrants due to the emphasis on fruits, vegetables, legumes, and nuts, who

were raised on a traditional Mesoamerican diet of maize, beans, and squash (Gelberg et al., 2019). A further conclusion is that the CHW leaders were essential for behavioral support and cultural competency in the experimental phase. This led to long-term adherence and sustainability, created patient satisfaction, and can be necessary for managing chronic diseases such as obesity and preventing complications in the Hispanic population—for example, T2DM and cardiovascular disease. Lastly, MyPlate was perceived as a better fit for the low-income Hispanic population from the study due to the minimal health literacy and numerical skills required. The CC approach required the ability to read food labels and track calories daily, which in turn required more literacy and numerical skills. Consequently, equipping patients with appropriate resources for success in various settings and integrating professionally qualified healthcare practitioners can improve patient adherence and bolster the motivational components of treatment planning.

McCarthy et al.'s RCT study (2023) examined the effectiveness of two nutritional interventions (the MyPlate versus the CC approach) for obesity treatment in low-income, primarily Latino communities and further analyzed the official approaches that were adopted since 2011 by the US government entities, such as the CDC and the Department of Agriculture were calorie counting and replacement of the food pyramid with MyPlate. Both approaches emphasized daily calorie restriction and a portion-controlled, balanced diet. The primary purpose of the study was to evaluate the effects of these methods on satiety, satiation, and central adiposity of primarily Latino adults in primary care from 2015 to 2017 (McCarthy et al., 2023). Both MyPlate and CC groups received similar interventions by CHWs consisting of two home educational visits, two group educational sessions, and seven telephone coaching calls over six months. Similar to previous studies, (Batis et al., 2011; Liu et al., 2012; Reininger et al, 2017)

the study's primary outcomes looked at satiation and satiety, essential for hunger management and compliance with dietary changes, along with measurements of waist circumference and body weight at baseline, six months, and 12 months (McCarthy et al., 2023).

As analyzed, a sample size of 261 overweight or obese adults was randomly assigned to two interventions: MyPlate or the CC group. The sample consisted of 86% Latino, 8% African American, and 6% other participants, with 82% being foreign-born and 74% preferring Spanish-speaking. Both treatments substantially affected satiation and satiety scores to increase from baseline to 12 months (McCarthy et al., 2023). Further confirmation of treatment-by-time interaction of reduction in the waist circumference decreased in both groups, with the MyPlate group having a difference of waist circumference of -1.86 cm with a p-value of 0.009 and the CC group difference of -1.71 cm with a p-value of 0.02 from baseline to 12 months (McCarthy et al., 2023). The MyPlate method, which advocates filling foods with DASH guidelines, such as fruits, vegetables, nuts, legumes, low-fat dairy products, and whole grains without needing calorie monitoring, resulted in further benefits.

Furthermore, the MyPlate group had a secondary outcome of significantly decreased systolic blood pressure after six months (McCarthy et al., 2023). This finding supports one previous study reported by Gelberg et al. (2019), suggesting that consuming various fruits, vegetables, and whole grains can improve cardiovascular health. Also, McCarthy et al.'s study (2023) incorporated the importance of cultural competency by integrating CHWs, who provided bilingual support and culturally sensitive nutritional strategies to meet the participants' cultural and linguistic needs, leading to increased patient satisfaction and quality of life. McCarthy et al. (2023) assert that culturally pertinent, low-calorie dietary interventions can aid low-income, diverse groups with diabetes in weight management and improve their health. The study

promotes implementing culturally sensitive strategies in public health initiatives to tackle obesity and associated health disparities, focusing on Hispanics. However, the study's limitations include its short intervention duration, follow-up, and dependence on self-reported data. These limitations should be considered when interpreting the study's findings, and future research should address these issues to provide a more comprehensive understanding of the topic.

Educational Intervention for T2DM: Plate Method

Zhang et al. (2022) performed an RCT to assess the efficacy of a simplified dietary education in individuals with T2DM, aged 18 – 65, utilizing a restricted diet with a plate called the plate model compared to a traditional counting model that counts carbohydrates every meal. The study aimed to assess these dietary methods in T2DM to evaluate the glycemic control and their effect on cardiovascular risk factors with a shorter duration of patient education for follow-up from inpatient and outpatient settings (Zhang et al., 2022). The trial involved 419 individuals from Nanjing, China, randomly allocated to the plate model or traditional carbohydrate counting group. In this trial, the plate model group received health education, monthly medical consultations by a registered dietitian, and a low-literacy color brochure explaining the model (Zhang et al., 2022). In contrast, the traditional carbohydrate-counting group consisted of similar settings, except for the paper booklet containing information on traditional carbohydrate-counting education (Zhang et al., 2022). The results indicated that both the plate model and carbohydrate counting demonstrated similar findings in HbA1C, weight, BMI, T2DM duration, and blood lipids, with no significant difference between the two groups (Zhang et al., 2022). The plate technique group presented higher visual education outcomes: health literacy was not an issue, as shown in the counting model, and demonstrated elevated numerical understanding, establishing the study's strength (Zhang et al., 2022).

The detailed findings in the plate model group indicated that individuals in that group resulted in a reduction in HbA1c levels of 0.7% during the initial three months, which declined to 1.44% at the six-month mark (Zhang et al., 2022). Although HbA1c levels did not maintain the reduction and experienced a modest elevation over the subsequent six months, the plate model group significantly reduced fasting plasma glucose (FPG) and 2-hour postprandial glucose (2hPG) readings, with the most pronounced decrease occurring in 2hPG values (Zhang et al., 2022). Further, the plate model group resulted in reductions in total cholesterol (TC) and low-density lipoprotein cholesterol (LDL-C) levels over 12 months, which indicates significant benefits with the plate method regarding managing lipid metabolism as a T2DM risk factor and prevention of cardiac complications. Of note, the CC group had slight improvements in LDL-C levels and TC compared to the plate model group. The study's findings suggest that the plate model, a simplified dietary education method, is as effective as the traditional carbohydrate counting approach for short-term glycemic regulation. This implies that the plate model may be preferable for managing weight and cholesterol in T2DM patients, offering an efficient and practical approach to diabetes management, especially for low socioeconomic and minority populations, resulting in a more significant prospect in educating patients with limited health literacy. In conclusion, the study by Zhang et al. (2022) shows that the plate model offers a practical and effective approach to T2DM management by simplifying nutritional guidance and reducing the time needed for training, with outcomes that were comparable to the traditional carbohydrate counting method.

Nutritional Educational Interventional Tool: Portion Control

Tanu-udom Maneesing et al. (2023) performed an RCT to assess the efficacy of portioned meal boxes (PMB) vs. general counseling in nutrition (GCN) in a T2DM outpatient

population from Chon Buri, Thailand, on blood glucose regulation. In the randomization process, T2DM patients were assigned to either the PMB or GCN group, with 50 participants in each group, and followed for 12 weeks. All participants followed food exchange lists to limit their carbohydrate intake. Primary health outcomes looked at fasting blood glucose and HbA1c measurements. In contrast, secondary outcomes were patient satisfaction and body composition, such as weight, percent body fat (PBF), and muscle mass (Tanu-udom Maneesing et al., 2023). Both groups showed reductions in HbA1c levels at the 6th and 12th weeks relative to baseline, with significant differences between the groups. In detail, the PMB (-9.5 ± 13.7 mmol/mol) had a more substantial difference in HbA1c levels compared with GCN (-8.4 ± 8.8 mmol/mol) (Tanu-udom Maneesing et al., 2023). Concerning body composition, the GCN and PMB groups showed a significant difference in BMI and PBF, where GCN had a greater reduction in both measurements (BMI difference: GCN (26.9 ± 4.2) vs. PMB (30.0 ± 6.2)), and a 4 % additional reduction in PBF than PMB (Tanu-udom Maneesing et al., 2023). Participants in the PMB group reported higher satisfaction levels, citing the ease and organization of the portioned meal boxes as a key factor. The study concluded that both PMB and GCN interventions improve glycemic regulation in T2DM (Tanu-udom Maneesing et al., 2023). Also, the GCN had a more effective approach than PMB, which provided more significant results in weight loss for overweight or obese patients due to lowering carbohydrate intake. PMB has increased patient willingness because portioned meal boxes are more efficient and effective dietary instruments for managing T2DM, improving adherence and patient satisfaction than the GCN method (Tanu-udom Maneesing et al., 2023). However, the trial underlines the need for prolonged follow-up durations to assess cardiovascular impacts and improve nutritional strategies based on the plate

technique (Tanu-udom Maneesing et al., 2023). Also, the study was limited due to the small sample size, which may not have had sufficient statistical power and generalizability.

Synthesis of Literature Review

This review highlights the association between weight and T2DM management, demonstrating that both benefited from a standardized nutritional educational intervention for individuals with a BMI greater than 30 kg/m², who are at risk of metabolic disorders such as diabetes. This intervention further improved patient outcomes by regulating glycemic control in T2DM prevention and treatment. All discussed articles (Gelberg et al. (2019), McCarthy et al. (2023), Tanu-udom Maneesing et al. (2023), and Zhang et al. (2022)) emphasize the important role of nutritional education and intervention in weight management in outpatient settings. Effective weight management is necessary for diabetes management, and comprehensive patient education can enhance self-management and compliance with treatment procedures. Tanu-udom Maneesing et al. (2023) and Zhang et al. (2022) further demonstrate the benefits of organized dietary interventions, particularly the efficacy of a restricted diet using plating or portion control in T2DM. Their focus on glycemic regulation, diabetes self-management, and other health outcomes provides reassurance and confidence in the potential of these interventions. Schmitt et al. (2022) revised the Diabetes Self-Management Questionnaire (DSMQ-R) as a measuring tool for the validity and reliability of overall self-management, which will be utilized to help participants with self-reflection and evaluation. Gelberg et al. (2019), McCarthy et al. (2023), Tanu-udom Maneesing et al. (2023), and Zhang et al. (2022) studies provide evidence that improves patients' understanding of suitable dietary practices and optimizes disease self-management, leading to better clinical outcomes, such as satiety/satiation and reduced HbA1c levels, and improved quality of food and life using the DSMQ-R tool. DSMQ is a valid

standardized questionnaire that is reliable and can be compared across studies, capturing behaviors, not just A1C outcomes. Moreover, Gelberg et al. (2019) and McCarthy et al. (2023) identify significant gaps in the evidence on optimal carbohydrate consumption. Studies focus on filling these gaps by assessing the effects of different carbohydrate levels on satiety, dietary quality, and health outcomes.

Gelberg et al. (2019), McCarthy (2023) and Zhang et al. (2022) show that healthcare providers can use MyPlate to simplify and provide culturally relevant nutritional advice. Prioritizing high-satiety foods without calorie counting can enhance primary care patient compliance and dietary quality and improve health outcomes. Gelberg et al. (2019), Tanu-udom Maneesing et al. (2023), and Zhang et al. (2022) demonstrate that structured instruction programs utilizing the plate method or portion-controlled portions can significantly enhance dietary habits and weight management in both obese and overweight individuals, as well as glycemic control in those with T2DM, thereby promoting greater metabolic health. Studies also provide pertinent information on the feasibility of educational and nutritional interventions that utilize portion control through the plate method as a standardized dietary tool. The plate method is a visual and straightforward dietary tool designed to aid nutritional management and improve glycemic control in diabetic patients, particularly in outpatient settings. It simplifies meal planning by dividing a plate into designated sections for vegetables, protein, and carbohydrates. This method prioritizes portion regulation and balanced nutrition, integrating diverse dietary categories. Gelberg et al. (2019) and McCarthy et al. (2023), who addressed patient populations in low socioeconomic status and minority care, predominantly Hispanic, provided additional reviews of health disparities. They outlined the need for access to better care through standards focusing on cultural sensitivity and health literacy. Notably,

Gelberg et al. (2019) and McCarthy et al. (2023) primarily focused on Latinos or Hispanic populations. Also, these two articles further examined the significance of cultural competency, especially within low-income diverse populations, demonstrating culturally sensitive methodology and the efficacy of diverse dietary strategies. Since most of the participants in these two studies were from Hispanic and Latino communities (Gelberg et al., 2019; McCarthy et al., 2023), a more thorough evaluation of how these treatments could be applied to other cultural groups is needed. In this sense, the studies reported by Tanu-udom Maneesing et al. (2023) and Zhang et al. (2022) must account for the variability of the participant population in terms of ethnicity, socioeconomic status, and comorbidities. For instance, Zhang et al. (2022) and Tanu-udom Maneesing et al. (2023) findings may require greater generalizability to broader populations due to their specific demographic and geographic focus, as the studies were conducted in China and Thailand.

While the studies by Gelberg et al. (2019), McCarthy et al. (2023), Tanu-udom Maneesing et al. (2023), and Zhang et al. (2022) have significantly improved our perception of dietary interventions, several gaps require further investigation. These include the long-term efficacy of interventions and the psychological and behavioral aspects of dietary adherence. Also, self-reported food intake and adherence can introduce bias, potentially compromising the accuracy of the findings in all studies reviewed (Gelberg et al., 2019). (McCarthy et al., 2023). (Tanu-udom Maneesing et al., 2023). (Zhang et al., 2022).

