DIABETES SELF-MANAGEMENT EDUCATION: AN EVALUATION OF THE PARTNERS IN CARE PROGRAM ON IMPROVING KNOWLEDGE, SELF-EFFICACY, AND SELF-MANAGEMENT

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Abstract

T2DM is a lifelong condition that requires consistent attention to glycemic monitoring, lifestyle therapies, and self-management to adequately control the disease. The lack of time during an office visit for DMSE/S and cultural barriers (language and relatability of educational materials) can hinder patients from adequate self-management and glycemic control. The purpose of this evidence-based project was to evaluate whether participating in the Partners in Care DSME/S course resulted in improved health outcomes through increasing diabetes knowledge, self-efficacy, and self-management skills in those with T2DM. The site of this project was held at the Queens Medical Center West Oahu Diabetes Management and Education Center (QMC-WO DMEC) with 7 participants. An evaluation of the course using pre-and post-surveys was used to study changes in self-efficacy, self-management, and diabetes knowledge scores after one Partners in Care DSME/S course. Analysis of data resulted in a 33% increase in diabetes self-management and a 14% increase in diabetes self-efficacy. Results of this project support the use of the Partners in Care DSME/S courses in improving diabetes self-efficacy and self-management. DSME/S courses require low financial and staffing requirements and can be implemented anywhere there are willing T2DM patients. Given the positive outcomes of this project, expansion of the number of courses offered, students, and locations may need to be explored going forward.

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List of Abbreviations

ADA	American Diabetes Association
CINAHL	Cumulative Index to Nursing and Allied Health Literature
DKT2	Revised Brief Diabetes Knowledge Test
DSME/S	Diabetes Self-Management Education and Support
LHL	Low Health Literacy
MANOVA	Multiple Analysis of Variance
MeSH	Medical Subject Headings
NHOPI	Native Hawaiian and other Pacific Islanders
PCP	Primary Care Provider
PICO	Population, intervention, control, and outcomes
QMC-WO DMEC	Queens Medical Center- West Oahu Diabetes Management and Education Center
SDSCA	Summary of Diabetes Self-Care Activities tool
T2DM	Type II Diabetes Mellitus

Diabetes Self-Management Education: An Evaluation of the Partners in Care Program on improving Knowledge, Self-Efficacy, and Self-Management

Type II Diabetes Mellitus (T2DM) is a multifaceted, progressive, and chronic disease that without proper management, can lead to a wide array of complications affecting various body systems and increases the risk for death. According to the National Diabetes Statistical Report by the Centers for Disease Control and Prevention (2020), 34.2 million Americans have T2DM which is the seventh leading cause of death in the United States. Poorly controlled T2DM can damage the eyes, kidneys, nerves, and cardiovascular system that can lead to complications such as cardiovascular disease, end-stage renal disease, blindness, and amputations (Sami, Ansari, Butt, & Hamid, 2017). Patients with T2DM have risks of death and cardiovascular events that are 2 to 4 times as great than those who do not have diabetes (Rawshani et al., 2018). T2DM is caused by insulin resistance and relative insulin deficiency. Being overweight or obese was the single most important predictor of diabetes. Low income, lack of exercise, poor diet, and smoking are strong contributors to T2DM (Hemmingsen et al., 2017). In Hawaii, 9.5% of the population is diagnosed with diabetes, but that does not account for those who are not diagnosed. Between 2015-2030, the prevalence of diabetes is projected to increase to more than 54.9 million Americans and annual deaths attributed to diabetes will climb by 38% (Rowley, Bezold, Arikan, Byrne, & Krohe, 2017).

Beyond just a health issue, the cost burden of T2DM was $327 billion in 2017, with 1 in every 7 health care dollars (14%) attributed to diabetes. T2DM cost burden include higher medical costs, lost productivity, premature mortality, and intangible costs in the form of reduced quality of life. The costs to directly treat diabetes (hospital/office-based services, prescription medications, and supplies) are currently estimated at $237 billion. The indirect costs of diabetes

are attributed to the economic burden caused by production losses due to premature mortality and morbidity at a cost of $90 billion dollars in the U.S. alone. This translates to an annual medical expenditure of around $9,601 per year for those with diabetes than those without (American Diabetes Association, 2018; Bommer et al., 2017).

