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Back to the Basics with SMART Goals: a Multimodal Intervention for Adults Who Have Type 2 Diabetes

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BACK TO THE BASICS WITH SMART GOALS: A MULTIMODAL INTERVENTION FOR ADULTS WHO HAVE TYPE 2 DIABETES

by

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DEDICATION

This project is dedicated to my wonderful parents, Gail and Nora Snyder. Thank you for your sacrifice and support over the years. I love you both so much!

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ABSTRACT

Diabetes, the seventh leading cause of death in the United States (Centers for Disease Control and Prevention [CDC], 2020a) and the ninth leading cause of death worldwide (World Health Organization [WHO], 2020), has increased by 70% over the last two decades (WHO, 2020). Type 2 diabetes (T2D), the most prevalent type accounting for 90% to 95% of diagnosed cases (CDC, 2020a), affects individuals of all ages and often results in major health problems including stroke, heart attack, and kidney disease. The purpose of this patient-centered, evidence-based practice (EBP) project was to evaluate the effectiveness of a multimodal intervention on hemoglobin A1c (HgbA1c) levels and diabetes self-management (DSM) behaviors. Adults who were 18 years of age or older, had T2D, and desired to make lifestyle changes (n = 33) were recruited at a rural primary care office in Northern Indiana to participate in the project. Participants set individualized, specific, measurable, attainable, realistic, and time-specific (SMART) goals, received a packet containing DSM educational supplements and tools, and received frequent follow-up at 2, 4, and 8 weeks by way of reminder letters and a progress telephone call. Prior to and 12 weeks after enrollment, a HgbA1c level was evaluated, and a self-report DSM questionnaire (DSMQ) was administered. Data were analyzed using paired t-tests to compare pre- and post-intervention HgbA1c levels and DSMQ scores and determine the effectiveness of the multimodal intervention. The primary outcome demonstrated a reduction in mean HgbA1c levels from pre- to post-intervention. Secondary outcomes demonstrated improvements in DSM behaviors related to diet, physical activity, and blood glucose monitoring following implementation of the intervention. Additional secondary outcomes demonstrated individual satisfaction with the intervention, and participants reported helpfulness, benefit, and improved accountability as a result of the intervention. Findings from this EBP project support the use of a multimodal intervention in the treatment plan for diabetic patients and will be discussed.

CHAPTER 1

INTRODUCTION

Background

Diabetes mellitus, a common non-infectious disease typically referred to as diabetes, remains the seventh leading cause of death in the United States (U.S.) (Centers for Disease Control and Prevention [CDC], 2020a) and the ninth leading cause of death worldwide (World Health Organization [WHO], 2020). Over the last two decades, the number of global cases of diabetes has significantly increased, at an alarming rate, by 70% (WHO, 2020). In 2019, an estimated 87,647 American deaths (CDC, 2020b) and 1.5 million global deaths (WHO, 2021a) were directly related to diabetes. Diabetes is defined as a metabolic disease characterized by a consistently elevated blood sugar caused by a lack of insulin secretion or action (American Diabetes Association [ADA], 2019). This condition affects individuals across the lifespan: children, adults, and the elderly. Diabetes can lead to major health problems including stroke, heart attack, kidney disease, blindness, and amputation of the lower extremities (ADA, 2019; WHO, 2021a). In 2017, direct medical care and decreased workforce productivity in the U.S., attributed to diabetes, cost $327 billion (ADA, 2021). Although there are four types of diabetes (a) type 1, (b) type 2, (c) gestational, and (d) diabetes due to other causes, for the purpose of this evidence-based practice (EBP) project and manuscript, only type 2 diabetes (T2D) will be discussed.

Type 2 is the most prevalent type of diabetes, accounting for 90% to 95% of diagnosed cases (CDC, 2020a). This condition results from insulin resistance or deficiency due to an impairment in insulin production (ADA, 2019). Insulin acts as an essential hormone which allows glucose to be transported from the bloodstream to certain body tissues and used as energy (Gilman, 2020). The exact cause of T2D is unknown; however, obesity or an increased percentage of body fat has been contributed to causing insulin resistance, and genetics may also

play a role in the development (ADA, 2019). Type 2 diabetes often remains undiagnosed for multiple years because high blood sugar levels typically develop slowly overtime. Risks of developing T2D include but are not limited to advancing age, obesity, and physical inactivity. The confirmation of T2D is made by blood testing, and certain criteria set forth by the ADA must be met. The criteria for diagnosis include either of the following: (a) symptoms of high blood sugar coinciding with a random plasma glucose level that is equal to or greater than 200 mg/dL or (b) two abnormal results: e.g., a fasting plasma glucose that is equal to or greater than 126 mg/dL, a plasma glucose that is equal to or greater than 200 mg/dL, and/or a serum hemoglobin A1c (HgbA1c) that is equal to or greater than 6.5% (ADA, 2019).

To help decrease morbidity and mortality, a healthy diet, regular physical activity, and healthy weight maintenance are recommended by the ADA (Riddle et al., 2019) and the American Association of Clinical Endocrinology (AACE) (Garber et al., 2020) as essential primary and secondary prevention interventions for those who are either at risk of developing or have previously been diagnosed with diabetes. Although a healthy lifestyle centered around diet, physical activity, and weight maintenance is a strong EBP recommendation, utilization of these interventions has been lacking by patients in the primary care setting since documented by Nelson et al. in a classic research study published in 2002. Of 1,480 U.S. adults who were diagnosed with T2D, over 60% of participants lacked the recommended daily nutritional intake and level of physical activity (Nelson et al., 2002). Furthermore, 82% of the participants had a body mass index (BMI) classified as either overweight or obese (Nelson et al., 2002). Unfortunately, since Nelson and colleagues published their study in 2002, the prevalence rates of diabetes and obesity within the U.S. have worsened (State of Childhood Obesity [SCOB], 2020). The WHO (2021b) reported a 5% increase of insufficient physical activity in countries with a higher income such as the U.S. since 2001.

Data Supporting Need for the Project

Global, National, Regional, and State Data

As noted previously, diabetes is very prevalent worldwide, and global and national statistics are likely to actually be higher due to an under-reporting of cases (CDC, 2020a). In the U.S. alone, diabetes affects more than 34 million Americans, approximately 13% of adults (CDC, 2020c) and 10.5% of the total U.S. population (ADA, 2021). Interestingly, it is estimated that 20% of these 34 million Americans remain undiagnosed and are unaware of having diabetes (ADA, 2021; CDC, 2020a), yet the ADA (2021) and National Diabetes Statistics Report detail a national incidence rate of 1.5 million newly diagnosed cases of diabetes each year in the U.S. (CDC, 2020c). The increasing number of individuals living with diabetes is a concern as diabetes attributed to 87,647 American deaths (CDC, 2020b) and 1.5 million global deaths (WHO, 2021a) in 2019.

Within the U.S., the prevalence of diabetes among adults who live in the Midwest region ranges from 8% to 15.9% (SCOB, 2020). Unfortunately, Indiana was ranked as one of the top 10 states within the U.S. to have the highest number of diagnosed diabetes cases in 2019 (SCOB, 2020). Even more disturbing, Indiana has the highest prevalence of diabetes within the Midwest at a rate of approximately 12.4% (Indiana State Department of Health [ISDH], 2019; SCOB, 2020). In 2018, it was estimated that 639,444 Indiana adults (12.48%) had a confirmed diagnosis of diabetes (ISDH, 2019); Thus, the prevalence rate for Indiana is higher than the U.S. national average of 10.5%. The number of cases in Marshall and St. Joseph counties, the surrounding areas in which this EBP project was implemented, are 3,968 and 18,157 respectively (ISDH, 2019), with prevalence rates for these counties at 8.58% and 6.68%, respectively (ISDH, 2019).

Clinical Agency Data

Although the prevalence rates for the local counties were below the national and state averages, the healthcare providers at a family practice primary care office located in Northern Indiana communicated a desire for an intervention aimed at improving patients' diabetes self-

management (DSM) behaviors and glycemic control. This primary care office consisted of two family practice providers, one physician and one nurse practitioner who also served as the practice's diabetic educator. The project leader completed a semester of clinicals at this primary care office working alongside the physician during the spring of 2021. During that time, the project leader was able to experience first-hand how prevalent the diagnosis of diabetes was within the practice's patient population. Additionally, the physician and project leader briefly reviewed the prevalence of elevated HgbA1cs in their patient population within the past year. This further supported the need for an intervention focused on DSM. During the summer of 2021, the project leader completed an in-depth review of patient charts in which a diagnosis of diabetes or an elevated HgbA1c had been previously confirmed. Of about 2,300 patients seen by these providers, approximately 250 patients had diabetes. With a prevalence rate near 10.8%, this primary care office exceeded not only the rate of diabetes of both Marshall and St. Joseph counties but also the national rate. Also, during the in-depth chart review, the project leader noted that many patients had reported a desire to attempt lifestyle changes prior to any pharmacotherapy interventions. Such patient input was a driving force within project development as it highlighted the need for interventions consistent with this preference.

Purpose of the Evidence-Based Practice Project

Purpose Statement and PICOT Question

The purpose of this patient-centered, EBP project was to evaluate the effectiveness of a multimodal intervention involving goal setting, educational supplements and tools centered around DSM, and frequent follow-up on HgbA1c levels and DSM behaviors. Specifically, this project addressed the following PICOT question: In adults who have T2D (P), how does the implementation of a multimodal intervention to encourage self-management (I) compared to current practices (C) impact HgbA1c levels (O) over a 12-week period (T)?

EBP Project Description

This patient-centered EBP project, entitled *Back to the Basics with Smart Goals: A Multimodal Intervention for Adults Who have Type 2 Diabetes*, involved three essential interventions intended to empower patients who have T2D to better self-manage their diagnosis. These interventions included individualized goal setting by the patient under the guidance of their family practice provider or the project leader, a packet containing DSM educational supplements and tools to be used as appropriate by the patient, and frequent follow-up by the project leader in the form of two letters to serve as reminders of set goals at 2 and 8 weeks and one progress telephone call at 4 weeks. Participants were recruited by either their family practice provider or the project leader at their already scheduled annual wellness visit or diabetes follow-up appointment. Adults, those over the age of 18, who had been previously diagnosed with T2D and expressed a desire to make lifestyle changes were invited to participate in the project. Additionally, those whom the family practice providers thought may benefit from the intervention and met the inclusion and exclusion criteria, which will be discussed further in Chapter 3, were also invited to participate in the project. The primary and secondary outcomes measured were glycemic control and DSM behaviors, respectively. Glycemic control was measured by point-of-care (POC) HgbA1c levels while DSM behaviors were measured by the Diabetes Self-Management Questionnaire (DSMQ). Both HgbA1c levels and the DSMQ scores were assessed at each patient's visit prior to the start of the intervention and again at the routine 12-week diabetes follow-up appointment. Patient satisfaction of the multimodal intervention was also evaluated at these follow-up appointments.

CHAPTER 2

EBP MODEL AND REVIEW OF LITERATURE

Evidence-Based Practice Model

Overview of EBP Model

The EBP model chosen to serve as a guide for this project was the Iowa Model Revised. The Iowa Model Revised, formerly known as the Iowa Model, acts as a decision-making guide for nurses and healthcare providers in both the clinical and administrative settings (Buckwalter et al., 2017; Dang et al., 2019). The goal of this model is to improve outcomes and promote excellency in healthcare through the implementation of evidence-based practices. The Iowa Model Revised consists of seven steps: (1) identifying triggering issues or opportunities, (2) stating the question or purpose, (3) forming a team, (4) assembling and synthesizing the body of evidence, (5) designing and piloting the practice change, (6) integrating and sustaining the practice change, and (7) disseminating the results. Three decision points, located at the end of steps 2, 4, and 5, aid the user in determining topic priority, sufficiency of evidence, and appropriateness of EBP change. These decision points are pertinent to the model as they provide feedback loops throughout allowing the user to revisit previous steps as necessary.

The Iowa Model Revised was chosen by the project leader for multiple reasons. This model is widely recognized by nursing organizations including Sigma Theta Tau International, interdisciplinary healthcare teams and professionals, and many countries worldwide (Buckwalter et al., 2017; Dang et al., 2019). The steps, decision points, and feedback loops within the model support its ease of use and applicability in the clinical setting. The Iowa Model Revised has also allowed users to establish clear boundaries, set an appropriate target, and utilize a more focused approach to help achieve successful EBP change. Additionally, this EBP model was chosen because it supported the engagement of patients as key stakeholders, the incorporation of patient preferences and values, and the consideration of the patient-partnership as an ongoing

priority. The use of the Iowa Model Revised was appropriate for this EBP project because of its emphasis on patient-centeredness and the structure of its framework.

Literature Search

Sources Examined for Relevant Evidence

Under the guidance of Valparaiso University's College of Nursing & Health Professions Research Services Librarian, exhaustive, systematic searches for relevant, scholarly, and high-quality articles were conducted using the Joanna Briggs Institute (JBI), Cochrane Library, Turning Research into Practice (TRIP), Cumulative Index of Nursing and Allied Health Literature (CINAHL), and MEDLINE with Full Text databases. The reference lists of the yielded articles from the searches were also reviewed, and applicable articles were retrieved through Valparaiso University's Summons search engine by means of citation chasing. Keywords of the clinical question (*diabetes*, *self-management*, and *hemoglobin A1c*) were used as the foundation for the searches and Boolean operators (AND/OR) were utilized. The final search terms used across the databases included the following: "diabetes mellitus", "type 2", self-manag*, manag*, self-care, and "hemoglobin a1c". To refine the search further in CINAHL and MEDLINE, an exact major subject heading, *(MM "Diabetes Mellitus, Type 2")*, was incorporated. The search strategy for each database is clearly listed on the literature search grid in Appendix A and will be briefly discussed below following discussion of the inclusion and exclusion criteria.

Inclusion criteria were applied to the searches to ensure relevant, scholarly, and high-quality pieces of evidence were chosen to support this EBP project. Inclusion criteria, or limits, consisted of peer reviewed articles that were written within the past 5 years from 2016 to 2021 and available in the English language. Additional inclusion criteria in the TRIP database included guidelines. These limits combined with the above-mentioned final search terms resulted in a total of 429 sources from the five databases. Thirteen additional sources were identified by means of citation chasing.

From the resulting sources, exclusion criteria were applied by the project leader to ensure appropriate sources were chosen to support the EBP project and needs of the project site. Systematic protocols were excluded because they are in the review stage and not considered high pieces of evidence. Duplicate sources within and between databases were manually excluded by the project leader. Additional exclusion criteria included sources that were focused on the pediatric population, pregnant or lactating women, acute care, other comorbidities or diagnoses like type 1 diabetes, heart failure, kidney disease, cancer, etc., pharmacotherapy, and technology. Sources that were limited to countries other than the U.S. or culturally tailored, lacked an outcome measure, or were not classified as level one pieces of evidence were also excluded. After a careful and thorough review of all eligible sources, 14 pieces of evidence were chosen by the project leader to help aid in addressing the aforementioned clinical question and support the EBP project. A PRISMA flow diagram depicting sources that were identified, screened, and included in this project can be seen below in Figure 2.1.

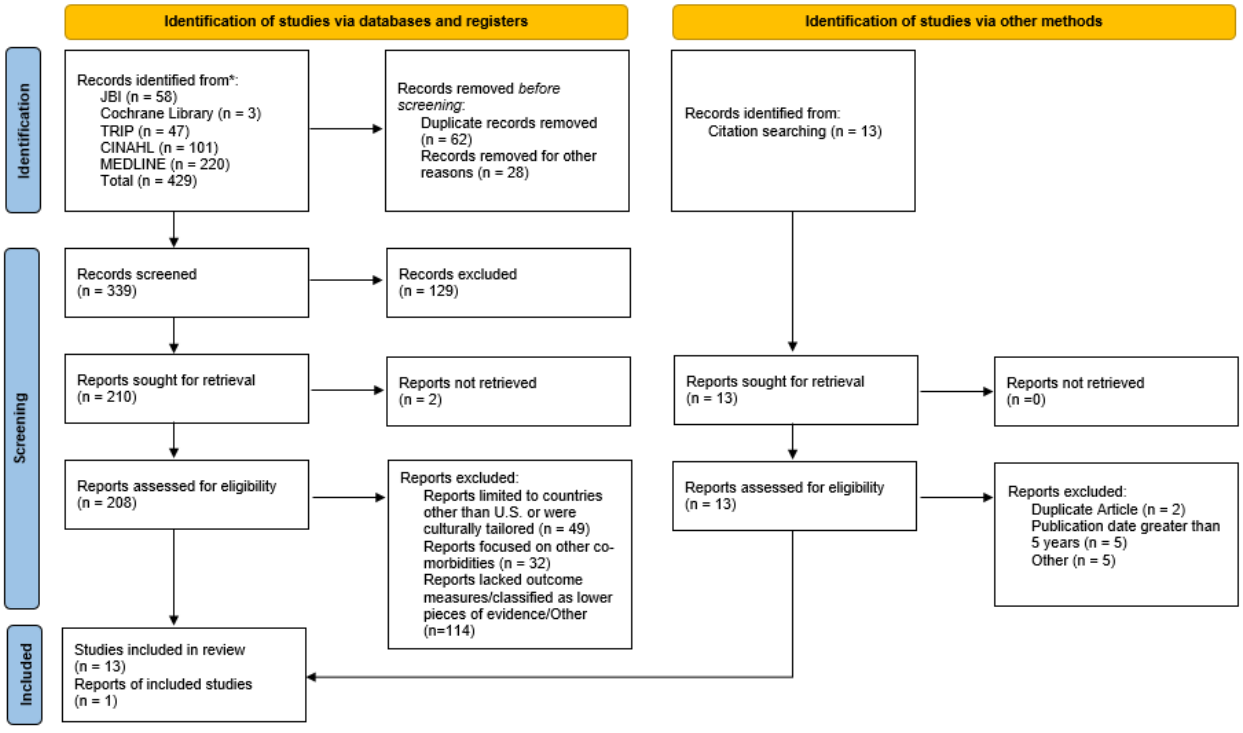
The five databases were searched in a linear fashion, beginning with JBI. In JBI, a search including “diabetes mellitus” OR “type 2” AND self-manag* with a 5-year limit (2016-current) generated 58 results. Of the 58 results, five pieces of evidence were selected for use following the screening of each and application of exclusion criteria. In Cochrane Library, a search including the same keywords, Boolean operators, and limiters as those used within the JBI database generated three results. None of these articles were deemed appropriate for use by the project leader since they were focused on the pediatric population and other comorbidities. In TRIP, a search including the keywords “diabetes mellitus” OR “type 2” AND manag* and limits of 5-years (since 2016) and guidelines generated 47 results. Of the 47 results, 4 pieces of evidence were selected for use following the screening of each and application of exclusion criteria.

The search structure was then expanded to include an additional keyword and subject heading in CINAHL and MEDLINE. The final search in these two databases which included the exact major subject heading *(MM “Diabetes Mellitus, Type 2”)* AND self-care OR self-manag*

AND “hemoglobin a1c” and limiters of 5-years (01/01/2016-12/31/2021), English language, and scholarly (peer reviewed) journals generated 101 and 220 results, respectively. Of these results, four articles were selected for use following the screening of each and application of exclusion criteria. Following screening and application of inclusion and exclusion criteria, one additional piece of evidence was selected for use by means of citation chasing by the project leader. A PRISMA flow chart detailing the project leader’s method of screening and exclusion is depicted below in Figure 2.1.

Figure 2.1

PRISMA Flow Diagram



Levels of Evidence

Sources were evaluated and leveled using Melnyk and Fineout-Overholt’s (2019) Hierarchy of Evidence which has served as a guide to help determine types of research studies

and reliability of evidence in order to answer a clinical question. Their hierarchy contains seven levels, with Level I indicating the strongest evidence and Level VII indicating the weakest evidence. Level I pieces of evidence include systematic reviews (SR) or evidence summaries (ES) (Melnyk & Fineout-Overholt, 2019) and clinical practice guidelines (CPG) or consensus statements (CS) (Melnyk, 2015). A SR or ES is a synthesis of multiple studies that addresses the same research question (Melnyk & Fineout-Overholt, 2019). Clinical practice guidelines and CSs, also commonly known as position statements, are carefully developed recommendations for clinical practice based on evidence from SRs and evaluation of benefits and risks (Melnyk, 2015). Due to the prevalence of diabetes and numerous, available Level I studies involving this diagnosis, only Level I pieces of evidence were selected for use in this EBP project: (a) four CPGs, (b) one CS, (c) five SRs, and (d) four ESs. Table 2.1 depicts the author, database, and level of evidence of each source.

Analysis and Appraisal of Relevant Evidence

Once each source's level of evidence was determined, each source underwent a critical analysis and appraisal by the project leader using the Johns Hopkins Nursing Evidence-Based Practice (JHNEBP) Research and Non-Research Evidence Appraisal tools. Permission to use these JHNEBP appraisal tools was received (see Appendix B). The JHNEBP appraisal tools were used because they are well-known, widely accepted, easy to understand and follow, and easily accessible. These appraisal tools aid in providing a quality rating ranked as high (A), good (B), or low (C) (Dang et al., 2022). The CPGs and CS were appraised using the JHNEBP Non-Research Evidence Appraisal tool while the SRs and ESs were appraised using the JHNEBP Research Evidence Appraisal tool. The overall assessment of the quality of evidence was determined to be good to high. Of the 14 sources, 12 received a high (A) quality rating, and two received a good (B) quality rating (see Table 2.1). A complete analysis and appraisal of each piece of the evidence used in this EBP project are available for review in the Evidence Table in Appendix C.

Table 2.1

Summary of Evidence

Author/Year	Database(s)	Level of Evidence/Type	Quality
Alexandre et al. (2021)	JBI	I/SR	High
Almutairi et al. (2020)	MEDLINE	I/SR	High
Baldoni et al. (2017)	MEDLINE	I/SR	High
Chrvala et al. (2016)	CINAHL MEDLINE	I/SR	High
Garber et al. (2021)	TRIP	I/CS	Good
Khanh-Dao Le (2021a)	JBI	I/ES	High
Khan-Dao Le (2021b)	JBI	I/ES	High
Ombech (2021)	JBI	I/ES	High
Podder (2021)	JBI	I/ES	High
Pogach et al. (2017)	TRIP	I/CPG	High
Riddle et al. (2019)	Citation Chase	I/CPG	High
Sherifali et al. (2016)	CINAHL MEDLINE	I/SR	High
Standiford et al. (2019)	TRIP	I/CPG	High
Waring et al. (2021)	TRIP	I/CPG	Good

Construction of Evidence-Based Practice

Synthesis of Critically Appraised Literature

To best address the clinical question, 14 relevant, high level, and good-high quality pieces of evidence (Alexandre et al., 2021; Almutairi et al., 2020; Baldoni et al., 2017; Chrvala et al., 2016; Garber et al., 2021; Khanh-Dao Le, 2021a&b; Ombech, 2021; Podder, 2021; Pogach

et al., 2017; Riddle et al., 2019; Sherifali et al., 2016; Standiford et al., 2019; Waring et al., 2021) were selected. During critical analysis, a primary theme associated with improved glycemic control, or decreased HgbA1c levels, was DSM. Self-management involves all activities or interventions in which a patient engages in order to care for their diabetes, expand diabetes knowledge and resources, prevent short- or long-term negative effects from diabetes, and promote overall health outcomes (Standiford et al., 2019). Furthermore, three key subtopics of DSM were identified: (a) diabetes self-management education (DSME), (b) diabetes self-management support (DSMS), and (c) DSM measurement.

Diabetes Self-Management Education

DSME may be delivered in various formats: (a) individual-based (Chrvala et al., 2016; Khanh-Dao Le, 2021a&b; Podder, 2021; Pogach et al., 2017; Riddle et al., 2018), (b) group-based (Baldoni et al., 2017; Chrvala et al., 2016; Khanh-Dao Le, 2021a&b; Podder, 2021; Pogach et al., 2017; Riddle et al., 2019), or (c) combination of individual- and group-based (Chrvala et al., 2016; Pogach et al., 2017). Khanh-Dao Le (2021a) and Podder (2021) reported little to no differences in HgbA1c levels between group-based and individualized DSME at 24 months, but Khanh-Dao Le noted that attendance rates were low in group-based formats. Interestingly, Chrvala and colleagues (2016) and Podder (2021) reported an overall mean reduction in HgbA1c levels of 0.74 in all participants who participated in DSME. Regardless of delivery format, DSME aimed at glycemic control included lifestyle changes primarily focused on nutrition, physical activity, blood glucose monitoring, and medication adherence (Alexandre et al., 2021; Almutairi et al., 2020; Garber et al., 2021; Khanh-Dao Le, 2021b; Pogach et al., 2017; Riddle et al., 2019; Standiford et al., 2019; Waring et al., 2021).

Nutrition. Nutrition education should include healthy food choices (Riddle et al., 2019; Waring et al., 2021), meal planning (Garber et al., 2020; Pogach et al., 2017; Riddle et al., 2019; Standiford et al., 2019), portion control (Riddle et al., 2019; Standiford et al., 2019), and diet. The incorporation of a low-carbohydrate Mediterranean (Pogach et al., 2017; Riddle et al., 2019;

Waring et al., 2021) or typical low-carbohydrate (Riddle et al., 2019; Standiford et al., 2019) diet has been demonstrated to improve glycemic control by decreasing HgbA1c levels; although, no approach is reported to be superior to the other (Riddle et al., 2019). Barriers to healthy eating include behavioral skills, demographics, environmental influences, and social or cultural factors (Alexandre et al., 2021). For this reason, education on nutrition and diet should be individualized.

Physical Activity. Physical activity such as resistance (Riddle et al., 2019) and moderate-intensity exercises (Waring et al., 2021) have been demonstrated to significantly decrease HgbA1c levels. It is recommended that individuals undergo 30 minutes of aerobic activity nearly every day with a minimum of 150 minutes of moderate-intensity activity each week (Riddle et al., 2019; Garber et al., 2021; Waring et al., 2021). Similar to nutrition, barriers to physical activity include behavioral skills, demographics, environmental influences, and social or cultural factors (Alexandre et al., 2021). For this reason, physical activity should be individualized and divided into increments as necessary (Riddle et al., 2019; Waring et al., 2021).

Blood Glucose Monitoring. While blood glucose monitoring is an important strategy in DSM (Almutairi et al., 2020; Garber et al., 2021; Ombech, 2021; Pogach et al., 2017; Riddle et al., 2019; Standiford et al., 2019; Waring et al., 2021) and reducing HgbA1c levels (Baldoni et al., 2017; Ombech, 2021), routine, daily monitoring of blood glucose has often been reserved for those on insulin (Garber et al., 2021; Pogach et al., 2017; Riddle et al., 2019; Standiford et al., 2019; Waring et al., 2021). When necessary, blood glucose can be assessed through either self or continuous monitoring, allowing for timely treatment or lifestyle changes based on the results (Almutairi et al., 2020; Garber et al., 2021; Ombech, 2012; Riddle et al., 2019; Waring et al., 2021). Blood glucose monitoring has demonstrated to improve glycemic control when the results are used to make lifestyle changes (Waring et al., 2021). Similar to nutrition and physical activity, barriers to blood glucose monitoring include behavioral skills, demographics, environmental influences, and social or cultural factors (Alexandre et al., 2021) and should be considered when determining a treatment plan.

Medication Adherence. Medication adherence is an important strategy in DSM for certain individuals who are unable to achieve glycemic control through lifestyle modifications such as diet and physical activity (Almutairi et al., 2020; Garber et al., 2021; Khanh-Dao Le, 2021b; Riddle et al., 2019; Standiford et al., 2019; Waring et al., 2021). Riddle and colleagues (2019) report poor medication-taking behaviors as an attributable factor to uncontrolled diabetes in approximately 25% of diabetic patients. Similar to nutrition, physical activity, and blood-glucose monitoring, barriers to medication adherence include behavioral skills, demographics, environmental influences, and social or cultural factors (Alexandre et al., 2021) and should be considered when determining a treatment plan.

Diabetes Self-Management Support

DSMS, although a newer concept (Pogach et al., 2017), has demonstrated to significantly improve glycemic control (Chrvala et al., 2016; Podder, 2021; Pogach et al., 2017; Riddle et al., 2019; Sherifali et al., 2016). Similar to DSME, DSMS should be provided to patients in either an individual- or group-format to help them successfully manage their diagnosis and perform appropriate lifestyle changes (Pogach et al., 2017). DSMS is recommended by the evidence to include goal setting (Chrvala et al., 2016; Khanh-Dao Le, 2021b; Riddle et al., 2019; Sherifali et al., 2016; Standiford et al., 2019), empowerment (Almutairi et al., 2020; Baldoni et al., 2017; Chrvala et al., 2016; Garber et al., 2020; Khanh-Dao Le, 2021b; Pogach et al., 2017; Riddle et al., 2019; Sherifali et al., 2016; Standiford et al., 2019; Waring et al., 2021), and frequent follow-up (Almutairi et al., 2020; Baldoni et al., 2017; Garber et al., 2021; Khanh-Dao Le, 2021b; Pogach et al., 2017; Riddle et al., 2019; Sherifali et al., 2016; Standiford et al., 2019; Waring et al., 2021).

Goal Setting. Collaborative goal setting between the provider and patient is an important strategy in DSMS and improving glycemic control (Chrvala et al., 2016; Khanh-Dao Le, 2021b; Riddle et al., 2019; Sherifali et al., 2016; Standiford et al., 2019). Khanh-Dao Le (2021b) reported a mean reduction in HgbA1c of 0.74 in patients using DSM interventions that were centered

around goal setting. Goal setting provides an opportunity for patients to actively participate in their own care and for healthcare providers to understand the needs of each patient (Khanh-Dao Le, 2021b; Pogach et al., 2017) which allow for realistic and achievable goals to be established (Alexandre et al., 2021). Approaches to goal setting should be closely aligned with DSM in an effort to improve glycemic control and include individualized lifestyle modifications involving nutrition, physical activity, blood glucose monitoring, or medication adherence (Chrvala et al., 2016; Riddle et al., 2019; Sherifali et al., 2016). In addition to improving glycemic control (Khanh-Dao Le (2021b), collaborative goal setting promotes shared decision making and individualized, patient centered care (Alexandre et al., 2021; Riddle et al., 2019; Sherifali et al., 2016).

Empowerment. Patient empowerment is an important strategy in DSMS (Alexandre et al., 2021; Almutairi et al., 2020; Baldoni et al., 2017; Pogach et al., 2017; Riddle et al., 2019; Sherifali et al., 2016; Standiford et al., 2019). Approaches to empowerment include shared decision making (Alexandre et al., 2021; Riddle et al., 2019; Sherifali et al., 2016), encouragement to accomplish goals directed towards DSM (Alexandre et al., 2021; Riddle et al., 2019; Sherifali et al., 2016), and access to appropriate tools that are intended to help patients integrate their goals into daily life, monitor progress, and achieve DSM (Alexandre et al., 2021; Baldoni et al., 2017; Chrvala et al., 2016; Khanh-Dao Le, 2021b; Pogach et al., 2017; Riddle et al., 2019; Standiford et al., 2019; Waring et al., 2021). Almutairi et al. (2020) and Baldoni et al. (2017) reported similar results demonstrating significant reductions in HgbA1c levels following the implementation of empowerment interventions. Additionally, empowerment has been shown to improve patient knowledge and satisfaction of diabetes care (Pogach et al., 2017).