Overall, significant findings from all discussed articles concluded the need for culturally based nutritional intervention in managing weight, glycemic scores, and other relevant health outcomes. Implementing these culturally sensitive nutritional strategies, such as the plate method, calorie counting, and portion control, into clinical practice allows APRNs to increase

patient compliance and self-management ability, improve patient outcomes, and thus, reduce health disparities among the low socioeconomic and Hispanic populations with lower health literacy. Further, justification for APRNs to collaborate with interdisciplinary teams has shown positive progress in quality improvement and standards of care, which emphasize their critical roles as team members in patient education and disease management. This highlights the importance of patient education in outpatient settings and the necessity of care that APRNs should be committed to.

CHAPTER FOUR: METHODS

This QI project aimed to evaluate the development of a Primary Care APRN lead in an educational program within the primary care setting. The goal was to enhance cultural competency in managing glycemic control in T2DM. The clinical question involves assessing pre- and post-survey and pre- and post-intervention project outcome variables, including BMI and HbA1c levels, to determine the impact of the ADA portion control plate method education on glycemic control and BMI. There was a cause-and-effect relationship among the participants, with data measurements taken before and after the intervention selected based on the nature of the purpose statement and clinical question (Sylvia & Terhaar, 2023).

Project Design

The QI-clinical project employs a mixed-method design that integrates quantitative and qualitative methodologies in a quasi-experimental approach to evaluating outcomes pre- and post-intervention. This design was not a valid experiment but rather a measurement of change following treatment or intervention on a single group of individuals. The design was efficient for healthcare-related outcomes as it does not necessitate randomization or a control group (Moran et al., 2023).

Project Setting

The QI project was conducted in a privately owned primary care facility with one clinical site in the Central Valley, California. The clinic provides medical care to adults in San Joaquin County, serving a racially and culturally diverse population with varying economic statuses. The patients have both private and public insurance. The clinic was staffed by one primary care provider (PCP) and an APRN who manage the patient population. There were no registered dietitians or diabetic educators at the two clinical sites. A clinical manager oversees the private primary care clinic, which has three medical assistants. The clinic does not offer standardized patient education. Nutritional resources outside the clinic are unknown. This unique patient care environment underscores the importance and relevance of the clinical project, as it directly addresses the healthcare needs of a diverse and resource-limited community.

Characteristics of Clinic Patients

The Central Valley is known for its diverse demographics, with a Hispanic or Latino population of 43.1% (*National CLAS Standards - the Office of Minority Health*, 2019). Recent data indicate that the average annual household income is \$60,628, with 78.5% of residents aged 25 years or older having a high school diploma or higher and 20.9% having a bachelor's degree or higher (US Census, 2020). The primary care clinic serves a multicultural patient population with diverse socioeconomic and educational backgrounds. This project will target the Hispanic population, one significant minority subpopulation in the clinics, by focusing on cultural competency and preventive education services to control glucose levels and body weight and further reduce complications from diabetes. The focus population consists of Hispanic adults aged 18 to 64 years, characterized as T2DM and obesity with glycated hemoglobin (HbA1c) >

8% and body mass index (BMI) > 30 kg/m² (P) at any time of care within the past couple of weeks.

Project Participants

This project did use convenience sampling. Participants were selected by the primary care provider at the clinic or through self-referrals by the patients. Flyers and posters were displayed in the clinic to recruit participants for the study. Participants who met the eligibility requirements were provided with a copy of the consent form for their records. Those who were willing were offered educational services. Eligible participants will be Hispanic adults aged 18 to 64 who meet one of the following criteria: newly diagnosed with T2DM and have an HbA1c level greater than 8.0% at more than one measure. Those diagnosed with T2DM and or who had a BMI > 30 kg/m².

Ethical Considerations

The project was deemed exempt from the institutional review board (IRB) submission by the program director and committee chair. Participation will be voluntary, and informed consent was obtained, during which the study's purpose, benefits, and risks were discussed with participants. Health Insurance Portability and Accountability Act (HIPAA) privacy rules were strictly enforced, ensuring that all data collected from patient participants remains confidential. The anonymity of personally identifiable information was maintained through unique identification numbers that were kept confidential by the investigator and shared with participants and primary care clinicians when requested. Participants are allowed to withdraw from the intervention at any time.

Intervention: The Portion Control Plate Method Tool

An educational seminar was held at one clinical site on several separate occasions, once in the morning and again in the evening, on a couple of designated days. The education sessions were conducted in the lobby before and after the clinic closed. Each session lasted at least 60 minutes or more and taught the standardized, evidence-based ADA Portion Control Plate Method using a plate tool and culturally sensitive placemats (ADA, 2022).

According to ADA (2022), the plate method is a portion control plate typically divided into three sections: half for vegetables, a quarter for protein, and a quarter for carbohydrates. The plate method assists in determining the optimal macronutrient ratio for a balanced meal. Some individuals use a clock face to visualize how to fill their plate. For example, from 12 to 3, four fingers' worth of meat or fish; from 3 to 6, a fistful of starchy food; and from 12 to 6 on the other side, two cups of vegetables. Placemats contain culturally preferred foods and safe and nutritious options that cater to individuals' diverse tastes and needs and reflect their cultural identity (CDC, 2024). Additionally, the DSMES Health Literacy Tool is used to assist participants with limited health knowledge by utilizing visual cues with minimal words. (Appendix G). (CDC, 2024).

Before starting the design phase, a meeting is held with the project lead, the PCP, a medical doctor, the office manager, and two medical assistants to discuss the material from the standardized, evidence-based education intervention presented during the educational seminar. The patient educational resources are designed for low health literacy, featuring visual cues and easy-to-read material at a fifth-grade reading level. Educational materials will be developed or adapted to reflect the patients' Hispanic backgrounds, languages, and health beliefs. This includes translating materials into Spanish and using culturally appropriate examples and visuals. The ADA portion control plate method will be adapted to include traditional foods commonly

consumed by the Hispanic population (see Appendix F) (CDC, 2024). Family members and supportive persons are encouraged to attend to assist with communication and reinforce education. During the initial session, participants will receive a plate method tool valued at five dollars (Appendix I), which will be provided through funding achieved through a scholarship to pay for the tool. They will be asked to maintain an individual food log of the diverse cultural foods they placed in the compartments, including portions in ounces, as instructed by the APRN (see Appendix K). These food logs will help guide portion control and the selection of healthier foods, including culturally based options. The project lead will review all food logs with each participant. Participants will receive a food label card, MyPlate, portion control, and grocery shopping pamphlets to help them choose healthier foods (Appendix H). (Positive promotions, 2024).

Following the initial educational seminar, four bi-weekly follow-ups via telephone will be conducted with each patient. These follow-up phone calls motivate patients to continue using the plate method and provide further feedback or reinforcement throughout the project. The optional educational workshop, lasting 30 to 60 minutes, was scheduled for individual learners midway through the project to reinforce the material through in-person, virtual, or telephone meetings. The educational workshop will consist of reviewing the use of the plate method, how blood sugar is affected by dietary intake, and how to measure glycemic control throughout the process to help in adherence to diabetic management. During the twelfth week, a one-on-one debriefing session will be held with the participant and APRN. This session will review significant concepts through a teach-back moment and address areas needing clarification.

Data Collection

In this project, two biophysical markers, HbA1c (% , mmol/mol) and BMI (kg/m²), along with patient satisfaction and knowledge retention (%), serve as the dependent variables. The primary biomarker, HbA1c, is measured at baseline and the end of the project at 12 weeks. If the HbA1c is lower than the previous measurement, it will indicate an improvement in glycemic control. Monthly follow-ups continue for those who need reinforcement of patient education. Secondary outcome measures for the project will be measured in the clinic by medical assistants, including BMI measurement, knowledge enhancement, and patient satisfaction, and analyzed at baseline before intervention, six weeks during intervention, and 12 weeks. The short quiz (Appendix M) was developed for the project and has a crucial intervention component. It is administered before and after the intervention to measure patients' knowledge of current dietary choices and the basic information on My Plate. Primary care clinicians review the assessment content for validity before administering it to participants. The quiz results validate the diabetic knowledge of the participants before and after the intervention by calculating the scores to determine if there is a positive or negative difference in the percentages of the scores. An increase in the score or percentage indicates that knowledge retention positively correlates with the intervention. Conversely, a lower score or percentage suggests that further reinforcement of the diabetic content is needed, leading to an additional educational seminar and a negative correlation.

Patient satisfaction scores are assessed using a five-point Likert scale to evaluate sustainability, plate methods, portion controls, a well-balanced low-carbohydrate diet, cultural sensitivity towards individual preference foods, and HgbA1C standards (ADA, 2022). These scores indicate whether the evidence-based nutritional intervention is feasible and dependable.

The participant is the control, with the pre-intervention baseline measured at week zero and compared to the post-intervention baseline at twelve weeks. (See Appendix N)

Other covariates of interest recorded in the electronic medical record (EMR) include age, gender, years since first diagnosis with T2DM, years of formal education, health insurance status, primary language, current number and type of oral medications for T2DM, and scores from the Diabetes Self-Management Questionnaire (DSMQ) (Appendix L) (Schmitt et al., 2013). The DSMQ tool is administered before the intervention at enrollment and after the twelve weeks to measure behavioral problems related to reduced glycemic control. DSMQ is a preferred tool for analyzing self-reported behavioral problems for clinical assessment of patients with suboptimal diabetes outcomes and determining factors affecting associations between self-management behaviors and glycemic control (Schmitt et al., 2022). DSMQ-R (Appendix J) is a revised multidimensional questionnaire with twenty-seven items assessing essential self-management practices for type 1 and type 2 diabetes, including diabetes-adjusted eating, glucose monitoring, medication taking, physical activity, and cooperation with the diabetes team using the DSMQ-R for behaviors (Schmitt et al., 2022).

Additional information is collected on a standardized form when the patient attends the educational seminar. This short form includes language preference, formal education, income status, number of primary members in the household preparing meals, cultural preference for foods, designated support person, and weekly physical activity in minutes. Each participant is assigned an identification number during registration. The identification key is securely stored in a locked medical file on a password-protected flash drive, accessible only to the office manager. After the project, participants will review and reassess their behavioral outcomes using the

portion control plate method to set achievable health goals, reflecting on and recommitting to behavioral modifications and lifestyle changes.

Statistical Analysis

Twenty participants are anticipated to enroll from one clinical site. If there is a higher participation rate at the clinic, the total limit will be no more than fifty participants for the project. The participants serve as the control group as well as the intervention group in the study. Data will be described using graphical, descriptive, and tabular analyses. Associations between continuous and categorical variables will be examined using a paired t-test and a chi-square test. Due to the small sample size and lack of normal distribution, the Wilcoxon signed-rank test, a non-parametric test for a paired difference in repeated measures, will be used to evaluate the characteristics of continuous variables with non-normal distributions (Sylvia & Terhaar, 2023). A paired parametric t-test or Wilcoxon test, if data are skewed, will be employed to analyze the participants at two measurement points, assessing the difference in means (parametric test) or median (non-parametric test) between pre-and post-intervention scores for HbA1c, BMI, diabetes knowledge-based survey changes, the DSMQ questionnaire, and patient satisfaction (Sylvia & Terhaar, 2023). Data analysis will use Microsoft Excel and IBM SPSS V29 (Sylvia & Terhaar, 2023).

Timeline

The DNP project timeline is proposed to begin on January 3, 2025, and be completed by July 31, 2025, for clinical implementation of the data, including the 12-week follow-up (Refer to the Gantt Chart in Appendix D).

CHAPTER FIVE: RESULTS

Participant Characteristics

A total of 25 participants were enrolled, of whom 20 completed the project from start to finish. All of the 20 participants had a Hispanic background and at least a diagnosis of type 2 diabetes mellitus for greater than 2 years, with a BMI greater than 30, and an A1C that was uncontrolled at least once in the past year, with a value of A1C of 8.0 or greater. The average age was 50.8, with a standard deviation of +/- 13.06. The participants' ages ranged from 22 to 64 years. The group consisted of eleven females and nine males, with the majority (12 of 20, 60%) having completed high school. Notably, only 8 out of 20 (40%), had completed middle school and some high school. There was a high preference for Spanish-speaking participants (60%), compared to 40% English-speaking participants. All participants had difficulty reading and comprehending English-written material only and preferred visual educational material.