Patients dealing with diabetes can feel severe emotional stress. Diabetes distress is a psychological distress experienced from feeling overwhelmed by the demands of self-management (adherence to diet, exercise and medication prescriptions), anxiety about existing or future complications, fear of hypoglycemia, and feelings of guilt or shame of T2DM prognosis. Systematic review with meta-analysis found a diabetes distress prevalence of 36% for those with T2DM; with higher rates in individuals with comorbid depressive symptoms and female gender (Perrin, Davies, Robertson, Snoek, & Khunti, 2017).

T2DM is a lifelong condition that requires consistent attention to glycemic monitoring, lifestyle therapies, and self-management to adequately control the disease. Due to the alarming rate at which T2DM is projected to grow, greater advancement should be made to increase diabetes knowledge, self-efficacy, self-management, and outcomes for these patients (Rowley et al., 2017). Diabetes knowledge pertains to understanding how to prevent and manage the disease effectively. Self-efficacy is the belief in one's own ability to complete tasks, manage situations, and reach goals (Karimy, Koohestani, & Araban, 2018). Self-management is the ability to conduct the medical and emotional management tasks that one must undertake to thrive with chronic conditions. Diabetes self-management education and support (DSME/S) are classes prepared to address the patient's current knowledge, health literacy and beliefs, emotional and cultural needs, physical and financial limitations, medical history, and other factors that affect self-management of T2DM (Powers et al., 2016). DSME/S have been shown to improve T2DM

outcomes through the decrease of A1Cs, reduction of diabetes complications, increase of healthy diets and regular physical activity, enhancement self-efficacy, and decrease of diabetes distress and depression. In addition, DSME/S are cost-effective by reducing hospital admissions and health care costs due to lower risks for complications (Piccinino et al., 2017).

Background

The site of this project was held at the Queens Medical Center West Oahu Diabetes Management and Education Center (QMC-WO DMEC). Many of the patients are referred to the QMC-WO DMEC by their primary care provider (PCP), other patients, community outreach, or upon discharge from the hospital. The course is offered to anyone who wants to participate, but the majority of the past participants were of Filipino descent. There is a big population of Filipinos living in West Oahu that QMC-WO serves. In 2014, Filipinos comprise 17.3% of the total population in Hawaii with 13.0% of the Filipino population diagnosed with T2DM. Many Filipino patients at the QMC-WO DMEC are first-generation immigrants with English as their second language, possibly hindering management of T2DM due to lower rates of health literacy and language comprehension. QMC-WO DMEC offers DSME/S courses to patients through the Partners in Care program through a partnership with the John A. Burns School of Medicine and PILI ‘Ohana (University of Hawaii, 2013). Partners in Care is a culturally adapted community based DSME/S intervention designed for NHOPIs (including Filipinos) and the unique multicultural environment of Hawaii. Curriculum materials align with the American Diabetes Association (ADA) clinical guideline goals for blood glucose, A1c, blood pressure, and lipids. The program places an emphasis on behavioral capability, self-control procedures, emotional coping response, and self-efficacy (Sinclair et al., 2012).

Problem Statement

Most individuals are diagnosed with T2DM at their primary care office. The PCP typically has 15-20 minutes for each visit, and many of those with T2DM also have other comorbidities the PCP must address during the visit. This leaves minimal time for DSME/S. Globally it was found that 30–70% of T2DM patients in primary care settings are not at target A1c levels (Gucciardi et al., 2020). Those from different cultures and/or English as a second language may not fully digest the brief education received during the PCP visit. Instructing a patient to decrease consumption of simple carbohydrates may be meaningless if the patient does not understand what types of food fall into the carbohydrate category. In Hawaii, Native Hawaiian, other Pacific Islanders (NHOPIs) including Filipinos had the highest prevalence of diabetes after controlling for other demographic factors and lifestyle variables in Hawaii. These groups also have lower health literacy, lower incomes, higher poverty rates, and higher rates of smoking than their white counterparts which put them at a higher risk for T2DM (Uchima, Wu, Browne, & Braun, 2019). The lack of time during an office visit for DMSE/S and cultural barriers (language and relatability of educational materials) may hinder patients from adequate self-management and glycemic control, which can worsen diabetes distress. By participating in the Partners in Care DSME/S course offered by ADA certified instructors at QMC-WO DMEC, patients with T2DM can be empowered through the acquisition of knowledge and self-efficacy which in turn will increase self-management capabilities and thus will improve health outcomes**.**