Follow-Up. Frequent follow-up by both patients (Chrvala et al., 2016; Pogach et al., 2017; Riddle et al., 2019) and healthcare professionals (Almutairi et al., 2020; Chrvala et al., 2016; Khanh-Dao Le, 2021b; Pogach et al., 2017; Riddle et al., 2019; Sherifali et al., 2016) is an important strategy in achieving DSM. Patients who are newly diagnosed or have uncontrolled diabetes should routinely be seen for follow-up every 3 months to evaluate HgbA1c levels and

determine whether or not glycemic target goals have been achieved (Garber et al., 2021; Riddle et al., 2019; Standiford et al., 2019; Waring et al., 2021). Improved rates of DSM and glycemic control are attributed to frequent follow-up by healthcare professionals (Almutairi et al., 2020; Khanh-Dao Le, 2021b; Pogach et al., 2017; Sherifali et al., 2016). In addition to in-person office visits, DSM follow-up from healthcare professionals can occur remotely through the mail (Chrvala et al., 2016) or by telephone (Almutairi et al., 2020; Pogach et al., 2017; Sherifali et al., 2016). Frequent follow-up enables the provider to deliver ongoing support (Pogach et al., 2017), monitor progress toward meeting previously set goals (Khanh-Dao Le, 2021b; Pogach et al., 2017), establish new goals (Pogach et al., 2017), and re-educate patients on diabetes care as necessary (Pogach et al., 2017).

Diabetes Self-Management Measurement

DSM is measured using various clinical biomarkers: (a) HgbA1c levels (Alexandre et al., 2021; Almutairi et al., 2020; Baldoni et al., 2017; Chrvala et al., 2016; Garber et al., 2021; Khanh-Dao Le, 2021a&b; Ombech, 2021; Podder, 2021; Pogach et al., 2017; Riddle et al., 2019; Sherifali et al., 2016; Standiford et al., 2019; Waring et al., 2021), (b) fasting blood sugar (Podder, 2021), (c) blood pressure (BP) (Alexandre et al., 2021; Baldoni et al., 2017; Garber et al., 2021; Pogach et al., 2017; Riddle et al., 2019; Standiford et al., 2019; Waring et al., 2021), (d) lipid levels (Alexandre et al., 2021; Baldoni et al., 2017; Garber et al., 2021; Pogach et al., 2017; Riddle et al., 2019; Waring et al., 2021), (e) BMI (Alexandre et al., 2021; Baldoni et al., 2017; Riddle et al., 2019; Standiford et al., 2019), (f) weight (Garber et al., 2021; Pogach et al., 2017; Riddle et al., 2019; Standiford et al., 2019; Waring et al., 2021), and (g) waist circumference (Podder, 2021; Riddle et al., 2019). Measuring each of these biomarkers at each diabetes follow-up is not considered practical or cost-effective. For this reason, HgbA1c levels, BP, and weight or BMI are routinely measured at these visits (Garber et al., 2021; Pogach et al., 2017; Riddle et al., 2019; Standiford et al., 2019; Waring et al., 2021). HgbA1c levels were the primary outcomes measured across the studies to evaluate glycemic control (Alexandre et al.,

2021; Almutairi et al., 2020; Baldoni et al., 2017; Chrvala et al., 2016; Khanh-Dao Le, 2021a&b; Ombech, 2021; Podder, 2021; Sherifali et al., 2016) since it is considered to be the gold standard measurement (Baldoni et al., 2017; Garber et al., 2021; Pogach et al., 2017; Riddle et al., 2019; Standiford et al., 2019; Waring et al., 2021). In addition to biomarkers, psychosocial factors (Khanh-Dao Le, 2021a&b) such as depression (Alexandre et al., 2021; Riddle et al., 2019) and self-care (Alexandre et al., 2021; Riddle et al., 2019) are often measured using questionnaires. The questionnaires utilized varied across the studies.

Recommendation for Best Practice

Current evidence supports the use of DSME and DSMS to improve glycemic control as evidenced by a decrease in HgbA1c (Alexandre et al., 2012; Almutairi et al., 2020; Baldoni et al., 2017; Chrvala et al., 2016; Garber et al., 2021; Khanh-Dao Le, 2021a&b; Ombech, 2021; Podder, 2021; Pogach et al., 2017; Riddle et al., 2019; Sherifali et al., 2016; Standiford et al., 2019; Waring et al., 2021). DSME centered on nutrition, physical activity, blood glucose monitoring, and diabetes medication adherence have been demonstrated to significantly reduce HgbA1c levels. Likewise, strategies of DSMS involving goal setting, empowerment, and frequent follow-up by healthcare professionals have produced similar results.

Based on the evidence presented, one may propose that the best practice to improve glycemic control by reducing HgbA1c levels would include a multimodal approach involving both DSME and DSMS. Because diabetes affects individuals of all ages and requires a patient centered approach, the most appropriate intervention to address the clinical problem of question would be a universal, multimodal intervention: (a) goal setting, (b) educational supplements about nutrition, physical activity, blood glucose monitoring, and medication adherence, (c) tools intended to help patients integrate their goals into daily life, monitor progress, and achieve DSM, and (d) frequent follow-up by a healthcare professional. Per best practice, the best proposed outcome measurement to determine glycemic control is a HgbA1c level. This measurement is easy to obtain, cost-effective, precise, accurate, and most importantly, supported by literature.

A final literature search was conducted using the exact search structure listed above to ensure that any significant literature published since the initial search were included. New Level I pieces of evidence that were published after the implementation of this EBP project continue to support the use of a multimodal intervention involving DSM in the form of DSME and DSMS, as described above, in clinical practice (Bayuo, 2021; Minooee, 2021; Porritt, 2021; Richardson et al., 2021).

CHAPTER 3

IMPLEMENTATION OF PRACTICE CHANGE

Based on the statistical data and the supporting recommendations and evidence related to T2D, the project leader developed a multimodal intervention involving goal setting, DSM educational supplements and tools, and frequent follow-up to help improve glycemic control, DSM behaviors, and overall health. First, participants, in collaboration with their family practice provider or project leader, set individualized goals that were centered on lifestyle modifications involving nutrition, physical activity, blood glucose monitoring, and/or medication adherence. Second, participants were provided with a folder containing educational supplements and tools centered around these lifestyle modifications that they could utilize as appropriate at home. Third, participants received frequent follow-up by way of a reminder letter or progress telephone call at 2, 4, and 8 weeks after enrolling in the project. Understanding that many participants may have individualized limitations, the goal of this multimodal intervention was for it to be applicable to all individuals across the lifespan who had T2D.

Participants and Setting

The EBP project took place at a rural family practice office in Northern Indiana. The key stakeholders pertinent to the project included a family practice physician who had been practicing for more than 10 years and a nurse practitioner who had been practicing for more than 22 years and served as the practice's diabetic educator. At the time of this project, these providers cared for more than 2,000 patients of all ages. Additional stakeholders included the project leader and the practice's medical assistants (MAs).

Individuals who were eligible to participate in the EBP project included those who were 18 years of age or older, had a diagnosis of T2D, were capable of reading and speaking English, and desired to make or were willing to attempt at least one of the aforementioned lifestyle modifications to achieve better glycemic control. Participants were required to read and speak

English in order for them to read and understand the informed consent, questionnaires, educational material and tools, and reminder letters as well as speak and understand the project leader during the progress telephone calls. Additionally, participants needed to be due to have a routine HgbA1c level checked at their initial visit prior to the start of the intervention and again in 12 weeks at the routine 3-month diabetes follow-up visit so that insurance would cover the cost of the testing. Individuals who were considered to be a vulnerable population such as those under the age of 18, pregnant women, prisoners, and cognitively impaired were excluded from consideration for participation in the project.

Pre-Intervention Group Characteristics

The majority of participants consisted of older adults. Upon agreeing to volunteer in the project at their initial visit, participants were asked to complete a form containing demographic information (see Appendix D). The demographic information about the participants collected included gender, age, ethnicity, highest level of education completed, current employment status, current living arrangement, marital status, and number of years since diagnosis.

Intervention

Prior to implementing the intervention in the family practice setting, a substantial amount of time went into planning the intervention, beginning with an exhaustive literature search that served as the foundation of the EBP project. As noted previously, the evidence supported a multimodal intervention aimed at DSM in the form of DSME and DSMS. Taking into account the limitations of the site's patient population including lack of internet access, transportation, and financial resources, it was necessary for the EBP intervention to be easily accessible, cost effective, and applicable for all T2D participants, regardless of their age. In coordination with the literature, current recommendations, and preferences of the site's diabetic educator, a multimodal intervention was developed by the project leader.

The EBP project involved three essential interventions: (a) individualized goal setting that was centered on DSM lifestyle choices involving nutrition, physical activity, blood glucose

monitoring, and/or diabetes medication adherence by the participant under the guidance of their family practice provider or project leader at their initial visit, (b) distribution of a folder containing DSM educational supplements and tools which were to be used as appropriate by the participant at home, and (c) frequent follow-up by the project leader in the form of two reminder letters at 2 and 8 weeks and one progress telephone call at 4 weeks.

Participants were recruited by their family practice provider or project leader at their scheduled routine annual wellness or diabetes follow-up appointment to begin utilizing the interventions of the EBP project. During this initial visit, participants were provided with verbal and written information about the EBP project, signed an informed consent (see Appendix E), had a HgbA1c level checked as it is routinely done at these visits, filled out a demographic form and DSMQ (see Appendix D), set specific, measurable, attainable, realistic, and time-specific (SMART) goals centered around nutrition, physical activity, blood glucose monitoring, or diabetes medication adherence under the guidance of their family practice provider or project leader using the SMART goals worksheet (see Appendix F), and received a folder containing DSM educational materials and tools. Contents of the folder can be seen in Appendix G.

The project leader sent each participant a reminder letter and a new SMART goals worksheet 2 and 8 weeks into the intervention which served as reminders to each of what their SMART goal was, encouraged them to continue DSM efforts, and allowed them to make any changes to their goals as they saw fit. The 2- and 8-week reminder letter templates can be seen in Appendix H and I, respectively. Four weeks into the intervention, the project leader completed a progress telephone call with each participant using a template as a guide (see Appendix J) which allowed her to evaluate each participant's progress, make note of any newly established SMART goals, and provide encouragement to continue DSM efforts. If a participant did not answer the initial progress telephone call, a voice message was left and a second call was made approximately one week later. Participants then returned to the office for their scheduled routine 12-week diabetes follow-up appointments. At this appointment, a HgbA1c level was rechecked

as it is routinely done at these visits and supported by EBP. Additionally, to complete the intervention phase, participants filled out a final satisfaction questionnaire and DSMQ which was either given to them in the office by the MAs or sent to them by mail by the project leader (see Appendix K). Approval to use the DSMQ for this EBP project was received from Mapi Research Trust (see Appendix L).

Comparison

During an in-depth chart review by the project leader, it was clear that prior to the implementation of the multimodal intervention, diabetes management and treatment plans varied between providers and were inconsistent between patients. The providers at this practice themselves even voiced the need for a practice change implementation regarding management of T2D, noting that this was an area for improvement.

Outcomes

During the course of the EBP project, two outcomes were evaluated: (a) glycemic control and (b) DSM behaviors. The primary outcome evaluated was glycemic control, which was measured by reviewing each participant's pre- and post-intervention HgbA1c levels in their electronic medical record (EMR). The secondary outcome evaluated was DSM behaviors which was measured by the DSMQ prior to and following the intervention.

The data collected from reviewing each participant's EMR included HgbA1c levels before and after the implementation of the EBP project. POC HgbA1c levels are routinely performed by the site's MAs and nurses by obtaining a sample of the participant's blood. The machine used to run these tests is the Afinion AS 100 Analyzer by Abbott. Controls and the Abbott HBA1c (HgbA1c) cartridges for this machine are checked routinely by the MAs and nurses. The project leader reviewed the monthly log, control ranges, and expiration dates of the Abbott HBA1c cartridges prior to the start of the EBP project on July 26th, 2021 and continued to do so routinely throughout the course of the project's implementation phase. Reliability and validity for the Afinion AS 100 Analyzer by Abbott have been previously established (Jain et al., 2017). POC

testing to measure HgbA1c has been routinely indicated for monitoring diabetes by the ADA and has been demonstrated to have similar accuracy compared to clinical lab tests (Jain et al., 2017; Szablowski et al., 2018).

The data collected from the pre- and post-intervention DSMQ included the frequency of completing self-care activities related to DSM centered around nutrition/diet, physical activity, blood glucose monitoring, and medication adherence. The DSMQ consists of 16 Likert scale questions to which the participant would rate each question from 0 (does not apply to me) to 3 (applies to me very much). Reliability and validity for the DSMQ have been previously established by its developer Schmitt et al. (2013), with reliability reported as an overall internal consistency of 0.84 (Cronbach's alpha).

Paired *t*-tests were used to compare pre- and post-intervention HgbA1c levels and DSMQ scores.

Time

Implementation of the EBP project began in September 2021, coinciding with the beginning of Valparaiso University's fall semester. Prior to the implementation phase, the project leader researched, developed, and organized the participant handouts and folders, created a PowerPoint to inform the family practice providers of the EBP change (see Appendix M), applied for institutional review board (IRB) approval, and completed more than 140 hours of project development during the planning phase of the EBP project. Exemption from IRB approval from both Valparaiso University and the project site was received. To protect the identity of the project site, only Valparaiso University's exemption is listed in Appendix N. The timeline necessary for successful completion of the project by participants was 12 weeks as this allowed for appropriate re-evaluation of HgbA1c levels as recommended by the ADA and AACE.

Thirty-three participants were recruited by either their family practice provider or the project leader at their scheduled visit and began using the multimodal interventions during the months of September, October, and November of 2021. The project leader performed frequent

follow-up with each participant beginning the last week of September 2021. The participants returned for their routine 12-week diabetes follow-up appointments beginning the first week of December 2021. The project leader evaluated and recorded the coded data throughout the course of the implementation phase from September 2021 through February 2022. The project leader began to analyze the data in February and completed data analysis by the end of March 2022. The DNP manuscript detailing the project and its outcomes is expected to be published to ValpoScholar during May 2022. A timeline of this EBP project can be seen on the implementation timeline in Appendix O.

Protection of Human Subjects

A main priority of the project leader's during this EBP project was the protection of human subjects. All involved persons who actively participated in this EBP project had completed a human subjects research training educational module within the past 2 years. To help protect the identity of the project site, only the project leader's ethics training certificate is listed in Appendix P. The project leader completed the online training course through the Collaborative Institutional Training Initiative Program on April 12, 2021. Approval to complete the EBP project was submitted to the site's organization and Valparaiso University's IRBs prior to the implementation of the project, and exemption was received on August 16, 2021 and August 18, 2021, respectively. Participation in the EBP project was strictly voluntary and was indicated on the informed consent which also specified that participants could discontinue participation at any time. Individuals who chose not to participate in the project continued to receive the recommended standard-of-care diabetic treatment by the family practice providers. Risks and benefits of the project were discussed and detailed in the informed consent to promote self-determination.

Due to the nature of the EBP project involving frequent follow-up by the project leader, complete confidentiality and anonymity of the participants during the implementation phase was limited. It is important to note that there was no disclosure to anyone outside of the EBP project

as disclosure only occurred among the project leader and practice's providers and MAs. Participants were aware of this and the steps taken to ensure their safety and privacy were upheld throughout the duration of the project. Following completion by the participants, the completed hardcopies of the informed consent, demographic form and DSMQ, SMART goals worksheet, and follow-up satisfaction questionnaires containing any personal information were initially stored by the family practice providers in a locked folder only accessible to them and the project leader. Every week, the project leader retrieved and reviewed these hardcopies as well as each participants HgbA1c level in their EMR, alone, on-site. Following review, any identifying information listed on the hardcopies was coded and covered using a black sharpie, and the hardcopies were stored on site using a double-locked, secured method until they were destroyed by shredding following the completion of the project. The coded data was stored on an EXCEL spreadsheet on the project leader's personal USB drive utilizing a double password protected, secured method until it was deleted following completion of the project in the presence of the site facilitator. A list of patient names with corresponding codes was kept on a separate, double-password protected EXCEL sheet only available to the project leader.

Due to the nature of the project involving frequent follow-up with participants by way of two mailed letters and one or two telephone call(s), limited available hours for the project leader to be present on-site, and the participants having a preferred day and time to receive a progress telephone call, the project leader completed the follow-up letters and telephone calls off-site. To protect the participants' personal information, each method of follow-up was completed in private by the project leader following decoding of the necessary personal information, and any identifying information was immediately deleted from both the project leader's personal computer or telephone upon completion of the follow-up. Data from the project was analyzed and shared with others through the use of oral, written, and poster presentations; however, the project data and site remained anonymous upon publication.

CHAPTER 4

FINDINGS

The purpose of this patient-centered, EBP project was to evaluate the effectiveness of a multimodal intervention involving goal setting, educational supplements and tools centered around DSM, and frequent follow-up on HgbA1c levels and DSM behaviors. Specifically, this project addressed the following PICOT question: In adults who have T2D (P), how does the implementation of a multimodal intervention to encourage self-management (I) compared to current practices (C) impact HgbA1c levels (O) over a 12-week period (T)?

The multimodal intervention was implemented among individuals who were over the age of 18, had a diagnosis of T2D, and desired to make or were willing to attempt lifestyle changes centered around diet, physical activity, blood glucose monitoring, and/or medication adherence in order to achieve better glycemic control. Prior to and 12-weeks following the implementation of the intervention, a HgbA1c level was checked and a DSMQ was administered. The primary outcome demonstrated a reduction in mean HgbA1c levels from pre- to post-intervention. Secondary outcomes demonstrated improvements in DSM behaviors related to diet, physical activity, and blood glucose monitoring following implementation of the multimodal intervention. Additional secondary outcomes demonstrated individual satisfaction with the intervention, and participants reported helpfulness, benefit, and improved accountability as a result of the intervention. Participants agreed that their providers should continue to use the multimodal intervention with diabetic patients to encourage DSM in the future.

Participants

Thirty-three participants, 14 men (42.4%) and 19 women (57.6%), were recruited to participate in the project. The attrition rate throughout the course of the implementation phase was 9.1% (*n* = 3), with a total of 30 participants, 14 men (42.4%) and 16 women (48.5%), returning for their final diabetes follow-up appointments. Of those lost to attrition, two participants

received all parts of the intervention while one only received the folder containing DSM educational materials and tools as this individual chose to discontinue participation shortly after their initial visit. Attrition was due to travel, other health comorbidities, and illness.

The mean age of the pre-intervention and post-intervention groups was 62.9 and 63.4, respectively. While the ages of participants ranged from 28 to 88 years for both groups, the majority of participants consisted of older adults (see Appendix Q). Demographic characteristics for both groups were analyzed by evaluating descriptive statistics (see Table 4.1 and Appendix Q) and calculating a Pearson Chi-Square for each variable. Post-intervention characteristics did not significantly differ from those initially recruited, and no significant relationships were found between variables ($p > .05$).

Table 4.1

Participants' Demographic Data

	Pre-Intervention		Post-Intervention	
	n(%)	Mean(*SD)*	*n*(%)	Mean(*SD)*
Gender				
Male	14(42.4)		14(46.6)	
Female	19(57.6)		16(53.4)	
Age		62.9(13.7)		63.4(13.9)
Ethnicity				
White/Caucasian	31(93.9)		28(93.3)	
Hispanic/Mexican	2(6.1)		2(6.7)	
Education				
Some HS*	4(12.1)		4(13.3)	
HS Diploma/GED	15(45.5)		13(43.3)	
Trade School	7(21.2)		6(20)	
Associate's Degree	4(12.1)		4(13.3)	
Bachelor's Degree	1(3)		1(3.3)	
Master's Degree	1(3)		1(3.3)	
Doctorate Degree	1(3)		1(3.3)	

Employment*		
Full-Time	9(27.3)	9(27.3)
Part-Time	3(9.1)	3(9.1)
Unemployed	1(3)	-
Retired	19(57.6)	17(51.5)
Living Arrangement		
House	31(93.9)	29(96.7)
Apartment	2(6.1)	1(3.3)
Marital Status*		
Single, Not Married	4(12.1)	4(13.8)
Married	23(69.7)	20(69)
Divorced	1(3)	1(3.5)
Widowed	4(12.1)	4(13.8)
Years Since Diagnosis*		
Less than 1	8(24.2)	6(18.2)
1-2	2(6.1)	2(6.1)
3-5	5(15.2)	5(15.2)
6-10	8(24.2)	8(24.2)
11-20	8(24.2)	7(21.2)
21+	1(3)	1(3)

*Information missing from one participant, pre-intervention

Analysis of the Instrument

The DSMQ, which was administered prior to and 12 weeks following implementation of the multimodal intervention, was used to measure participants' self-perception of their DSM behaviors over the previous 8 weeks. A Cronbach's alpha was calculated to measure the internal consistency of the 16 items within the DSMQ. The Cronbach's alpha for the pre-intervention (n = 16), post-intervention (n = 16), and combined pre- and post-intervention (n = 32) DSMQs were $\alpha = .749$, $\alpha = .834$, and $\alpha = .860$, respectively. These results represent acceptable ($.7 \leq \alpha < .8$) and good ($.8 \leq \alpha < .9$) internal consistency, demonstrating reliability of the DSMQ (Melnyk & Fineout-Overholt, 2019).

Changes in Outcomes

Following implementation of the multimodal intervention and completion of data collection, the primary and secondary outcomes of interest, HgbA1c levels and DSM behaviors,

respectively, were evaluated. Additional secondary outcomes included satisfaction of the multimodal intervention. The primary outcome demonstrated a reduction in mean HgbA1c levels from pre- to post-intervention while secondary outcomes demonstrated improvements in DSM behaviors related to diet, physical activity, and blood glucose monitoring.

Statistical Testing and Significance

All data were entered into International Business Machines Corporation's (IBM's) Statistical Package for the Social Sciences (Version 25), also known as SPSS®, for analysis. The project leader utilized the SPSS® step-by-step guide by Cronk (2020) to perform analysis and interpret the results. The primary and secondary outcomes were evaluated using paired-samples *t* tests. The primary outcome specifically addressed the aforementioned PICOT question: In adults who have T2D (P), how does the implementation of a multimodal intervention to encourage self-management (I) compared to current practices (C) impact HgbA1c levels (O) over a 12-week period (T)? The paired-samples *t* tests compared the means of both pre- and post-intervention HgbA1c levels and DSMQ scores. Descriptive statistics of both primary and secondary outcomes were also evaluated in order to help further determine clinical and statistical significance. The participants served as their own comparison for both the primary and secondary outcomes.

Findings

The primary outcome of pre- and post-intervention HgbA1c levels was evaluated with a paired-samples *t* test. The mean pre-intervention and post-intervention's HgbA1c levels were 7.79% (*SD* = 1.28) and 7.69% (*SD* = 1.28), respectively, lacking statistical significance ($t(30) = 0.59$, $p = .557$) (see Table 4.2). Among all participants who completed the intervention ($n = 30$), 45% demonstrated lower post-intervention HgbA1c levels, supporting clinical significance for these individuals (see Appendix R).

Secondary Outcomes

Diabetes Self-Management Questionnaire. The secondary outcome of pre- and post-intervention DSMQ scores was evaluated with a paired-samples *t* test. The DSMQ was scored and analyzed in its entirety and then further broken down and scored into the following sub-categories: (a) diet, (b) physical activity, (c) blood glucose monitoring, and (d) medication adherence (see Appendix S). The mean pre-intervention and post-intervention total DSMQ scores were 7.05 (*SD* = 1.39) and 7.54 (*SD* = 1.37), respectively, lacking statistical significance ($t(22) = -1.50$, $p = .148$) (see Table 4.2). Among all participants who completed the DSMQ pre- and post-intervention ($n = 22$), 77% reported an increase in DSM behaviors, overall.

Diet. When establishing an initial SMART goal, 73.3% of participants ($n = 22$) centered their goal around improving diet and nutrition (see Table 4.3 and Appendix T). The mean pre-intervention and post-intervention scores for diet within the DSMQ were 5.38 (*SD* = 2.12) and 5.95 (*SD* = 1.77), respectively, lacking statistical significance ($t(22) = -1.37$, $p = .186$) (see Table 4.2). Among all participants who completed the DSMQ pre- and post-intervention ($n = 22$), 50% reported an improvement in DSM behaviors centered around diet.

Physical Activity. When establishing an initial SMART goal, 30% of participants ($n = 9$) centered their goal around increasing physical activity (see Table 4.3 and Appendix T). The mean pre-intervention and post-intervention scores for physical activity within the DSMQ were 6.99 (*SD* = 2.31) and 7.29 (*SD* = 1.65), respectively, lacking statistical significance ($t(22) = -0.68$, $p = .505$) (see Table 4.2). Among all participants who completed the DSMQ pre- and post-intervention ($n = 22$), 36% reported an improvement in DSM behaviors centered around physical activity.

Blood Glucose Monitoring. When establishing an initial SMART goal, 23.3% of participants ($n = 7$) centered their goal around improving blood glucose monitoring (see Table 4.3 and Appendix T). The mean pre-intervention and post-intervention scores for blood glucose monitoring within the DSMQ were 4.77 (*SD* = 3.62) and 7.42 (*SD* = 2.83), respectively,

demonstrating statistical significance ($t(22) = -3.18$, $p < .05$) (see Table 4.2). Among all participants who completed the DSMQ pre- and post-intervention ($n = 22$), 64% reported an improvement in DSM behaviors centered around blood glucose monitoring.

Medication Adherence. When establishing an initial SMART goal, 6.7% of participants ($n = 2$) centered their goal around improving diabetes medication adherence (see Table 4.3 and Appendix T). The mean pre-intervention and post-intervention scores for medication adherence within the DSMQ were 9.52 ($SD = 1.50$) and 9.20 ($SD = 1.80$), respectively, lacking statistical significance ($t(22) = 0.63$, $p = .538$) (see Table 4.2). Among all participants who completed the DSMQ pre- and post-intervention ($n = 22$), 10% reported an improvement in DSM behaviors centered around medication adherence.

Intervention Satisfaction. The secondary outcomes of satisfaction with the multimodal intervention were analyzed using descriptive statistics (see Table 4.4). Among all participants who completed the intervention ($n = 30$), 73% ($n = 22$) completed the satisfaction questionnaire. Of these participants, 100% ($n = 22$) reported satisfaction with the multimodal intervention. Additionally, 90.9% ($n = 20$) of participants found the intervention to be helpful, 90.9% ($n = 20$) found the SMART goals method easy to use, 95.5% ($n = 21$) found the DSM educational materials and tools easy to read and understand, 90.9% ($n = 20$) found the DSM materials to be beneficial, 95.5% ($n = 21$) found that frequent follow-up promoted accountability, and 95.5% ($n = 21$) recommended continued use of the multimodal intervention with future diabetic patients. Clinical significance is further supported by multiple participants describing the intervention as “life changing.” Most expressed sincere appreciation for this project and the inclusion of the DSM educational materials, tools, and frequent follow-up. One described how he “found” himself again and “got (his) life back.”

Table 4.2

Primary & Secondary Outcomes: Paired-Samples t Tests

	Total(*n)*	Mean(*SD)*	*t* value	*p* value
Pair 1: HgbA1c			0.59	.557
Pre-Intervention	30	7.79(1.28)		
Post-Intervention	30	7.69(1.28)		
Pair 2: DSMQ (Total Score)			-1.50	.148
Pre-Intervention	22	7.05(1.39)		
Post-Intervention	22	7.54(1.37)		
Pair 3: Diet*			-1.37	.186
Pre-Intervention	22	5.38(2.12)		
Post-Intervention	22	5.95(1.77)		
Pair 4: Physical Activity*			-0.68	.505
Pre-Intervention	22	6.99(2.31)		
Post-Intervention	22	7.29(1.65)		
Pair 5: Blood Glucose*			-3.18	.004
Pre-Intervention	22	4.77(3.62)		
Post-Intervention	22	7.42(2.83)		
Pair 6: Med. Adherence			0.63	.538
Pre-Intervention	22	9.52(1.50)		
Post-Intervention	22	9.20(1.80)		

Table 4.3

SMART Goals

	N(%)
Diet/Nutrition	
Yes	22(73.3)
No	8(26.7)
Physical Activity	
Yes	9(30)
No	21(70)
Blood Glucose Monitoring	
Yes	7(23.3)
No	23(76.7)
Medication Adherence	
Yes	2(6.7)
No	28(93.3)

Table 4.4

Satisfaction with Intervention

	N(%)
Satisfaction with Intervention	
Yes	22(100)
No	-
Intervention was Helpful	
Yes	20(90.9)
No	1(4.5)
Missing	1(4.5)
SMART Method Easy to Use	
Yes	20(90.9)
No	-
Missing	2(9.1)
DSM Materials Easy to Read/Understand	
Yes	21(95.5)
No	-
Missing	1(4.5)
DSM Materials Beneficial	
Yes	20(90.9)
No	-
Missing	2(9.1)
Frequent Follow-up Promoted Accountability	
Yes	21(95.5)
No	-
Missing	1(4.5)
Recommend Continued Use of Intervention	
Yes	21(95.5)
No	-
Missing	1(4.5)

CHAPTER 5

DISCUSSION

The goal of this project was to determine if the implementation of a multimodal intervention involving individualized goal setting, educational supplements and tools centered around DSM, and frequent follow-up improves HgbA1c levels and DSM behaviors in patients with T2D. When developing treatment plans for diabetic patients, the doctoral-prepared advanced practice registered nurse (APRN) understands the importance of taking into account the limitations of the site's patient population including but not limited to lack of internet access, transportation, and financial resources. For this reason, it was necessary for this EBP intervention to be easily accessible, cost effective, and applicable for all T2D participants, regardless of their age. In coordination with the literature, current evidence, and professional organizations' recommendations, the primary outcome of interest, HgbA1c levels, was chosen because this testing is routinely performed to evaluate glycemic control at each patient's diabetes follow-up appointment. The goal of the primary outcome of decreased HgbA1c levels would help decrease the risk of developing major health problems and improve overall health. This chapter will provide an explanation and interpretation of project findings, discussion of strengths and limitations of the EBP project, examination of relevance of the EBP model, and recommendations for future EBP projects and clinical practice.

Explanation of Findings

Primary Outcome

The primary outcome of the project did not result in a significant decrease in HgbA1c levels ($t(30) = .59$, $p = .557$). While the mean pre-intervention and post-intervention HgbA1c levels demonstrated only a 1.28% reduction rate, 45% of participants ($n = 14$) demonstrated a reduction rate ranging from 1.66% to 25.89%. In terms of HgbA1c levels, 10% of participants ($n = 3$) who demonstrated poorly controlled diabetes prior to the intervention experienced greater

than 1% decrease in their HgbA1c level, superseding the mean reduction of 0.74% reported in the study by Chrvala et al. (2016) and similar findings by Almutairi and colleagues (2020). Ten participants' HgbA1c levels (30%) dropped or remained below the target goal of 7% as recommended by Garber et al. (2020), Pogach et al. (2017), Riddle et al. (2019), Standiford et al. (2019), and Waring et al. (2021). Additionally, 30% of participants (*n* = 10) demonstrated a clinically significant decrease in HgbA1c levels as evidenced by a decrease in HgbA1c level by ≥ 0.5% (Lisi, 2018). The primary outcome results, both the lack of overall statistical significance and achievement of clinical significance for some participants, are best supported when viewed within the context of the secondary outcomes which are discussed below.

Secondary Outcomes

The EBP project involved three essential interventions of which DSM lifestyle modifications involving diet and nutrition, physical activity, blood glucose monitoring, and/or diabetes medication adherence served as the foundation of the project. To best assess changes in these lifestyle behaviors and their influence on the primary outcome, total scores of the DSMQ and subcategories of diet, physical activity, blood glucose monitoring, and medication adherence were analyzed.

Diabetes Self-Management Questionnaire

As noted previously, among all participants who completed the DSMQ pre- and post-intervention (*n* = 22), 77% reported an increase in DSM behaviors, overall. Furthermore, greater than 81% reported an improvement in one or more of the four focused lifestyle modifications. Similarly, Almutairi and colleagues (2020) reported an improvement in at least one DSM behavior for all RCTs involved in their study.