Table 1: Participant Characteristics at the project enrollment (n = 20)

Patient ID	Gender	Age	Race / Language Preference	Education Completed	Initial A1C
OO1	Female	57	Hispanic / Spanish	Middle School	9.2
OO2	Female	63	Hispanic/ English	Middle School	8.5
OO3	Male	64	Hispanic/English	Middle School	10.1
OO4	Female	26	Hispanic/Spanish	High School	7.8
OO5	Male	39	Hispanic/Spanish	High School	8.9
OO6	Female	45	Hispanic/Spanish	High School	13
OO7	Female	58	Hispanic/Spanish	High School	9
OO8	Male	62	Hispanic/Spanish	Middle School	8.6
OO9	Female	22	Hispanic/English	High School	7.6
O10	Male	47	Hispanic/English	High School	8.4
O11	Male	35	Hispanic/English	High School	9.3
O12	Female	44	Hispanic/Spanish	High School	10.4
O13	Male	56	Hispanic/Spanish	Middle School	8.8
O14	Male	60	Hispanic/Spanish	Middle School	7.5
O15	Female	64	Hispanic/Spanish	Middle School	8
O16	Female	49	Hispanic/Spanish	Middle School	7.8
O17	Female	36	Hispanic/English	High School	8.2

O18	Male	28	Hispanic/English	High School	7.5
O19	Female	36	Hispanic/English	High School	12
O20	Male	55	Hispanic/Spanish	High School	7.2

Primary Outcome: Hemoglobin A1C before and after Education Intervention

A1C Changes in Subgroups

Table 2: A1C Education Effect on subgroups based on baseline A1C levels

Baseline Group	A1C Before	A1C After	A1C Change Mean	A1C Change Max	A1C Change Min	% Change Mean
High (>10)	11.38	9.85	1.52	1.9	1.2	-13.83
Medium (8-10)	8.69	7.3	1.39	1.7	1.1	-15.96
Low (<8)	7.57	6.65	0.92	1.1	0.7	-12.1

Figure 1: Average Percentage Change in A1C by Baseline Group

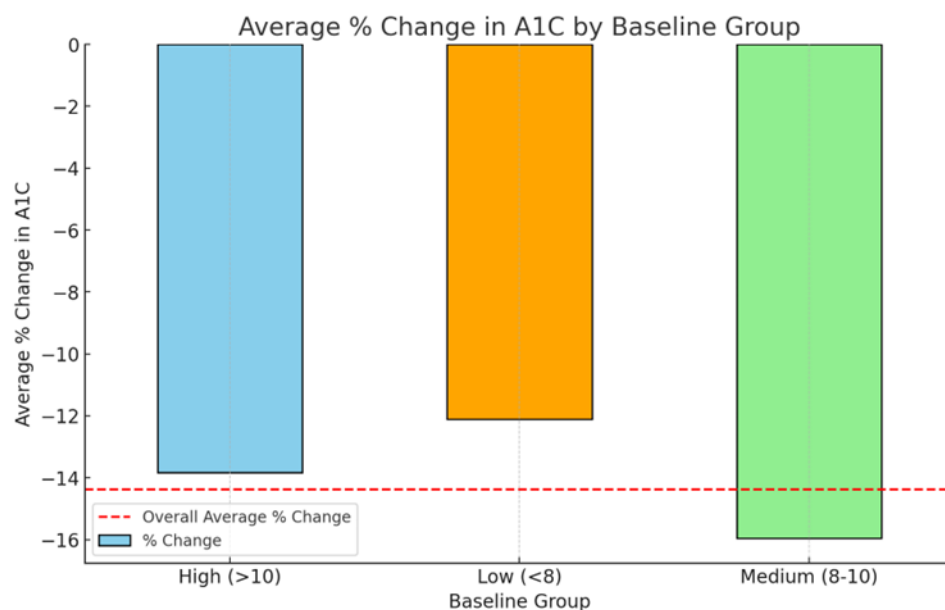
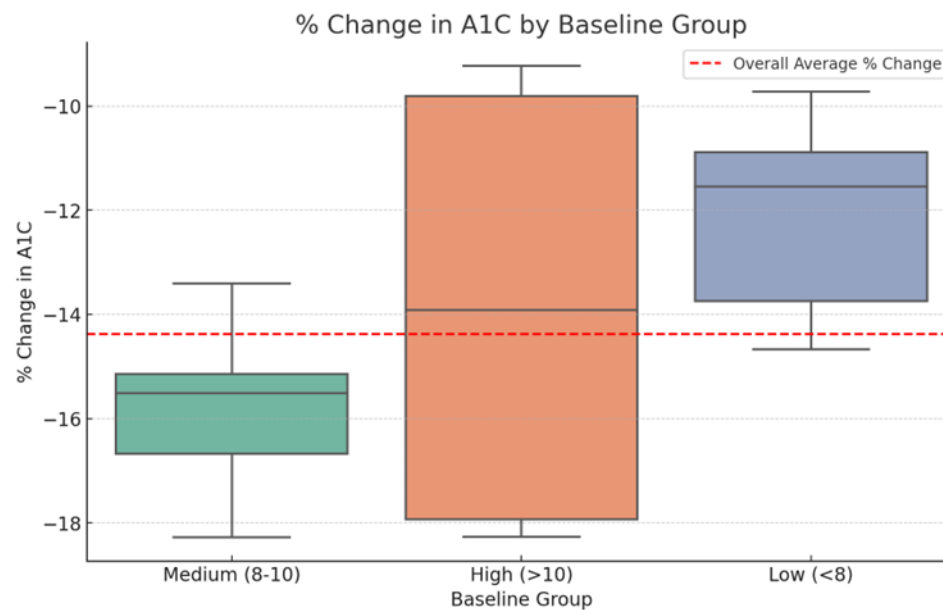


Figure 2: Percentage Change in A1C by Baseline Group



Next, changes in A1C levels after subgroups were examined according to the baseline A1C levels (Table 4 and Figures 5 and 6). A paired-samples *t*-test was conducted to assess the effect of the intervention on A1C levels across subgroups. The analysis revealed a statistically significant reduction in A1C following the intervention, $t(19) = 17.586, p < .00001$, indicating a substantial overall improvement in glycemic control. To examine differences in percentage change across baseline A1C groups (Low, Medium, High), a one-way analysis of variance (ANOVA) was performed. The results showed $F(2, 17) = 4.323, p = .030$, indicating a significant difference in the effect of intervention on percentage improvement by subgroups. Post-hoc comparisons using Tukey's Honestly Significant Difference (HSD) test showed that participants in the medium baseline group improved significantly more than those in the Low baseline group ($p = .024$). No significant differences were observed between the High vs. Medium or High vs. Low groups ($ps > .05$). Patient education resulted in a statistically

significant reduction in A1C levels across all patients. Medium baseline A1C patients (8–10) benefited the most in relative terms, while high baseline patients showed the most considerable absolute reductions. Education interventions are therefore effective across all groups, with powerful results in the medium baseline group.

Table 3: Summary statistics of A1C Levels and Changes

Statistic	A1C Before Education	A1C After Education	A1C Change	% Change
count	20.0	20.0	20.0	20.0
mean	8.89	7.62	1.27	-14.38
std	1.51	1.39	0.32	2.99
min	7.2	6.4	0.7	-18.28
25%	7.8	6.88	1.1	-16.67
50%	8.55	7.2	1.25	-15.06
75%	9.22	7.65	1.42	-11.54
max	13.0	11.8	1.9	-9.23

Secondary Outcome: Participants' BMI before and after Education Intervention

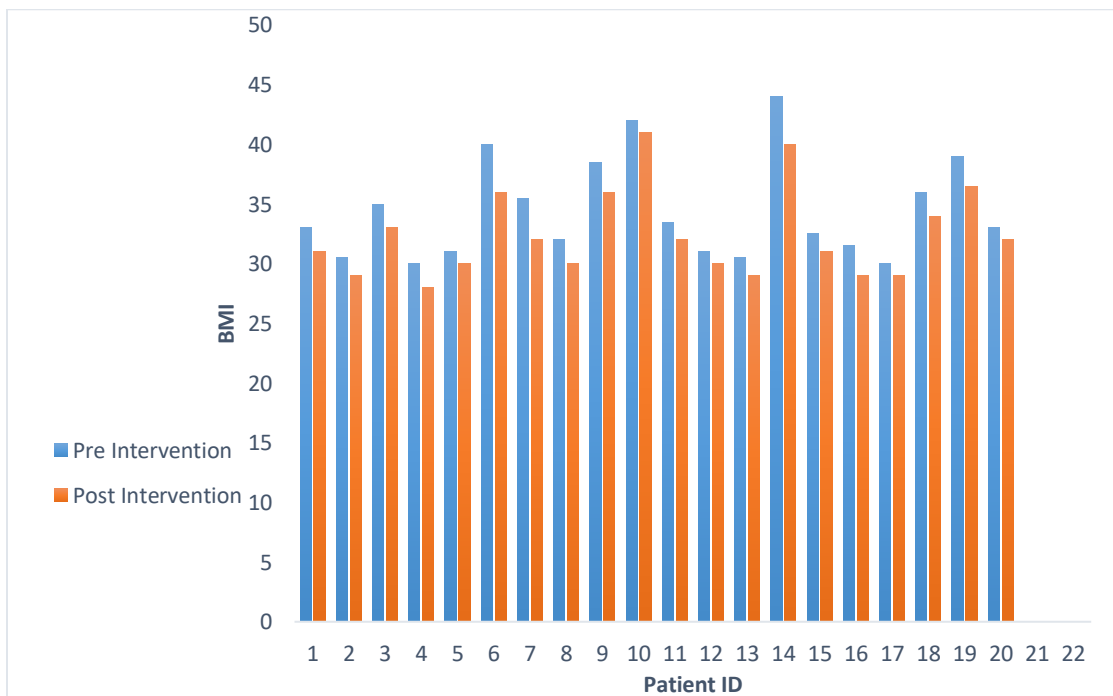
Table 4: Comparison of BMI Before and After Intervention

Patient ID	BMI before	BMI after	Change	Status	GLP -1 Med
01	33	31	-2.0	Improved	yes
02	30.5	29	-1.5	Improved	no
03	35	33	-2.0	Improved	yes
04	30	28	-2.0	Improved	no
05	31	30	-1.0	Improved	no
06	40	36	-4.0	Significant	yes
07	35.5	32	-3.5	Improved	yes

08	32	30	-2.0	Improved	yes
09	38.5	36	-2.5	Improved	yes
10	42	41	-1.0	Slightly Improve	no
11	33.5	32	-1.5	Improved	no
12	31	30	-1.0	Improved	no
13	30.5	29	-1.5	Improved	no
14	44	40	-4.0	Significan t	yes
15	32.5	31	-1.5	Improved	no
16	31.5	29	-2.5	Improved	yes
17	30	29	-1.0	Improved	no
18	36	34	-2.0	Improved	yes
19	39	36.5	-2.5	Improved	yes
20	33	32	-1.0	Improved	no

Note. Some patients may have started GLP-1 injectable medication, which may contribute to an increase in weight loss and A1C improvement.

Figure 3: BMI Before and After Intervention



Participants' BMI before the educational intervention was an average of 34.175 with a standard deviation of ± 4.23 , with a significant improvement of the BMI after the educational

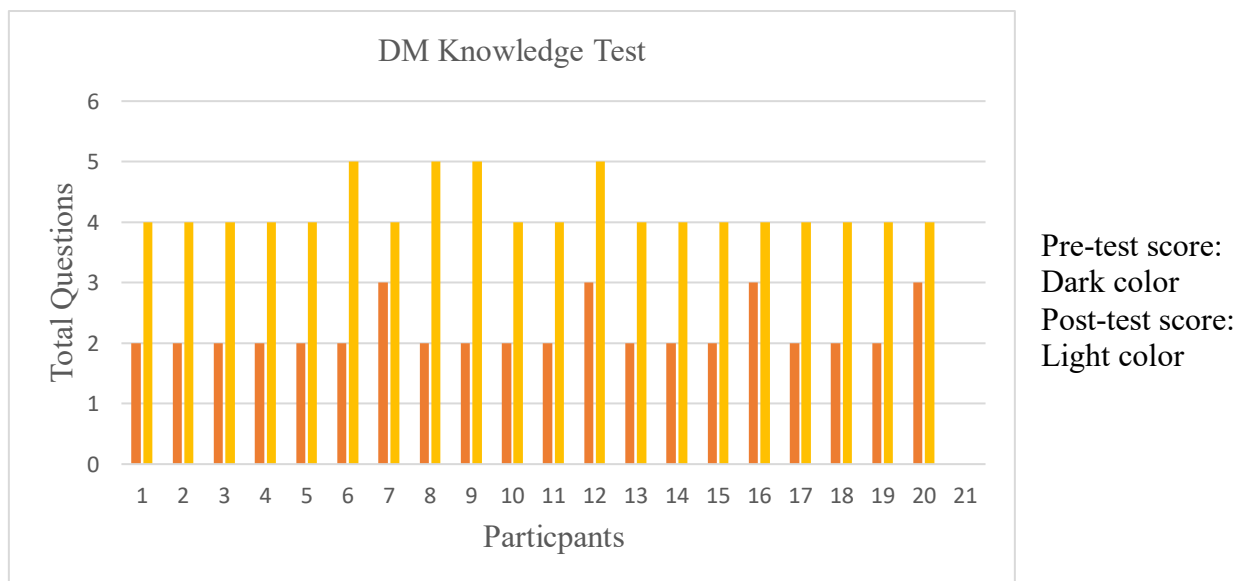
intervention, with an average BMI of 31.525 with a standard deviation of ± 3.57 . A paired t-test was conducted ($t=0.003$), highly significant with 95% CI of 2.65 ± 1.656 [0.99, 4.31].