PICOT

The PICO statement is: Does participating in the Partners in Care DSME/S course (I) for T2DM patients (P) improve diabetes knowledge, self-efficacy, and self-management skills (O) compared to the pre-intervention assessment (C)?

Purpose and Objectives

The purpose of this evidence-based project is to evaluate whether participating in the Partners in Care DSME/S course results in improved health outcomes through increasing diabetes knowledge, self-efficacy, and self-management skills in those with T2DM.

The objectives are to be reached through 1) Implementation of Partners in Care DSME/S course at QMC-WO DMEC; 2) Validated tools written and comprehensible at a 4th grade level; 3) Measurement through validated tools for knowledge, self-efficacy, and self-management; and 4) Evaluation of tool responses analyzed to meet goals for implementation of routine practice.

Conceptual Framework

The Stetler model of evidence-based practice is practical in guiding providers in the planning and implementation of patient-centered health programs (Stetler, 2001). The Stetler model structures a series of critical thinking and decision-making phases designed to facilitate safe, effective use of research findings. There are five phases: preparation, evidence validation, decision making, translation/application, and evaluation. This model of EBP outlines criteria for substantiating evidence, current practice related to the need for change, appropriates use of evidence for the user group and setting, assessing feasibility of implementing the research findings, and determining availability of resources and stakeholder readiness. The preparation phase includes consideration of contextual factors, which requires an understanding of the current state of diabetes education and care. The second phase of evidence validation includes examining each relevant study for its quality prior to utilization in research synthesis. The decision-making phase encourages organization of findings from all validated sources to determine applicability or feasibility of findings to be put into practice. The translation phase takes research from phase III and forms action plans to apply synthesized findings into practice change strategies. The Stetler model encourages use of formative and outcome evaluation data in

the final evaluation phase to determine whether it should be part of routine practice or the need for further research is necessary (Stetler, 2001).

Synthesis of the Evidence

Evidence Search

A literature search was conducted using PubMed, CINAHL, and Google Scholar. Search terms included all aspects of the PICO statement and related topics such as “Diabetes Type II”, “Diabetes Education: (MeSH term), “diabetes knowledge,” “self-efficacy,” “self-management,” “cultural factors,” “barriers,” and “health outcomes.” Boolean operators were used to ensure the results were related to the keyword education for concepts such as self-efficacy and self-management. Date limitations were placed from 2010- present. Data was refined to only include those written in English. References of the most pertinent articles were also examined to ensure a complete search of original material. A total of 723 articles resulted and these were narrowed down to 110 after eliminating duplicates.

The 110 resulting articles were then scrutinized to determine correspondence to Mosby’s level of evidence. Twenty-four articles were determined to have sufficient quality for inclusion in this synthesis of the literature (Table 1). Articles were excluded for lack of relevance to T2DM education, DSME/S, or weak level of evidence with a final result of N=24 relevant articles.

Table 1

Levels of Evidence

Mosby’s Quality of Evidence	Number of articles obtained (total of 24)
Level I: Meta-analysis	9
Level II: Experimental design (RCT)	2
Level III: Quasi-experimental design	9

Level IV: Case-controlled, cohort, longitudinal studies	3
Level V: Correlation studies	1
Level VI: Descriptive studies	0
Level VII: Authority opinion or expert committee reports	0
Other: Performance improvement; Review of literature	0

Literature Synthesis

DSME/S. The American Diabetes Association as well as the American Association of Clinical Endocrinologists recognize diabetes self-management education (DSME) as an integral aspect of the care for people with diabetes (Powers et al., 2016). Systematic review of DSME/S literature indicates 61.9% of participants achieved statistically significant and clinically relevant improvements in A1C compared to those who received no DSME/S 3 months post intervention (Chrvala, Sherr, & Lipman, 2016). Meta-analysis found team-based approaches, case management, patient education, and promotion of self-management were the most effective strategies for achieving significant changes in participants with baseline A1C levels greater than 8.0% (Tricco et al., 2012).