Diet. Diet, along with physical activity, was the most commonly measured DSM behavior in the RCTs addressed by Almutairi et al. (2020). Similarly, the majority of participants involved in this EBP project (73.3%) centered their goal around improving diet and nutrition as this provided more realistic and achievable opportunities for most. Common, specific yet individualized goals

included meal planning, portion control, decreasing carb intake, replacing high starchy foods with vegetables, and avoiding sweets. These goals similarly reflect Standiford and colleagues' (2019) recommendations to include portion control, healthy choices, and monitoring carb intake when meal planning. Statistical significance was not achieved in this area as evidenced by the mean pre- and post-intervention scores of 5.38 (*SD* = 2.12) and 5.95 (*SD* = 1.77). However, among all participants who completed the DSMQ pre- and post-intervention (*n* = 22), 50% reported an improvement in DSM behaviors centered around diet. In addition to setting an individualized goal, this improvement may be attributable to both the reinforcement of the importance of diet and nutrition in diabetes outcomes and frequent follow-up which was reported by participants to promote accountability. Standiford et al. (2019) emphasizes the need to reinforce appropriate diet at every visit and during every patient encounter. Khanh-Dao Le (2021a) notes significant improvements in HgbA1c levels and DSM behaviors in those in which individualized telephone and mailing interventions were implemented. Additional evidence supports interventions aimed at impacting individual diet and nutrition as a critical component of DSME and DSMS for those with T2D (Khanh-Dao Le, 2021a).

Physical Activity. Physical activity, along with diet, was the most commonly measured DSM behavior in the RCTs addressed by Almutairi et al. (2020). Many participants involved in this EBP project (30%) centered their goal around increasing physical activity as this provided more realistic and achievable opportunities for many. Statistical significance was not achieved in this area as evidenced by the mean pre- and post-intervention scores of 6.99 (*SD* = 2.31) and 7.29 (*SD* = 1.65), respectively. However, among all participants who completed the DSMQ pre- and post-intervention (*n* = 22), 36% reported an improvement in DSM behaviors centered around physical activity. In addition to setting an individualized goal, this improvement may be attributable to both the reinforcement of the importance of physical activity in diabetes outcomes and frequent follow-up which was reported by participants to promote accountability. Standiford et al. (2019) emphasizes the need to reinforce physical activity at every visit and with every

patient encounter. Again, Khanh-Dao Le (2021a) notes significant improvements in HgbA1c levels and behaviors in those in which individualized telephone and mailing interventions were implemented.

Blood Glucose Monitoring. Few participants involved in this EBP project (23.3%) centered their goal around increasing blood glucose monitoring as this provided more realistic and achievable opportunities for some. Statistical significance was achieved in this area as evidenced by the mean pre- and post-intervention scores of 4.77 (*SD* = 3.62) and 7.42 (*SD* = 2.83), respectively. Among all participants who completed the DSMQ pre- and post-intervention (*n* = 22), 64% reported an improvement in DSM behaviors centered around blood glucose monitoring. In addition to setting an individualized goal, this improvement may be attributable to the frequent follow-up which was reported by participants to promote accountability. Multiple participants were started on continuous glucose monitoring (CGM) during the implementation of the project. This likely significantly impacted these results. Ombech (2021) reports reductions in HgbA1c levels regardless of the method utilized to self-monitor blood glucose. By monitoring blood glucose levels, participants reported being able to make better choices related to diet, physical activity, and medication adherence. This further supports Waring and colleagues' (2021) recommendation that self-monitoring of blood glucose demonstrates benefit when the results are used to make lifestyle changes or adjustments.

Medication Adherence. Very few participants involved in this EBP project (6.7%) centered their goal around improving diabetes medication adherence. Statistical significance was not achieved in this area as evidenced by the mean pre- and post-intervention scores of 9.52 (*SD* = 1.50) and 9.20 (*SD* = 1.80), respectively. Among all participants who completed the DSMQ pre- and post-intervention (*n* = 22), 10% reported an improvement in DSM behaviors centered around medication adherence. Based on the mean scores and associated standard deviations, one could state that medication adherence remained about the same, lacking improvement or worsening behavior, regardless of the intervention. Alexandre and colleagues (2021) identified

many demographic, psychological, and physical barriers of DSM related to medication adherence: (a) low socioeconomic position resulting in personal financial constraints and lack of access to medication, (b) forgetting to take diabetes medication resulting in missed doses, and (c) anxiety about side effects. Similar findings from this project included personal financial constraints and high costs of the medication which were not covered by insurance despite prior authorizations, lack of access to medication for other reasons, forgetting to take the medication, and medication side effects.

Satisfaction Questionnaire

Among all participants who completed the intervention (*n* = 30), 73% (*n* = 22) completed the satisfaction questionnaire. Of these participants, 100% (*n* = 22) reported satisfaction with the multimodal intervention. Additionally, 90.9% (*n* = 20) of participants found the intervention to be helpful, 90.9% (*n* = 20) found the SMART goals method easy to use, 95.5% (*n* = 21) found the DSM educational materials and tools easy to read and understand, 90.9% (*n* = 20) found the DSM materials to be beneficial, 95.5% (*n* = 21) found that frequent follow-up promoted accountability, and 95.5% (*n* = 21) recommended continued use of the multimodal intervention with future diabetic patients. Clinical significance is further supported by multiple participants describing the intervention as “life changing.” Most expressed sincere appreciation for this project and the inclusion of the DSM educational materials, tools, and frequent follow-up. One described how he “found” himself again and “got (his) life back.”

Overall results of this EBP project compared to previous studies may be negatively influenced by the duration of the project. The length of the interventions intended to improve glycemic control and DSM behaviors varied among the studies by Almutairi et al. (2020), Baldoni et al. (2017), and Podder (2021), ranging from 3 months to 2 years. The duration of this project was 12 weeks. During the evaluation phase of the project, the project leader continued to follow many participants during a separate clinical experience. Most of the participants demonstrated new or further reductions in HgbA1c levels which could not be included in the data for this project

since this project was evaluating the intervention for only 12-weeks, and completion of data analysis was required at an earlier date compared to when the participants were seen again.

Strengths and Limitations of the DNP Project

Strengths

Many strengths related to the project site were identified throughout each phase of planning, implementation, and evaluation of the EBP project. Perhaps the biggest and most important one being the support and willingness of the agency and medical director to allow implementation of an EBP change. At first mention of a DNP project, the providers discussed among themselves about what improvements in patient outcomes were needing to be made at this site. This allowed clear guidance for the project leader as to what patient population to focus on. Initial interest was placed on implementing CGM. However, once it was determined by the project leader that this was not a feasible intervention due to few patients meeting the criteria for CGM and cost of the intervention, the providers at this site were willing to allow the project leader to change the direction of the intervention. While CGM was not the project intervention, the providers did begin providing those who met the criteria with a sample of a 2-week CGM system as well as prescribing these systems more frequently which likely contributed to increased blood glucose monitoring behaviors and achievement of statistical significance. The diabetic educator played a vital role in not only supporting this project through excitement but also identifying patients who were interested in participating for recruitment by the project leader. The number of diabetic patients seen at the project site contributed to a good recruitment rate of 33 participants within 2 months. The project site was open daily throughout the week, allowing the project leader to work on and complete each phase of the project at her convenience. All of the staff, in addition to the agency's providers, were very supportive, allowing for timely implementation and completion of the project.

Strengths related to the multimodal intervention included overcoming limitations of the patient population which included lack of internet access, transportation, and financial resources.

Participants were recruited, set individualized goals, and given the DSM folder at their already scheduled appointments. Contents of the DSM folder were easy to read and understand. Initial hesitancy of participation was addressed when participants were informed that the intervention was free, they did not need internet access, and only needed to return to the office for their next 3-month diabetes follow-up appointment since follow-up by the project leader was completed by both mail and telephone. Costs of the intervention, initially covered by the project leader, were in turn covered by a grant from Sigma Theta Tau Zeta Epsilon chapter during the phase of implementation.

Limitations

Perhaps the largest, yet expected, barriers of the project, likely preventing the achievement of statistical significance, were the patient identified limitations associated with the holidays (Thanksgiving, Christmas, and New Year's), weather, and illness. As noted previously, the majority of participants centered their DSM goal around diet. Upon return to their 3-month follow-up appointments, more than 30% of participants made mention of struggling with diet around the holidays. Poor weather conditions made it difficult for many to increase their physical activity. Many stated they were unable to get outside due to the cold, snow, or rain. Furthermore, few reported that the weather influenced their mood and motivation, or lack thereof. Last, illness related to Covid-19, pneumonia, and additional health complications, including surgery, negatively impacted participants' ability to work towards achieving their goals. Additional participant associated barriers encountered in the project, similar to those identified in the study by Alexandre et al. (2021), included financial constraints. Participants voiced an inability to afford healthier eating options or medications as well as the need to work long hours, both of which inhibited their efforts towards improving glycemic control, DSM behaviors, and overall health.

An aforementioned strength also served as a limitation to the project: the inability to implement CGM as the project intervention. While very supportive in other ways, the energy of one key stakeholder and desire to implement the multimodal intervention decreased when it was

determined that CGM was not a feasible intervention for the project. This resulted in a very low recruitment rate by the provider, and many diabetic patients missed the opportunity to participate in the project. Additionally, although multiple efforts, including the development of an informative PowerPoint and quick facts note sheet, were taken by the project leader to inform all providers about the intervention and pertinent information related to its' implementation, there was confusion about who could participate in the project, initially. This also resulted in many diabetic patients missing the opportunity to participate in the project.

Additional limitations that occurred early on during the implementation phase and were not anticipated included the time it took to recruit participants and complete the initial visit and underutilization of the SMART goals method by the providers. It is likely that these two limitations were closely related. To combat these limitations, the project leader remained on-site and assumed responsibility of recruitment once patients who were willing to participate in the project were identified by their provider. By doing this, the project leader was able to spend the necessary amount of time with each participant explaining the interventions, setting SMART goals, and answering questions. Last, an unanticipated limitation was the inability to be on-site during the weeks of Valparaiso University's academic break and between semesters to ensure the final questionnaires were being administered to each participant upon return to their 3-month diabetes follow-up appointment. Prior to the break, the project site's staff were given a list of days in which participants would be returning for their follow-up appointments. To help improve the response rate upon return to the site following break, the project leader mailed the questionnaire and an appreciation letter (see Appendix U), along with a pre-addressed stamped envelope, to those who were not administered a questionnaire at their follow-up appointment.

Sustainability

To help promote sustainability of the intervention, the project leader provided the site with extra DSM folders which also contained the SMART goals worksheet. Most of the content included in the DSM folder were free, downloadable, and reproducible handouts from the

American Diabetes Association and can be easily accessed online (see Appendix G). Additionally, the weekly log and journal (see Appendix G), which were created by the project leader, were given to the diabetic educator to print out as needed. Ways to continue similar frequent follow-up with diabetic patients were discussed, but did not result in a set plan as this will require further effort from management and other support staff. This EBP change will likely be adopted by certain providers of the practice as they are planning to hire on an additional provider who is also passionate about diabetes and interested in implementing this intervention. Recommendations for future implementation and sustainability of the multimodal intervention would include implementing the project during the spring or summer months to help aid patients in establishing healthy DSM behaviors and habits prior to the holidays and winter months.

Relevance for EBP Model

The Iowa Model Revised served as a guide in the development, implementation, and evaluation of this EBP project. The model's sevens steps closely aligned with the project: (1) identifying triggering issues or opportunities, (2) stating the question or purpose, (3) forming a team, (4) assembling and synthesizing the body of evidence, (5) designing and piloting the practice change, (6) integrating and sustaining the practice change, and (7) disseminating the results (Buckwalter et al., 2017; Dang et al., 2019). The three decision points, located at the end of steps 2, 4, and 5, aided the project leader in determining topic priority, sufficiency of evidence, and appropriateness of EBP change. These decision points were pertinent to this project as they provided feedback loops throughout allowing the project leader to revisit previous steps as necessary.

Together, the providers at the project site identified an area in which patient outcomes needed improvement: diabetes (step 1). The project leader then developed an initial PICOT question centered around CGM (step 2). Before moving forward, it was necessary to determine whether or not this topic was a priority (decision point 1). Due to related costs and unmet criteria, CGM was not deemed a priority resulting in the project leader to enter the feedback loop and

revisit the previous step. From there a new PICOT question was formed and priority was established. To achieve appropriate use of everyone's time, evidence assembly, appraisal, and synthesizing (step 4) and determination of sufficient evidence (decision point 2) were completed prior to forming a team involving the diabetic educator and other key stakeholders (step 3). The EBP multimodal intervention was developed and implemented, and data were evaluated (step 5). Based on its' clinical significance, it has been determined that this EBP change is appropriate for adoption into practice (decision point 3). Discussion of how to sustain the practice change is ongoing (step 6). The results of the project were disseminated to the project site's providers and at the University of Iowa Hospitals & Clinics 29ths National EBP Conference (step 7).

As noted above, it was necessary that steps 3 and 4 be switched for this project. The steps, decision points, and feedback loops within the model support its ease of use and applicability in the clinical setting. The Iowa Model Revised allowed the project leader to establish clear boundaries, set an appropriate target, and utilize a more focused approach to help achieve successful EBP change (Buckwalter et al., 2017; Dang et al., 2019). This model supported the engagement of patients as key stakeholders, the incorporation of patient preferences and values, and the consideration of the patient-partnership as an ongoing priority. The use of the Iowa Model Revised was appropriate for this EBP project because of its emphasis on patient-centeredness and the structure of its framework.

Recommendations for the Future

The incidence of diabetes continues to increase at an alarming rate (WHO, 2020). Each year, there are 1.5 million newly diagnosed cases of diabetes each year in the U.S. (CDC, 2020c). This condition affects individuals of all ages and leads to increasing morbidity and mortality. Results from this EBP project support recommendations for future research and practice by the doctoral-prepared APRN.

Research

Future research is needed to determine if the multimodal intervention impacts long-term diabetes outcomes and overall health. The overall results of this EBP project compared to previous studies may be negatively influenced by duration of the project. As noted previously, the length of the interventions intended to improve glycemic control and DSM behaviors varied among the studies by Almutairi et al. (2020), Baldoni et al. (2017), and Podder (2021), ranging from 3 months to 2 years in duration. The duration of this project was only 12 weeks. Additionally, future research is needed to determine if the multimodal intervention is more effective and sustainable for patients if implemented during the spring or summer months. Diabetic patients may be able to establish better habits and experience better results and sustainability during the spring and summer months because the weather is nice and there is often easier access to fruits and vegetables in the Midwest regions of the U.S. The limitations listed above demonstrate that future research is needed to determine how to best help patients manage their diabetes during the winter months and increase DSM motivation over the holiday seasons. Last, future research is needed to determine whether or not CGM impacts long-term diabetes outcomes and overall health for all T2D patients which may support changes to the current criteria required to prescribe CGM.

Practice

The clinical findings of this EBP project may support the APRN's use of a multimodal intervention in the treatment plan of a patient with T2D. The findings indicate that a multimodal intervention is not only effective in reducing HgbA1c levels but also increasing DSM behaviors in many patients with T2D. Both quantitative and qualitative data support the continued use of DSME and DSMS.

Education

Although a very common diagnosis, little is known about diabetes in the clinical setting. Unfortunately, the undesired outcomes related to diabetes are broad and often vary between

individuals. Many are uninformed about the negative and positive influences that lifestyle habits and behaviors can have on their diabetes and overall health. In a high technological, fast paced world, managing diabetes is simple. It truly is all about getting back to the basics: (a) diet, (b) physical activity, (c) blood glucose monitoring, and (d) medication adherence. This should be emphasized not only in the clinical setting by providers to their patients but also in the educational setting by professors to their students who are in medical training. Knowledge is power. It is up to each provider that their diabetic patients are both properly informed about the measures one can take to improve glycemic control and DSM behaviors and equipped with the tools to achieve success.

Conclusion

The purpose of this EBP project was provide primary care APRNs and their physician counterparts with interventions that are easily accessible, cost effective, and applicable for all T2D patients to improve diabetes outcomes and overall health. Specifically, the goal of the multimodal intervention involving goal setting, DSM educational materials and tools, and frequent follow-up was to decrease HgbA1c levels and improve DSM behaviors. By utilizing the intervention, 30% of participants' HgbA1c levels dropped or remained below the target goal of 7%, and 30% demonstrated a clinically significant decrease in HgbA1c level as evidenced by a decrease in HgbA1c level by ≥ 0.5%. Self-management behaviors centered around diet, physical activity, blood glucose monitoring, and medication adherence increased by 77%. Participants reported 100% satisfaction with the intervention and recommended that their providers continue its use with future diabetic patients. It is the responsibility of the APRN provider to ensure their patients are both properly informed about the measures one can take to improve glycemic control and DSM behaviors and equipped with the tools to achieve DSM success. In a high technological, fast paced world, managing diabetes is simple. It truly is all about getting back to the basics: (a) diet, (b) physical activity, (c) blood glucose monitoring, and (d) medication adherence.

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BIOGRAPHICAL MATERIAL

Ms. Snyder graduated Magna Cum Laude from Pensacola Christian College with a Bachelor of Science in Nursing degree in 2015. Since receiving her undergraduate degree, she has worked as a registered nurse on the Labor and Delivery and High Risk Obstetrics units at Memorial Hospital in South Bend, Indiana. In 2019, she received her Inpatient Obstetric Nursing Certification. Additionally, Alyssa holds certifications in Advanced Cardiac Life Support and Neonatal Resuscitation Provider. Prior to attending graduate school at Valparaiso University where she is currently pursuing a Doctor of Nursing Practice degree, Alyssa mentored nursing students, oriented newly hired nurses, and served as relief charge nurse on the aforementioned obstetrical units. Alyssa is a member of the American Association of Nurse Practitioners, Coalition of Advanced Practice Registered Nurses of Indiana, American Nurses Association, American Diabetes Association, and Sigma Theta Tau International Honor Society of Nursing – Zeta Epsilon Chapter. She was the recipient of multiple Gerke Scholarships during the Fall of 2019, 2020, and 2021 as well as Spring of 2021 and 2022. She received an Evidence-Based Practice (EBP) grant by Sigma Theta Tau Zeta Epsilon Chapter while completing her EBP project entitled, “Back to the Basics with SMART Goals: A Multimodal Intervention for Adults Who Have Type 2 Diabetes.” Alyssa’s EBP project was accepted for poster presentation at the University of Iowa’s Hospital and Clinics 29th National Evidence-Based Practice Conference in April of 2022. Following graduation in May of 2022, Ms. Snyder plans to marry the love of her life and work as a family nurse practitioner (FNP) at a primary care office located in Northern Indiana where she has been offered a job. Alyssa desires to use the knowledge and skills the Lord has blessed her with to serve Him and others faithfully wherever He leads. It is her prayer that others may see Him through her and come to a saving knowledge of Christ. Ms. Snyder is committed to live out Jude 1:22 while working as an FNP and promoting the nursing profession: “And of some have compassion, making a difference.”

ACRONYM LIST

ADA: American Diabetes Association

AACE: American Association of Clinical Endocrinology

BP: Blood Pressure

BMI: Body Mass Index

CDC: Centers for Disease Control and Prevention

CPG: Clinical Practice Guidelines

CS: Consensus Statement

CINAHL: Cumulative Index of Nursing and Allied Health Literature

DSM: Diabetes Self-Management

DSME: Diabetes Self-Management Education

DSMQ: Diabetes Self-Management Questionnaire

DSMS: Diabetes Self-Management Support

EBP: Evidence-Based Practice

EMR: Electronic Medical Record

ES: Evidence Summary

IRB: Institutional Review Board

ISDH: Indiana State Department of Health

JBI: Joanna Briggs Institute

JHNEBP: Johns Hopkins Nursing Evidence-Based Practice

HgbA1c: Hemoglobin A1c

MA: Medical Assistant

PICOT: Population, Intervention, Comparison, Outcome, Time

POC: Point-Of-Care

SCOB: State of Childhood Obesity

SD: Standard Deviation

SMART: Specific, Measurable, Attainable, Realistic, Time-specific

SPSS®: Statistical Package for the Social Sciences

SR: Systematic Review

T2D: Type 2 Diabetes

TRIP: Turning Research into Practice

U.S.: United States

WHO: World Health Organization

APPENDIX A

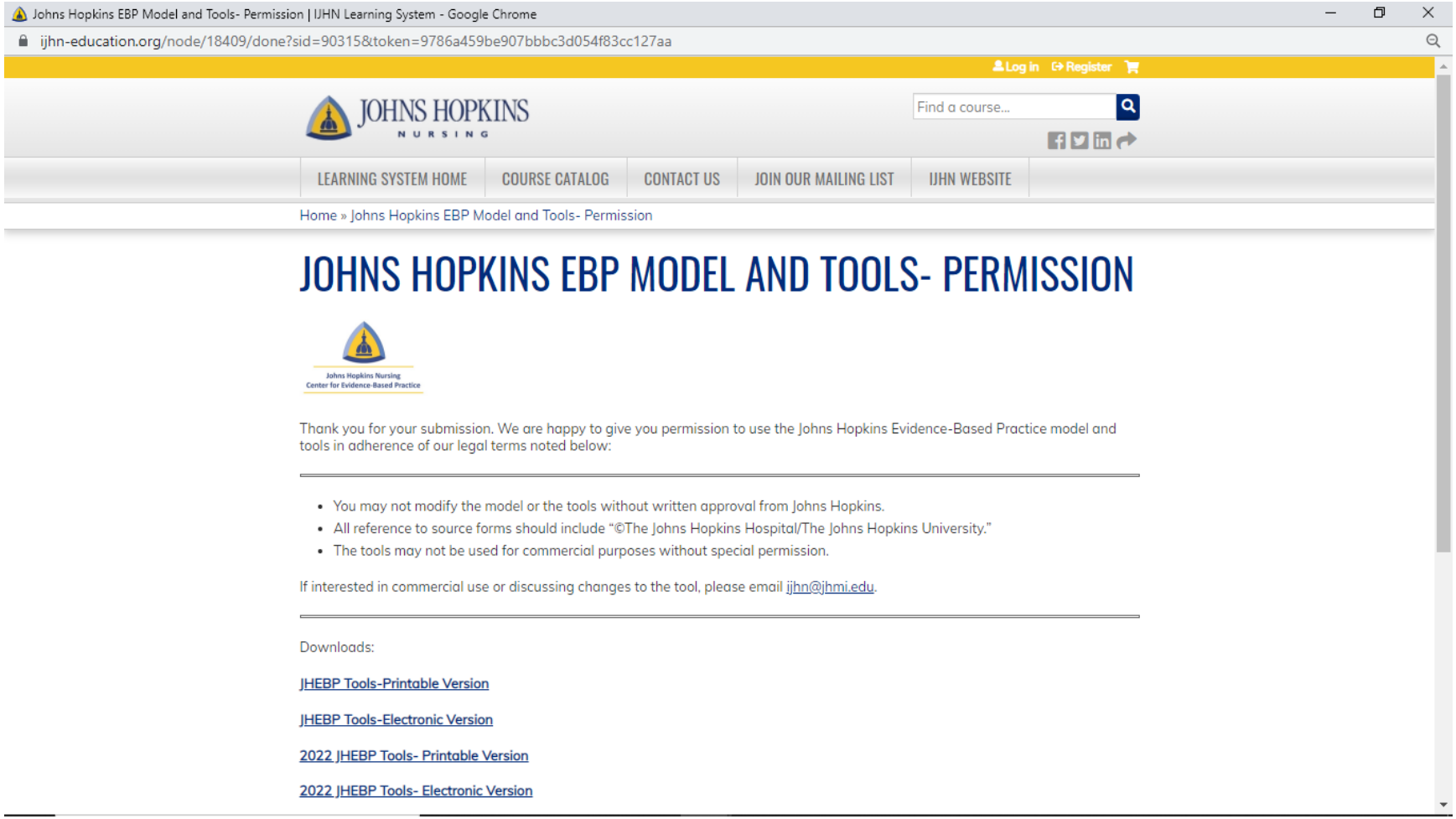
Literature Search Grid

Database/Resource Searched	Keywords/Phrases Used	Limiters Used	Number of Results from Search	Number of Pieces of Evidence Selected for Use In Paper
Joanna Briggs Institute EBP Database (JBI)	"Diabetes Mellitus" OR "Type 2" AND Self-manag*	5 year limit (2016-current)	58	5
Cochrane Library	"Diabetes Mellitus" OR "Type 2" AND Self-manag*	5 year limit (Jan 2016 to Jun 2021)	3	0
Turning Research into Practice (TRIP) Medical Database	(Title: "Diabetes Mellitus" OR "Type 2") AND Manag*	Guidelines 5 year limit (from:2016)	47	4
CINAHL	(MM "Diabetes Mellitus, Type 2") AND self-care OR self-manag* AND "hemoglobin a1c"	Published Date: 2016/01/01-2021/12/31 English Language Scholarly (Peer Reviewed) Journals	101	2
MEDLINE with Full Text (via EBSCO)	(MM "Diabetes Mellitus, Type 2") AND self-care OR self-manag* AND "hemoglobin a1c"	Date of Publication: 2016/01/01-2021/12/31 English Language Scholarly (Peer Reviewed) Journals	220	2
	List the Title of the Article/Original Piece of Evidence that contained the "Citations Chased"		Number of Pieces Searched	Number of New Pieces of "Chased" Evidence Selected for Use
Pieces of Evidence selected that were "Citation Chased" from systematic reviews, evidence summaries, guidelines, etc.	Factors Influencing Diabetes Self-Management in Adults: An Umbrella Review of Systematic Reviews	N/A	6	1
	Diabetes (Non-Hospitalized Patient): Self-management Education	N/A	1	0
	Diabetes (Self-Managed Type 2): Educational Support in Community Settings	N/A	1	0
	Blood Glucose Level: Self-Monitoring	N/A	1	0

	Management of Type 2 Diabetes Mellitus	N/A	1	0
	American Diabetes Association Standards of Medical Care in Diabetes - 2019	N/A	1	0
	VA/DoD Clinical Practice Guideline for the Management of Type 2 Diabetes Mellitus in Primary Care	N/A	2	0
		Total Number of pieces of Evidence Identified for Use:		14

APPENDIX B

Permission to Use Johns Hopkins Appraisal Tools



APPENDIX C

Table 2.2

Evidence Table

Lead Author/ Year/Quality	Purpose/ Design/Sample or Population	Interventions	Measurement/ Outcomes	Results/ Findings	Strengths/ Limitations
Level I Evidence					
Alexandre, K. (et al.) 2021 High Quality (A)	**Purpose:** To determine what factors influence diabetes self-management **Design**: Systematic review **Sample**: Adults diagnosed with either type I or type II diabetes mellitus 114 systematic reviews were included in this systematic review sample. There were multiple countries of origin involved in all of the studies combined.	There were no isolated interventions specific to this review. This systematic review is an umbrella review of 114 systematic reviews combined. Each of these systematic reviews focused on various diabetes self-management foci: DSM motivational predictors, DSM adherence factors, self-care activities, cost of care associated with DSM, social/peer support, Diet, physical activity, Medication adherence, self-monitoring of blood glucose, depression, cognitive behavioral therapy (CBT), foot care,	Barriers or facilitators of diabetes self-management Diabetes self-management/Individual behaviors/factors Hemoglobin A1c, blood pressure (diastolic and systolic), Lipid panels, smoking cessation, BMI, depression scores, social support, self-care	There were approximately 40 factors related to diabetes self-management identified. Psychological factors are one of the most common barrier or facilitator of diabetes self-management. Additional barriers or facilitators are behavioral skills, demographics, physical environment, and social or cultural influencers. Most commonly studied DSM behaviors are diet, physical activity, and medication compliance.	**Strengths:** Authors addressed heterogeneity of the included studies. Authors included strong sample and population **Limitations:** Layout of SR was difficult to follow. Lacks statistical conclusions
Almutairi, N. (et al.) 2020 High Quality (A)	**Purpose:** To determine the effectiveness of "patient activation intervention" on glycemic control and	Patient activation is a concept focused on "patient knowledge, skills and confidence building" (p. 17).	Glycemic control (hemoglobin A1c levels) and diabetes self-management behaviors were measured as either the primary or	7 of the 10 studies reported a significant improvement in glycemic control for the intervention group.	**Strengths:** Search strategy provided along with PRISMA; Inclusion and Exclusion

	diabetes self-management behaviors (p. 13) **Design**: Systematic review **Sample**: Adults (greater than 18 years of age) who have type 2 diabetes mellitus 10 RCTs with a total of 3,728 participants were included in this systematic review There were multiple countries of origin involved in all of the studies combined: U.S (4), Chine (2), Brazil (1), United Kingdom (1), Germany (1), and Qatar (1).	The RCTs in this systematic review utilized multiple patient activation interventions (motivational interviewing, patient empowerment, individualized patient centered care, skills building, etc.). The interventions were delivered by way of in-person, telecare (including telephone calls/follow-up), and a combination of the two. The intervention ranged from 6 weeks to 1 year.	secondary outcome(s) in all 10 studies. Self-management behaviors include: diet, physical activity, blood glucose monitoring, medication compliance, and foot care.	Those who had very poorly controlled diabetes (starting hemoglobin A1c greater than 10%) demonstrated a significant decrease with the intervention. All RCTs reported an improvement in at least 1 diabetes-self management behavior for the intervention group. Diet and physical activity were the most commonly measured self-management behavior.	Criteria; Information of each study provided clearly on tables **Limitations:** None Identified
Baldoni, N. R. (et al.) 2017 High Quality (A)	**Purpose:** To determine the effectiveness of empowerment strategies on hemoglobin A1c levels in patients who have diabetes mellitus. **Design:** Systematic review with meta-analysis **Sample**: Individuals who have diabetes mellitus (type 1 or 2). The majority of	The interventions consisted of empowerment strategies and varied between studies: group discussion, diabetes education toolkits, self-care booklets centered on diabetes, weekly meetings, etc.	Hemoglobin A1c was utilized as the gold standard measurement and primary outcome for glycemic control evaluation and effectiveness of the intervention. Additional outcomes were measured: diastolic blood pressure, lipid levels, diet, blood glucose monitoring, BMI, attitudes toward diagnosis, and confidence of knowledge of diagnosis	6 of the 9 studies demonstrated a significant reduction in hemoglobin A1c levels for the intervention groups.	**Strengths**: Appropriate search strategy provided along with PRISMA. Tables provided are easy to follow and detail each study **Limitations**: None identified

	the studies included only patients with type 2. 9 studies taking place in various countries were included in this systematic review; 7 of the 9 studies were included in the meta-analysis Sample sizes of each study ranged from 32 to 430 participants				
Chrvala, C. A. (et al.) 2016 High Quality (A)	**Purpose:** To determine the effectiveness of diabetes self-management (and mode of delivery, provider type, and duration) and support on hemoglobin A1c levels in adults who have type 2diabetes mellitus. **Design**: Systematic review **Sample**: Adults who have type 2 diabetes (studies may have included both type 1 and 2 – but separate results had to be reported on type 2 diabetics in order to be included in this systematic review)	The intervention of all studies included DSME. The modes of DSME delivery consisted of individual or group education, a combination of individual and group education, or remote methods via online or telephone. Various providers delivered DSME: healthcare professionals including physicians, diabetes educators, registered nurses, etc. In this SR, provider type was classified as either solo or team. Duration of DSME was classified as either less than or equal to 10 hours or greater than 10 hours.	Baseline and Follow-up (post-intervention) hemoglobin A1cs were measured as the primary outcome. Outcomes were analyzed using Pearson's chi-square.	Modes of DSME delivery: Combination of education demonstrated significant improvement in hemoglobin A1c levels. Provider method: Approximately 70% of team interventions demonstrated significant improvement in hemoglobin A1c levels compared to only 56% of solo interventions. Analysis of results using Pearson's chi-square did not determine significance between team or solo methods. Additionally, there was a mean improvement in hemoglobin A1c levels of -0.74 in both methods. Those with a higher hemoglobin A1c at baseline demonstrated significant improvement in levels following DSME interventions. Those participating in DSME for greater than 10 hours demonstrated significantly greater changes in 70% of interventions.	**Strengths:** Researchers identified and addressed heterogeneity; Researchers provided tables making it easy to follow and review single studies. Authors provided analysis. Appropriate search strategy presented. Numerous RCTs included in SR. **Limitations:** **None**

	120 RCTs were included in this review.			The overall mean reduction in hemoglobin A1c levels in all participants combined was 0.74 (SD, 0.63).	
Garber, A. J. (et al.) 2021 Good Quality (B)	**Purpose:** To provide guidance to healthcare providers on how to comprehensively manage patients who have type 2 diabetes **Design**: Consensus/Position Statement **Population:** Individuals who have type 2 diabetes	Patient education on lifestyle modifications, packaged/processed food nutrition labels, dietary measures, weight control, physical activity, smoking cessation, blood glucose monitoring. Physical activity consisting of greater than or equal to 150 minutes of moderate-intensity activity each week. Establishing goals centered on weight loss/control, physical activity, diet. Pharmacotherapy and continuous glucose monitoring may be necessary for certain patients.	Hemoglobin A1c, blood pressure, lipid levels, and weight are routinely measured in diabetes care. Hemoglobin A1c is an established biomarker for glycemic control and is measured every 3 months until stable.	Lifestyle modifications are multifaceted (diet, weight control, physical activity, blood glucose monitoring, medication compliance) and should be ongoing. Treatment plans should include individualized hemoglobin A1c target goal(s); A target hemoglobin A1c goal of less than or equal to 6.5% is ideal as long as it can be achieved safely. Patients should be seen for diabetes management every 3 months until their diseases is well-controlled.	**Strengths:** Provides comprehensive details of T2DM algorithm, includes key stakeholders **Limitations:** Does not report search strategy
Khanh-Dao Le, L. 2021 High Quality (A)	**Purpose**: To determine the best evidence "regarding individual dietary teaching compared to group teaching for HGa1c control in newly diagnosed adults with type 2 diabetes" **Design**: Evidence Summary	Diabetes self-management education delivered in a group-based format Diabetes self-management education delivered in an individualized format	The effect of diabetes self-management education on hemoglobin A1c levels was measured. Secondary outcomes were also measures which included psychosocial, lifestyle, and clinical improvements. Attendance rates of a group-based format was measured.	One systematic review supports group-based diabetes self-management due to its cost-effectiveness and report of significantly reducing hemoglobin A1c. However, a qualitative study found that attendance rates for group-based education formats are low and an RCT identified no differences between peer-support, group-based education and individual sessions on hemoglobin A1c.	**Strengths:** The author included qualitative studies to determine participants' viewpoints and limitations. **Limitations**: Statistical data was not provided.