Covariate Outcome: Patients' knowledge

Table 5: Patient Knowledge Quiz for Diabetes

Average Pre-Test Score = 2/5
Average Post-Test Score = 4/5
Average Change of +2.00
Paired t-Test: $t = -15.00$, $p < 0.0001$ indicating significant improvement

Figure 4: Patient Knowledge Quiz for Diabetes



A shorter version of diabetic knowledge was conducted before and after the educational seminar, which consisted of 5 questions assessing patient satisfaction. Prior to intervention, the mean scores were 2/5 question responses. Then, after the intervention, there was a 50% increase in change with a 4/5 question response mean with a Paired t-Test: $t = -15.00$, $p < 0.0001$, indicating significant improvement (Appendix M).

Secondary Outcome: Patients' Satisfaction Questionnaire for Nutrition & Diabetes Care

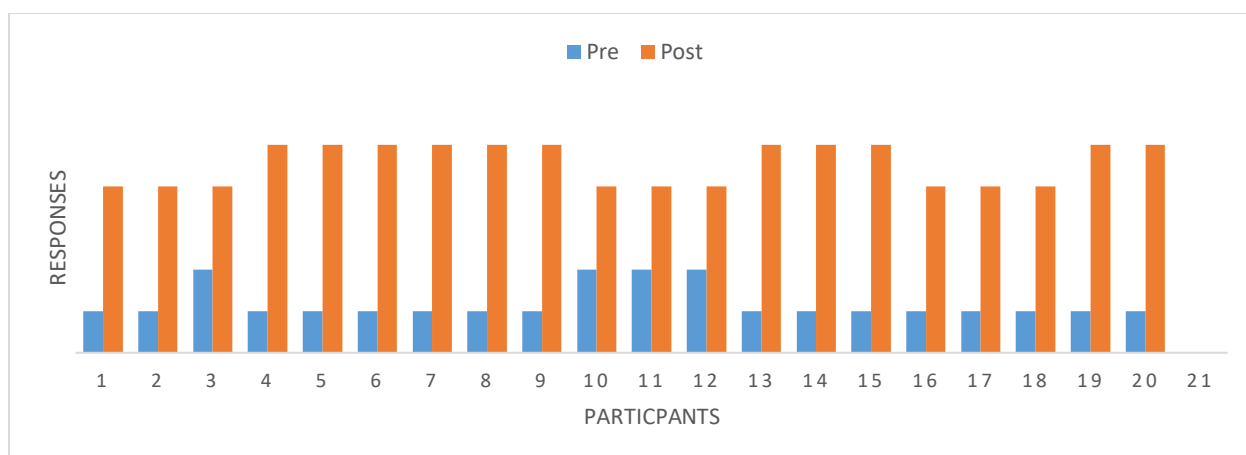
Outcomes

Before the education seminar, a majority of participants expressed dissatisfaction with patient responses of disagree or strongly disagree in diabetic education and management. Following the education seminar, patient satisfaction increased, with an average response indicating agree and strongly agree.

Table 6: Patients' Satisfaction Questionnaire for Nutrition & Diabetes Care Outcomes

Themes	Question Set	Pre Intervention Mean Response	Post Intervention Mean Response
Sustainability & Environmental Awareness	1-3	Strongly Disagree 1	Agree 4
Plate Method Education	4-6	Strongly Disagree 1	Strongly Agree 5
Portion Control Guidance	7-9	Strongly Disagree 1	Strongly Agree 5
Low-Carbohydrate Diet Balance	10-12	Disagree 2	Agree 4
Cultural Sensitivity & Personalization	13-15	Strongly Disagree 1	Strongly Agree 5
HgbA1C Standards & ADA Guidelines	16-18	Strongly Disagree 1	Agree 4
Overall Satisfaction	19-20	Strongly Disagree 1	Strongly Agree 5

Figure 5: Patient Satisfaction Questionnaire



Covariate: Patients' Diabetes Self-Management Outcomes:

Table 7: DSME-R Questionnaire Responses

Mean Before Intervention	6.8
Mean After Intervention	9.6
% of change of improvement	41.18%

The DSMQ questionnaire was not completed entirely, and it was difficult for some patients to complete; additionally, some did not attend the initial seminar. During the initial educational seminar, the questionnaire was reviewed and discussed to inform patients of information that helps with diabetes management. (Appendix N). DSME-R questionnaire with yes or no answers indicated for questions 1-20. Questions 21-27 were not asked because the patients had type 2 diabetes, most were on oral medication rather than insulin (addressed by questions 22-24), and questions 21, 25-27, although potentially relevant, were not utilized with the participants. (Appendix I). Table 6 highlights a substantial improvement in participants' self-management behaviors following the intervention. The mean DSME-R score increased from 6.8 before the intervention to 9.6 afterward, reflecting a 41.18% improvement. This suggests that the educational program significantly enhanced participants' self-management efficacy of diabetes, indicating stronger engagement and confidence in managing their condition post-intervention.

CHAPTER SIX: DISCUSSION

The quality improvement project, focusing on initiating standardized, evidence-based nutritional counseling and education, has proven to be a successful strategy in improving adherence to diabetic management of glycemic control. This was evidenced by significant improvements in HbA1C, BMI, and diabetic knowledge over three months. The patient education, which emphasized a low-carbohydrate, well-balanced diet with a portion-control plate meal method and cultural sensitivity, was vital to this success. The project's findings revealed lower HbA1C in all participants and improved diabetic knowledge, further reinforcing the effectiveness of this approach. Data suggests that patient education in groups or one-on-one can improve glycemic control, with more notable changes when individualized to health literacy and culturally competent. The role of APRN-led patient education in improving self-control and self-efficacy was particularly significant. Participants increased their confidence and self-control with reinforcement from the APRN-led follow-up every two weeks after the initial educational seminar. As repetition of patient education continued throughout the twelve weeks, participants improved their diabetic management, increasing glycemic control by being productive in their self-management and having the confidence to change their behavior.

Similar findings were observed in a larger-scale study (Zhang, 2022), which concluded that participants could reduce glycemic control and weight loss through diabetic education on counting carbohydrates and the plate method over three months. However, they could not sustain these improvements without follow-up. The plate method, a more practical and visual approach, was found to be more effective for participants with lower health literacy, providing a clear and tangible method of education. This contrasted with counting carbohydrates, which required more in-depth education in reading food labels and understanding the counting method (Zhang, 2022).

Overall, by using visual portion control, participants manage food intake by reducing cognitive burden compared to calorie counting and improving adherence due to simplicity and visual cues that encourage balanced meals with appropriate macronutrient distribution.

Project Limitations and Strengths

Three of the main limitations of the DNP QI project are the small sample size, the control group, and generalizability. The focus on a specific population (Hispanic adults with T2DM) in each Central California primary care clinic may limit the findings' generalizability to other populations or settings. A limitation for recruitment is that the patients must pay to participate in the study. Additionally, the short duration may not be sufficient to observe long-term changes in glycemic control and BMI, which are needed to monitor other health outcomes such as cardiovascular complications. The clinic lacks registered dietitians and diabetic educators, which may limit the depth and breadth of the educational intervention due to limited resources once the project is complete. Some data, such as dietary habits, will be self-reported by participants, which can introduce bias and inaccuracies.

While efforts will be made to adapt the educational materials culturally, there may still be variations in cultural practices and preferences within the Hispanic population that are not fully addressed. Despite efforts to control confounding factors, such as maintaining consistent testing effects through diabetic education for both pre- and post-responses, and not altering the measurement method, external variables like medication changes could still influence the outcomes. Ensuring consistent participation and engagement throughout the intervention can be challenging, and dropouts or non-compliance may affect the results. Although steps will be taken to ensure accurate measurement of HbA1c and BMI, there may still be variability in how these measurements are taken and recorded. The project includes follow-up assessments, but the long-

term sustainability of behavior changes beyond the intervention period may not be fully captured. By acknowledging these limitations, the project can take steps to mitigate their impact and provide a more accurate interpretation of the findings.

The QI projection produced many strengths. One of the strengths was high participation in the initial educational seminar and follow-up care. Participants enjoyed individual nutritional counseling that was culturally sensitive and more relatable to their daily lives. ADA (2024) plate method placemats for diverse cultural groups enhance the visual aid for participants, encouraging curiosity and willingness to adapt to nutritional intervention and help manage their diabetes. One of the significant findings was an improvement in HgbA1C; the results met the QI project goal of improving glycemic control with nutritional intervention through patient education initiated before and after the intervention. Participants increased their efforts with follow-up calls every two weeks, which helped APRNs individualize patient education and allowed for communication to increase provider-patient rapport. As the QI project progressed, there was an increase in trust and self-efficacy among the participants with the APRN and shared decision-making. The plate method is an effective tool for managing diabetes and offers a cost-effective approach to meal planning. According to the American Diabetes Association (2020), its simplicity enables patients to visualize portion sizes and nutrient distribution without relying on expensive measuring tools or intricate calculations, making it accessible and affordable for many patients. Therefore, the QI project emphasizes a reliable operational system for primary ambulatory care, making patient education feasible and cost-effective, and helping improve self-care management and glycemic control among T2DM patients.

Implications for Clinical Practice

According to ADA (2022), nutritional interventions are essential in fighting against the rising cases of T2DM in America. Recent studies have shown that nutritional interventions such as carbohydrate counting, and the plate method have improved glycemic control for T2DM patients with rising HbA1c in primary care settings (Zhang, 2021). However, there is no standardization of nutritional education within the primary care settings, which leads to uncontrolled T2DM and an increased risk of complications. This gap in care is prevalent in most outpatient care clinics. DNP leaders are pivotal in bridging clinical practice and research through QI initiatives. Their contributions have profound implications for both realms, enhancing patient care, operational efficiency, and integrating evidence-based practices. Therefore, the DNP QI project intends to address the gap in care and establish a standardized nutritional education platform for T2DM patients in their primary care settings.

In implementing the QI project, nutritional education that is standardized and personalized to the patient's needs or cultural lifestyle is needed to create cultural competence in primary care (Dragomanovich & Shubrook, 2021). Additionally, the materials and formats used in the QI project are established and publicly available through the ADA's online store and free supplies (ADA, 2020). This includes the 9-inch plate tool MyPlate that each participant will purchase, ADA placemats that are culturally specific, a pamphlet on portion control food list for aid at the grocery store, and an ADA goal list for each patient to complete during the first day of the educational seminar (ADA, 2022). Each participant will have access to tools that assist with nutritional education and help sustain nutritional interactions in primary care, even after the QI project concludes.

The cost of diabetic care has increased with diverse components in specialty care and pharmaceutical costs. An individual diagnosed with diabetes incurs annual medical expenditures of approximately \$19,736, with around \$12,022 related to diabetes, including glucose-lowering medication and blood glucose testing supplies (Parker et al., 2024). DNP leaders implementing preventive measures, such as patient education, will aid in increasing disease awareness and improving the management of this disease. The goal is to reduce the long-term cost of chronic diseases and minimize complications. The QI project will create a potential return on investment by reducing the disease burden and health expenditure costs. Ultimately, the QI project can create a standardized protocol that is a cost- and time-effective strategy that incorporates nutritional education into primary care, led by APRNs, diabetic educators, or registered dietitians. The interprofessional collaboration, where DNP leaders facilitate teamwork across various healthcare disciplines, ensures comprehensive and coordinated care. They also lead interdisciplinary teams in developing and implementing care pathways for complex patient populations.

DNP leaders foster an environment where continuous quality improvement is a core value. According to the CDC (2024), comprehensive strategies for preventing and managing T2DM for individuals and broader public health initiatives led to the DSMES program. The DSMES questionnaires and tools provide personal education to help individuals manage their diabetes effectively (see Appendix G, J & L). The primary barrier to implementing services like DSMES and QI project nutritional education interventions is the lack of registered dietitians or diabetic educators in primary care clinics. Modifying care through APRNs will help establish a continuum of care and improve the community's overall health by serving patients' needs effectively. The sustainability of the QI project lies in the stakeholders who have invested in

primary care, including physicians, APRNs, or physician assistants, along with the supporting staff and the surrounding community, which includes patients, family support, and community resources for better, healthier choices for all.

Application of Doctor of Nursing (DNP) Essential

DNP Essentials outline the foundational competencies DNP graduates must possess to effectively lead and implement quality improvement (QI) projects and practices. The DNP Essentials provide a framework for the competencies necessary to lead and implement quality improvement initiatives in healthcare settings. The following essentials are related to the QI project and the DNP leader's skill set to formulate and implement the project.