Lifestyle Modification. T2DM is a disease that is mainly controlled through self-management of lifestyle choices involving diet, exercise, and use of tobacco/alcohol. One study found five risk factors considered to be the strongest predictors for cardiovascular outcomes and death: low physical activity, smoking, and out of target ranges of A1C, systolic blood-pressure,

and LDL cholesterol levels (Rawshani et al., 2018). These risk factors can be mitigated through medication and lifestyle therapy. Physical activity increases sensitivity to insulin, is beneficial in preventing the progression of T2DM, and has been found to reduce intra-abdominal fat, which is a known risk factor for insulin resistance. A diet high in red meat, sweets, and fried foods can increase the risk of insulin resistance and T2DM. In contrast, the opposite was observed between a diet high in vegetables, lean meats, and fiber (Sami, Ansari, Butt, & Hamid, 2017). Systematic review and meta-analysis suggest lifestyle therapies such as maintaining a healthy body weight, diet, and physical activity interventions, avoiding smoking, and avoiding excessive alcohol consumption achieved significant clinical outcomes and reduction of diabetes risk (Cradock et al., 2017; Zhang et al., 2019).

Self-efficacy. The 2014 National Diabetes Survey found that more than 50% of those with diabetes were not confident in managing hypoglycemia, hyperglycemia, and exercise. DSME/S addresses psychosocial and emotional care needed to improve self-efficacy measures such as confidence, depression, and diabetes distress. Higher self-efficacy is associated with greater glycemic control, medication adherence, self-care behavior, improvements in physical activity, increased communication with provider, and mental health improvements in self-efficacy (Piccinino et al., 2017).

Group classes. Group-based education interventions were more effective than the usual care at doctor's visits at improving clinical, lifestyle, and psychosocial outcomes in people with T2DM. A support system of similar people can help those with psychological struggles of dealing with diabetes. Systematic review with meta-analysis found that group-based education may be more cost-effective and time efficient than individual education, due to the reduced time and funding required to educate numerous people at one time. Group-based education for T2DM

management significantly improved A1C levels, fasting blood glucose, body weight, waist circumference, triglycerides, diabetes knowledge, and self-efficacy (Odgers-Jewell et al., 2017). Dorland and Liddy (2014) found that diabetes classes with shorter sessions involving didactic teaching methods may be equally effective in producing improvements as much as longer sessions with intensive interactive course formats.

Cultural sensitivity. Incorporating cultural diversity, food preferences, local food availability, and income into consideration is fundamental when developing health-promotion activities related to diabetes. Providers need to consider the cultural and socio-economic susceptibilities of minorities with T2DM. DSME geared towards cultural, social, and economic context must be considered (Juárez-Ramírez et al., 2019). Effective communication skills, selection of patient-friendly diabetes education strategies and materials, and classes designed for racially and ethnically diverse patients increased patients, referring providers, and staff overall satisfaction (Swavely, Vorderstrasse, Maldonado, Eid, & Etchason, 2014). By using culturally relevant context such as "local" language and examples to convey some of the educational content, the information about diabetes and self-management becomes more meaningful for the intended audience (Sinclair et al., 2012)

Low health literacy. Health literacy refers to one's capacity to read, understand, and utilize healthcare-related material for decision making and self-care. Inadequate understanding of the diabetes information increases the likelihood of non-adherence and poor outcomes (Ahola & Groop, 2013). Groups most vulnerable to low health literacy (LHL) include the elderly, ethnic minority groups, individuals speaking English as a second language, the unemployed, those with limited education, those receiving Medicaid, and/or have low income. Research has found LHL and culturally sensitive DSME/S for low-income minority patients reported improvements in

diabetes knowledge, self-efficacy, self-management (diet, exercise, and foot care), and A1C upon completion of program (Swavely, Vorderstrasse, Maldonado, Eid, & Etchason, 2014). LHL catered education bridge gaps in health disparities and improve interaction between healthcare teams and LHL patients.