	Sample: Adults newly diagnosed with type 2 diabetes 1 systematic review with meta-analysis involving 21 RCTs, 3 single RCTs, 2 qualitative studies, and 1 position statement were included in the evidence summary sample			One RCT demonstrated that an individualized format involving telephone interventions and educational mailings focused on small changes in diet and physical activity significantly improved hemoglobin a1c levels, DBP, and weight in women. Interventions aimed at impacting individual food consumption, regardless of educational format, is a critical component of TIIDM education and diabetes self-management. Current evidence does not clearly denote which format of dietary teaching/self-management is best. Clinical judgement should be utilized by healthcare professionals.	
Khan-Dao Le, L. 2021 High Quality (A)	**Purpose:** To determine the best evidence regarding the effectiveness of diabetes self-management education **Design:** Evidence Summary **Sample:** Patients who have diabetes 1 systematic review and meta-analysis involving 8 RCTs, 11 systematic reviews involving 511 studies (167+ RCTs), 1 single RCT, and 1 CPG were included	Individual self-management education Diabetes self-management education or instruction: goal setting, medication compliance, interpreting blood sugar results Exercise Goal setting Follow-up telephone calls monitoring patient's progress toward meeting goals that were set with the clinician during an individual visit Diabetes self-management tools listing goals and plan to better help patients	Hemoglobin A1c Quality of life, Psychological/Psychosocial, Clinical outcomes	One systematic review reported an absolute reduction in hemoglobin A1c of 0.57. Interventions aimed at improving knowledge of diabetes, self-management skills, and active participation centered around goal setting demonstrated a mean reduction in hemoglobin A1c of 0.74. All patient who have diabetes should receive self-management education centered on diet, physical activity, medication compliance, blood sugar monitoring, and reducing risks such as smoking cessation.	**Strengths:** The author included numerous high quality pieces of evidence in the summary. Statistical data was provided for readers. **Limitations**: None identified

	in the evidence summary sample	monitor progress and self-manage diabetes Active participation			
Ombech, E. 2021 High Quality (A)	**Purpose**: To determine the best evidence "regarding the effectiveness of self-monitoring of blood glucose (SMBG)" **Design**: Evidence Summary **Sample**: Patients with type 2 diabetes mellitus 2 systematic reviews and meta-analysis involving 29 RCTs, 3 systematic reviews involving 53 RCTs, and 2 single RCTs were included in the evidence summary sample	Structured and/or unstructured self-monitoring of blood glucose Continuous glucose monitoring	The effect of SMBG on glycemic control/hemoglobin A1c was measured.	Self-monitoring of blood glucose, regardless of the method utilized, is beneficial in reducing hemoglobin A1c and should be considered an important strategy in diabetes self-management.	**Strengths**: Evidence about both methods of monitoring blood glucose were evaluated by the author. **Limitations**: Statistical data was not provided.
Podder, V. 2021 High Quality (A)	**Purpose**: To determine the best evidence regarding educational support for self-managed TIIDM in a community setting. **Design:** Evidence Summary **Sample:** Patients who have diabetes 3 systematic reviews and meta-analysis involving 69 RCTs,	Diabetes self-management education: communication, education, health data, feedback Individual vs. group-based educational format Comparison group: usual care consisting of minimal diabetes education and/or intervention	The effect of diabetes self-management education on Hemoglobin A1c was measured. In one systematic review, weight, waist circumference, lipid levels, fasting blood glucose, and knowledge of diabetes was measured.	One systematic review reported communication, education, feedback, and health data as essential elements to improving hemoglobin A1c levels. Engagement in diabetes self-management education/intervention compared to minimal education/intervention significantly improves hemoglobin A1c levels both statistically and clinically. A mean reduction in hemoglobin of 0.74 was reported for the diabetes self-management group.	**Strengths:** The author included numerous high quality pieces of evidence in the summary. Statistical data was provided for readers. **Limitations**: None identified

	and 4 systematic reviews were included in the evidence summary sample			One systematic review reported a greater reduction in hemoglobin A1c levels at 6-, 12-, and 18-months for those participating in a group-based educational format. There was no notable difference in hemoglobin levels between the group-based and individual DSME format at 24-months. DSME produced favorable outcomes for weight, waist circumference, lipid levels, fasting blood glucose, and diabetes knowledge. Diabetes self-management education and interventions produces favorable outcomes. Resources for DSME in the community setting should be determined at the clinicians own judgement.	
Pogach, L. (et al.) 2017 High Quality (A)	**Purpose:** To provide guidance to healthcare providers on how to manage type 2 diabetes mellitus in the primary care setting **Design:** Clinical practice guideline **Sample**: Non-pregnant/Nursing adults who have type 2 diabetes mellitus and are eligible to receive care at the VA/DOD healthcare systems – this includes veterans, their families, etc.	Shared-decision making and patient-centered care are vital components of diabetes treatments. Treatment plans should be individualized and include the patients' needs and goals, including lifestyle changes (physical activity, diet/nutrition, smoking cessation, weight loss/control) and a hemoglobin A1c target range. Comprehensive diabetes self-management education (DSMS) includes: diet, physical activity, self-monitoring of blood glucose, tools to identify or integrate the patients' goals, etc.	Hemoglobin A1c level serves as a glycemic control indicator. DSME has been demonstrated to decrease hemoglobin A1c levels and BMI. A lower-carb diet has been demonstrated to improve glycemic control (hemoglobin A1c levels).	A target hemoglobin A1c range for uncomplicated diabetic patients is 6.0-7.0% Although DSMS is a newer concept, ongoing support such as intermittent follow-up and the evaluation of and re-establishment of goals improved outcomes The clinician and patient should decide on a personalized hemoglobin A1c target and behavioral/lifestyle goals together. Patients should be provided with DSME and DSMS either individually or in a group format to help them understand and successfully manage their diagnosis and perform lifestyle changes.	**Strengths:** All around strong CPG **Limitations**: None identified

		Diabetes self-management support (DSMS) includes ongoing support to evaluate progress on personal goals, knowledge of diagnosis, assessment of DSM skills, and re-education as needed.			
Riddle, M. C. (et al.) 2019 High Quality (A)	**Purpose:** To provide guidance to clinicians on the management of diabetes **Design**: Clinical practice guideline **Population**: Individuals who are diagnosed with diabetes	Fundamental elements of diabetes treatment involve patient centered care including diabetes self-management education and support (DSMES), physical activity, dietary counseling and smoking cessation. Interventions should include a low-carb diet, 30 minutes of aerobic activity daily (broken up as necessary to meet the needs of the patient) working up to 150 minutes each week of moderate-intensity physical activity. Self-monitoring of blood glucose may be utilized for certain patients.	Hemoglobin A1c is measured as an indicator of glycemic control over the course of 3-months. BMI is routinely measured at diabetes follow-up visits.	DSMES improves knowledge of the diagnosis, self-care, hemoglobin A2c levels, quality of life, and weight. Hemoglobin levels should be routinely measured every 3-months until target goals have been maintained. Point of care testing is an appropriate and timely measure for this. Low-carb diets improve glycemic control. Resistance exercise has been demonstrated to lower hemoglobin A1c levels. Weight management is in integral part of diabetes care.	**Strengths:** All around strong CPG. Very detailed. Provides references to studies within text. Includes key stakeholders. Limitations: None identified.
Sherifali, D. (et al.) 2016 High Quality (A)	**Purpose:** To determine the effectiveness of health coaching on glycemic control. **Design**: Systematic review with meta-analysis. **Sample**: 724 Non-pregnant adults who had type 2 diabetes	All RCTs included in this study implemented a health coach intervention. The authors define health coaching as “health-related education, behavior change and support by a healthcare professional” (p. 85). Coaching intervention methods/sessions included: telephone only, a	The primary outcome measured was hemoglobin A1c levels. All RCTs reported hemoglobin A1c changes.	Health coaching demonstrated the following pooled effect: a reduced hemoglobin A1c level of 0.32% (95% CI, -0.50 to -0.15) Short term health coaching (less than 6 months) demonstrated a significant decrease in hemoglobin A1c levels (0.23%) (95% CI, -0.37 to -0.09)	**Strengths:** The researchers took into account the heterogeneity of the studies. Provided in-depth information of each study on tables. Limitations: None identified.

	8 RCTs were included in this review.	combination of telephone and face-to-face, or a combination of telephone, internet, and face-to face Coaching interventions consisted of goal setting/achievement, improving diabetes self-care management/knowledge, individualized recommendations, and/or frequent follow-up. The control groups received the usual/formal standard of care diabetes education and support.			
Standiford, C. J. (et al.) 2019 High Quality (A)	**Purpose:** To provide guidance to healthcare providers on how to manage type 2 diabetes mellitus **Design**: Clinical practice guideline **Sample**: Adults who have type 2 diabetes mellitus	Critical elements of treatment for type 2 diabetes includes self-management education and tools, lifestyle interventions/changes, goal setting, and blood glucose control. Diabetes self-management topics include: daily self-care, knowledge of and progress towards hemoglobin a1c levels/goals, blood glucose monitoring, medication compliance, symptoms of hyper- and hypoglycemia, physical activity, meal planning, weight loss, and stress/coping Goals should be centered around the aforementioned DSM topics	Hemoglobin A1c is measured every 3-months if one is on insulin or their diabetes is not well-controlled. Blood pressure, weight, and BMI are assessed at each diabetes visit. A hemoglobin A1c greater than 6.5% indicates diabetes.	Individuals should regularly visit their primary care provider every 3- or 6-months. A target hemoglobin A1c for patients with TIIDM is equal or less than 7%. Patients whose Hemoglobin A1c level is not at or below target or who have undergone changes to either diabetic medications or lifestyle should have their hemoglobin measured every 3-months. Diet and physical activity should be reviewed and reinforced at every visit. Meal Planning should include portion control, healthy choices, and/or monitoring carbohydrate intake	**Strengths:** Strong CPG, easy to understand and follow, addresses population of interest very clearly, includes necessary stakeholders Limitations: None identified.

				Goals centered around diabetes self-management should be set with each patient.	
Waring, A. (et al.) 2021 Good Quality (B)	**Purpose:** To provide guidance to healthcare providers on how to appropriately treat type 2 diabetes mellitus **Design**: Clinical practice guideline **Population**: Individuals who have type 2 diabetes	Diabetes treatment include lifestyle modifications such as diet, physical activity, weight management, foot care, medication compliance, and blood glucose monitoring. Establish risk-reduction goals and a balance between dietary intake and physical activity Perform or work up to 30 minutes or more of moderate-intensity exercise. Break-up physical activity into increments as needed. Consume a low-carb, Mediterranean diet (whole grains, nuts, fruits, and vegetables, legumes, fish, etc.).	Hemoglobin A1c, blood pressure, lipid levels, and weight are routinely measured in diabetes care. A hemoglobin A1c greater than 6.5% indicates diabetes.	Self-monitoring of blood glucose proves beneficial when results are used to make lifestyle changes or adjustments. Hemoglobin A1c levels should be evaluated every 3-months until the target goal is achieved.	**Strengths**: Includes key stakeholders, addresses population of interest, easy to follow and understand. **Limitations**: Does not provide search strategy.

APPENDIX D

Demographic Form and DSMQ

Back to the Basics with SMART Goals: A Multimodal Intervention for Adults Who Have Type 2 Diabetes

Instructions: Please fill out the form below and the questionnaire on the back.

Reminder: Only your healthcare provider and project leader will have access to the information you have provided. Results of the project will remain anonymous. **By filling out this form and questionnaire, you are voluntarily providing consent to participate in this project.** You may choose to discontinue participation at any time.

Name: _____

Best Phone Number to be Reached at _____

Best Day(s) and Time(s) to be Reached (Circle):

Sunday Monday Tuesday Wednesday Thursday Friday Saturday

Morning (9-11am) Afternoon (1-3pm) Evening (5-7pm)

Address: _____

Gender: _____

Age: _____

Ethnicity (Circle One):

A. White/Caucasian
B. Black/African American
C. Pacific Islander
D. Hispanic
E. American Indian/Native American
F. Asian
G. Other/Unknown
H. Prefer not to say

Highest Level of Education Completed (Circle One):

A. Some High School
B. High School Diploma/GED
C. Associate's Degree
D. Bachelor's Degree
E. Master's Degree
F. Doctorate Degree
G. Trade School
H. Prefer not to say

Current Employment Status (Circle One):

A. Employed Full-Time
B. Employed Part-Time
C. Seeking Opportunities
D. Self-Employed
E. Unemployed
F. Retired
G. Student
H. Prefer not to say

Current Living Arrangement (Circle One):

A. House
B. Apartment
C. Assisted Living
D. Hotel/Motel
E. Shelter
F. Homeless
G. Prefer not to say

Marital Status (Circle One):

A. Single, Not Married
B. Married
C. Divorced
D. Living with a partner
E. Separated
F. Widowed
G. Prefer not to say

Number of Years Since Diagnosis of Diabetes (Circle One):

A. Less than 1
B. 1-2
C. 3-5
D. 6-10
E. 11-20
F. 21 or more
G. Prefer not to say

*Turn page to fill out questionnaire.

Diabetes Self-Management Questionnaire (DSMQ)

The following statements describe self-care activities related to your diabetes. Thinking about your self-care over the **last 2 weeks**, please specify the extent to which each statement applies to you. Note: If you monitor your glucose using continuous interstitial glucose monitoring (CGM), please refer to this where 'blood sugar checking' is requested.	applies to me very much	applies to me to a considerable degree	applies to me to some degree	does not apply to me
1. I check my blood sugar levels with care and attention. ☐ *Blood sugar measurement is not required as a part of my treatment.*	☐3	☐2	☐1	☐0
2. The food I choose to eat makes it easy to achieve optimal blood sugar levels.	☐3	☐2	☐1	☐0
3. I keep all doctors' appointments recommended for my diabetes treatment.	☐3	☐2	☐1	☐0
4. I take my diabetes medication (e. g. insulin, tablets) as prescribed. ☐ *Diabetes medication/insulin is not required as a part of my treatment.*	☐3	☐2	☐1	☐0
5. Occasionally I eat lots of sweets or other foods rich in carbohydrates.	☐3	☐2	☐1	☐0
6. I record my blood sugar levels regularly (or analyse the value chart with my blood glucose meter). ☐ *Blood sugar measurement is not required as a part of my treatment.*	☐3	☐2	☐1	☐0
7. I tend to avoid diabetes-related doctors' appointments.	☐3	☐2	☐1	☐0
8. I do regular physical activity to achieve optimal blood sugar levels.	☐3	☐2	☐1	☐0
9. I strictly follow the dietary recommendations given by my doctor or diabetes specialist.	☐3	☐2	☐1	☐0
10. I do not check my blood sugar levels frequently enough as would be required for achieving good blood glucose control. ☐ *Blood sugar measurement is not required as a part of my treatment.*	☐3	☐2	☐1	☐0
11. I avoid physical activity, although it would improve my diabetes.	☐3	☐2	☐1	☐0
12. I tend to forget to take or skip my diabetes medication (e. g. insulin, tablets). ☐ *Diabetes medication/insulin is not required as a part of my treatment.*	☐3	☐2	☐1	☐0
13. Sometimes I have real 'food binges' (not triggered by hypoglycaemia).	☐3	☐2	☐1	☐0
14. Regarding my diabetes care, I should see my medical practitioner(s) more often.	☐3	☐2	☐1	☐0
15. I tend to skip planned physical activity.	☐3	☐2	☐1	☐0
16. My diabetes self-care is poor.	☐3	☐2	☐1	☐0

Thank you for participating in this evidence-based practice project!

APPENDIX E

Informed Consent

SMART GOALS

Back to the Basics with SMART Goals: A Multimodal Intervention for Adults Who Have Type 2 Diabetes

Informed Consent

Alyssa Snyder
BSN, RNC-OB
DNP-FNP Student
Valparaiso University
Project Leader
Phone: [redacted]

Dr [redacted]
Medical Director, Provider
[redacted]
Project Site Facilitator

[redacted], NP
Diabetic Educator, Provider
[redacted]

Dr. Alesha McClanahan
DNP, RN, FNP-BC
Valparaiso University
Project Advisor

- Type 2 diabetes mellitus (T2DM) is a common chronic condition that can lead to health problems affecting your heart, kidneys, eye-sight, skin, and the feeling in your hands or feet.
- The goal of treatment is to prevent these long-term problems and improve overall health. The most important actions that a person can take to decrease the risk of developing long-term problems and improve health are lifestyle changes.
- These lifestyle changes are centered around diet, physical activity, blood sugar monitoring, and medication compliance.
- Not all individuals will need to regularly monitor their blood sugar or take medication for their diabetes. However, all individuals should perform healthy lifestyle choices involving diet and physical activity as a step to self-manage their diabetes.
- To evaluate how well a person's diabetes is being managed, your healthcare provider frequently checks a hemoglobin A1c level – this is that finger-stick you get every 3-months. For most individuals, a hemoglobin A1c less than 7.0 is the recommended goal which indicates good diabetes management. Those with a hemoglobin A1c greater than 7.0 may require additional lifestyle changes to reach the recommended goal.
- Back to the Basics with SMART Goals: A Multimodal Intervention for Adults Who Have Type 2 Diabetes is an evidence based practice project intended to support diabetes self-management and improve hemoglobin A1c levels.

Statement about Project: In an effort to further promote diabetes self-management and improve hemoglobin A1c levels, you are invited to voluntarily participate in an evidence-based practice (EBP) project focused on diabetes self-management. The project will take place at [redacted]. The person in charge of the project is Alyssa Snyder. Although this is not a research study, data collected from this EBP project will be analyzed to determine whether or not the project intervention is beneficial and should be continued on by healthcare providers. Following completion of this project, data will be published and uploaded to ValpoScholar. Note: There are no experimental procedures involved in this project.

Purpose of Project: The purpose of this EBP project is to evaluate the effectiveness of a multimodal intervention involving goal setting, educational supplements and tools centered around diabetes self-

management, and frequent follow-up on hemoglobin A1c levels and diabetes self-management behaviors. The expected duration of the project is 12-weeks. The approximate number of participants involved in this project is 10 (minimum) to 50 (maximum).

Description of Project: Participants of the project will set specific, measurable, attainable, realistic, and time-specific (SMART) goals involving diet, physical activity, blood-sugar monitoring, and/or medication adherence with their healthcare provider or project leader. Participants will be given a packet containing educational materials/tools, provided by the project leader, centered on diabetes self-management that they can utilize at home as appropriate. Participants will receive frequent follow-up from the project leader at 2-, 4-, and 8-weeks. At 2- and 8-weeks, participants will receive a letter in the mail reminding them of their SMART goal(s) and encouraging them to continue diabetes self-management efforts. At 4-weeks, participants will receive a brief phone call from the project leader to evaluate progress and provide encouragement to continue diabetes self-management efforts. The 3-month hemoglobin A1c levels checked routinely by your provider at regular diabetes follow-up office visits will be evaluated by the project leader prior to and at the end of the project to determine whether or not this multimodal intervention involving goal-setting, educational supplements/tools, and frequent follow-up were beneficial. Participants will fill out a demographic form and questionnaire prior to the intervention as well as a questionnaire following the intervention.

Risks of Project: There are no foreseeable risks involved in this project. The routine finger-stick to check your hemoglobin A1c may cause mild discomfort. Reminder: This is not a research study. Due to the nature of this EBP project involving an individualized self-management approach, participants should only perform dietary and physical activity changes as appropriate to what is tolerable to them. Blood-sugar monitoring and medications are prescribed by the healthcare provider, not the project leader. Any changes to blood-sugar monitoring or medications will be done by the healthcare provider, not the project leader. There will be no compensation provided to participants should an injury occur during the course of this project.

Benefits of Project: There are many potential benefits involved in this project. Participants will learn to properly establish goals using the SMART method, receive additional diabetes educational supplements and tools, and receive frequent support, encouragement, and accountability from the project leader. The most important benefits may be improved diabetes self-management, hemoglobin A1c levels, and overall health.

Alternative Courses of Treatment: There are no alternative procedures or courses of treatment. All individuals receiving care at [redacted] will receive the standard-of-care from their healthcare provider regardless of their decision to participate in this project.

Confidentiality of Records: Only your healthcare provider and project leader will have access to the information you provide on the demographic form and questionnaires. Any hardcopy identifying records that can be traced back to an individual participant will be kept in a locked filing safe at [redacted] for which only the project leader will have access to. Any participant information necessary to send letters or complete the phone calls by the project leader will be coded and double-password protected on an Excel spreadsheet and digitally stored on a USB flash drive that is kept in the project leader's possession and reviewed on a personal laptop. The FDA and [redacted] IRB may inspect these records at any time as they see fit. Telephone calls will be made from the project leader's own personal cell phone at either [redacted] or her own home private office and letters will be prepared on the project leader's own personal laptop and printed on her own personal printer and mailed off-site. At the end of the project, any hardcopy, identifying records will be destroyed by shredding at [redacted]. Files on the USB flash drive will also be deleted. Results of the project will be analyzed and shared with others, however this information will remain anonymous.

Questions about Project: Should you have pertinent questions about the project itself or your rights as a participant, you may contact the project leader, Alyssa Snyder, by phone at [redacted]. All other questions involving your health or treatment plans should be directed to your healthcare provider.

Participation in Project: Participation in this project is voluntary. Refusal to participate in it will not involve any penalty or loss of benefits to which you are otherwise entitled to. All patients of [redacted] will receive the standard-of-care from their healthcare provider. Those who choose to participate may discontinue participation at any time without penalty or loss of benefits to which you are otherwise entitled to.

Consent to Participate in Project: By signing this informed consent and filling out the provided demographic form and questionnaire, you are voluntarily providing consent to participate in this project. By providing consent, you understand that (a) your healthcare provider will use the SMART goal method to help you establish healthy lifestyle choices, (b) you will receive additional educational supplements/tools provided by the project leader, (c) you will receive frequent follow-up by way of letters and a telephone call at 2-, 4-, and 8-weeks by the project leader, and (d) a hemoglobin A1c will be checked prior to the start and at the end of the project as this is routinely done every 3-months by your healthcare provider to evaluate your diabetes and the project leader will review these results in your electronic medical record at [redacted].

Conflict of Interest: There are no conflicts of interest for anyone involved. There is no financial compensation involved in this project for either the project leader or staff at [redacted].

Volunteers Statement

I have been given a chance to ask questions about this evidence-based project. These questions have been answered to my satisfaction. If I have any more questions about taking part in this project, I may contact Alyssa Snyder at [redacted].

I understand that my participation in this evidence-based practice project is voluntary. I know that I may quit the project at any time without harming my future medical care or losing any benefits to which I might be otherwise entitled.

In the event I have any questions regarding my rights as a project participant, I may contact [redacted]. I may also contact a patient representative, who is not involved with this project at [redacted].

By signing this consent form, I have not waived any of my legal rights or released the parties involved in this study from liability for negligence.

I have read and understand the above information. I agree to participate in this study. I have been given a copy of the above information for my own records.

Project Participant (Signature): _____ **Date:** _____

Participant's Name (Printed): _____ **Date:** _____

Signature of Person Providing Information: _____

Date and Time: _____

APPENDIX F

SMART Goals Carbon Copy Worksheet

SMART Goals Worksheet

Name: _____ Date: _____

What initial goal(s) do you have in mind?

_____

_____

Expand on this goal using the S.M.A.R.T. goal method:

S Specific	**What do I want to achieve?** (Is your goal precise?)
M Measureable	**How will I know when I've reached my goal?** (How will you track your progress?)
A Attainable	**Is meeting this goal possible for me?** (What do you need to make sure you achieve your goal?)
R Realistic	**Is this goal something I know I can achieve if I try?** (Is this goal important to you?)
T Time-Specific	**When do I want to achieve this goal?** (What is your target date?)

Example SMART Goal for Diabetes Self-Management:

- I will eat 1 serving of vegetables with at least 2 meals every day for the next 4 weeks (specific, realistic, time-specific) and track my progress using the weekly log provided (measureable). I will meet this goal by purchasing vegetables instead of potato chips from the grocery store (attainable).
- I will walk for 30 minutes with the neighbor before dinner on Monday, Wednesday, Friday, and Saturday for the next 3 weeks (specific, attainable, realistic, time-specific) and track my progress using the weekly log provided (measureable).
- Other ideas to start from:
  - I will eat a breakfast containing 50 grams of carbs every morning for the 2 weeks.
  - I will take a healthier meal from home for lunch instead of getting fast food on Monday through Thursday for the next week.
  - I will walk in place during every commercial break when watching television every evening for the next 2 weeks.
  - I will drink water with every meal instead of pop for the next 4-weeks.

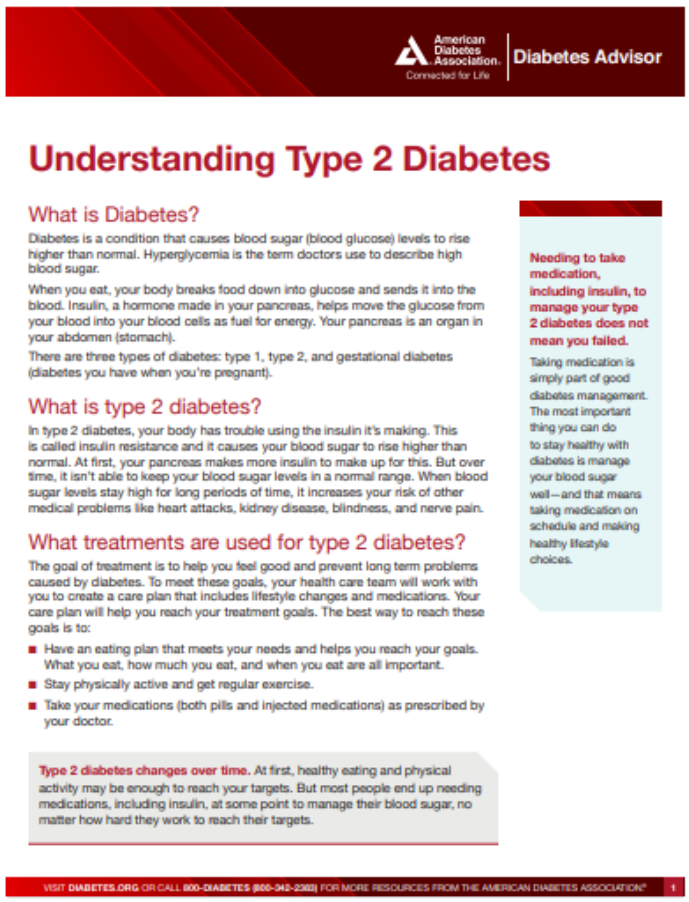
Challenges Identified/Overcome

***You will receive a letter in the mail at 2- and 8-weeks reminding you of your goal(s). You will also receive a brief telephone call at 4-weeks to discuss your progress, report any challenges identified or overcome, and update the project leader on any new goals you may have set for yourself. **Expect to receive this phone call from the following number: (574) 485-9068.**

Note: This SMART Goals Worksheet was created by the project leader.

APPENDIX G

Participant Handout Folder



American Diabetes Association. Connected for Life | Diabetes Advisor

Understanding Type 2 Diabetes

What is Diabetes?

Diabetes is a condition that causes blood sugar (blood glucose) levels to rise higher than normal. Hyperglycemia is the term doctors use to describe high blood sugar.

When you eat, your body breaks food down into glucose and sends it into the blood. Insulin, a hormone made in your pancreas, helps move the glucose from your blood into your blood cells as fuel for energy. Your pancreas is an organ in your abdomen (stomach).

There are three types of diabetes: type 1, type 2, and gestational diabetes (diabetes you have when you're pregnant).

What is type 2 diabetes?

In type 2 diabetes, your body has trouble using the insulin it's making. This is called insulin resistance and it causes your blood sugar to rise higher than normal. At first, your pancreas makes more insulin to make up for this. But over time, it isn't able to keep your blood sugar levels in a normal range. When blood sugar levels stay high for long periods of time, it increases your risk of other medical problems like heart attacks, kidney disease, blindness, and nerve pain.

What treatments are used for type 2 diabetes?

The goal of treatment is to help you feel good and prevent long term problems caused by diabetes. To meet these goals, your health care team will work with you to create a care plan that includes lifestyle changes and medications. Your care plan will help you reach your treatment goals. The best way to reach these goals is to:

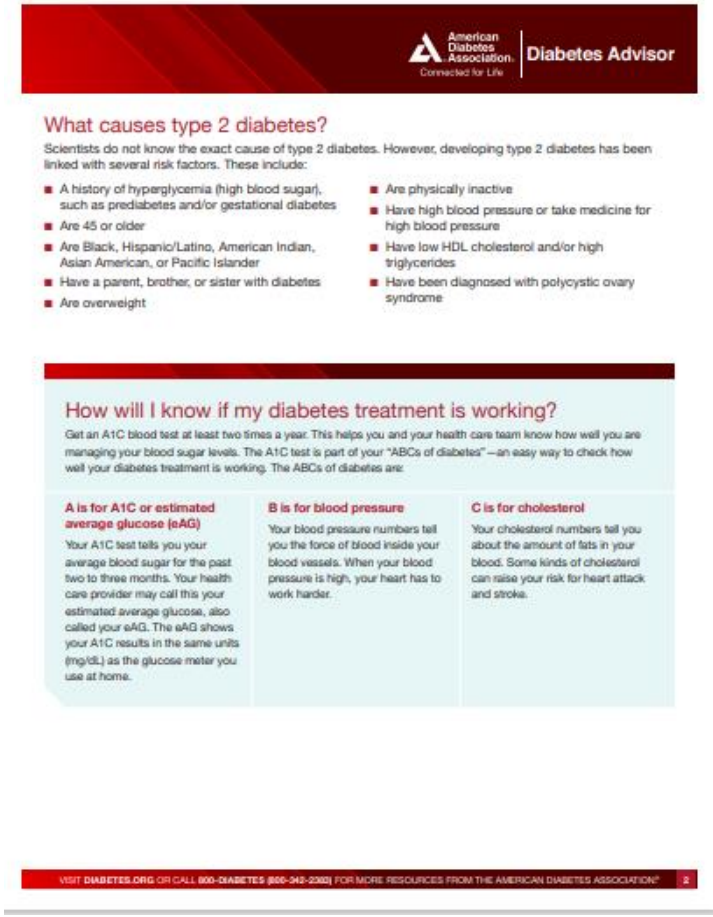
- Have an eating plan that meets your needs and helps you reach your goals. What you eat, how much you eat, and when you eat are all important.
- Stay physically active and get regular exercise.
- Take your medications (both pills and injected medications) as prescribed by your doctor.