Essential I: Scientific Underpinnings for Practice can utilize advanced scientific knowledge to develop, implement, and evaluate QI projects that include understanding the biological, psychological, and social determinants of health (AACN, 2006). The QI project led by Advanced Practice Registered Nurses (APRNs) aimed to reduce complications and hospital readmissions by applying standard evidence-based protocols for managing chronic diseases such as diabetes. When evaluating patient care, the needs assessment perspective is considered when looking at patient outcomes and improving care, which DNP leaders try to carry out in clinical practice.

Essential II: Organizational and Systems Leadership for Quality Improvement and Systems Thinking implies leading and managing QI initiatives within healthcare organizations, focusing on systemic changes that enhance patient care quality and safety (AACN, 2006). The DNP candidate's quality improvement initiative aims to reduce T2DM complications by implementing evidence-based practices. This APRN-led project focuses on enhancing T2DM

patients' quality of life through diabetic education and nutritional interventions to improve glycemic control and reduce insulin resistance.

Role of DNP Leadership

Doctor of Nursing Practice (DNP) leaders are crucial in quality improvement (QI) projects and practices within healthcare settings. Their advanced education and clinical expertise equip them to lead initiatives that enhance patient outcomes, streamline processes, and promote evidence-based practices. Guidance and leadership needed to be implemented to sustain the DNP QI project goals when they were completed. Leadership skills acquired in a DNP program focus on individualized goals to achieve patient-focused standardized practices and improve patient outcomes. DNP leaders are crucial in quality improvement initiatives, utilizing their advanced clinical and leadership skills to improve patient care.

Interdisciplinary Practice

Interdisciplinary practice among APRNs and other healthcare professionals is crucial for successful QI projects. This collaborative approach ensures comprehensive care, optimizes resource use, and enhances patient outcomes. T2DM is a complex disease that requires management from various disciplines, such as nutrition and pharmacy. In the QI project, the APRN participates in multidisciplinary rounds where team members discuss patient care plans and identify areas for improvement before an educational seminar or follow-up care is given to improve patient outcomes. Helping patients receive diabetic education in their personal lives will individualize the care. APRNs communicate with patients in one-to-one sessions and follow-up calls throughout the QI project. APRNs educate and mentor other team members, sharing knowledge about best practices and QI methodologies and conducting seminars on the latest evidence-based practices for managing chronic diseases like diabetes.

CONCLUSION

DNP leaders significantly impact clinical practice and research through their leadership in quality improvement projects. According to Heyward, Michael Dreher, and Ellen (2017), they enhance patient outcomes, streamline healthcare processes, and foster interprofessional collaboration in clinical settings. Additionally, they contribute to generating and applying practice-based evidence, bridging the gap between research and clinical practice. As Diabetes costs continue to increase, more outstanding care is needed in managing patients with T2DM.

The QI project aimed to address the gap in care in standardized nutritional education in primary care as a component of diabetic management to control glycemic levels better and reduce complications. Primary markers in the QI project that were monitored included HbA1c, BMI, cultural competency, and diabetic knowledge over twelve weeks. The intervention consisted of a low-carbohydrate, well-balanced diet, cultural competency, and portion size control to improve glycemic control and reduce long-term complications from unmanaged diseases such as cardiovascular factors. The QI project study design was based on the clinical question of the standardized nutritional-based education intervention to improve glycemic control in the ambulatory setting. Recognizing the necessity of improving care for T2DM is warranted, and fulfilling the clinical gap with cost-effective solutions will reinforce the initiative of the QI project and the continual importance of patient education to retain feasibility and sustainability. The SCT framework helps patients increase self-care management and motivation to sustain the process and use nutritional intervention to improve glycemic control and behavioral modifications.

The crux of this QI project is to provide preventive and financial justifications for implementing patient education in diabetic treatment management across primary care clinics. It underscores the pivotal role of primary care providers in the journey toward success, thereby reducing the financial burden and medical resource utilization and improving the quality of life for patients. Addressing complex issues faced by chronic patients requires straightforward solutions. One practical approach to reducing the financial burden and minimizing medical resource utilization is establishing a nutritional education intervention based on the ADA plate method and patient education in primary care. Patients gain knowledge and awareness of healthier choices by promoting portion controls and specific food groups with the plate (ADA, 2022).

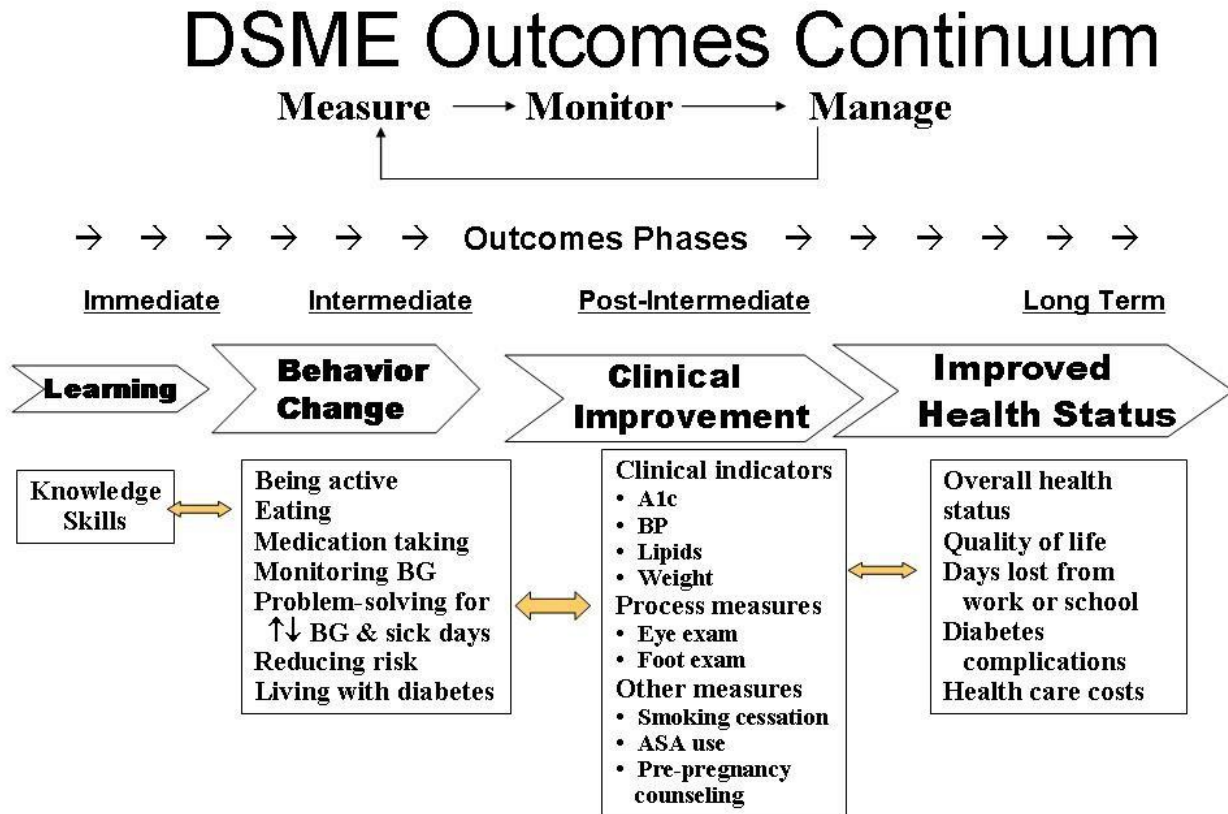
When integrated with comprehensive diabetic education, the plate method offers a cost-effective and practical approach to improving glycemic control in diabetic patients. Its simplicity and visual appeal make it accessible to patients, while ongoing support and education ensure sustained benefits. Future Research should focus on optimizing individual dietary plans or nutritional counseling with education and exploring innovative ways to integrate the plate method into broader diabetes management programs. The DNP leader transforms care into patient-centered and cost-effective care by standardizing it through the application of evidence-based practices, as demonstrated in this DNP QI project. The DNP leaders regularly conduct team meetings to review performance metrics and identify areas for improvement. QI projects often focus on optimizing workflows and reducing inefficiencies within healthcare settings. DNP leaders utilize qualitative and quantitative data to view QI initiatives comprehensively, such as patient surveys and readmission rates of patients. Also, QI projects adhere to ethical standards and protect patient rights by obtaining informed consent from participants in a study assessing

the impact of a new treatment protocol. Further, it provides the basis for future research by producing initial data for the feasibility of implementing a standardized, evidence-based nutritional education intervention in the primary care setting.

APPENDICES

Appendix A

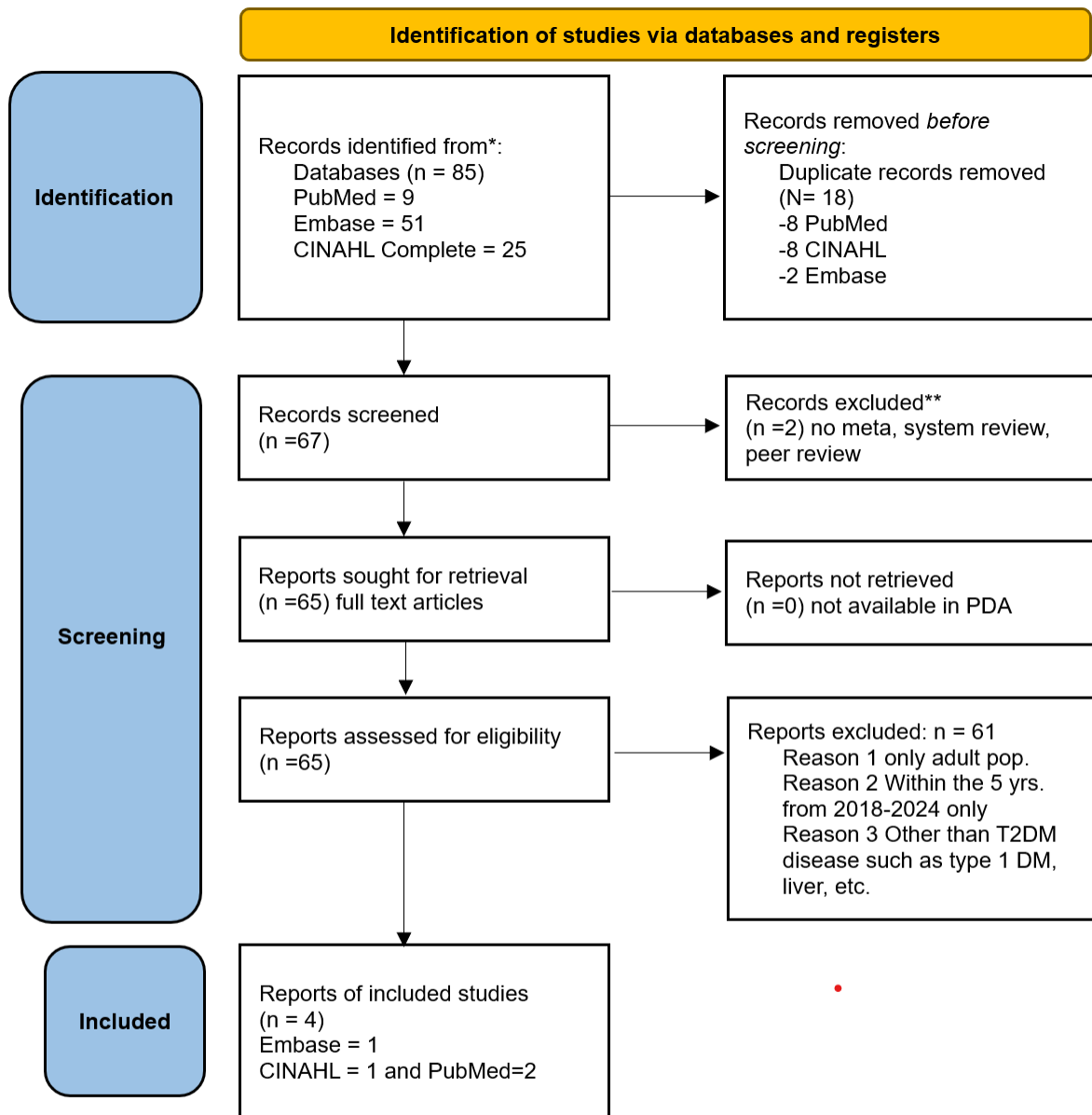
DSME Framework (Mulcahy et al., 2003)



Adapted from Mulcahy K, et al. Diabetes self-management education core outcome measures. *The Diabetes Educator* 29:768-803, 2003.

Appendix B

PRISMA Flow Diagram for Literature Search



Source: Page MJ, et al. BMJ 2021;[372:n71](#). Doi: 10.1136/[bmj.n71](#).