Cost-effectiveness. Two systematic reviews found strong evidence for DSME/S to be cost-effective treatment ($5,047/QALY) for individuals with diabetes, compared with usual care. QALY refers to the cost to extend quality adjusted life by one year. Comprehensive foot care and patient education to prevent and treat foot ulcers for those with moderate/high risk for foot ulcers were found to be cost saving. ADA-recommended interventions for preventing or treating diabetes were determined to be cost saving or very cost-effective with strongest evidence for primary prevention through intensive lifestyle modification (Li, Zhang, Barker, Chowdhury, & Zhang, 2010; Siegel et al., 2020).

Strengths, Weaknesses, and Literature Gaps

Strengths of the literature include consistency across studies demonstrating the importance of DSME/S in improving diabetes knowledge, self-efficacy, and self-management capabilities for T2DM patients. Many of the evidence-based articles consisted of Level I systematic reviews and meta-analyses. Most of the research consisted of Level I-III evidence performed within that last 10 years. A weakness of the literature search includes few randomized control studies in the different styles of DSME/S courses, technology-based classes, and culturally sensitive course offerings. Further research with higher level evidence is needed to find insight into what types of DSME/S classes are most effective (technology based, didactic, group, cultural sensitivity, low literacy, or a mixture).

Methods

Project Design

A single-group pretest posttest design was to evaluate the Partners in Care DSME/S course being offered at QMC-WO DMEC. An evaluation of the course was used to study changes in self-efficacy, self-management, and diabetes knowledge scores after one DSME/S course with analysis based on a pre-intervention and post-intervention surveys to quantify self-efficacy, self-management, and diabetes knowledge scores related to the self-management of T2DM. The outcome goals for this project was to 1) Increase current diabetes knowledge to a rate of 80% on the diabetes knowledge test score; 2) A 25% increase in self-efficacy scores post course; 3) An increase of 25% in diabetes self-management scores upon completion of course. Increases were projected in at least 50% of the participants completing the DSME/S course.

Evaluation Plan

The plan for evaluation of this project was based on the Stetler Model of Research Utilization (Stetler, 2001). This model supports evaluation of outcome goals through anonymous pretest and posttest surveys (see Appendices B, C, and D) evaluating diabetes knowledge, self-efficacy, and self-management changes upon completion of the course. Diabetes knowledge was tested using the Revised Brief Diabetes Knowledge Test (DKT2) (see Appendix B). This is a 14-item multiple-choice general test and a 9-item insulin use subscale. The DKT2 was found to be valid and reliable instrument with a Cronbach's alpha ≥ .70. A passing score was determined to be 80% recognizing adequate T2DM knowledge (Fitzgerald et al., 2016). Self-efficacy was measured using the Stanford Diabetes Self-Efficacy tool (see Appendix C) made available through the Self-Management Resource Center (Stanford School of Medicine) with an internal reliability of Cronbach's alpha ≥ .82. Diabetes self-care was measured using the Summary of Diabetes Self-Care Activities tool (SDSCA) (see Appendix D), an 11-item self-report instrument

for measuring different components of the diabetes self-care regimen including diet, exercise, foot care, smoking, and blood glucose monitoring. The SDSCA tool demonstrated sufficient high-quality evidence for structural validity and internal consistency, with quantitatively pooled Cronbach's alpha ≥ 0.70 (Toobert, Hampson, & Glasgow, 2000). These tools will be utilized at the beginning of the course and upon the completion of the 1 month course. Improvements based on the goals of the project will be evaluated.