Type 2 diabetes changes over time. At first, healthy eating and physical activity may be enough to reach your targets. But most people end up needing medications, including insulin, at some point to manage their blood sugar, no matter how hard they work to reach their targets.

Needing to take medication, including insulin, to manage your type 2 diabetes does not mean you failed.

Taking medication is simply part of good diabetes management. The most important thing you can do to stay healthy with diabetes is manage your blood sugar well—and that means taking medication on schedule and making healthy lifestyle choices.

VISIT DIABETES.ORG OR CALL 800-DIABETES (800-342-2383) FOR MORE RESOURCES FROM THE AMERICAN DIABETES ASSOCIATION® 1



American Diabetes Association. Connected for Life | Diabetes Advisor

What causes type 2 diabetes?

Scientists do not know the exact cause of type 2 diabetes. However, developing type 2 diabetes has been linked with several risk factors. These include:

- A history of hyperglycemia (high blood sugar), such as prediabetes and/or gestational diabetes
- Are 45 or older
- Are Black, Hispanic/Latino, American Indian, Asian American, or Pacific Islander
- Have a parent, brother, or sister with diabetes
- Are overweight
- Are physically inactive
- Have high blood pressure or take medicine for high blood pressure
- Have low HDL cholesterol and/or high triglycerides
- Have been diagnosed with polycystic ovary syndrome

How will I know if my diabetes treatment is working?

Get an A1C blood test at least two times a year. This helps you and your health care team know how well you are managing your blood sugar levels. The A1C test is part of your "ABCs of diabetes"—an easy way to check how well your diabetes treatment is working. The ABCs of diabetes are:

A is for A1C or estimated average glucose (eAG)

Your A1C test tells you your average blood sugar for the past two to three months. Your health care provider may call this your estimated average glucose, also called your eAG. The eAG shows your A1C results in the same units (mg/dL) as the glucose meter you use at home.

B is for blood pressure

Your blood pressure numbers tell you the force of blood inside your blood vessels. When your blood pressure is high, your heart has to work harder.

C is for cholesterol

Your cholesterol numbers tell you about the amount of fats in your blood. Some kinds of cholesterol can raise your risk for heart attack and stroke.

VISIT DIABETES.ORG OR CALL 800-DIABETES (800-342-2383) FOR MORE RESOURCES FROM THE AMERICAN DIABETES ASSOCIATION® 2

Note: This is a "free, reproducible handout" from the American Diabetes Association and can be found at https://professional.diabetes.org/pel/type-2-diabetes-english

American Diabetes Association. Connected for Life | Diabetes Advisor

Small Steps for Your Health

There are many things you can do to help prevent type 2 diabetes or its complications, but where do you start? It's not always easy to eat healthy and be active in today's fast-paced world.

It's easier to make healthy lifestyle changes **one step at a time and over time.**

Think of each small step as one piece of your effort to change your habits.

The good news is that making just a few small changes can have a big impact on your health.

Are you ready, willing, and able to change?

To succeed at making lifestyle changes you need to answer YES to the question, "Are you ready, willing, and able to change?" You must have better reasons to change than reasons not to change.

Take what you want to do and break it down into small steps. Then think about a few things you are ready, willing, and able to change and leave other habits for another time.

What are you ready, willing, and able to change?

Think about your current eating and activity habits. What foods do you buy? How active are you? Try to keep honest food records for a few days to get a true picture of what you eat. Based on your current habits, start with a few changes that are easy to tackle. Pick some changes that you want to do the most, and that will make the biggest impact. Perhaps choose one change in your eating habits and another in activity. Remember you don't need to change everything at once.

For example, if you eat fast food at lunch because you're in a hurry, try bringing a healthier meal from home. Maybe you can walk in place during the commercial break when you watch TV.

Making an Action Plan

Setting Goals

There are many things you need to do to manage your disease. Focus on one goal at a time.

Setting **"S.M.A.R.T."** goals can help you reach your health goals. **S.M.A.R.T.** goals can also help you manage your time and track your progress.

Continued >>

American Diabetes Association. Connected for Life | Diabetes Advisor

Small Steps for Your Health

S.M.A.R.T. goals are Specific, Measurable, Attainable, Realistic, and Time-specific.

For example, "I will walk for 20 minutes with my neighbor after dinner on Monday, Wednesday, and Friday."

Specific: What exactly do you want to accomplish? Decide who, what, where, when, why, and how.

Measurable: How can you track your progress? How will you know when you have made it to your goal?

Attainable: Is meeting this goal something that is possible for you? Do you have everything you need to make it happen?If not, how will you get what you need?

Realistic: Is the goal something you know you can do if you try? Is it important to you?

Time-specific: When will you complete this goal? Set a time or a deadline that you know you can meet if you try.

Making an Action Plan that Works

Think of one thing about food, physical activity, taking medicine, or coping that you are ready, willing, and able to change. Using the S.M.A.R.T. goals principles, write a goal for yourself.

My Plan to Reach My Goal

- What am I going to do?
- When and how often will I do it?
- Where will I do it?

Did you succeed?

The last step is to see how you did at making the change. Ask yourself these questions: Did I succeed? Did I set my sights too high? Did something happen in my life to keep me from being successful? If you were successful, give yourself a BIG pat on the back (or maybe a trip to the movies!).

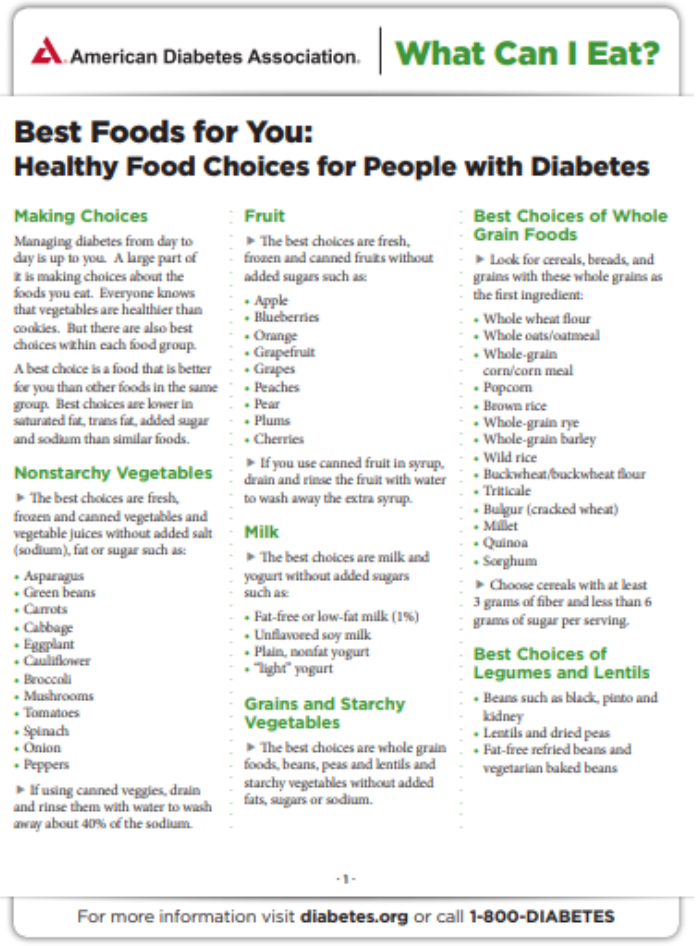
Wait, you are not done! Making a change for two weeks or a month does not mean that it will stick for life. It's easy to slip back into old habits. Keep practicing your new habits. It may take time before they're part of your daily life. If you weren't successful, try again. Revise your goals if you need to. Make sure you're setting **S.M.A.R.T.** goals that are within reach.

What is your next step?

Keep practicing your new habits.

Choose some new goals to work on. Slowly, goal by goal, you'll be eating healthier and staying more active. You'll also be on the road to preventing or delaying diabetes or its complications.

Note: This is a "free, reproducible handout" from the American Diabetes Association and can be found at https://professional.diabetes.org/pel/small-steps-health-english



American Diabetes Association. | What Can I Eat?

Best Foods for You:
Healthy Food Choices for People with Diabetes

Making Choices

Managing diabetes from day to day is up to you. A large part of it is making choices about the foods you eat. Everyone knows that vegetables are healthier than cookies. But there are also best choices within each food group.

A best choice is a food that is better for you than other foods in the same group. Best choices are lower in saturated fat, trans fat, added sugar and sodium than similar foods.

Nonstarchy Vegetables

▶ The best choices are fresh, frozen and canned vegetables and vegetable juices without added salt (sodium), fat or sugar such as:

- Asparagus
- Green beans
- Carrots
- Cabbage
- Eggplant
- Cauliflower
- Broccoli
- Mushrooms
- Tomatoes
- Spinach
- Onion
- Peppers

▶ If using canned veggies, drain and rinse them with water to wash away about 40% of the sodium.

Fruit

▶ The best choices are fresh, frozen and canned fruits without added sugars such as:

- Apple
- Blueberries
- Orange
- Grapefruit
- Grapes
- Peaches
- Pear
- Plums
- Cherries

▶ If you use canned fruit in syrup, drain and rinse the fruit with water to wash away the extra syrup.

Milk

▶ The best choices are milk and yogurt without added sugars such as:

- Fat-free or low-fat milk (1%)
- Unflavored soy milk
- Plain, nonfat yogurt
- "light" yogurt

Grains and Starchy Vegetables

▶ The best choices are whole grain foods, beans, peas and lentils and starchy vegetables without added fats, sugars or sodium.

Best Choices of Whole Grain Foods

▶ Look for cereals, breads, and grains with these whole grains as the first ingredient:

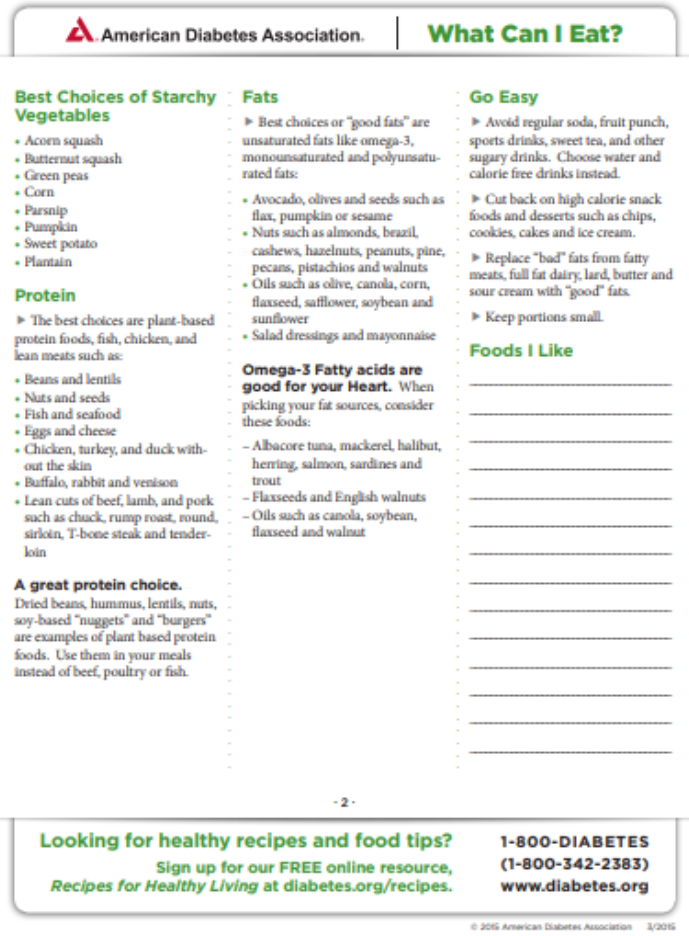
- Whole wheat flour
- Whole oats/oatmeal
- Whole-grain corn/corn meal
- Popcorn
- Brown rice
- Whole-grain rye
- Whole-grain barley
- Wild rice
- Buckwheat/buckwheat flour
- Triticale
- Bulgur (cracked wheat)
- Millet
- Quinoa
- Sorghum

▶ Choose cereals with at least 3 grams of fiber and less than 6 grams of sugar per serving.

Best Choices of Legumes and Lentils

- Beans such as black, pinto and kidney
- Lentils and dried peas
- Fat-free refried beans and vegetarian baked beans

For more information visit **diabetes.org** or call **1-800-DIABETES**



American Diabetes Association. | What Can I Eat?

Best Choices of Starchy Vegetables

- Acorn squash
- Butternut squash
- Green peas
- Corn
- Parsnip
- Pumpkin
- Sweet potato
- Plantain

Protein

▶ The best choices are plant-based protein foods, fish, chicken, and lean meats such as:

- Beans and lentils
- Nuts and seeds
- Fish and seafood
- Eggs and cheese
- Chicken, turkey, and duck without the skin
- Buffalo, rabbit and venison
- Lean cuts of beef, lamb, and pork such as chuck, rump roast, round, sirloin, T-bone steak and tenderloin

A great protein choice.
Dried beans, hummus, lentils, nuts, soy-based "nuggets" and "burgers" are examples of plant based protein foods. Use them in your meals instead of beef, poultry or fish.

Fats

▶ Best choices or "good fats" are unsaturated fats like omega-3, monounsaturated and polyunsaturated fats:

- Avocado, olives and seeds such as flax, pumpkin or sesame
- Nuts such as almonds, brazil, cashews, hazelnuts, peanuts, pine, pecans, pistachios and walnuts
- Oils such as olive, canola, corn, flaxseed, safflower, soybean and sunflower
- Salad dressings and mayonnaise

Omega-3 Fatty acids are good for your Heart. When picking your fat sources, consider these foods:

- Albacore tuna, mackerel, halibut, herring, salmon, sardines and trout
- Flaxseeds and English walnuts
- Oils such as canola, soybean, flaxseed and walnut

Go Easy

▶ Avoid regular soda, fruit punch, sports drinks, sweet tea, and other sugary drinks. Choose water and calorie free drinks instead.

▶ Cut back on high calorie snack foods and desserts such as chips, cookies, cakes and ice cream.

▶ Replace "bad" fats from fatty meats, full fat dairy, lard, butter and sour cream with "good" fats.

▶ Keep portions small.

Foods I Like

Looking for healthy recipes and food tips?
Sign up for our FREE online resource, *Recipes for Healthy Living* at diabetes.org/recipes.

1-800-DIABETES
(1-800-342-2383)
www.diabetes.org

Note: This is a "free, reproducible handout" from the American Diabetes Association and can be found at http://main.diabetes.org/dorg/PDFs/awareness-programs/hhm/what_can_i_eat-best_foods-American_Diabetes_Association.pdf

American Diabetes Association.
Connected for Life

Nutrition for Life

Making Choices Using Food Labels

Nutrition Facts

Approx. 14 servings per container
Serving size 1 slice (48g)

Amount per serving	
Calories	**100**
	% Daily Value*
Total Fat 0.5g	1%
Saturated Fat 0g	0%
Trans Fat 0g	
Cholesterol 0mg	0%
Sodium 115mg	5%
Total Carbohydrate 21g	7%
Dietary Fiber 4g	15%
Total Sugar 1g	
Includes 1g Added Sugars	2%
Protein 4g	
Vitamin D 0mcg	0%
Calcium 25mg	0%
Iron .7mg	4%
Potassium 60mg	0%

* The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.

INGREDIENTS:
WHOLE WHEAT FLOUR, WATER, CRACKED WHEAT, WHEAT BRAN, HONEY, MOLASSES, SOYBEAN OIL, SALT, YEAST

Things to Look for First

Servings per Container: Servings per container tells you how many servings are in the package.

Serving Size: The serving size is how much a person usually eats or drinks.

In this food label the container has 14 servings and each serving is 1 slice of bread.

Calories: Calories provide our bodies with energy. The three nutrients that provide calories are: carbohydrates, fats and protein.

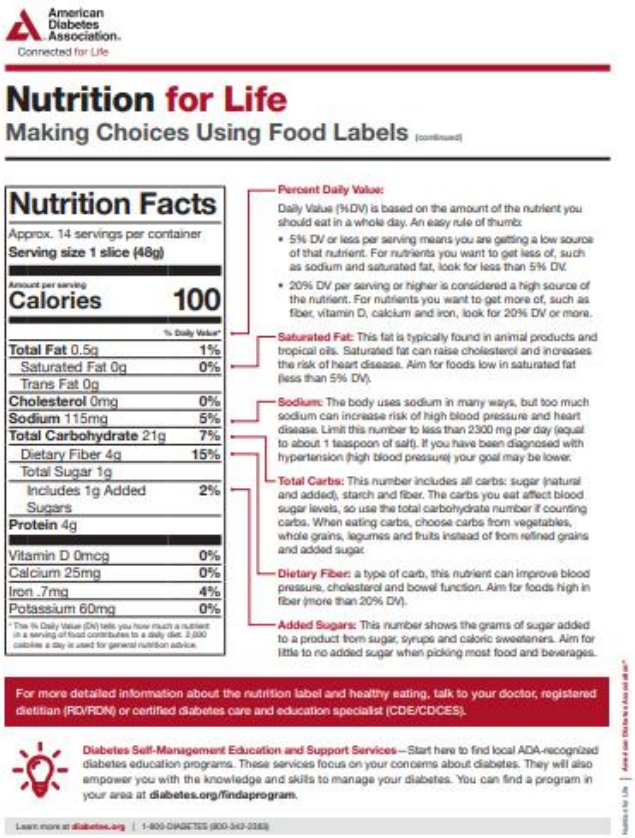
How to Use the Serving Size Information

In this example, the serving size is 1 slice of bread, so 1 slice will provide you with 100 calories, 21 grams of carbs and the same amounts listed of all other items on the nutrition facts label.

If you eat 2 slices, you are having 2 servings. This means you get 2 times the nutrients, so: 200 calories, 42 grams of carbs and double the other items listed.

Ingredients: Ingredients are listed in descending order by weight. This means that the ingredient **used the most** is listed first and the ingredient that is **used the least** is listed last.

Continued >>



American Diabetes Association.
Connected for Life

Nutrition for Life

Making Choices Using Food Labels (continued)

Nutrition Facts

Approx. 14 servings per container
Serving size 1 slice (48g)

Amount per serving	
Calories	**100**
	% Daily Value*
Total Fat 0.5g	1%
Saturated Fat 0g	0%
Trans Fat 0g	
Cholesterol 0mg	0%
Sodium 115mg	5%
Total Carbohydrate 21g	7%
Dietary Fiber 4g	15%
Total Sugar 1g	
Includes 1g Added Sugars	2%
Protein 4g	
Vitamin D 0mcg	0%
Calcium 25mg	0%
Iron .7mg	4%
Potassium 60mg	0%

* The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.

Percent Daily Value:
Daily Value (%DV) is based on the amount of the nutrient you should eat in a whole day. An easy rule of thumb:

- 5% DV or less per serving means you are getting a low source of that nutrient. For nutrients you want to get less of, such as sodium and saturated fat, look for less than 5% DV.
- 20% DV per serving or higher is considered a high source of the nutrient. For nutrients you want to get more of, such as fiber, vitamin D, calcium and iron, look for 20% DV or more.

Saturated Fat: This fat is typically found in animal products and tropical oils. Saturated fat can raise cholesterol and increases the risk of heart disease. Aim for foods low in saturated fat (less than 5% DV).

Sodium: The body uses sodium in many ways, but too much sodium can increase risk of high blood pressure and heart disease. Limit this number to less than 2300 mg per day (equal to about 1 teaspoon of salt). If you have been diagnosed with hypertension (high blood pressure) your goal may be lower.

Total Carbs: This number includes all carbs: sugar (natural and added), starch and fiber. The carbs you eat affect blood sugar levels, so use the total carbohydrate number if counting carbs. When eating carbs, choose carbs from vegetables, whole grains, legumes and fruits instead of from refined grains and added sugar.

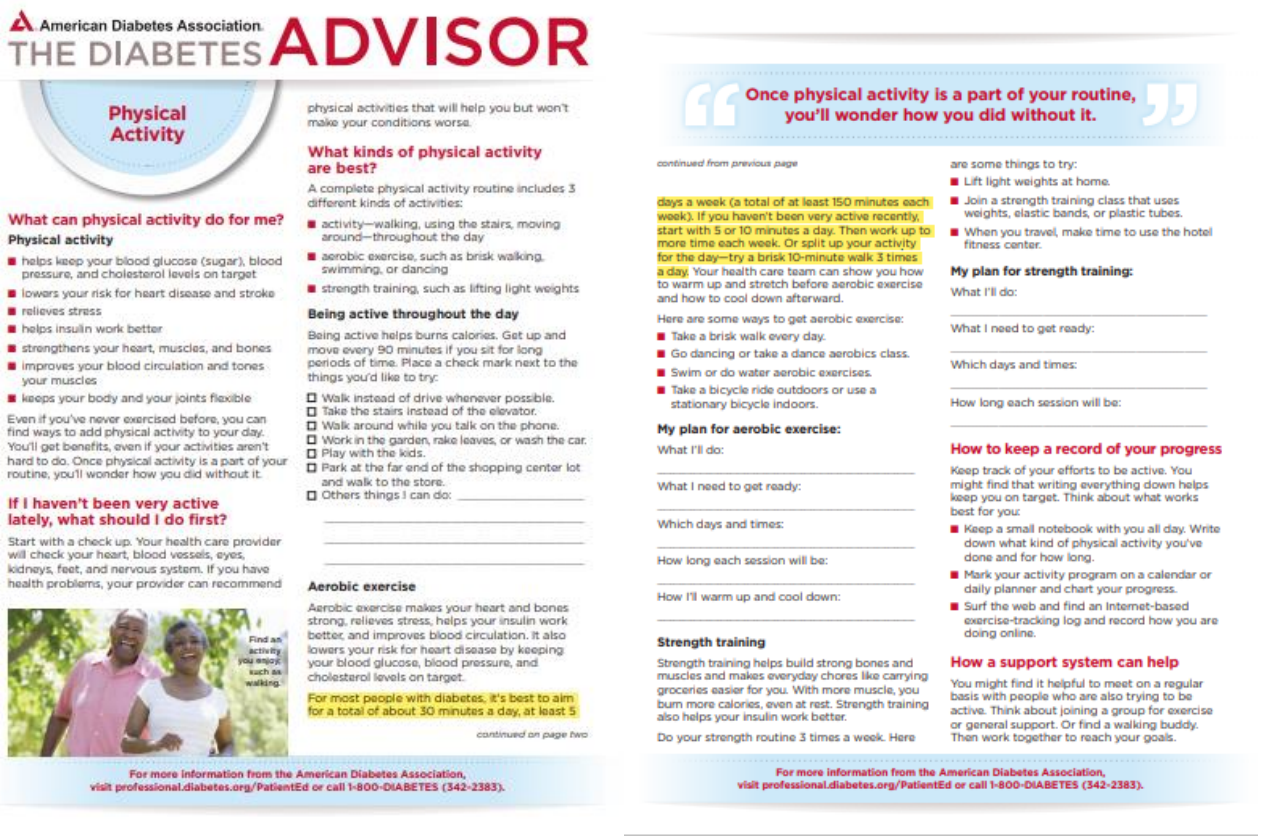
Dietary Fiber: a type of carb, this nutrient can improve blood pressure, cholesterol and bowel function. Aim for foods high in fiber (more than 20% DV).

Added Sugars: This number shows the grams of sugar added to a product from sugar, syrups and caloric sweeteners. Aim for little to no added sugar when picking most food and beverages.

For more detailed information about the nutrition label and healthy eating, talk to your doctor, registered dietitian (RD/RDN) or certified diabetes care and education specialist (CDE/CDCES).

Diabetes Self-Management Education and Support Services—Start here to find local ADA-recognized diabetes education programs. These services focus on your concerns about diabetes. They will also empower you with the knowledge and skills to manage your diabetes. You can find a program in your area at **diabetes.org/findaprogram**.

Note: This is a “free, reproducible handout” from the American Diabetes Association and can be found at https://professional.diabetes.org/pel/making-choices-using-food-labels-english-0



American Diabetes Association.
THE DIABETES ADVISOR

Physical Activity

What can physical activity do for me?

Physical activity

- helps keep your blood glucose (sugar), blood pressure, and cholesterol levels on target
- lowers your risk for heart disease and stroke
- relieves stress
- helps insulin work better
- strengthens your heart, muscles, and bones
- improves your blood circulation and tones your muscles
- keeps your body and your joints flexible

Even if you've never exercised before, you can find ways to add physical activity to your day. You'll get benefits, even if your activities aren't hard to do. Once physical activity is a part of your routine, you'll wonder how you did without it.

If I haven't been very active lately, what should I do first?

Start with a check up. Your health care provider will check your heart, blood vessels, eyes, kidneys, feet, and nervous system. If you have health problems, your provider can recommend physical activities that will help you but won't make your conditions worse.

What kinds of physical activity are best?

A complete physical activity routine includes 3 different kinds of activities:

- activity—walking, using the stairs, moving around—throughout the day
- aerobic exercise, such as brisk walking, swimming, or dancing
- strength training, such as lifting light weights

Being active throughout the day

Being active helps burns calories. Get up and move every 90 minutes if you sit for long periods of time. Place a check mark next to the things you'd like to try:

- ☐ Walk instead of drive whenever possible.
- ☐ Take the stairs instead of the elevator.
- ☐ Walk around while you talk on the phone.
- ☐ Work in the garden, rake leaves, or wash the car.
- ☐ Play with the kids.
- ☐ Park at the far end of the shopping center lot and walk to the store.
- ☐ Others things I can do: _____

_____

_____

_____

Aerobic exercise

Aerobic exercise makes your heart and bones strong, relieves stress, helps your insulin work better, and improves blood circulation. It also lowers your risk for heart disease by keeping your blood glucose, blood pressure, and cholesterol levels on target.

For most people with diabetes, it's best to aim for a total of about 30 minutes a day, at least 5

continued on page two

For more information from the American Diabetes Association, visit professional.diabetes.org/PatientEd or call 1-800-DIABETES (342-2383).

> **Once physical activity is a part of your routine, you'll wonder how you did without it.**

continued from previous page

days a week (a total of at least 150 minutes each week). If you haven't been very active recently, start with 5 or 10 minutes a day. Then work up to more time each week. Or split up your activity for the day—try a brisk 10-minute walk 3 times a day. Your health care team can show you how to warm up and stretch before aerobic exercise and how to cool down afterward.

Here are some ways to get aerobic exercise:

- Take a brisk walk every day.
- Go dancing or take a dance aerobics class.
- Swim or do water aerobic exercises.
- Take a bicycle ride outdoors or use a stationary bicycle indoors.

My plan for aerobic exercise:

What I'll do:

_____

What I need to get ready:

_____

Which days and times:

_____

How long each session will be:

_____

How I'll warm up and cool down:

_____

Strength training

Strength training helps build strong bones and muscles and makes everyday chores like carrying groceries easier for you. With more muscle, you burn more calories, even at rest. Strength training also helps your insulin work better.

Do your strength routine 3 times a week. Here are some things to try:

- Lift light weights at home.
- Join a strength training class that uses weights, elastic bands, or plastic tubes.
- When you travel, make time to use the hotel fitness center.

My plan for strength training:

What I'll do:

_____

What I need to get ready:

_____

Which days and times:

_____

How long each session will be:

_____

How to keep a record of your progress

Keep track of your efforts to be active. You might find that writing everything down helps keep you on target. Think about what works best for you:

- Keep a small notebook with you all day. Write down what kind of physical activity you've done and for how long.
- Mark your activity program on a calendar or daily planner and chart your progress.
- Surf the web and find an Internet-based exercise-tracking log and record how you are doing online.

How a support system can help

You might find it helpful to meet on a regular basis with people who are also trying to be active. Think about joining a group for exercise or general support. Or find a walking buddy. Then work together to reach your goals.

For more information from the American Diabetes Association, visit professional.diabetes.org/PatientEd or call 1-800-DIABETES (342-2383).

Note: This is a “free, reproducible handout” from the American Diabetes Association and can be found at https://professional.diabetes.org/pel/physical-activity-english

American Diabetes Association.
Connected for Life

Desk Moves

It's important to break up periods of sitting with activity to stay healthy. The American Diabetes Association® recommends that you limit your time of inactivity with movement every 30 minutes. Read on to learn movements you can do sitting at your desk or standing by your chair.

Try these seated moves to improve your fitness

1. AEROBIC EXERCISE

Seated March

- Start by sitting upright and marching your feet in place.
- Lift right foot up; place right foot down. Lift left foot up; place left foot down.
- Swing your arms back and forth with your elbows bent while you march.
- March for about 1 minute.

2. AEROBIC EXERCISE

Seated Overhead Punches

- Start with our fists in front of our shoulders.
- Punch your right fist up overhead and bring it back down.
- Then punch your left fist up overhead and bring it down.
- Switch from right- to left-side punches for 45 seconds (about 20 times for each arm).

3. BALANCE EXERCISE

Single Leg Balance

- Stand with a chair in front of you to hold on to for balance, if needed.
- Raise your right foot off the ground.
- Hold it there for 10 to 20 seconds.
- Put your right foot back on the ground.
- Raise your left foot.
- Hold it up for 10 to 20 seconds.
- Repeat for one minute.

Desk Moves (continued)

4. BALANCE EXERCISES

Three-way Leg Swing

- Stand on one foot, with your hands on your hips or, if you need to, hold a chair or wall.
- Keeping your leg straight, move your raised foot forward and hold it there for 5 seconds.
- Put your foot back on the ground.
- Repeat the forward lift 10 times.
- Now lift it sideways 10 times.
- And finally, backwards 10 times.
- Repeat with other foot.

5. FLEXIBILITY EXERCISE

Neck Stretch

- For the neck stretch, stand with your feet apart and your knees slightly bent (or sit in a chair with your back straight and your feet on the floor).
- Relax your shoulders and gently bend your head toward your right shoulder.
- Hold it there for 5 seconds.
- Repeat on the left side and hold it for 5 seconds.
- Now tip your head forward toward your chest and hold it for 5 seconds.
- Then tilt your head back, looking up toward the ceiling for 5 seconds.