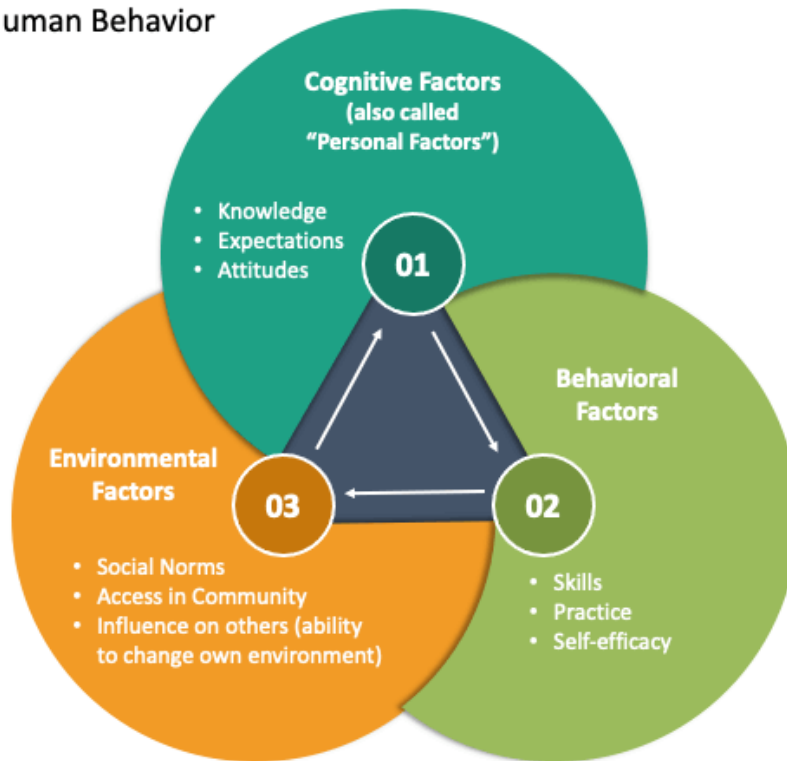
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Appendix C

Social Cognitive Theory Diagram (Young Hong et al., 2016).

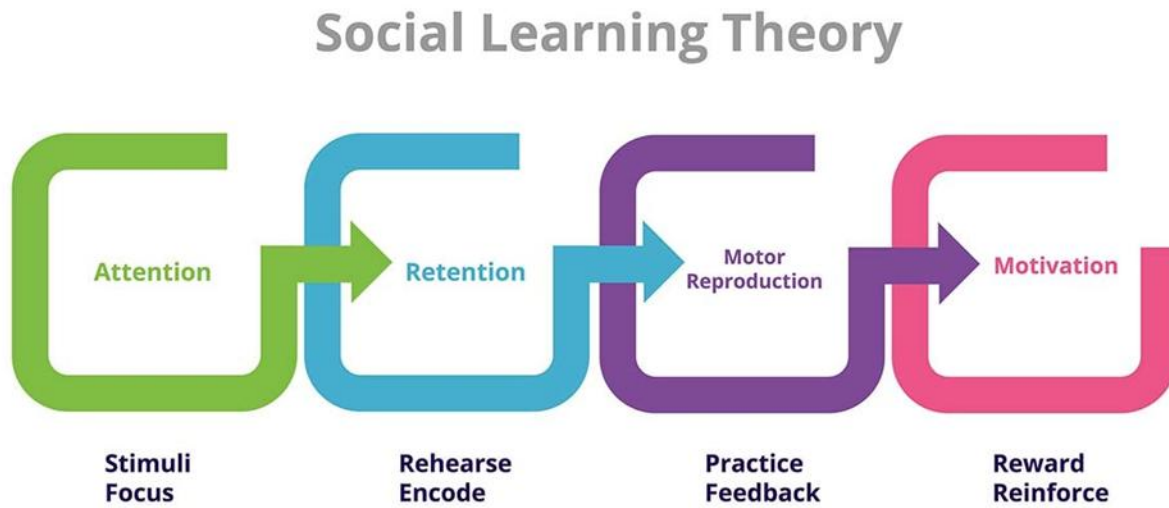
SOCIAL COGNITIVE THEORY

Determines Human Behavior



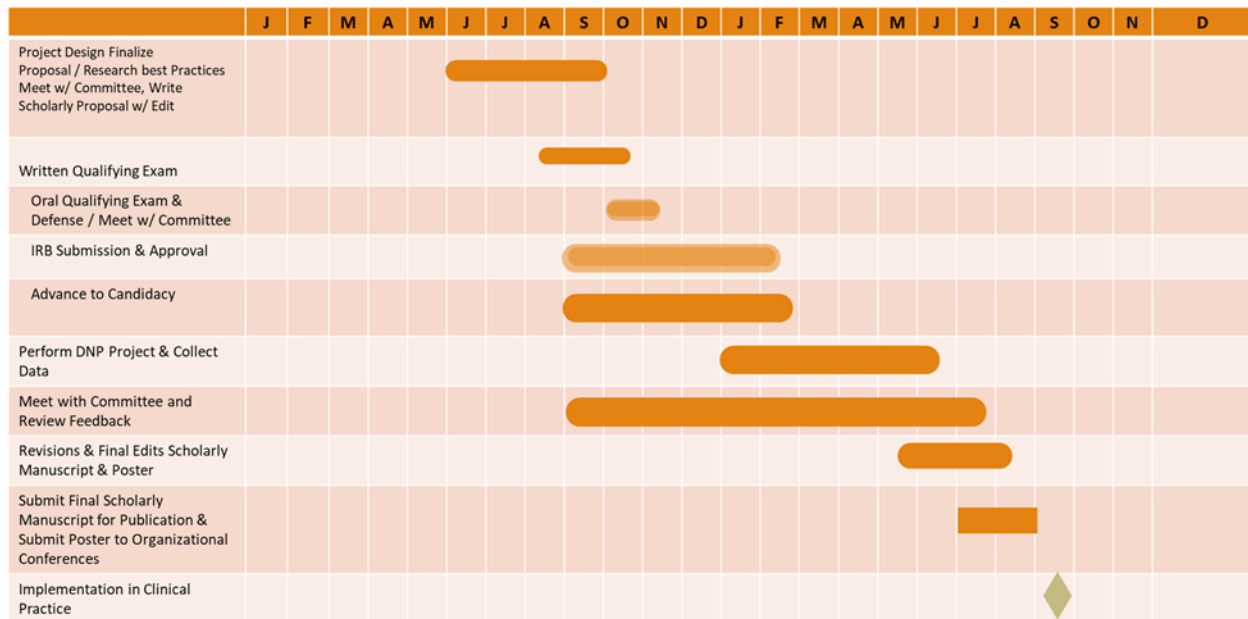
Appendix D

Social Cognitive Theory Framework (Young Hong et al., 2016).



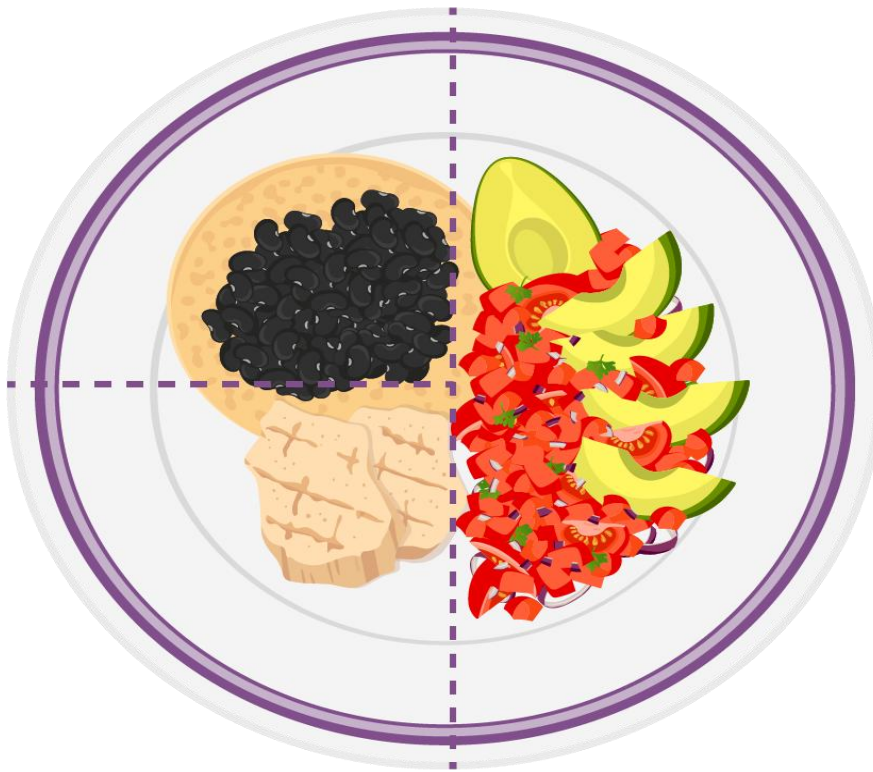
Appendix E

Gantt Chart (developed by author)



Appendix F

Hispanic MyPlate Example (CDC, 2024).



Water

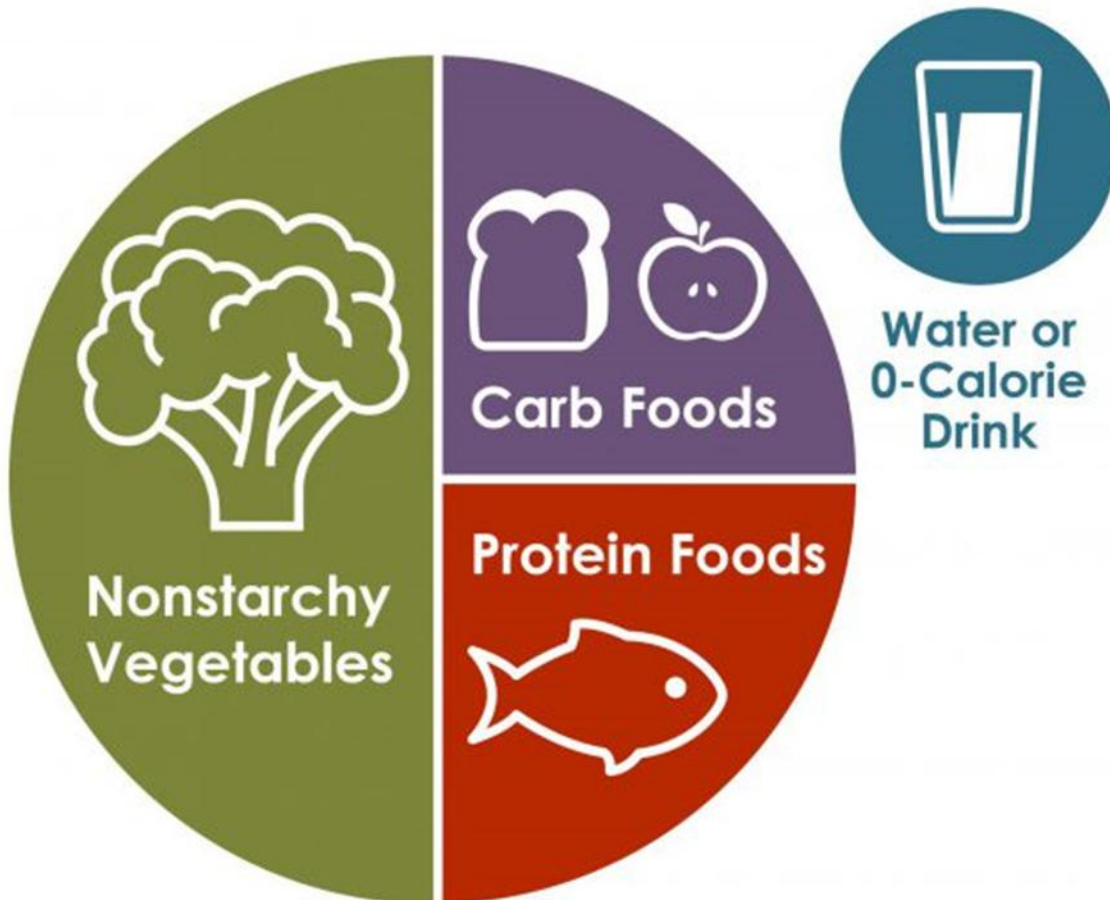


**Optional
fruit**

U.S. Department of Health and Human Services
U.S. Department of Agriculture

Appendix G

DSMES Health Literacy Tool (CDC, 2024).



Fill half your plate with non-starchy or leafy vegetables, 1/4 with lean protein, and 1/4 with carb foods. (CDC, 2024).

Appendix H

Portion Size and Grocery Shopping Made Easy Pamphlets (Positive Promotions, 2024).



Appendix I

MyPlate Method Tool (Positive Promotions, 2024).