6. RESISTANCE EXERCISE

Standing Calf Raises

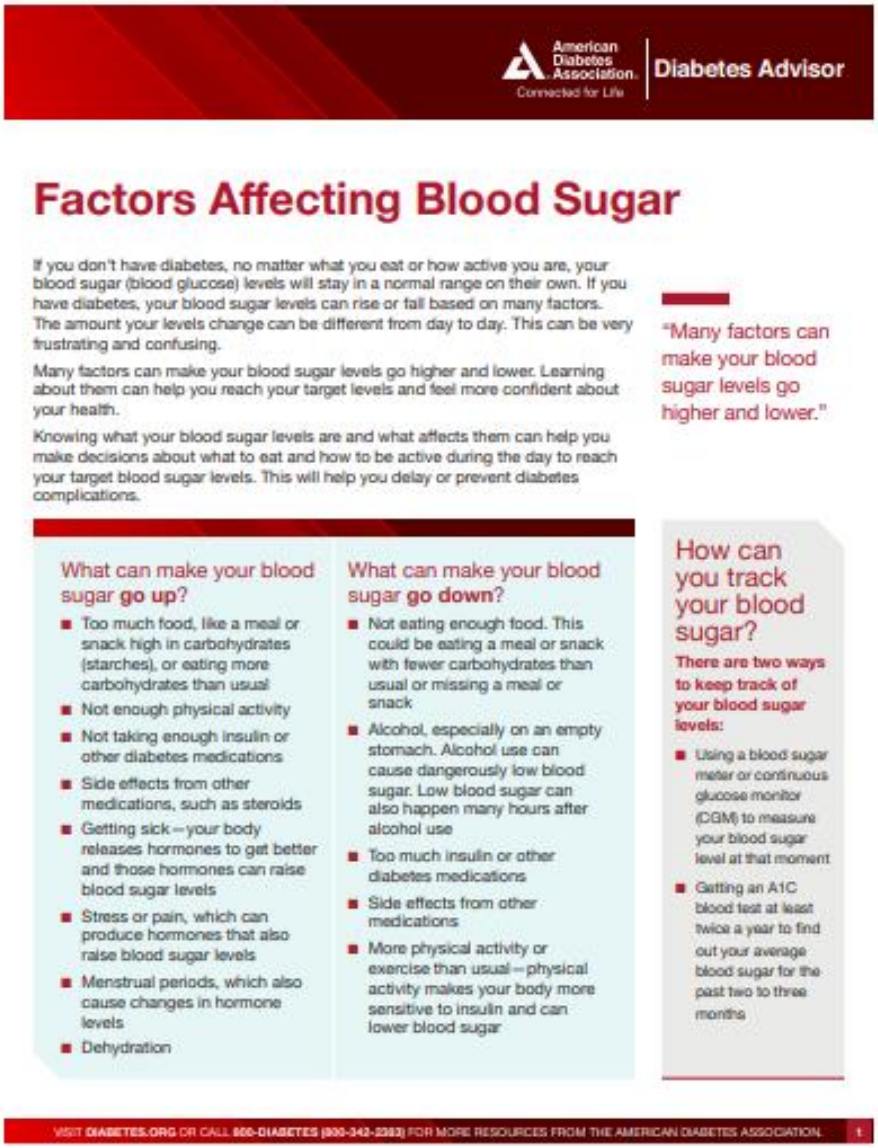
- Stand behind a chair with your feet about shoulder-width apart.
- Keep your fingertips on the chair for support as you slowly raise your heels off the ground.
- Then, slowly lower your heels back to the ground.
- Repeat 20 times.

SAFETY NOTE
Work with your diabetes care team if you have concerns about how much, and what type of activity is right for you.

Staying active will not only help keep you healthy, but it also will help you manage your diabetes.

Brought to you by the American Diabetes Association. For answers to your questions about prediabetes and diabetes, call 1-800-DIABETES (800-342-2383).

Note: This is a “free, reproducible handout” from the American Diabetes Association and can be found at https://professional.diabetes.org/pel/desk-exercises-english



American Diabetes Association. Connected for Life | Diabetes Advisor

Factors Affecting Blood Sugar

If you don't have diabetes, no matter what you eat or how active you are, your blood sugar (blood glucose) levels will stay in a normal range on their own. If you have diabetes, your blood sugar levels can rise or fall based on many factors. The amount your levels change can be different from day to day. This can be very frustrating and confusing.

Many factors can make your blood sugar levels go higher and lower. Learning about them can help you reach your target levels and feel more confident about your health.

Knowing what your blood sugar levels are and what affects them can help you make decisions about what to eat and how to be active during the day to reach your target blood sugar levels. This will help you delay or prevent diabetes complications.

"Many factors can make your blood sugar levels go higher and lower."

What can make your blood sugar **go up**?

- Too much food, like a meal or snack high in carbohydrates (starches), or eating more carbohydrates than usual
- Not enough physical activity
- Not taking enough insulin or other diabetes medications
- Side effects from other medications, such as steroids
- Getting sick—your body releases hormones to get better and those hormones can raise blood sugar levels
- Stress or pain, which can produce hormones that also raise blood sugar levels
- Menstrual periods, which also cause changes in hormone levels
- Dehydration

What can make your blood sugar **go down**?

- Not eating enough food. This could be eating a meal or snack with fewer carbohydrates than usual or missing a meal or snack
- Alcohol, especially on an empty stomach. Alcohol use can cause dangerously low blood sugar. Low blood sugar can also happen many hours after alcohol use
- Too much insulin or other diabetes medications
- Side effects from other medications
- More physical activity or exercise than usual—physical activity makes your body more sensitive to insulin and can lower blood sugar

How can you track your blood sugar?

There are two ways to keep track of your blood sugar levels:

- Using a blood sugar meter or continuous glucose monitor (CGM) to measure your blood sugar level at that moment
- Getting an A1C blood test at least twice a year to find out your average blood sugar for the past two to three months

VISIT DIABETES.ORG OR CALL 800-DIABETES (800-342-2383) FOR MORE RESOURCES FROM THE AMERICAN DIABETES ASSOCIATION. 1

Note: This is a "free, reproducible handout" from the American Diabetes Association and can be found at https://professional.diabetes.org/pel/factors-affecting-blood-sugar-english

Checking Blood Glucose

American Diabetes Association.
Diabetes Advisor

Checking your blood glucose (also called blood sugar) is important. You can use the results to make decisions about food, physical activity, and medication. These decisions can help you feel better day to day and delay or prevent diabetes complications such as heart attack, stroke, or blindness.

How do I check my blood glucose?

Many people use a blood glucose meter to check their blood glucose several times a day. A meter is a small device that tests a tiny drop of blood and then displays your blood glucose level at that moment. A lancet is a device used to prick the skin to get the drop of blood.

What are the blood glucose targets for people with diabetes?

The general targets recommended by the American Diabetes Association are listed below. Talk with your health care team about whether these targets are right for you.

ADA targets:

- When you wake up and before meals: 80 to 130 mg/dL
- 2 hours after starting a meal: below 180 mg/dL

When are the best times of day to check blood glucose?

Many people check blood glucose first thing in the morning before they eat (called "fasting") as well as before other meals. You also may want to check after meals (called "postprandial") when your blood glucose is likely to be higher.

Other times to check include:

- When you're having symptoms of high or low blood glucose
- When you're ill, especially if you're vomiting or suffering from dehydration
- Before, during, and after physical activity
- Before you drive
- Before you go to sleep

Many people check blood glucose first thing in the morning before they eat

How often do I need to check?

If you're using your blood glucose results to decide how much insulin to take, you'll need to check several times a day. You will probably need to check more often if you're pregnant or you make changes to your medications, activity, or meal plan. Talk it over with your doctor.

More recent technology has lead to continuous glucose monitors (CGMs) that check your blood glucose at regular intervals. These work by using a sensor attached to the skin. This sensor uses a transmitter to send your blood glucose levels to a receiver, which tracks if your levels are trending up or down. This gives you a more complete look at how your blood glucose levels are changing throughout the day and night.

Continued »

American Diabetes Association.
Diabetes Advisor

Can I get a blood sample without sticking my finger?

Some glucose meters can check blood samples from areas other than the fingertips. This can be the fleshy parts of the hand, the forearm, the outer thigh, the calf, or the abdomen.

Sometimes, to get the most accurate results, experts recommend that you use your fingertips instead of these other sites.

If you're seeking ways to keep your fingertips from getting sore, or you can't get blood from alternative sites, talk with your health care team

These times include when:

- Your blood glucose is low or likely to be low
- You have trouble realizing that your blood glucose is low
- It's's less than two hours after starting a meal
- You've been physically active

If you're seeking ways to keep your fingertips from getting sore, or you can't get blood from alternative sites, talk with your doctor about different types of lancets or other techniques that can help.

How can I make sure that my meter provides accurate results?

Follow your meter's instructions for the most accurate results.

This includes:

- Keeping your meter clean
- Making sure your test strips haven't passed their expiration date
- Storing your strips as recommended
- Coding (setting up) your meter for your strips if necessary and using the control solution as recommended
- Making sure your blood sample is big enough

If your meter isn't working at all, it may need new batteries. Check the back of your meter for the meter manufacturer's phone number in case questions arise.

Once a year, talk with your doctor or diabetes educator about how you use your meter.

American Diabetes Association.
Visit **diabetes.org** or call **800-DIABETES** (800-342-2383) for more resources from the American Diabetes Association.

Note: This is a "free, reproducible handout" from the American Diabetes Association and can be found at https://professional.diabetes.org/pel/checking-blood-glucose-english

Low Blood Glucose (Hypoglycemia)

American Diabetes Association.
Diabetes Advisor

Hypoglycemia, also known as low blood glucose (blood sugar), is when your blood glucose levels have fallen low enough that you need to take action to bring them back to your target range. This is usually when your blood glucose is less than 70 mg/dL. However, talk to your doctor about your own blood glucose targets, and what level is too low for you.

When can it happen?

Low blood glucose can happen if you've skipped a meal or snack, eaten less than usual, or been more physically active than usual. If you don't take steps to bring glucose levels back to normal, you could even pass out.

What are the symptoms?

Each person's reaction to low blood glucose is different. It's important that you learn your own signs and symptoms when your blood glucose is low.

Signs and symptoms of low blood glucose include:

- Feeling shaky
- Being nervous or anxious
- Sweating, chills, clamminess
- Mood swings, irritability, impatience
- Confusion
- Fast heartbeat
- Feeling light-headed or dizzy
- Hunger, nausea
- Color draining from skin (pallor)
- Feeling sleepy
- Feeling weak, having no energy
- Blurred/impaired vision
- Tingling or numbness in lips, tongue, cheeks
- Headaches
- Coordination problems, clumsiness
- Nightmares or crying out in sleep
- Seizures

What should you do?

The 15-15 rule—have 15 grams of carbohydrate to raise your blood glucose and check it after 15 minutes. If it's still below 70 mg/dL, have another serving.

Repeat these steps until your blood glucose is at least 70 mg/dL. Once your blood glucose is back to normal, eat a meal or snack to make sure it doesn't lower again.

This may be:

- Glucose tablets (see instructions)
- Gel tube (see instructions)
- 4 ounces (1/2 cups) of juice or regular soda (not diet)
- 1 tablespoon of sugar, honey, or corn syrup
- 8 ounces of nonfat or 1% milk
- Hard candies, jellybeans, or gumdrops—see food label for how many to consume

Continued »

American Diabetes Association.
Diabetes Advisor

Make a note about any episodes of low blood glucose and talk with your health care team about why it happened. They can suggest ways to avoid low blood glucose in the future.

Your doctor may refer to different levels of hypoglycemia. These include:

- **Level 1**—blood glucose between 54 and 70 mg/dL
- **Level 2**—blood glucose less than 54 mg/dL
- **Level 3**—when you need help to treat your low blood glucose.

Severe hypoglycemia

When low blood glucose isn't treated and you need someone to help you recover, it is considered a severe event.

Treating Severe Hypoglycemia

Glucagon is a hormone produced in the pancreas that stimulates your liver to release stored glucose into your bloodstream when your blood glucose levels are too low. Injectable glucagon is used to treat someone with diabetes when their blood glucose is too low to treat using the 15-15 rule.

Glucagon kits are available by prescription. Speak with your doctor about whether you should buy a glucagon kit and how and when to use it.

The people you are in frequent contact with (for example, friends, family members, and co-workers) should be instructed on how to give you glucagon to treat severe hypoglycemia.

Steps for treating a person with symptoms keeping them from being able to treat themselves.

1. Inject glucagon into the buttock, arm, or thigh, following the instructions in the kit.
2. When the person regains consciousness (usually in 5-15 minutes), they may experience nausea and vomiting.
3. If you have needed glucagon, let your doctor know so you can discuss ways to prevent severe hypoglycemia in the future.

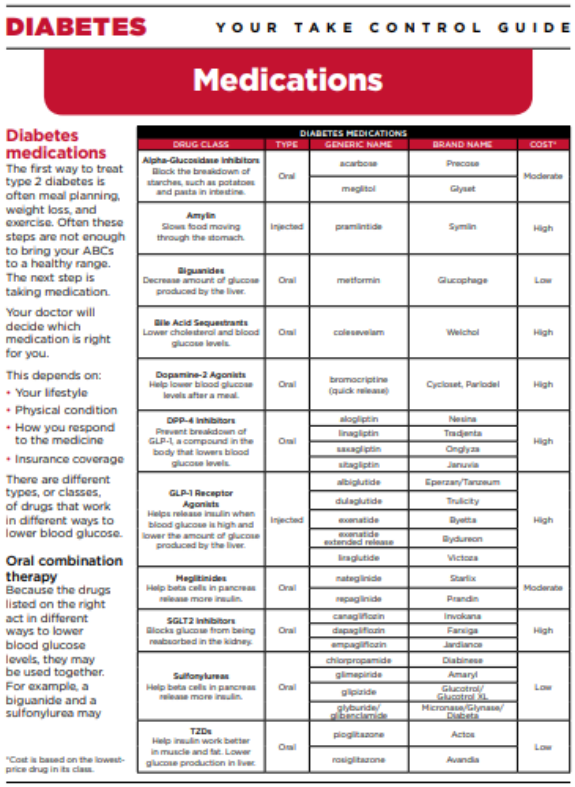
Don't hesitate to call 911. If someone is unconscious and glucagon is not available or someone does not know how to use it, call 911 immediately.

Do NOT:

- Inject insulin (it will lower their blood glucose even more)
- Provide food or fluids (they can choke)
- Put hands in mouth (they can choke)

American Diabetes Association.
Visit **diabetes.org** or call **800-DIABETES** (800-342-2383) for more resources from the American Diabetes Association.

Note: This is a “free, reproducible handout” from the American Diabetes Association and can be found at https://professional.diabetes.org/pel/low-blood-glucose-hypoglycemia-english



DIABETES YOUR TAKE CONTROL GUIDE

Medications

Diabetes medications

The first way to treat type 2 diabetes is often meal planning, weight loss, and exercise. Often these steps are not enough to bring your ABCs to a healthy range. The next step is taking medication.

Your doctor will decide which medication is right for you.

This depends on:

- Your lifestyle
- Physical condition
- How you respond to the medicine
- Insurance coverage

There are different types, or classes, of drugs that work in different ways to lower blood glucose.

Oral combination therapy

Because the drugs listed on the right act in different ways to lower blood glucose levels, they may be used together. For example, a biguanide and a sulfonylurea may be used together. Many combinations are combined into a single pill for convenience.

DIABETES MEDICATIONS

DRUG CLASS	TYPE	GENERIC NAME	BRAND NAME	COST*
Alpha-Glucosidase Inhibitors Block the breakdown of starches, such as potatoes and pasta in intestine.	Oral	acarbose	Precose	Moderate
		miglitol	Glyset	
Amylin Slows food moving through the stomach.	Injected	pramlintide	Symlin	High
Biguanides Decrease amount of glucose produced by the liver.	Oral	metformin	Glucophage	Low
Bile Acid Sequestrants Lower cholesterol and blood glucose levels.	Oral	colesevelam	Welchol	High
Dopamine-2 Agonists Help lower blood glucose levels after a meal.	Oral	bromocriptine (quick release)	Cycloset, Parlodel	High
DPP-4 Inhibitors Prevent breakdown of GLP-1, a compound in the body that lowers blood glucose levels.	Oral	alogliptin	Nesina	High
		linagliptin	Tradjenta	
		saxagliptin	Onglyza	
		sitagliptin	Januvia	
GLP-1 Receptor Agonists Helps release insulin when blood glucose is high and lower the amount of glucose produced by the liver.	Injected	albiglutide	Eperzan/Tanzeum	High
		dulaglutide	Trulicity	
		exenatide	Byetta	
		exenatide extended release	Bydureon	
		liraglutide	Victoza	
Meglitinides Help beta cells in pancreas release more insulin.	Oral	nateglinide	Starlix	Moderate
		repaglinide	Prandin	
SGLT2 Inhibitors Blocks glucose from being reabsorbed in the kidney.	Oral	canagliflozin	Invokana	High
		dapagliflozin	Farxiga	
		empagliflozin	Jardiance	
Sulfonylureas Help beta cells in pancreas release more insulin.	Oral	chlorpropamide	Diabinese	Low
		glimepiride	Amaryl	
		glipizide	Glucotrol/ Glucotrol XL	
		glyburide/ glibenclamide	Micronase/Glynase/ Diabeta	
TZDs Help insulin work better in muscle and fat. Lower glucose production in liver.	Oral	pioglitazone	Actos	Low
		rosiglitazone	Avandia	

*Cost is based on the lowest-price drug in its class.

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Medications (continued)

Other injected medications

In addition to pills and insulin, some medications for controlling your blood glucose are injected.

Insulin

There are different types of insulin that vary in how quickly they lower blood glucose levels. Some work very quickly and are taken with meals. Others are long-acting and are used just once or twice a day.

INSULIN

INSULIN TYPE*	GENERIC NAME	BRAND NAME
Rapid-Acting Onset: about 15 minutes Peak: about 1 or 2 hours after injection Duration: last between 2–4 hours	aspart	Fiasp
		NovoLog
	glulisine	Apidra
	lispro	Admelog
		Humalog
Regular- or Short-Acting Onset: about 30 minutes Peak: about 2 to 3 hours after injection Duration: last between 3–6 hours	human regular	Humulin R
		Novolin R
		Velosulin R
Intermediate-Acting Onset: about 2 to 4 hours after injection Peak: 4 to 12 hours later Duration: it is effective for about 12 to 18 hours	human nph	Humulin N
		Novolin N
		ReliOn
Long-Acting or Basal Insulin Analogs Onset: between 2 and 4 hours Peak: continuous, "peakless" action that acts the way your body normally releases insulin Duration: last up to 24 hours or longer	degludec	Tresiba
	detemir	Levemir
	glargine	Basaglar
		Lantus
Ultra Long-Acting Onset: 6 hours Peak: No peak Duration: 36 hours	glargine u-300	Toujeo
Inhaled Insulin Onset: Within 12 to 15 minutes Peak: 30 minutes Duration: Out of your system in 180 minutes Note: Must be used with injectable long-acting insulin in patients with type 1 diabetes and in type 2 diabetes patients who use long-acting insulin.	technosphere insulin-inhalation system	Afrezza

*Costs for insulin vary due to types and doses.

What if my blood glucose stays too high?

If your blood glucose levels remain too high, your medication may need to be adjusted. Do not adjust your medication on your own. Talk to your doctor about possible changes.

Diabetes and pregnancy

If you're pregnant, talk with your health care provider about what medications are right for you.

Important note:

The generic names and brand names are shown to help you know what you take. The American Diabetes Association does not recommend or endorse any specific medication.

You might take a medication that is not on this list. Your healthcare team is your best source of information. Talk to them about all the medications you take. Never stop taking a medication or change your dose without talking with your doctor.

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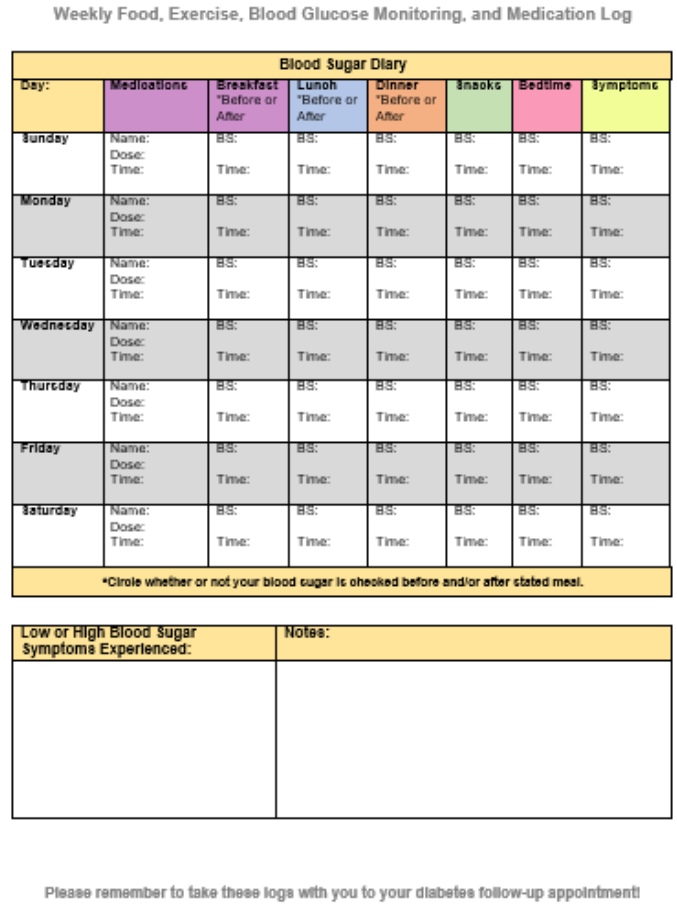
Note: This is a “free, reproducible handout” from the American Diabetes Association and can be found at https://professional.diabetes.org/pel/medications-treating-type-2-diabetes-english

Weekly Food, Exercise, Blood Glucose Monitoring, and Medication Log

Week: Dates:

Meal	Item(s)/Amount (Including Food and Drink)	Carbs
Breakfast:		
Sunday		
Monday		
Tuesday		
Wednesday		
Thursday		
Friday		
Saturday		
Lunch:		
Sunday		
Monday		
Tuesday		
Wednesday		
Thursday		
Friday		
Saturday		
Dinner:		
Sunday		
Monday		
Tuesday		
Wednesday		
Thursday		
Friday		
Saturday		
Snacks:		
Sunday		
Monday		
Tuesday		
Wednesday		
Thursday		
Friday		
Saturday		

Day	Minutes	Physical Activity (Walking/Cardio/Strength/Flexibility)
Sunday		
Monday		
Tuesday		
Wednesday		
Thursday		
Friday		
Saturday		



Weekly Food, Exercise, Blood Glucose Monitoring, and Medication Log

Blood Sugar Diary

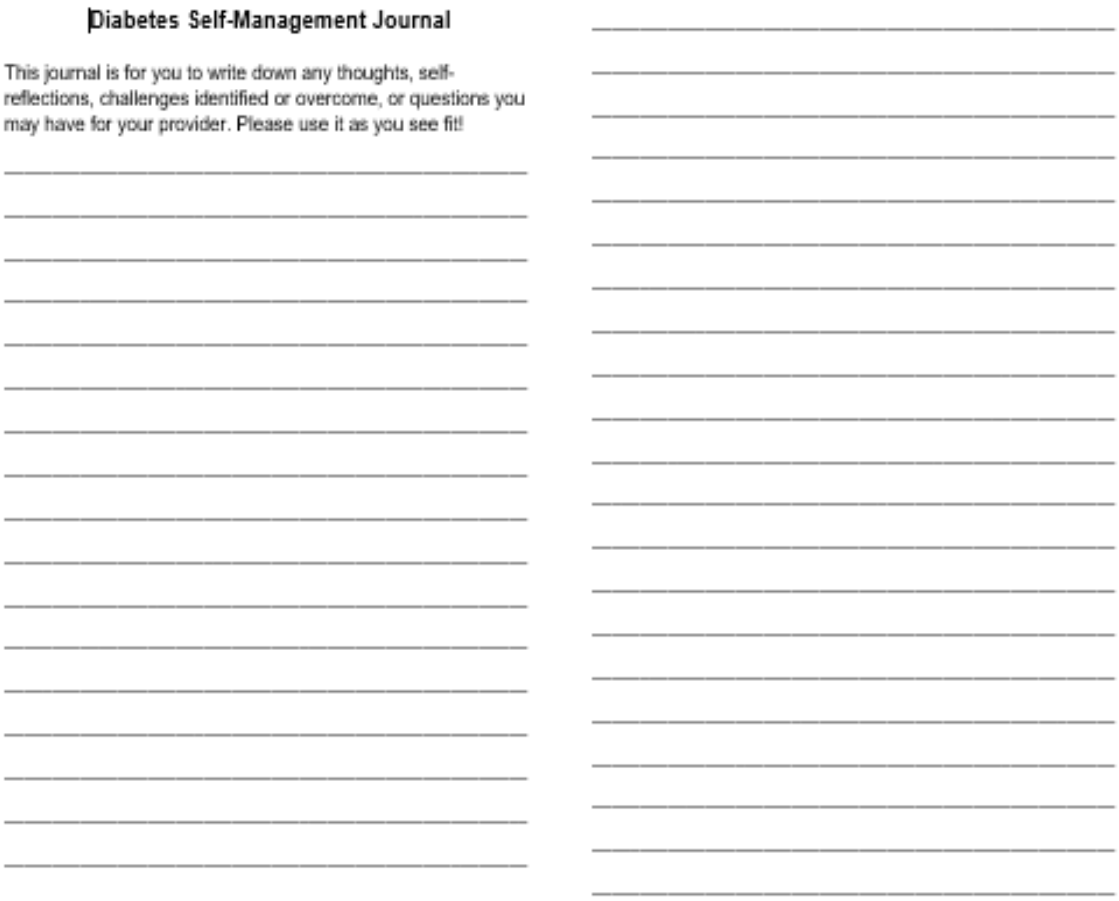
Day:	Medications	Breakfast *Before or After	Lunch *Before or After	Dinner *Before or After	Snacks	Bedtime	Symptoms
Sunday	Name: Dose: Time:	BS: Time:	BS: Time:	BS: Time:	BS: Time:	BS: Time:	BS: Time:
Monday	Name: Dose: Time:	BS: Time:	BS: Time:	BS: Time:	BS: Time:	BS: Time:	BS: Time:
Tuesday	Name: Dose: Time:	BS: Time:	BS: Time:	BS: Time:	BS: Time:	BS: Time:	BS: Time:
Wednesday	Name: Dose: Time:	BS: Time:	BS: Time:	BS: Time:	BS: Time:	BS: Time:	BS: Time:
Thursday	Name: Dose: Time:	BS: Time:	BS: Time:	BS: Time:	BS: Time:	BS: Time:	BS: Time:
Friday	Name: Dose: Time:	BS: Time:	BS: Time:	BS: Time:	BS: Time:	BS: Time:	BS: Time:
Saturday	Name: Dose: Time:	BS: Time:	BS: Time:	BS: Time:	BS: Time:	BS: Time:	BS: Time:

*Circle whether or not your blood sugar is checked before and/or after stated meal.

Low or High Blood Sugar Symptoms Experienced:	Notes:

Please remember to take these logs with you to your diabetes follow-up appointment!

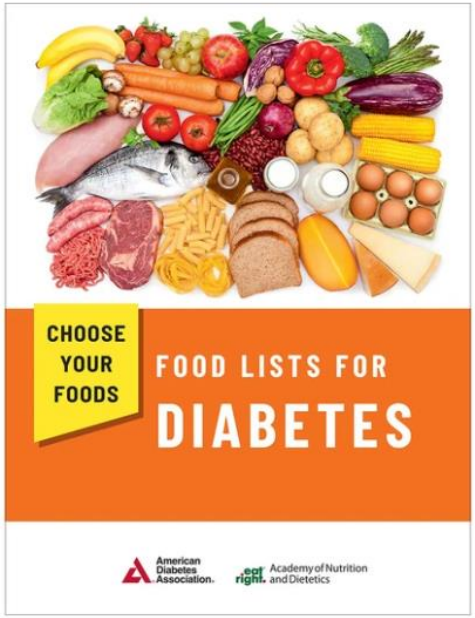
Note: This weekly food, exercise, blood glucose monitoring, and medication log was created by the project leader.

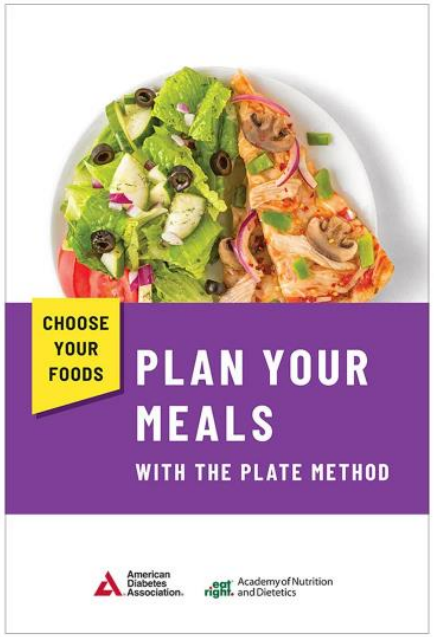


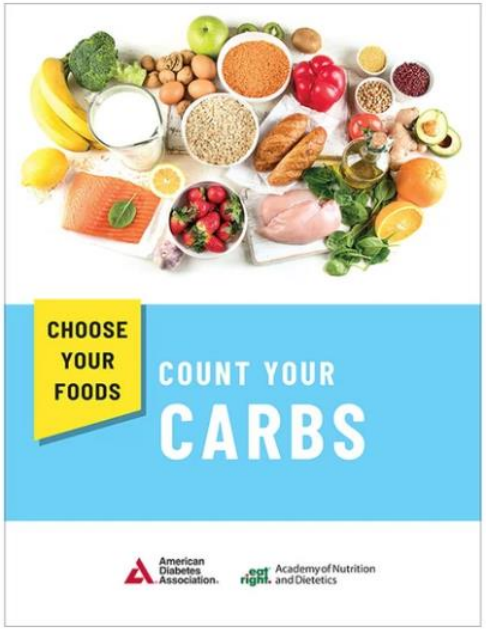
Diabetes Self-Management Journal

This journal is for you to write down any thoughts, self-reflections, challenges identified or overcome, or questions you may have for your provider. Please use it as you see fit!

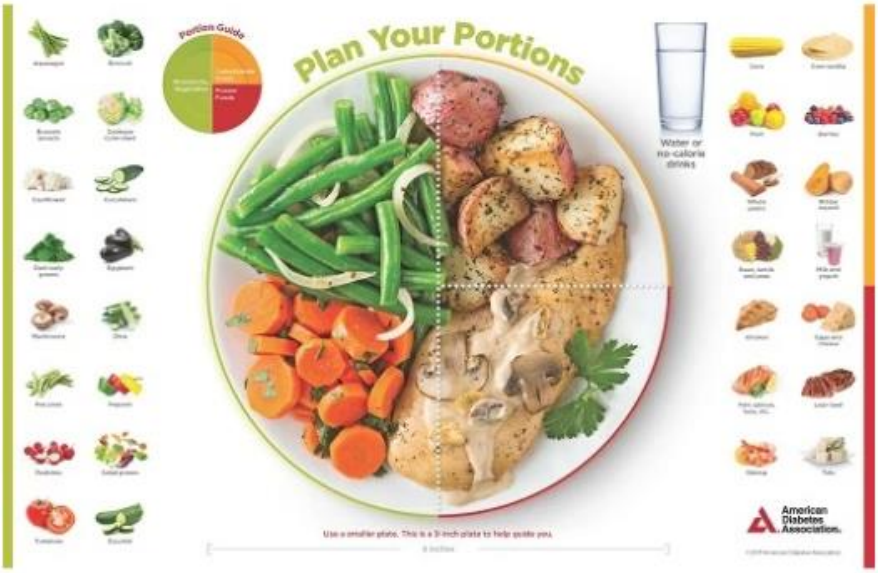
Note: This diabetes self-management journal was created by the project leader. There are approximately 5 pages containing blank lines in the journals provided in the participant handout folder.