Appendix J

DSME-R Questionnaire (Schmitt et al., 2022)

Revised version with 27 items (items 21-27 were not conducted)

Item

1. I check my glucose levels with care and attention.
2. The foods I choose to eat make it easy for me to achieve good glucose levels.
3. I regularly see the doctor (/diabetes specialist) regarding my diabetes.
4. I take my diabetes medication (e.g. insulin, tablets) consistently and reliably.
5. I occasionally eat large amounts of sweets or other foods rich in carbohydrates.
6. I keep a diary/log of my glucose levels to inform and improve my diabetes management.
7. I tend to avoid seeing the doctor (/diabetes specialist) regarding my diabetes.
8. I am regularly physically active to improve my diabetes and health.
9. I follow the current dietary recommendations for people with diabetes (e.g. given to me by my doctor or diabetes specialist).
10. I do not check my glucose levels frequently enough for achieving good blood glucose control.
11. I avoid physical activity although it would be good for my diabetes.
12. I tend to forget or skip taking my diabetes medication (e.g. insulin, tablets).
13. Sometimes I have real 'food binges' (not triggered by hypoglycemia).
14. Regarding my diabetes, I should see my doctor (/diabetes specialist) more often.
15. I am less physically active than would be good for my diabetes.
16. I could improve my diabetes self-care considerably.
17. I estimate the carbohydrate content of my meals/foods (to improve my diabetes control).
18. I eat without regard to my diabetes.
19. I check and discuss my diabetes treatment with the doctor (diabetes specialist) regularly.

- 20. My diabetes self-care is poor.
 - 21. I check my glucose levels before each meal.
 - 22. I adjust my insulin doses to the carbohydrate content of my meals.
 - 23. I adjust the timing of my insulin injections to the start of my meals.
 - 24. I adjust my insulin doses according to the current glucose levels and preceding or planned activities.
 - 25. I correct elevated glucose levels consistently whenever necessary.
 - 26. I carry fast carbohydrates to enable quick treatment of low blood glucose.
 - 27. In case of low blood glucose, I take appropriate amounts of carbohydrates to avoid causing high blood glucose.
-

Appendix K

Food Log

FOOD LOG

Date		S	M	T	W	T	F	S	Water	○	○	○	○	○	○	○	○
Time	Food	Qty	Calories	Carbs	Sugar	Fat	Protein										

Date		S	M	T	W	T	F	S	Water	○	○	○	○	○	○	○	○
Time	Food	Qty	Calories	Carbs	Sugar	Fat	Protein										

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Appendix L

Diabetes Self-Management Questionnaire (DSMQ) (Schmitt et al., 2013).

(Diabetes Self-Management Questionnaire Diabetes Self-Management Questionnaire General Information, n.d.)

General Information

Name: _____ Age: _____ Date: _____
Address: _____ City: _____ Zip Code: _____
Home phone: _____ Work phone: _____ Cell: _____

1. What is your race or ethnic background? ☐ American Indian or Alaskan Native
☐ Asian/Chinese/Japanese/Korean ☐ Black/African American ☐
Hispanic/Latino/Mexican
☐ White/Caucasian ☐ Native Hawaiian or other Pacific Islander ☐ Other:

Socioeconomic/ Support System

1. Marital status: ☐ Single ☐ Married ☐ Divorced ☐ Widowed
2. How many people live in your household? _____
3. Does anyone else who lives with you have diabetes? ☐ No ☐ Yes (Who?):
_____ 4. Is there anyone who will help you with your diabetes care?
☐ Yes ☐ No
If “yes,” who?

If different, who is your primary support person/caregiver? ☐ None ☐
Yes _____
5. Occupation: _____ Work hours: _____
6. Last grade of school completed:

7. Any religion preference?

Cultural Influences

1. Do you have any special dietary needs, religious and/or observances? ☐ Yes ☐ No
If “yes,” explain:

2. What is your language preference? Spoken: _____ Reading: _____

Diabetes History

1. How long have you had diabetes or year diagnosed?

2. What type of diabetes do you have? ☐ Type 1 ☐ Type 2 ☐ Gestational ☐ Don't know

Chronic Complications- Are you aware of or have you ever been told by a doctor you have any of these problems? Please rate as L=Little M=Moderate S=Severe

☐ Eye problems, explain:

☐ Heart/artery problems, explain:

☐ Nerve problems, explain:

☐ Teeth/gums problems, explain:

☐ Feet/leg problems, explain:

☐ Skin problems, explain:

☐ GI problems, explain:

☐ Sexual problems, explain:

☐ Kidney problems, explain:

☐ Frequent infections, explain:

☐ Other problems, explain:

Diabetes Health Attitudes/ Learning

1. How would you rate your understanding of diabetes? ☐ Good ☐ Fair ☐ Poor

2. In your own words what is diabetes?

3. Have you ever been instructed on diabetes care? ☐ No ☐ Yes/Where and by whom?

4. Do you have any physical limitations that may affect your ability to perform your self-care?

☐ Hearing problems ☐ Problem with the use of your hands

☐ Vision loss (not corrected by glasses or contacts) ☐ Problems with the use of your feet

5. How do you learn best? ☐ Written materials ☐ Verbal discussions ☐ Video

☐ Hands-on/Doing ☐ Other

Medical History

1. Have you ever been diagnosed, ever been told, or have you had problems with the following?

☐ High Blood pressure ☐ High Cholesterol/Triglycerides ☐ Kidney/Bladder problems

☐ Eye or vision problems ☐ Frequent nausea, vomiting, constipation, diarrhea

☐ Surgery in the last 5 years ☐ heart disease/Chest pain ☐ Thyroid disease

☐ Asthma ☐ Numbness/pain/tingling of hands/feet

☐ Depression or anxiety ☐ Stroke ☐ Circulation problems

☐ Obesity ☐ Shortness of Breath

☐ Other health problems: _____

2. Do you have any allergies? ☐ No ☐ Yes: Medication/foods: _____

3. Do you smoke? ☐ No ☐ Have you ever smoked in the past?

☐ Yes: How long did you smoke for? _____ ☐ Yes: How much?

_____ For how long? _____ When did you quit?

_____ Have you ever tried to quit? ☐ No ☐ Yes: How long ago?

_____ Would you like information on how to quit?

4. Do you drink alcohol? ☐ Yes ☐ No If "yes," amount and type?

If "yes," are you aware of the effects of diabetes on pregnancy and of pregnancy on diabetes? ☐ Yes ☐ No

Family History

1. List any family members with diabetes:

With high blood pressure:

With heart attacks or other heart problems:

With stroke: _____ With cancer:

Health Care Used in Past 12 months

1. When was your last physical examination?

2. How often do you see your regular doctor?

3. Have you been hospitalized within the last 12 months?

☐ Yes ☐ No

If "yes," describe reason(s) and where:

4. Have you been to the emergency room within the last 12 months?

☐ Yes ☐ No

If "yes," describe reason(s) where:

Your Diabetes Self Care Behaviors

Healthy Eating

1. Height: _____ Weight: _____ What weight are you comfortable at?

2. Has your weight changed in the past three months? ☐ Yes ☐ No If "yes," I've ☐ lost / ☐ gained _____ lbs.

Was the weight change intentional? ☐ No ☐ Yes

Yes _____

3. Have you ever received diet counseling? ☐ Yes ☐ No

If "yes," describe:

4. Do you have a current meal plan? _____ If so, what is it?

5. What is your biggest challenge to eating healthily?

6. How many times do you eat per day? ☐ Meals _____ ☐ Snacks _____ 7.

Times of meals: am _____ noon _____ pm _____ snacks

8. How often do you eat/drink (answer **per day** or **per week**):

Fruit: _____ Juice: _____ Milk: _____ ☐ Fat-free ☐ 1% ☐ 2% ☐ Whole

Vegetables: _____ Sweets: _____ Sugar-free deserts/drinks _____
Beverages with sugar: _____ Alcohol: _____ Water: _____ How much a day?

Starches eaten: State number of servings eaten **per meal**

☐ bread _____ ☐ potatoes _____ ☐ beans _____ ☐ tortillas _____ ☐ rice _____ ☐ pasta _____
☐ corn/peas _____ ☐ other _____

Meats/Proteins: State number of times eaten **per week**

☐ chicken _____ ☐ red meats _____ ☐ fish _____ ☐ turkey _____ ☐ pork _____ ☐
eggs _____
☐ cheese _____ ☐ other _____

Cooking Oil/Fat used: ☐ Lard/Shortening ☐ Butter/Margarine ☐ Vegetable/Corn ☐
Olive

☐ Canola ☐ Peanut ☐

Other _____

9. Who does the cooking? _____ Who usually does the grocery shopping:
_____ 10. How many times during the week do you eat away from home?

11. How often is your meal away from home:

Cafeteria style: _____ Fast food: _____ Buffet: _____ Sit-down restaurant:

Other: _____

12. How is your food usually prepared? ☐ Fried ☐ Baked ☐ Broiled ☐ Grilled
☐ Steamed

13. How would you describe your portions? ☐ Small ☐ Average ☐ Large

14. How would you describe your appetite? ☐ Increased ☐ Normal ☐ Decreased

15. List any food allergies or intolerance:

16. Any other special diet needs:

17. How do mood/stress affect your eating?

Being Active

1. Do you exercise regularly? ☐ No ☐ Yes

Type of exercise(s): _____

_____ How often
do you exercise? _____ How long each time? _____

What time of day do you exercise? _____

2. List any problems with exercise:

____ 3. How important is it to you to be active, where **0** is not important at all and **10** is very important?

0 1 2 3 4 5 6 7 8 9 10

4. How sure are you that you can be active, where **0** is not sure and **10** is very sure?

0 1 2 3 4 5 6 7 8 9 10

Monitoring

1. Do you test your blood for sugar? ☐ Yes ☐ No

If "yes," what blood sugar monitor do you use?

Do you have any problems with your monitor? ☐ No ☐ Yes _____

How often do you test? ☐ Once a day ☐ 2 or more times a day ☐ Once/ Twice a week
☐ Rarely/ Never

Usual results? Mornings: _____ Afternoon: _____ Bedtime: _____

After Meals: _____ Other times: _____

2. Do you keep a record? ☐ Yes ☐ No

3. What is considered a normal blood sugar range? _____

4. What are **your** target numbers? _____

5. How often do you have HIGH blood sugar? (250 or more) ☐ Daily ☐ Several times a week

.. A few times a month ☐ Once in a while ☐ Rarely or never ☐ Don't know

6. How often do you have LOW blood sugar (70 or less)? ☐ Daily ☐ Several times a week

.. A few times a month ☐ Once in a while ☐ Rarely or never ☐ Don't know

7. Do you have access to your diabetes supplies? ☐ No ☐ Yes/ Pharmacy

8. Do you test your urine for sugar or ketones? ☐ No ☐ Yes/How often?

9. How important is it to you to monitor your blood sugar at least once per day, where 0 is not important at all and 10 is very important?
0 1 2 3 4 5 6 7 8 9 10
10. How sure are you that you can monitor your blood sugar at least once per day, where 0 is not sure at all and 10 is very sure?
0 1 2 3 4 5 6 7 8 9 10

Taking Medications

1. Do you take pills for your diabetes? ☐ No ☐ Yes/What times?

2. Any side effects from the medications that you know of? ☐ No ☐ Yes
Yes _____
3. Do you take any additional nutritional supplements? ☐ Vitamins ☐ Herbal supplements
☐ Other _____
- Have you ever forgotten to take your diabetes medication? ☐ No ☐ Yes/How often?

Problem Solving

1. Have you ever had a low blood sugar reaction? ☐ No ☐ Yes
If "yes," how did you feel?

How did you treat it?

Did you require assistance or hospitalization for it? ☐ Yes ☐ No
No _____
2. Do you carry a source of sugar with you? ☐ Yes ☐ No
If "yes," what kind?

3. Have you ever had to give Glucagon? ☐ Don't know ☐ Yes ☐ No
4. Does someone who lives with you know how to give Glucagon? ☐ Don't know ☐ Yes ☐ No
5. Do you have an identification that says you are diabetic? ☐ Don't know ☐ Yes ☐ No
6. Have you ever had high blood sugar? ☐ Don't know ☐ Yes ☐ No

If "yes," how did you feel?

_____ What did you do
to treat it? _____ Have

you ever been hospitalized for very high blood sugars? ☐ No ☐ Yes: When/Where:

7. When you are sick or cannot eat usual food, how do you take care of yourself?

· Replace usual food with carbohydrate or sugar ☐ Take diabetes medication

· Check ketone levels ☐ Check blood sugar more often ☐ Drink more water

· Contact healthcare provider ☐ Do nothing ☐

Other _____

Stress

1. Is there much stress in your life? ☐ Yes ☐ No

If "yes," explain:

2. What do you do to handle stress in your life?

3. How important is being able to problem solve when being faced with everyday and/or challenging decisions, where 0 is not important at all and 10 is very important?

0 1 2 3 4 5 6 7 8 9 10

4. Do you feel you can problem solve when faced with everyday and/or challenging decisions, where 0 is not sure at all and 10 very sure?

0 1 2 3 4 5 6 7 8 9 10

5. Do you perceive problems with your diabetes management, where 0 is none perceived and 10 is perceive many?

0 1 2 3 4 5 6 7 8 9 10

Healthy Coping

1. How would you describe your general health? ☐ Good ☐ Fair ☐ Poor

2. Is your health important to you? ☐ All the time ☐ Sometimes ☐ Only when ill ☐ Not at all

3. How do you feel about having diabetes?

4. Do you feel diabetes is serious? ☐ No ☐ Yes

5. Do you feel you can control your diabetes? ☐ Yes ☐ No

6. Is good control worth it? ☐ Yes ☐ No

7. My diabetes has caused problems in the following areas:

☐ Family life/social activities ☐ Work/school ☐ Sports/exercise ☐ Sexual relations

☐ Finances ☐ Contentment ☐ Travel ☐ Other:

8. Are you currently experiencing any of the following? ☐ No problems
☐ Recent death ☐ Separation ☐ Divorce ☐ Illness ☐ Unemployment ☐ Financial difficulties
☐ Housing problems ☐ Depression symptoms ☐ Loneliness ☐ Confusion
☐ Thoughts of hurting yourself ☐ Other:

9. Do you have history of depression? ☐ No ☐ Yes/How often do you feel depressed? ☐ A lot ☐ Some ☐ A little ☐ Not at all

Reducing Risks

1. How often do you have your eyes checked by an eye doctor? _____
2. **Date** of last exam (with drops in the eyes) : _____
3. Do you wear glasses? ☐ No ☐ Yes/For what?

4. Have you noticed any changes in your skin recently? ☐ No ☐ Yes
If "yes," please describe:

5. How often do you check your feet at home? ☐ Daily ☐ Weekly ☐ Never ☐ Other
_____ Date of last foot exam by doctor: _____
6. How often do you have a dental checkup? _____ Date of last checkup:

7. Have you ever had a shot to prevent pneumonia? ☐ No ☐ Yes When:

8. Have you received a flu shot within the year? ☐ No ☐ Yes When:

9. Have you had your blood pressure checked? ☐ No ☐ Yes When:

10. Have you had a fasting glucose (blood sugar) checked? ☐ No ☐ Yes When:

11. Have you had your cholesterol and triglycerides checked? ☐ No ☐ Yes When:

11. Have you had an A1c test done? ☐ No ☐ Yes When:

12. Do you wear a bracelet or keep something with you that identifies you as having diabetes? ☐ Yes ☐ No

13. How sure are you that you can get the help you need to prevent or reduce problems related to diabetes, where 0 is not sure at all and 10 is very sure?

0 1 2 3 4 5 6 7 8 9 10

Goal Setting

1. What areas of diabetes would you like to learn more about?
☐ What is diabetes? ☐ Pills for diabetes ☐ High blood sugar ☐ Low blood sugar
☐ Diet ☐ Exercise ☐ Stress ☐ Sick Days
☐ Pregnancy ☐ Blood testing ☐ Complications ☐ Insulin Pumps
2. Having diabetes means you may need to make changes; if any, what changes would you like to make now?
☐ Being active ☐ Eating healthily
☐ Medication taking ☐ Monitoring
☐ Problem solving for blood sugars and sick days complications ☐ Reducing risks of diabetes
☐ Living with diabetes strategies ☐ Using healthy coping
☐ None of the above ☐ Other:

(Diabetes Self-Management Questionnaire Diabetes Self-Management Questionnaire General Information, n.d.)

Please bring this questionnaire to your first appointment. Thank you!

Appendix M

Diabetes Knowledge Quiz for Patients with Type 2 Diabetes (developed by author)

Answer the following questions before and after your nutrition education session. Choose the best answer. (Circle one)

1. Which foods make your blood sugar go up the most?
 - a) Soda and pan dulce (sweet bread)
 - b) Chicken and fish
 - c) Nopales (cactus) and vegetables
2. When you eat tortillas, about how many is a healthy portion at one meal?
 - a) 1–2
 - b) 4–6
 - c) As many as you want
3. When filling your plate, what should half of it be?
 - a) Vegetables and salad
 - b) Rice and beans
 - c) Meat
4. Which drink is best for people with diabetes to have every day?
 - a) Water
 - b) Regular soda
 - c) Juice
5. Why is it important to check your blood sugar?
 - a) To see how food and activity affect it
 - b) Just because the doctor says so

c) It does not matter

Pre-test Score: _____ Post-test Score: _____

Appendix N

Patient Satisfaction Questionnaire: Nutrition & Diabetes Care (developed by author)

Instructions:

Please indicate how much you agree or disagree with the following statements based on your experience. Use the scale below:

1 = Strongly Disagree

2 = Disagree

3 = Neutral

4 = Agree

5 = Strongly Agree

Sustainability & Environmental Awareness

1. The dietary recommendations I received support environmentally sustainable food choices.
2. I feel encouraged to choose locally sourced or seasonal foods when possible.
3. My care team discussed the environmental impact of different food options with me.

Plate Method Education

4. I understand how to use the plate method to plan balanced meals.
5. Visual tools (e.g., diagrams or models) helped me grasp the plate method effectively.
6. The plate method was tailored to my personal dietary needs and preferences.

Portion Control Guidance

7. I received clear guidance on appropriate portion sizes for different food groups.
 8. I feel confident managing my portion sizes at home and when dining out.
 9. Portion control strategies were practical and easy to follow.
-

Low-Carbohydrate Diet Balance

10. The low-carbohydrate diet plan I was given felt well-balanced and nutritious.
 11. I was informed about healthy alternatives to high-carb foods.
 12. The diet plan helped me maintain energy levels throughout the day.
-

Cultural Sensitivity & Personalization

13. My cultural food preferences were respected and incorporated into my nutrition plan.
 14. I felt comfortable discussing my traditional or preferred foods with my care team.
 15. I was offered culturally appropriate substitutions for recommended foods.
-

HgbA1C Standards & ADA Guidelines (2022)

16. My nutrition plan was clearly aligned with ADA guidelines for managing HgbA1C.
 17. I understand how my diet affects my HgbA1C levels.
 18. I feel supported in achieving my target HgbA1C through dietary changes.
-

Overall Satisfaction

19. I am satisfied with the nutritional guidance I received.
 20. I would recommend this dietary program to others managing diabetes.
-

TABLE OF EVIDENCE

CITATION	PURPOSE	SAMPLE/ SETTING	METHODS (Design, Interventions, Measures)	RESULTS	DISCUSSION, INTERPRETATION, LIMITATION OF FINDINGS
Gelberg, L., Rico, M. W., Herman, D. R., Belin, T. R., Chandler, M., Ramirez, E., Love, S., & McCarthy, W. J. (2019). Comparative effectiveness trial comparing MyPlate to calorie counting for mostly low-income Latino primary care patients of a federally qualified community health center: study design, baseline characteristics. <i>BMC Public Health</i>, 19. https://doi.org/10.1186/s12889-019-7294-z	To evaluate primary care-based behavior change obesity treatment using portion control vs MyPlate	-261 participants -Latino: 86% -Federal funded. -Clinics: Long Beach, CA -June 29, 2015 – February 29, 2016.	Random Control Trial (RCT) Interventions: Plate method and Carbohydrate counting (CC) Measures: BMI, waist circumference, and BP	Food insecurity: 13.8 to 21.95% -Mean BMI: 33.3 kg/m2 -Mean Wt.: 82kg -Mean Waist Circumference: 102 cm. -Mean BP: 122/77 DASH dietary score for MyPlate: -Chi-square 9.75 -P =.008 Positive for the lifestyle change intervention.	-No difference in outcomes between the two interventions. -Positive to Latino patients for the MyPlate approaches due to minimal literacy. -Decreased intake of DASH diet quality score and sugary beverages in the MyPlate group. -Negative related to dietary quality. -Overweight patients • aim to lose weight • seek advice from their PCP • want an effective lifestyle change Limitation: -CC resembles My place: reduced satiety outcome differences -Waist measurement error: male over clothes, female without -Data collection method affected the results

CITATION	PURPOSE	SAMPLE/ SETTING	METHODS (Design, Interventions, Measures)	RESULTS	DISCUSSION, INTERPRETATION, LIMITATION OF FINDINGS
McCarthy, W. J., Rico, M., Chandler, M., Herman, D. R., Chang, C., Belin, T. R., Love, S., Ramirez, E., & Gelberg, L. (2023). <i>Randomized Comparative Effectiveness Trial of 2 Federally Recommended Strategies to Reduce Excess Body Fat in Overweight, Low-Income Patients: MyPlate.gov vs Calorie Counting</i>. 21(3), 213–219. https://doi.org/10.1370/afm.2964	To compare the effectiveness of two federally recommended strategies for reducing excess body fat in overweight, low-income patients: the MyPlate.gov approach and calorie counting.	An RCT study that enrolled participants was overweight, low-income adults, predominantly from Latino backgrounds. The participants were recruited from primary care clinics that serve low-income populations.	Random Control Trial (RCT) Interventions: Plate method and Calorie counting Measures: BMI, waist circumference, BP, and patient satisfaction	-Increased Satiation and Satiety in both groups. -Reduction in Waist Circumference in both groups. -Blood Pressure Improvements were sustained at six months but not at 12 months. -Quality of Life (QOL) and Emotional Well-Being Improved -High Patient Satisfaction Levels	Both groups reduced waist circumference: -indicates decreased central adiposity. -supports diabetes and heart risk management. MyPlate reduced systolic BP, showing heart health benefits. Both interventions improved QOL and emotional well-being. High satisfaction may lead to strongly adherence to both programs. Limitation -Limited insight into long-term effects and sustainability. -Limited sample diversity affects generalizability. -Self-reported data introduces bias.

CITATION	PURPOSE	SAMPLE/ SETTING	METHODS (Design, Interventions, Measures)	RESULTS	DISCUSSION, INTERPRETATION, LIMITATION OF FINDINGS
Tanu-udom Maneesing, Atchara Dawangpa, Pechngam Chaivanit, Sudjai Songsakul, Piyapong Prasertsri, Natália Yumi Noronha, Lígia Moriguchi Watanabe, Carla Barbosa Nonino, Busadee Pratumvinit, & Chanachai Sae-Lee. (2023). Optimizing blood glucose control with a portioned meal box in type 2 diabetes mellitus patients: a randomized controlled trial. <i>Frontiers in Nutrition</i>, 10. https://doi.org/10.3389/fnut.2023.1216753	To evaluate the effect of general counseling in nutrition (GCN) and portion meal box (PMB) on fasting blood glucose, HbA1c, and body composition in T2DM.	-56 total participants, -6 of whom were lost to follow-up, -25 participants were evaluated in each group, - totaling 50 participants in the study. The study was conducted at Burapha University Hospital in Chon Buri, Thailand. Participants were diagnosed with T2DM in the outpatient department. It lasted from November 2021 to June 2022.	Random Control Trial (RCT) Interventions: Plate method and Portion Control Meal boxes Measures: HbA1C, BMI, and patient satisfaction	-No significant difference in calorie intake and protein intake. -Carbohydrate intake decreased in PMB at weeks 6 and 12; GCN only in week 6. -Significant decrease in daily energy intake at 6 and 12 weeks, with PMB consuming 105 kcal and FBG 153 kcal/day -Reduced HbA1c in 6 and 12 weeks, with PMB displaying a higher decrease: -9.5 +/- 13.7 compared to GCN-8.4 +/-mol.	-Portion control aided weight loss: the plate method was accessible and practical. -HbA1c improved significantly in both groups -No difference in cardiovascular risk Energy levels dropped -Energy levels dropped -Low health literacy hurts outcomes. Limitation: -PMB usage inconsistent (4-7days/week): no standardized adherence. -short study duration, limited observation of long-term effects -Diet control outside the home is difficult; PMB tool needs to be more portable and convenient.

CITATION	PURPOSE	SAMPLE/ SETTING	METHODS (Design, Interventions, Measures)	RESULTS	DISCUSSION, INTERPRETATION, LIMITATION OF FINDINGS
Zhang, Y., Han, H., & Chu, L. (2022). Effectiveness of a restricted diet with a plate in patients with type 2 diabetes: A randomized controlled trial. <i>Primary Care Diabetes</i>. https://doi.org/10.1016/pcd.2022.03.007	To evaluate whether the plate method model can improve glycemic control and reduce cardiovascular risk in T2DM adults With less time spent on education and preventing weight gain, this study assesses whether the plate technique can enhance glycemic management and cardiac risks for type 2 diabetes.	-419 participants - used the 210-plate method, -209 were in the carb-counting group. Exclusion of subjects: proteinuria, history of malignancy, impaired renal function, patients involved in trials, pregnancy or lactation, and clinical depression. Duration: October 2018 to October 2019	Random Control Trial (RCT) Interventions: Plate method and Counting Group Measures: HbA1C, BP, BMI, and patient satisfaction	HbA1c endpoint for plate method group reduced 8.02 +/- 1.10% at 3 months vs 9.31 +/- 1.44% at 6 months with P= 0.037. In counting group, the HbA1c endpoint at 3 months 9.81 +/- 1.62 vs 9.31 +/- 1.44% at 6 months with P=0.475	-Plate method showed early hgbA1C, slightly increased by 6months. -Weight loss peaked at 3 months -Behavior change is essential. -MINT reduces hgbA1C short-term. -Plate method led to less weight gain. Limitation -MINT effective short-term (6 months): benefits diminish over time -Plate method led to less weight gain due to lower carbs and simplicity -Plate model improved hgbA1c, weight, BP, and LDL significantly.

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