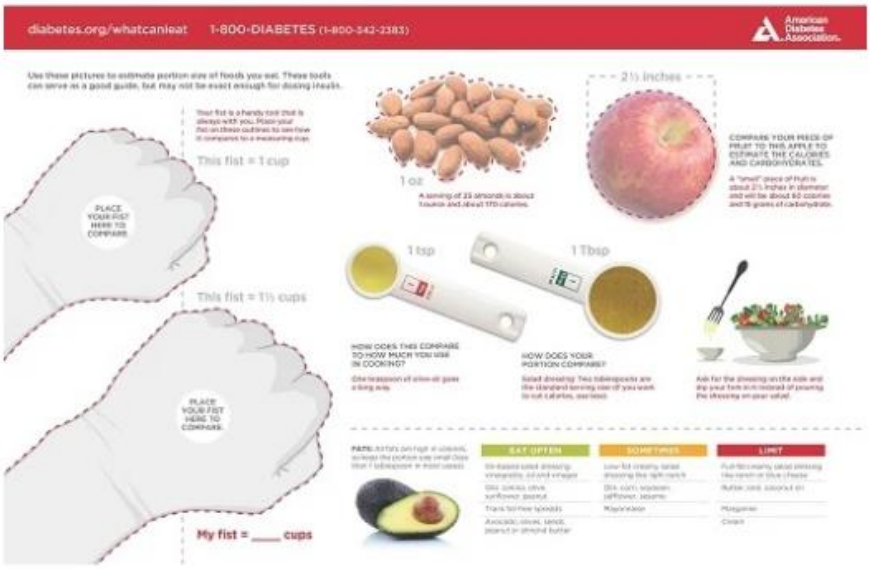






Note: These booklets were purchased by the project leader from the American Diabetes Association and were included in each participant handout folder. These can be purchased from the American Diabetes Association at the following website: https://shopdiabetes.org/collections/patient-education-handouts





Note: This placemat was purchased by the project leader from the American Diabetes Association and was included in each participant handout folder. This can be purchased from the American Diabetes Association at the following website: https://shopdiabetes.org/collections/patient-education-handouts

APPENDIX H

2-Week Reminder Letter Template and SMART Goals Worksheet

SMART GOALS

Back to the Basics with SMART Goals: A Multimodal Intervention for Adults Who Have Type 2 Diabetes

Alyssa Snyder
BSN, RNC-OB
DNP-FNP Student
Valparaiso University
Project Leader
Phone: [redacted]

Dr. [redacted]
Medical Director, Provider
[redacted]
Project Site Facilitator

[redacted] NP
Diabetic Educator, Provider
[redacted]

Dr. Alesha McClanahan
DNP, RN, FNP-BC
Valparaiso University
Project Advisor

Dear (Insert Participant's Name Here),

Way to go! You have reached the 2-week mark of making lifestyle changes towards a better health one step at a time. These small changes can significantly decrease the risk of developing complications associated with type 2 diabetes.

Just as a reminder, your initial SMART goal was:

(Insert each participant's goal here)

Take a moment to evaluate whether or not your goal was met. If your goal was met, keep practicing those new habits and choose some new goals to work on using the SMART Goals Worksheet enclosed. If your goal was not met, continue working on your goal. If necessary, revise your goal using the SMART Goals Worksheet enclosed to make sure it is Specific, Measurable, Attainable, Realistic, and Time-specific.

Remember, take it one step at a time. Focus on one goal at a time. You can do it!

"""You will receive a brief telephone call from the Project Leader in 2-weeks which will allow you to discuss your progress, report any challenges identified or overcome, and report any new goals you may have set for yourself. **Expect to receive this phone call from the following number:** [redacted]

SMART Goals Worksheet

Name: _____ Date: _____

What initial goal(s) do you have in mind?

_____

_____

Expand on this goal using the S.M.A.R.T. goal method:

S Specific	**What do I want to achieve?** (Is your goal precise?)
M Measureable	**How will I know when I've reached my goal?** (How will you track your progress?)
A Attainable	**Is meeting this goal possible for me?** (What do you need to make sure you achieve your goal?)
R Realistic	**Is this goal something I know I can achieve if I try?** (Is this goal important to you?)
T Time-Specific	**When do I want to achieve this goal?** (What is your target date?)

Example SMART Goal for Diabetes Self-Management:

- I will eat 1 serving of vegetables with at least 2 meals every day for the next 4 weeks (specific, realistic, time-specific) and track my progress using the weekly log provided (measureable). I will meet this goal by purchasing vegetables instead of potato chips from the grocery store (attainable).
- I will walk for 30 minutes with the neighbor before dinner on Monday, Wednesday, Friday, and Saturday for the next 3 weeks (specific, attainable, realistic, time-specific) and track my progress using the weekly log provided (measureable).
- Other ideas to start from:
  - I will eat a breakfast containing 50 grams of carbs every morning for the 2 weeks.
  - I will take a healthier meal from home for lunch instead of getting fast food on Monday through Thursday for the next week.
  - I will walk in place during every commercial break when watching television every evening for the next 2 weeks.
  - I will drink water with every meal instead of pop for the next 4-weeks.

Challenges Identified/Overcome

APPENDIX I

8-Week Reminder Letter Template and SMART Goals Worksheet

SMART GOALS

Back to the Basics with SMART Goals: A Multimodal Intervention for Adults Who Have Type 2 Diabetes

Alyssa Snyder
BSN, RNC-OB
DNP-FNP Student
Valparaiso University
Project Leader
Phone: [redacted]

Dr. [redacted]
Medical Director, Provider
[redacted]
Project Site Facilitator

[redacted], NP
Diabetic Educator, Provider
[redacted]

Dr. Alesha McClanahan
DNP, RN, FNP-BC
Valparaiso University
Project Advisor

Dear (Insert Participant's Name Here),

Way to go! You have reached the 8-week mark of making lifestyle changes towards a better health one step at a time. These small changes can significantly decrease the risk of developing complications associated with type 2 diabetes.

Just as a reminder, your SMART goal was:

(insert each participant's goal here)

Take a moment to evaluate whether or not your goal was met. If your goal was met, keep practicing those new habits and choose some new goals to work on using the SMART Goals Worksheet enclosed. If your goal was not met, continue working on your goal. If necessary, revise your goal using the SMART Goals Worksheet enclosed to make sure it is Specific, Measureable, Attainable, Realistic, and Time-specific.

Remember, take it one step at a time. Focus on one goal at a time. You can do it!

***Your provider looks forward to seeing you at your routine diabetes follow-up appointment scheduled on: (insert date here). As usual, your hemoglobin A1c will be checked. At this visit, you will be asked to fill out one last questionnaire. Thank you for participating in this evidence-based practice project!

SMART Goals Worksheet

Name: _____ Date: _____

What initial goal(s) do you have in mind?

_____

_____

Expand on this goal using the S.M.A.R.T. goal method:

S Specific	**What do I want to achieve?** (Is your goal precise?)
M Measureable	**How will I know when I've reached my goal?** (How will you track your progress?)
A Attainable	**Is meeting this goal possible for me?** (What do you need to make sure you achieve your goal?)
R Realistic	**Is this goal something I know I can achieve if I try?** (Is this goal important to you?)
T Time-Specific	**When do I want to achieve this goal?** (What is your target date?)

Example SMART Goal for Diabetes Self-Management:

- I will eat 1 serving of vegetables with at least 2 meals every day for the next 4 weeks (specific, realistic, time-specific) and track my progress using the weekly log provided (measureable). I will meet this goal by purchasing vegetables instead of potato chips from the grocery store (attainable).
- I will walk for 30 minutes with the neighbor before dinner on Monday, Wednesday, Friday, and Saturday for the next 3 weeks (specific, attainable, realistic, time-specific) and track my progress using the weekly log provided (measureable).
- Other ideas to start from:
  - I will eat a breakfast containing 50 grams of carbs every morning for the 2 weeks.
  - I will take a healthier meal from home for lunch instead of getting fast food on Monday through Thursday for the next week.
  - I will walk in place during every commercial break when watching television every evening for the next 2 weeks.
  - I will drink water with every meal instead of pop for the next 4-weeks.

Challenges Identified/Overcome

APPENDIX J

4-Week Progress Telephone Call Template Guide

Back to the Basics with SMART Goals: A multimodal Intervention for Adults Who Have Type 2 Diabetes

Progress Telephone Call Template Guide

Code Name: _____ Date: _____

Telephone Call Guide:

Confirm speaking with participant.

Words of encouragement: I want to congratulate you for making it to the 4-week mark of making lifestyle changes towards a better health one step at a time. These small changes can significantly decrease the risk of developing complications associated with type 2 diabetes

As a reminder, your SMART goal was: (insert each participant's goal here)

Now that we've reviewed your SMART goal, please tell me how things are going.

Were you able to meet your set goal?

Did you identify any challenges that were experienced or overcome?

Did you make any new goals?

Do you feel that you need to revise your goal?

What tools have you used up to this point? Have they been helpful?

Words of encouragement: We understand that making these lifestyle changes can be difficult due to a number of reasons in this busy world. It's never too late to start making lifestyle changes. Remember to take it one step at a time. Focus on one goal at a time. You can do it!

Again, I want to thank you for participating in this EBP project intended to improve diabetes self-management and lower hemoglobin A1c levels.

As a reminder, you will receive a letter in 4-weeks reminding you of your goals.

I look forward to evaluating your progress made at the completion of this project. Remember to keep your scheduled diabetes follow-up appointment with your provider on: _____.

APPENDIX K

12-Week Satisfaction Questionnaire and DSMQ

Back to the Basics with SMART Goals: A Multimodal Intervention for Adults Who Have Type 2 Diabetes

Name: _____ **Date**: _____

Instructions: Please complete the questionnaire below and on the back of this page.

Circle Yes or No:

1. I was satisfied with the multimodal intervention involving goal setting, educational supplements/tools, and frequent follow-up. Yes / No

2. I found the multimodal intervention involving goal setting, educational supplements/tools, and frequent follow-up to be helpful. Yes / No

3. I found the SMART goals method easy to use. Yes / No

4. I found the diabetes self-management educational materials and tools easy to read and understand. Yes / No

5. I found the diabetes self-management educational materials and tools to be beneficial. Yes / No

6. I found that the frequent follow-up such as the 2- and 8-week reminder letters and 4-week progress telephone call helped me stay accountable so that I could accomplish my goal. Yes / No

7. I would recommend that my provider continue using the multimodal intervention with other diabetic patients to encourage diabetes self-management. Yes / No

Please provide an explanation to questions answered "no" or any additional comments you may have below:

_____

_____

_____

*Turn page to fill out final questionnaire

Diabetes Self-Management Questionnaire (DSMQ)

The following statements describe self-care activities related to your diabetes. Thinking about your self-care over the **last 3 weeks**, please specify the extent to which each statement applies to you. Note: If you monitor your glucose using continuous interstitial glucose monitoring (CGM), please refer to this when 'blood sugar checking' is requested.	applies to me very much	applies to me to a consider-able degree	applies to me to some degree	does not apply to me
1. I check my blood sugar levels with care and attention. ☐ *Blood sugar measurement is not required as a part of my treatment.*	☐3	☐2	☐1	☐0
2. The food I choose to eat makes it easy to achieve optimal blood sugar levels.	☐3	☐2	☐1	☐0
3. I keep all doctors' appointments recommended for my diabetes treatment.	☐3	☐2	☐1	☐0
4. I take my diabetes medication (e. g. insulin, tablets) as prescribed. ☐ *Diabetes medication/insulin is not required as a part of my treatment.*	☐3	☐2	☐1	☐0
5. Occasionally I eat lots of sweets or other foods rich in carbohydrates.	☐3	☐2	☐1	☐0
6. I record my blood sugar levels regularly (or analyse the value chart with my blood glucose meter). ☐ *Blood sugar measurement is not required as a part of my treatment.*	☐3	☐2	☐1	☐0
7. I tend to avoid diabetes-related doctors' appointments.	☐3	☐2	☐1	☐0
8. I do regular physical activity to achieve optimal blood sugar levels.	☐3	☐2	☐1	☐0
9. I strictly follow the dietary recommendations given by my doctor or diabetes specialist.	☐3	☐2	☐1	☐0
10. I do not check my blood sugar levels frequently enough as would be required for achieving good blood glucose control. ☐ *Blood sugar measurement is not required as a part of my treatment.*	☐3	☐2	☐1	☐0
11. I avoid physical activity, although it would improve my diabetes.	☐3	☐2	☐1	☐0
12. I tend to forget to take or skip my diabetes medication (e. g. insulin, tablets). ☐ *Diabetes medication/insulin is not required as a part of my treatment.*	☐3	☐2	☐1	☐0
13. Sometimes I have real 'food binges' (not triggered by hypoglycaemia).	☐3	☐2	☐1	☐0
14. Regarding my diabetes care, I should see my medical practitioner(s) more often.	☐3	☐2	☐1	☐0
15. I tend to skip planned physical activity.	☐3	☐2	☐1	☐0
16. My diabetes self-care is poor.	☐3	☐2	☐1	☐0

Thank you for participating in this evidence-based practice project!

APPENDIX L

DSMQ Permission for Use and Reprint

Mapi Research Trust

SPECIAL TERMS

These User License Agreement Special Terms ("Special Terms") are issued between Mapi Research Trust ("MRT") and Alyssa Snyder ("User").

These Special Terms are in addition to any and all previous Special Terms under the User License Agreement General Terms.

These Special Terms include the terms and conditions of the User License Agreement General Terms, which are hereby incorporated by this reference as though the same was set forth in its entirety and shall be effective as of the Special Terms Effective Date set forth herein.

All capitalized terms which are not defined herein shall have the same meanings as set forth in the User License Agreement General Terms.

These Special Terms, including all attachments and the User License Agreement General Terms contain the entire understanding of the Parties with respect to the subject matter herein and supersedes all previous agreements and undertakings with respect thereto. If the terms and conditions of these Special Terms or any attachment conflict with the terms and conditions of the User License Agreement General Terms, the terms and conditions of the User License Agreement General Terms will control, unless these Special Terms specifically acknowledge the conflict and expressly states that the conflicting term or provision found in these Special Terms control for these Special Terms only. These Special Terms may be modified only by written agreement signed by the Parties.

1. **User information**

User name	Alyssa Snyder
Category of User	Student
User address	69525 Juniper Rd Bremen 46506 United States of America
User VAT number	
User email	alyssa.snyder@valpo.edu
User phone	5744859058
Billing Address	69525 Juniper Rd Bremen 46506 United States of America

2. **General information**

Effective Date	Date of acceptance of these Special Terms by the User
Expiration Date ("Term")	Upon completion of the Stated Purpose
Name of User's contact in charge of the request	Alyssa Snyder

3. **Identification of the COA**

Name of the COA	DSMQ - Diabetes Self-Management Questionnaire
Author	Schmitt A
Copyright Holder	Dr. Andreas Schmitt
Copyright notice	DSMQ © Dr Andreas Schmitt, 2013
Bibliographic reference	Schmitt A, Gahr A, Hermanns N, Kulzer B, Huber J, Haak T. The Diabetes Self-Management Questionnaire (DSMQ): development and evaluation of an instrument to assess diabetes self-care activities associated with glycaemic control. Health Qual Life Outcomes. 2013 Aug 13;11:138 (Full Text Article) Schmitt A, Reimer A, Hermanns N, Huber J, Ehrmann D, Schall S, Kulzer B. Assessing Diabetes Self-Management with the Diabetes Self-Management Questionnaire (DSMQ) Can Help Analyse Behavioural Problems Related to Reduced Glycaemic Control. PLoS One. 2016 Mar 3;11(3) (Full Text Article)
Modules/versions needed	DSMQ

4. **Context of use of the COA**

The User undertakes to use the COA solely in the context of the Stated Purpose as defined hereafter.

4.1 Stated Purpose

Other project

Title	DNP project
Disease or condition	Type 2 Diabetes Mellitus
Planned Term*	Start: 06/2021; End: 05/2022
Description (including format or media)	

4.2 Country and languages

MRT grants the License to use the COA on the following countries and in the languages indicated in the table below:

Version/Module	Language	For use in the following country
DSMQ	English	the UK

The User understands that the countries indicated above are provided for information purposes. The User may use the

COA in other countries than the ones indicated above.

5. **Specific requirements for the COA**

- The Copyright Holder of the COA has granted ICON LS exclusive rights to translate the COA in the context of commercial studies or any project funded by for-profit entities. ICON LS is the only organization authorized to perform linguistic validation/translation work on the COA.

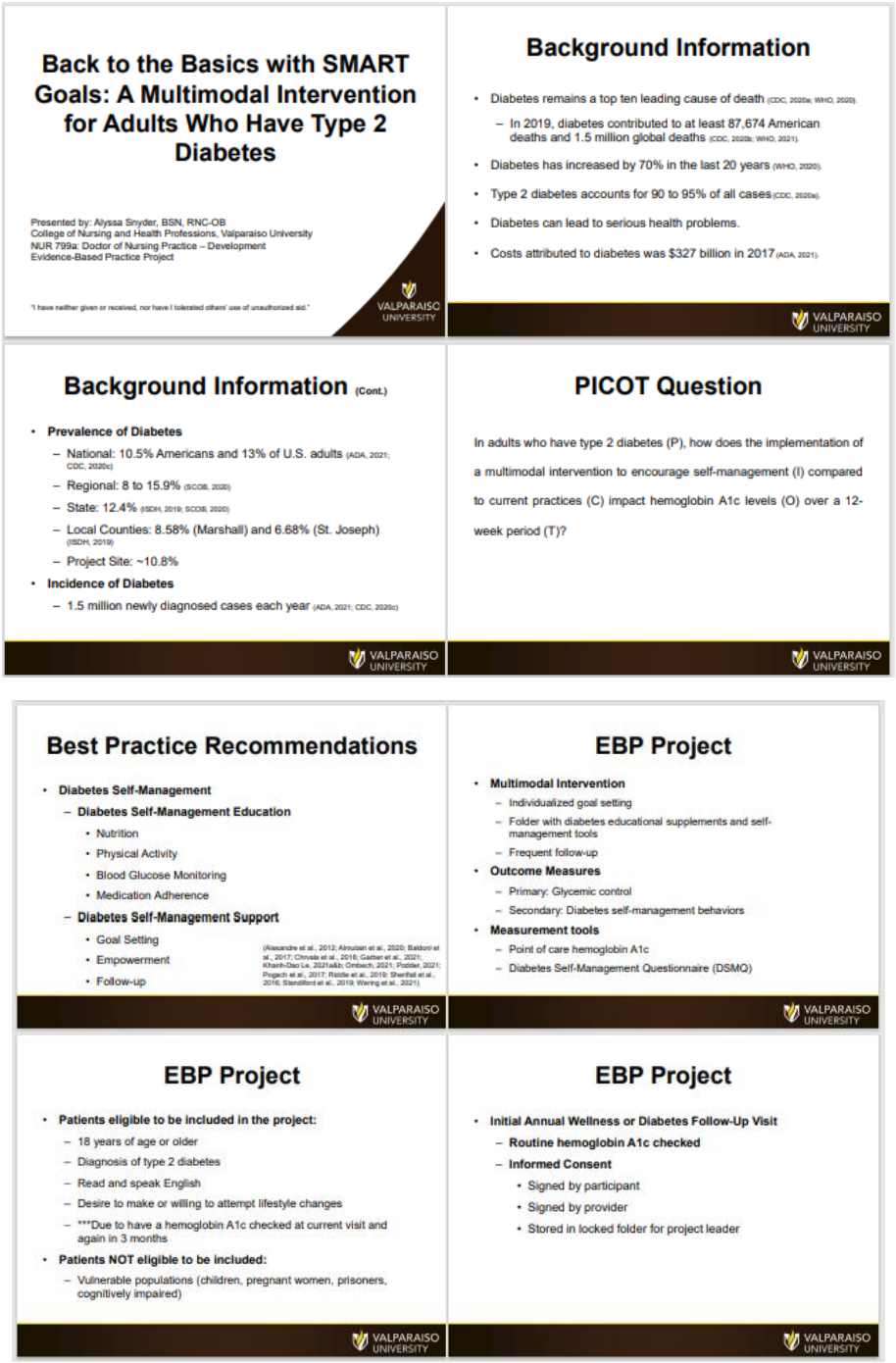
- In case the User wants to use an e-Version of the COA, the User shall send the Screenshots of the original version of the COA to MRT or ICON LS for review and approval. The Screenshots review may incur additional fees.

- In case the User wants to use an e-Version of the COA, ICON LS shall update (if needed) and populate the COA translations into the User's or IT Company's system and the User shall send the Screenshots of the translations of the COA to ICON LS for approval. The update (if needed), population of translations and the Screenshots review may incur additional fees.

By accepting these Special Terms, the User acknowledges and confirms that it has read and approves the User Agreement General Terms.

APPENDIX M

PowerPoint for Stakeholders



Back to the Basics with SMART Goals: A Multimodal Intervention for Adults Who Have Type 2 Diabetes

Presented by: Alyssa Snyder, BSN, RNC-OB
College of Nursing and Health Professions, Valparaiso University
NJR 798a: Doctor of Nursing Practice – Development
Evidence-Based Practice Project

"I have neither given or received, nor have I tolerated others' use of unauthorized aid."

VALPARAISO UNIVERSITY

Background Information

- Diabetes remains a top ten leading cause of death (CDC, 2020a; WHO, 2020).
  - In 2019, diabetes contributed to at least 87,674 American deaths and 1.5 million global deaths (CDC, 2020b; WHO, 2021).
- Diabetes has increased by 70% in the last 20 years (WHO, 2020).
- Type 2 diabetes accounts for 90 to 95% of all cases (CDC, 2020a).
- Diabetes can lead to serious health problems.
- Costs attributed to diabetes was $327 billion in 2017 (ADA, 2021).

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Background Information (Cont.)

- **Prevalence of Diabetes**
  - National: 10.5% Americans and 13% of U.S. adults (ADA, 2021; CDC, 2020c)
  - Regional: 8 to 15.9% (SCDB, 2020)
  - State: 12.4% (ISDH, 2019; SCDB, 2020)
  - Local Counties: 8.58% (Marshall) and 6.68% (St. Joseph) (ISDH, 2019)
  - Project Site: ~10.8%
- **Incidence of Diabetes**
  - 1.5 million newly diagnosed cases each year (ADA, 2021; CDC, 2020c)

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PICOT Question

In adults who have type 2 diabetes (P), how does the implementation of a multimodal intervention to encourage self-management (I) compared to current practices (C) impact hemoglobin A1c levels (O) over a 12-week period (T)?

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Best Practice Recommendations

- **Diabetes Self-Management**
  - **Diabetes Self-Management Education**
    - Nutrition
    - Physical Activity
    - Blood Glucose Monitoring
    - Medication Adherence
  - **Diabetes Self-Management Support**
    - Goal Setting
    - Empowerment
    - Follow-up

(Alexandre et al., 2012; Almubari et al., 2020; Baldoni et al., 2017; Chhabra et al., 2016; Garber et al., 2021; Khanh-Dao Le, 2021a&b; Ombech, 2021; Podder, 2021; Pogach et al., 2017; Riddle et al., 2019; Sherifali et al., 2016; Standiford et al., 2019; Waring et al., 2021)

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EBP Project

- **Multimodal Intervention**
  - Individualized goal setting
  - Folder with diabetes educational supplements and self-management tools
  - Frequent follow-up
- **Outcome Measures**
  - Primary: Glycemic control
  - Secondary: Diabetes self-management behaviors
- **Measurement tools**
  - Point of care hemoglobin A1c
  - Diabetes Self-Management Questionnaire (DSMQ)

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EBP Project

- **Patients eligible to be included in the project:**
  - 18 years of age or older
  - Diagnosis of type 2 diabetes
  - Read and speak English
  - Desire to make or willing to attempt lifestyle changes
  - ***Due to have a hemoglobin A1c checked at current visit and again in 3 months
- **Patients NOT eligible to be included:**
  - Vulnerable populations (children, pregnant women, prisoners, cognitively impaired)

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EBP Project

- **Initial Annual Wellness or Diabetes Follow-Up Visit**
  - **Routine hemoglobin A1c checked**
  - **Informed Consent**
    - Signed by participant
    - Signed by provider
    - Stored in locked folder for project leader

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EBP Project

- **Initial Annual Wellness or Diabetes Follow-Up Visit**
  - **Demographic Form & Diabetes Self-Management Questionnaire (DSMQ)**
    - Completed by participant
    - Stored in locked folder for project leader
  - **Goal Setting**
    - Established collaboratively between provider and patient
    - SMART Goals Worksheet
      - » White copy given to participant
      - » Yellow copy stored in locked folder for project leader

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EBP Project

- **Initial Annual Wellness or Diabetes Follow-Up Visit**
  - **Folder of Educational Supplements and Tools**
    - Provided by project leader and stored in convenient location
    - Handed out to participant by provider
      - May quickly review items with participant if desired
        - » **Education**: Type 2 diabetes, nutrition, physical activity, blood glucose monitoring, diabetic medications
        - » **Self-management tools**: Weekly log, journal, nutrition booklets, placemat
    - Participant may review and utilize as appropriate to help accomplish set goal(s) at home

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EBP Project

- **Frequent Follow-Up**
  - Completed by project leader
  - Reminder letters
    - 2 and 8 weeks
  - Progress telephone call
    - 4 weeks

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EBP Project

- **Three-Month Diabetes Follow-up Visit**
  - **Routine hemoglobin A1c checked**
  - **Satisfaction questionnaire and DSMQ**
    - Completed by participant
    - Stored in locked folder for project leader

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EBP Project

- **Outcome measures**
  - **Glycemic control**
    - Point-of-care hemoglobin A1c
      - Measured at initial visit
      - Measured at 3 month diabetes follow-up visit
  - **Diabetes self-management behaviors**
    - Diabetes Self-Management Questionnaire (DSMQ)
      - Measured at initial visit
      - Measured at 3 month diabetes follow-up visit

VALPARAISO UNIVERSITY

Ethical Considerations

- **Institutional Review Board Approval**
  - Project Site
  - Valparaiso University
- **Informed Consent**
  - Voluntary Participation
- **Protocol**
  - Emailed along with this PowerPoint
  - May review if desired

VALPARAISO UNIVERSITY

Ethical Considerations

- **Protection of Personal Information**
  - **Hardcopies**
    - Informed consent, demographic form/DSMQ, SMART goals worksheet, satisfaction questionnaire/DSMQ
      - Initially stored in locked folder by provider
        - » Both provider and project leader have access to
      - Retrieved, reviewed in private, and coded by project leader
      - Kept in locked folder AND locked filing safe for duration
        - » Only project leader has access to
      - Destroyed by shredding at project site at end of project

VALPARAISO UNIVERSITY

Ethical Considerations

- **Protection of Personal Information**
  - **EXCEL Spreadsheet on USB Drive**
    - Coded data
      - Always reviewed in private by project leader
      - Double password protected
        - » Kept in project leader's possession at all times
        - » Only project leader has access to
      - Destroyed by deleting files at project site in the presence of site facilitator at end of project

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Ethical Considerations

- **Protection of Personal Information**
  - **Frequent Follow-Up**
    - Two and Eight Week Letters
      - Data decoded in private by project leader
      - Immediately printed and mailed by project leader off-site at nearby postal office
    - Four Week Progress Call
      - Data decoded in private by project leader
      - Completed using project leader's personal cell phone
      - Participant's telephone number immediately deleted from history following call

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EBP Project

- **Important Information**
  - Tentative Implementation Date : September 2, 2021 (assuming IRB approval)
  - Minimum Participants: 10
  - Maximum Participant: 50

****Project leader will be on site every Monday and/or Wednesday to review and record data and be available if any needs or questions were to arise.**

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EBP Project

- **Important Information**
  - **Provider's responsibility**
    - Informed Consent
    - Participant to fill out Demographic form/DSMQ (initial visit)
    - Establish individual SMART goals using worksheet
    - Hand out folder containing DSM educational supplements/tools
    - Participant to fill out final satisfaction questionnaire/DSMQ (3-month follow-up)

****Project leader will be on site every Monday and/or Wednesday to review and record data and be available if any needs or questions were to arise.**

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EBP Project

- **Important Information**
  - **Project leader's responsibility**
    - Review informed consent, demographic form/DSMQ, SMART goals
    - Code data
    - Send 2-week reminder letters
    - Complete 4-week progress telephone calls
    - Send 8-week reminder letters
    - Review 3-month follow-up questionnaires and record data
    - Analyze data following implementation phase (Spring, 2022)

****Project leader will be on site every Monday and/or Wednesday to review and record data and be available if any needs or questions were to arise.**

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Informed Consent

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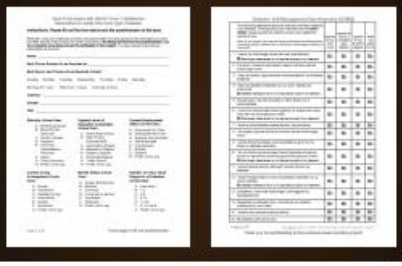
Demographic and DSMQ



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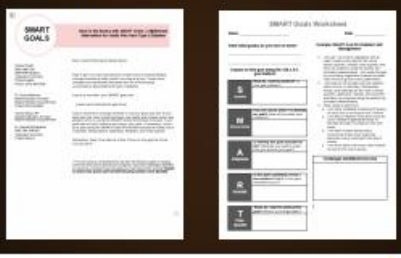
SMART Goals Worksheet

VALPARAISO UNIVERSITY

Participant Letters

Two & Eight Week Reminders



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Telephone Guide

Four Week Progress Call

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Satisfaction Questionnaire and DSMQ

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References

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APPENDIX N

Valparaiso University's IRB Exemption

VALPARAISO UNIVERSITY

Alyssa Snyder <alyssa.snyder@valpo.edu>

Fwd: IRB Questionnaire Response

11 messages

Valpo IRB <valpoirb@valpo.edu> Wed, Aug 18, 2021 at 3:51 PM
To: Alyssa Snyder <alyssa.snyder@valpo.edu>

Hi, Alyssa,

Class projects are not subject to IRB review. Good luck with your project!

Dorothy Warner
IRB Administrator

---------- Forwarded message ---------
From: <valpoirb@valpo.edu>
Date: Wed, Aug 18, 2021 at 12:50 PM
Subject: IRB Questionnaire Response
To: <jennifer.winquist@valpo.edu>, <valpoirb@valpo.edu>

Response summary

Timestamp
Wed Aug 18 2021 13:50:32 GMT-0400 (EDT)

Username
alyssa.snyder@valpo.edu

Are you a student, faculty, or staff?
Student

Provide a title for your project
Back to the Basics with SMART Goals: A Multimodal Intervention for Adults Who Have Type 2 Diabetes

If you are a student, type the VU EMAIL ADDRESS of the faculty member supervising your project. Be sure it is their VU email address.
alesha.mcclanahan@valpo.edu

Is this project for the Doctor of Nursing Practice (DNP) Program?
Yes

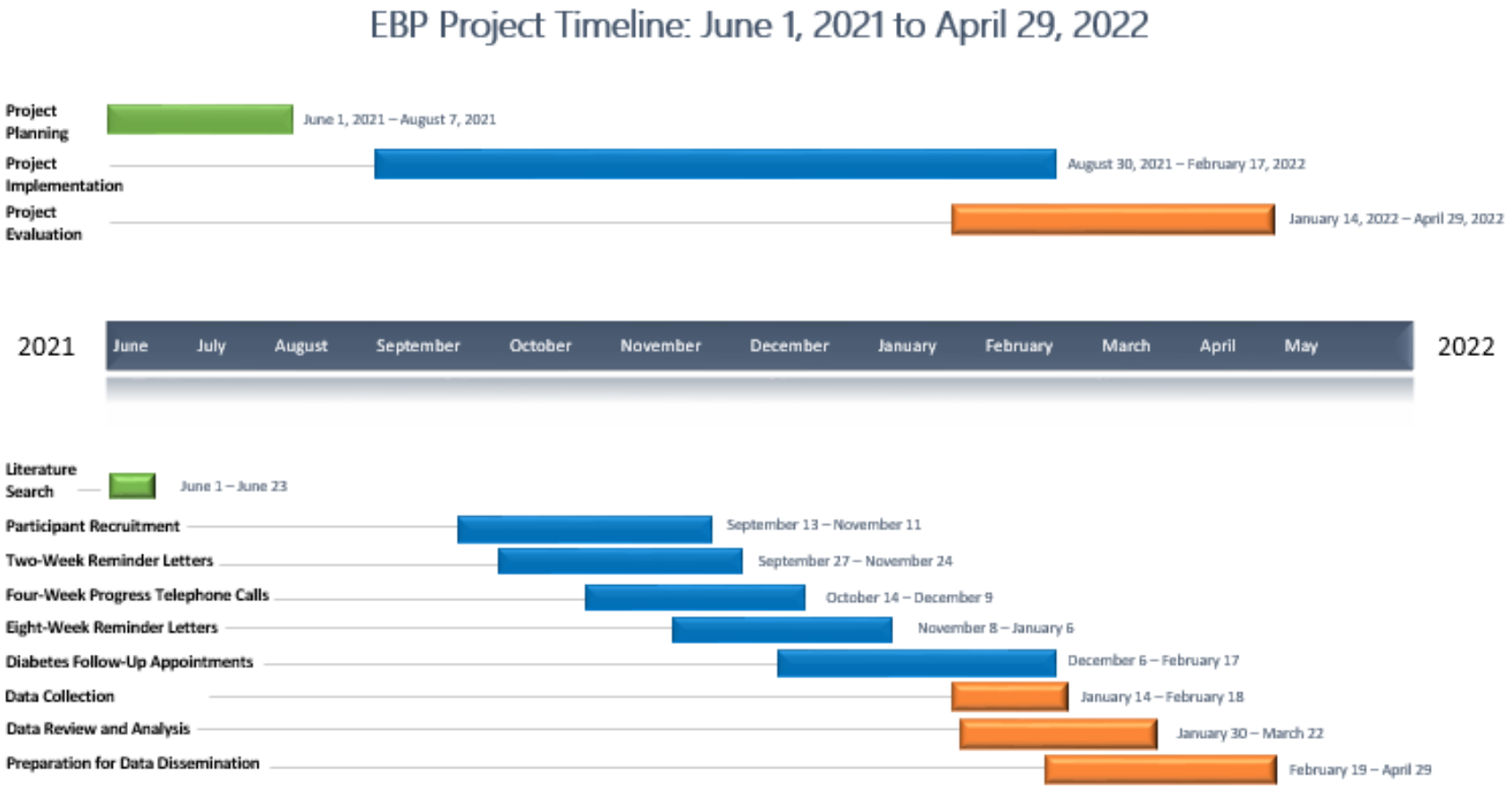
Does your project meet all 8 criteria described above?
Yes

I certify that the information provided in this application is complete and accurate. I understand that as the Principal Investigator I have ultimate responsibility for the conduct and ethical performance of the study, the protection of the rights and welfare of human participants.
I agree with this statement

--
Valpo IRB Team

APPENDIX O

EBP Project Implementation Calendar



APPENDIX P

Project Leader's Ethics Training Certificate

CITI PROGRAM

Completion Date 12-Apr-2021
Expiration Date N/A
Record ID 41885765

This is to certify that:

Alyssa Snyder

Has completed the following CITI Program course:

Not valid for renewal of certification through CME.

Group 1: Social Behavioral Educational Researchers
(Curriculum Group)
Group 1: Social Behavioral Educational Researchers
(Course Learner Group)
1 - Basic Course
(Stage)

Under requirements set by:

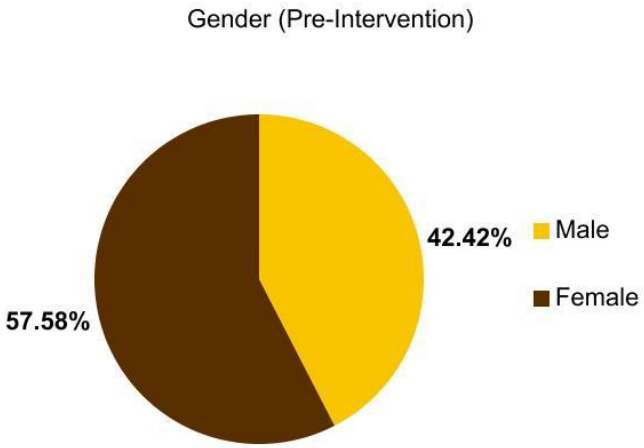
Valparaiso University

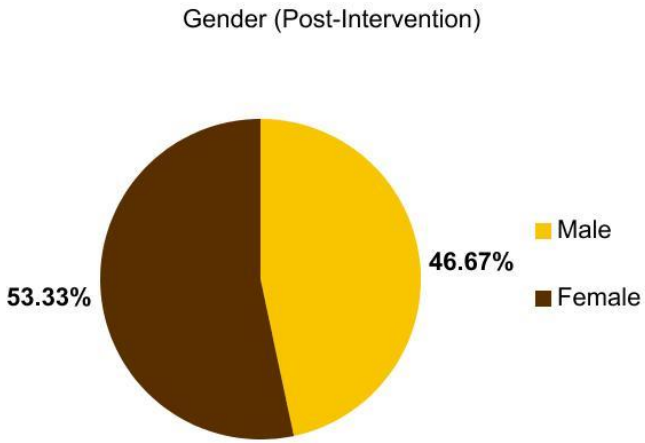
CITI
Collaborative Institutional Training Initiative

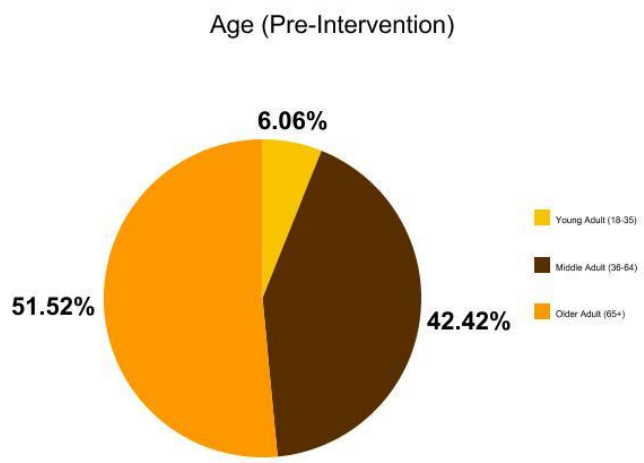
Verify at www.citiprogram.org/verify/?wd7c34c23-2f04-4477-923f-c60ac895a518-41885765

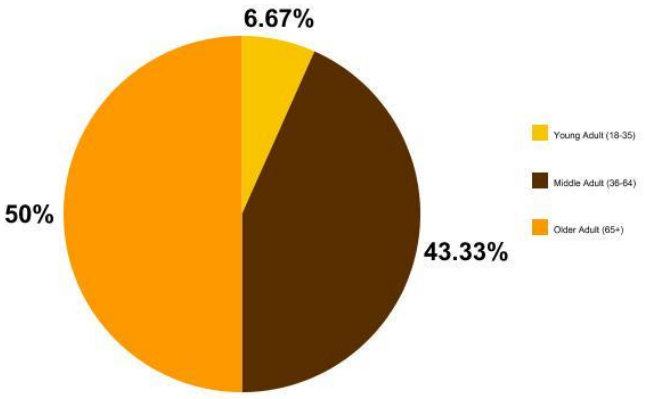
APPENDIX Q

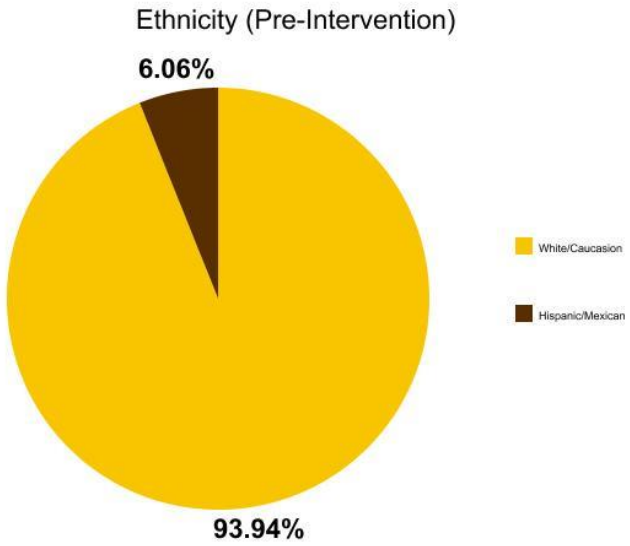
Graphs of Demographic Data

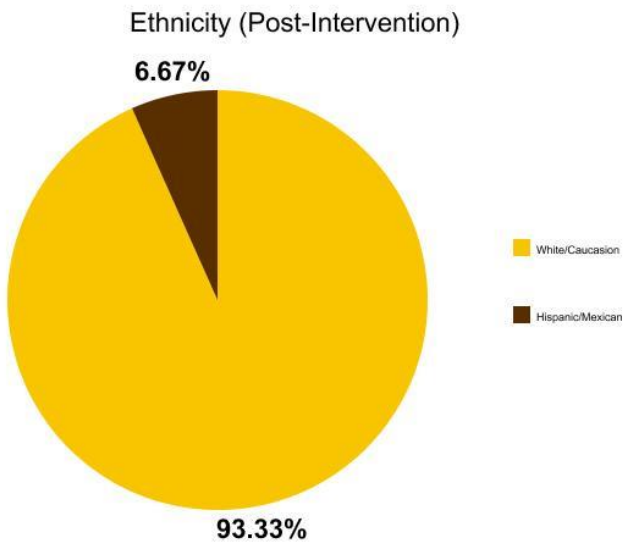


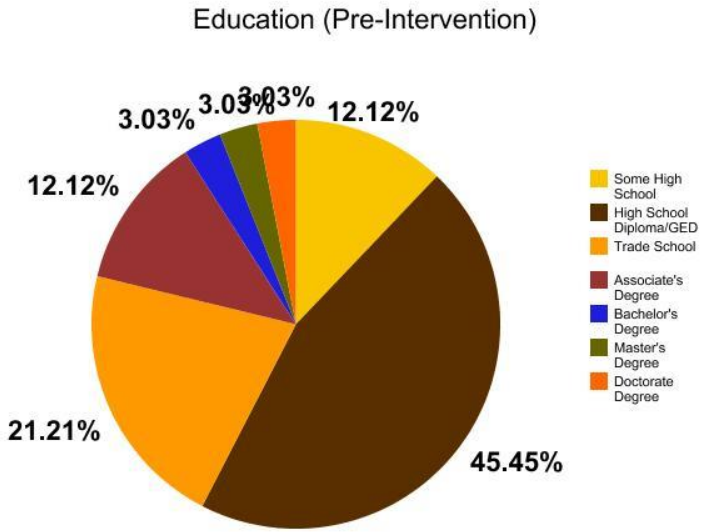


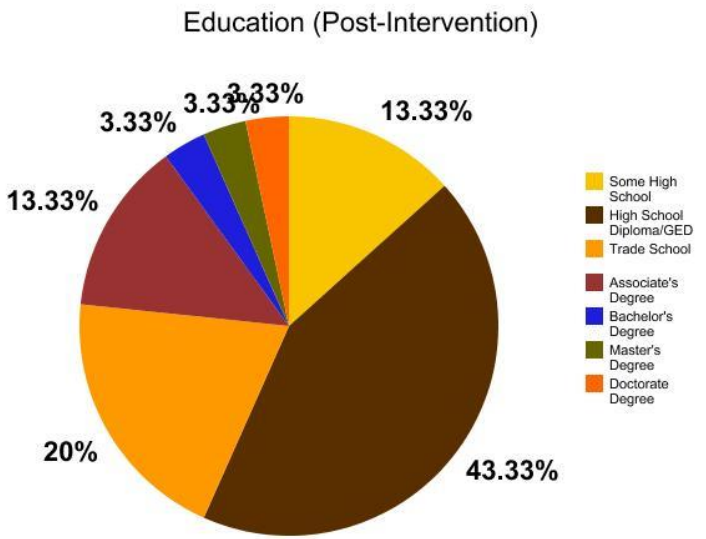


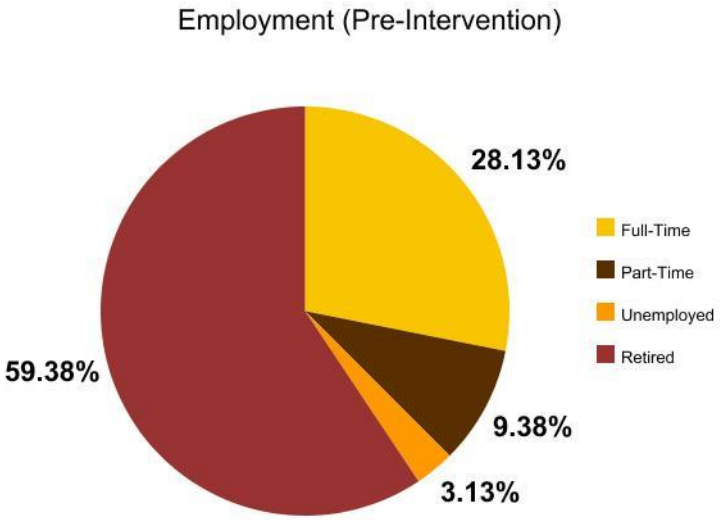


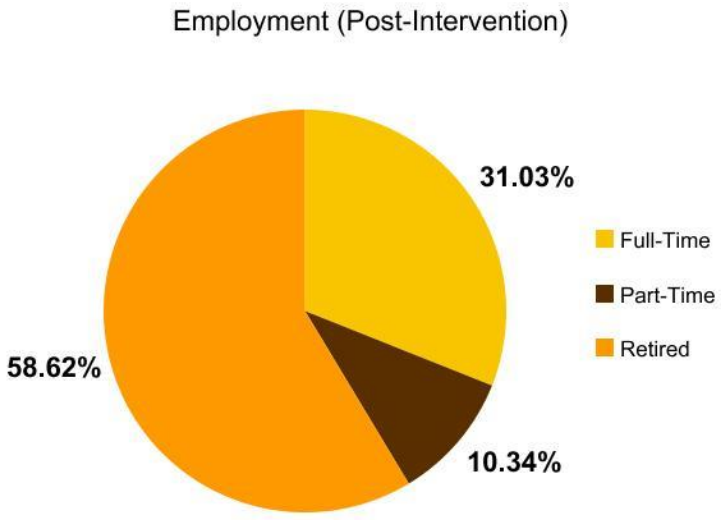

Ethnicity (Pre-Intervention)
6.06%
93.94%
White/Caucasion
Hispanic/Mexican

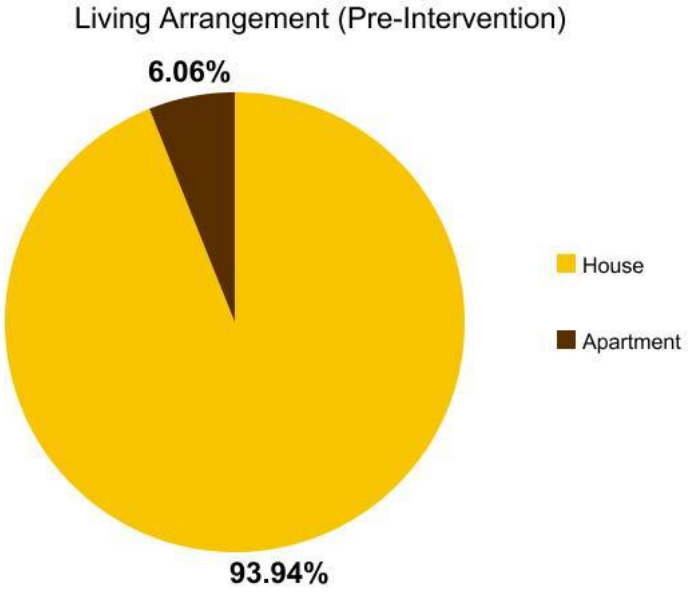

Ethnicity (Post-Intervention)
6.67%
93.33%
White/Caucasion
Hispanic/Mexican

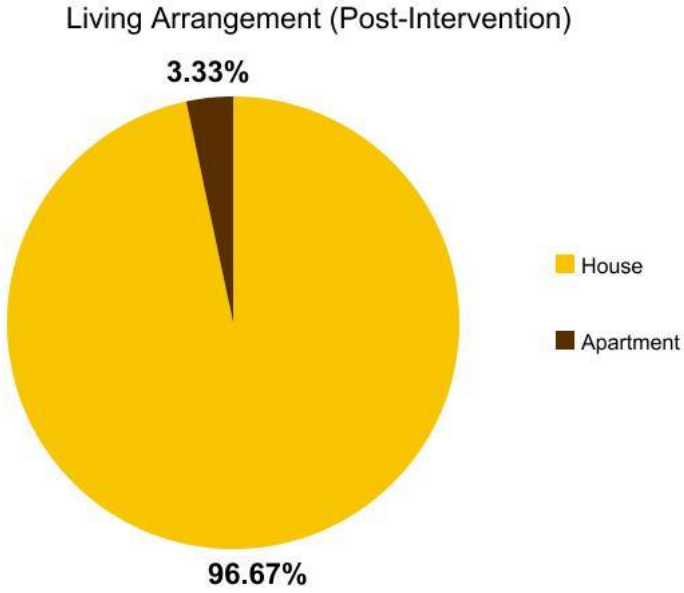

Education (Pre-Intervention)
3.03%
3.03%
3.03%
12.12%
12.12%
21.21%
45.45%
Some High School
High School Diploma/GED
Trade School
Associate's Degree
Bachelor's Degree
Master's Degree
Doctorate Degree

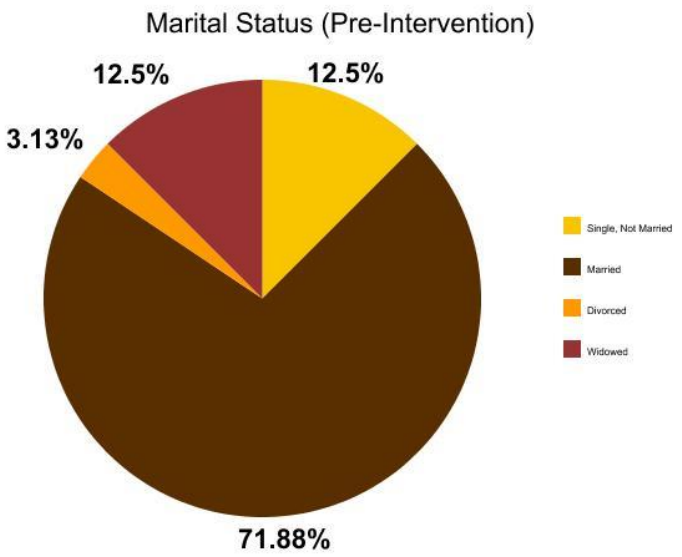

Education (Post-Intervention)
3.33%
3.33%
3.33%
13.33%
13.33%
20%
43.33%
Some High School
High School Diploma/GED
Trade School
Associate's Degree
Bachelor's Degree
Master's Degree
Doctorate Degree

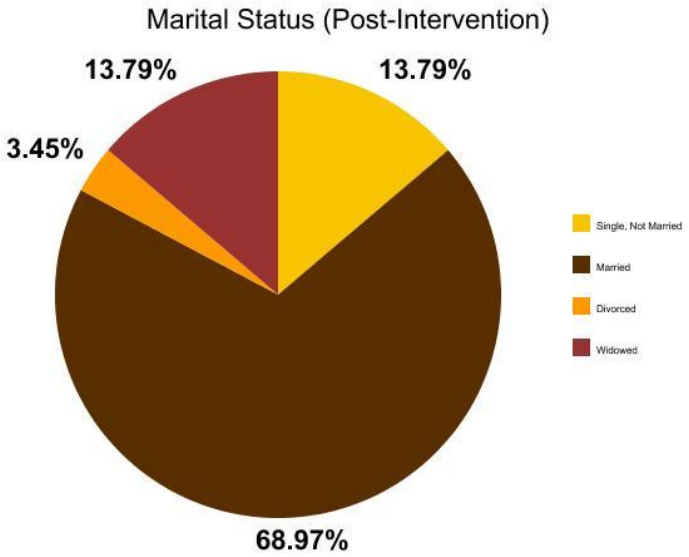

Employment (Pre-Intervention)
28.13%
59.38%
9.38%
3.13%
Full-Time
Part-Time
Unemployed
Retired


Employment (Post-Intervention)
31.03%
58.62%
10.34%
Full-Time
Part-Time
Retired


Living Arrangement (Pre-Intervention)
6.06%
93.94%
House
Apartment

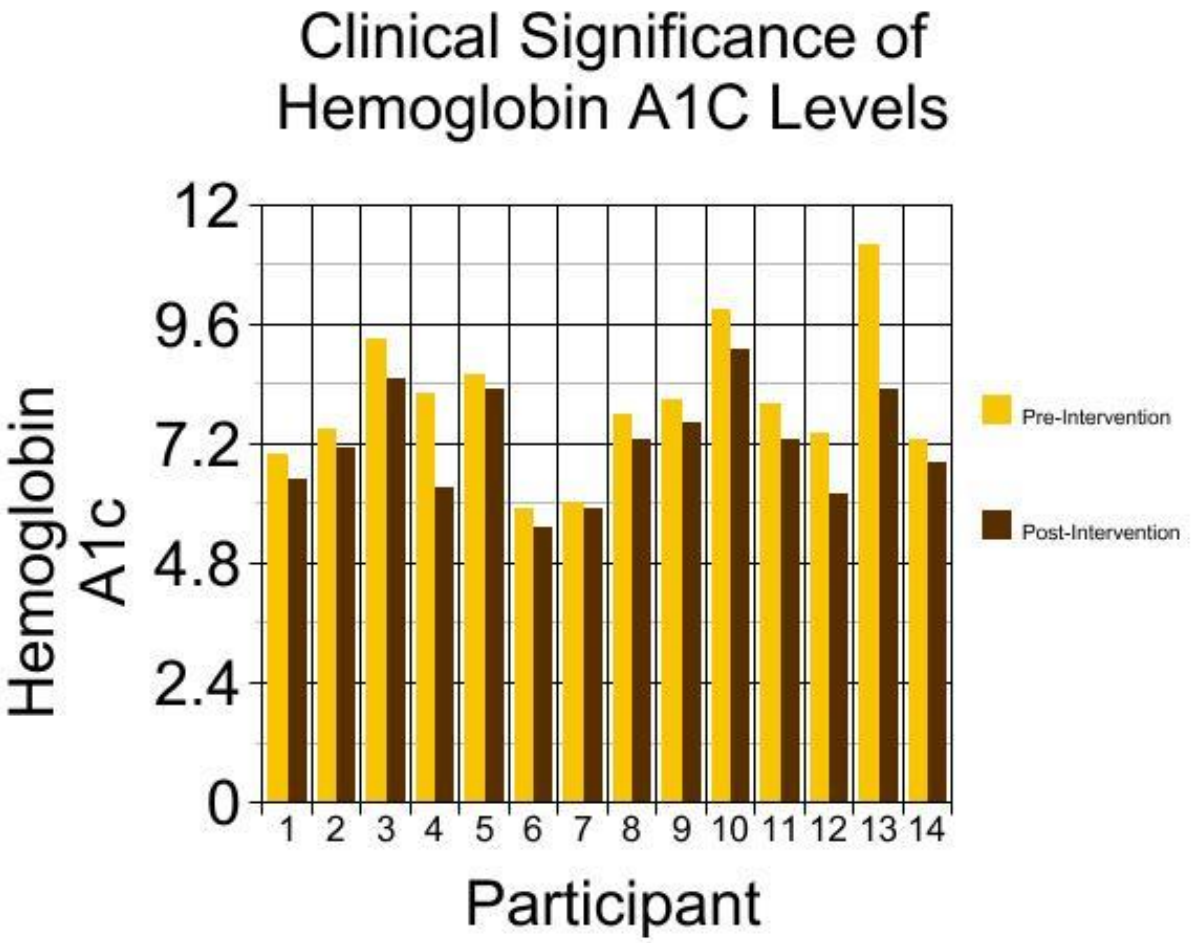

Living Arrangement (Post-Intervention)
3.33%
96.67%
House
Apartment


Marital Status (Pre-Intervention)
12.5%
12.5%
3.13%
71.88%
Single, Not Married
Married
Divorced
Widowed


Marital Status (Post-Intervention)
13.79%
13.79%
3.45%
68.97%
Single, Not Married
Married
Divorced
Widowed

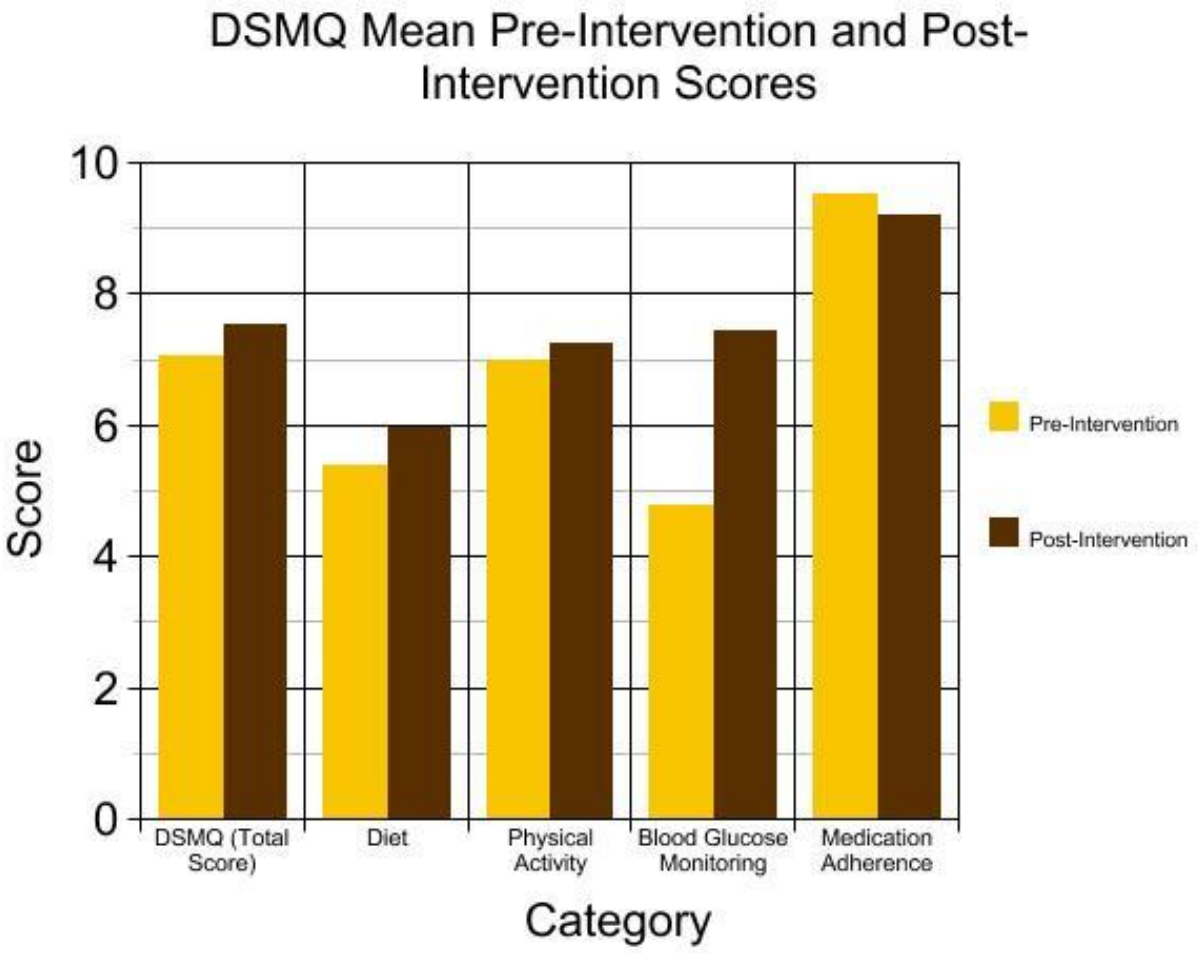
APPENDIX R

Graph of Improved Hemoglobin A1c Levels



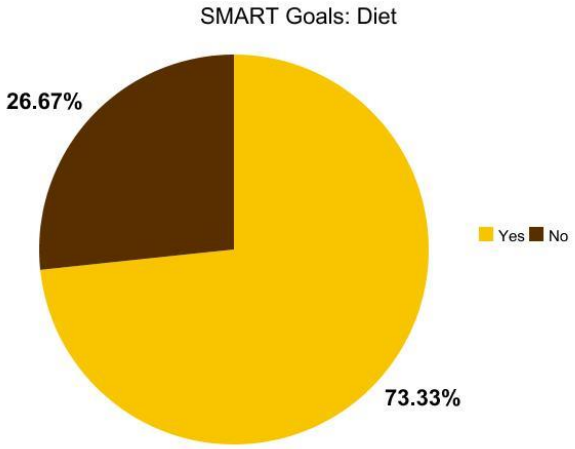
APPENDIX S

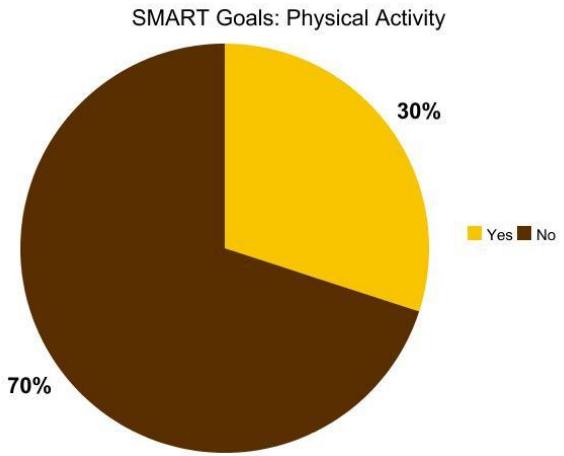
Mean Scores of DSMQ

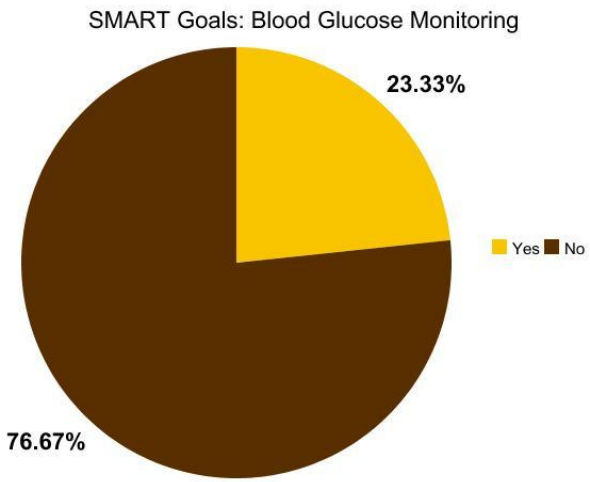


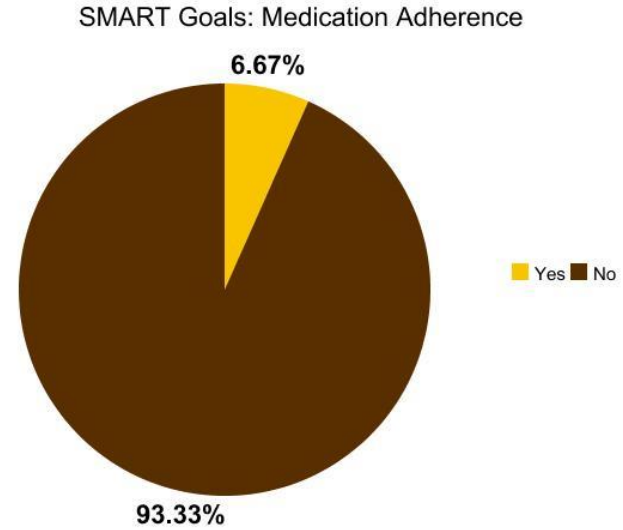
APPENDIX T

Pie Graphs of SMART Goals









APPENDIX U

Mailed Appreciation Letter Sent with Final Questionnaire

SMART GOALS

Back to the Basics with SMART Goals: A Multimodal Intervention for Adults Who Have Type 2 Diabetes

Alyssa Snyder
BSN, RNC-OB
DNP-FNP Student
Valparaiso University
Project Leader
Phone: [redacted]

Dr. [redacted]
Medical Director, Provider
[redacted]
Project Site Facilitator

[redacted], NP
Diabetic Educator, Provider
[redacted]

Dear (insert participant's name),

I want to thank you for participating in the evidence-based practice project geared toward improving diabetic outcomes. It has been a pleasure being a part of your own diabetes journey. It is my hope that these interventions implemented over the last few months will continue to help you improve your own diabetes and overall health.

I encourage you to continue setting specific SMART goals and using the packet given to you to help you reach your goals, decrease your hemoglobin A1c level, and improve your diabetes self-management behaviors.

Remember, take it one step at a time. You can do it!

Included with this letter is one final questionnaire (front and back). Please complete the questionnaire and mail it back to me as soon as possible (No later than February 14th, 2022). I've included an envelope that is already addressed and stamped for you to use. Thank you!

Thank you again for participating!

Sincerely,

Alyssa Snyder