Implementation Setting

The project setting was held at the QMC-WO DMEC with 7 participants (to maintain social distancing during COVID-19). T2DM patients were enrolled through a referral from a medical provider. The class consisted of a multi-cultural background of 2 Caucasians, 4 Asians (3 were of Filipino descent), and 1 mixed race individual. The DSME classes (intervention) were conducted every Wednesday of May 2022. A total of four classes, two hours in length were taught by a diabetes specialist. A cumulative time of 8 hours were taught. Each participant received a binder with course materials for Partners in Care DSME created using guidelines from the ADA Standards of Care 2021. This binder contained DSME lesson plans regarding glucose checks, medications, diet, exercise, stress, heart health, cholesterol, preventing complications, and support for diabetes self-management. The participants were allowed to bring 1 person for support. The content was written at a 4th grade reading level, with a recap at the end of every lesson on the important key points, spaces to write down questions or self-reflections. There were short stories to introduce concepts and inserts with further detailed information the participants could read on their own time. The lessons were held in an interactive didactive format. Seven participants and one support person attended the 4 classes. Two participants missed 1 day of class respectively during the 4 weeks. With approval from the content expert,

different food items were brought and given to the participants to practice reading the nutritional label and note the differences in calories, sugar, carbohydrates, proteins, and fats between similar food items. Some of the items included protein pasta options, sugar free candies, and protein shakes to learn from, compare, and consume. Upon completion of the DSME course, participants were contacted to sign up for individual consultation with the diabetes specialist to get customized care specific to the person.

Data Collection

Pretest Survey

All 7 participants attended the first and last day of the course and were able to complete the pre- and post-test surveys. A numbered sticker was placed on each participant's course binder. The participants were asked to write the number on their binder on the pre-test survey to maintain anonymity. A pretest of the tools used to evaluate T2DM knowledge, self-efficacy, and self-management (see Appendices B, C, and D), was administered to the participants prior to the start of the course. Participants were given 20 minutes to answer pre-test surveys with the ability to ask questions if they did not understand the question. For the DKT2 tool, the test is split into a general T2DM questionnaire and additional 9 questions for those on insulin. Only one participant was on insulin and answered the insulin portion of the questions. The average DKT2 knowledge score was 0.7, the average Stanford self-efficacy score was 0.62, and the average SDSCA score was 0.29 (See Table 2).

Posttest Survey

All 7 participants completed the post-test survey. Participants were once again asked to write the corresponding number of the sticker placed on their course binder onto the posttest survey. The exact same surveys used in the pretest surveys were used (see Appendices B, C, and

D). The post test was administered at the completion of the last day of the course. Participants were once again given 20 minutes to answer the post-test survey with the ability to ask questions if clarification was needed. The average DKT2 knowledge score was 0.68, the average Stanford self-efficacy score was 0.73, and the average SDSCA score was 0.43 (See Table 2).

Data Analysis and Results

Raw scores were taken for each survey and data was analyzed using Microsoft Excel to determine the average scores for the DKT2 Test, Stanford self-efficacy, and SDSCA self-management tools (See Table 2).

There was a 3% decrease in the DKT2 knowledge test score. Of the 7 participants, only 2 received a score of 80%, which was determined by the creators to be an adequate score for T2DM knowledge (Fitzgerald et al., 2016). There was a 14% increase in the Stanford Diabetes Self-efficacy tool score. There was a 33% increase in the SDSCA tool for self-management. Of the 7 participants, 6 were found to have an increase of over 25% for self-management from their pre-test surveys (See Table 2).

Table 2 Data Analysis

Participant	DKT2 Test (knowledge)		% improvement	Stanford Self-efficacy Tool		% improvement	SDSCA Tool (self-care)		% improvement
	Pre-test	Post-test		Pre-test	Post-test		Pre-test	Post-test	
1	0.52	0.39	-33%	0.58	0.48	-21%	0.10	0.38	74%
2	1.00	0.86	-17%	0.65	0.74	12%	0.49	0.77	36%
3	0.79	0.79	0%	0.74	0.81	9%	0.56	0.49	-14%
4	0.71	0.93	23%	0.35	0.75	53%	0.25	0.39	36%
5	0.57	0.57	0%	0.65	0.69	5%	0.13	0.23	44%

6	0.79	0.64	-22%	0.65	0.78	16%	0.35	0.54	34%
7	0.50	0.57	13%	0.75	0.85	12%	0.15	0.24	35%
Average	0.70	0.68	**-3%**	0.62	0.73	**14%**	0.29	0.43	**33%**

Relationship of Results to Purpose/Goals/Objectives

The purpose of this project was to evaluate the Partners in Care DSME/S class in increasing T2DM knowledge, self-efficacy, and self-management. Key objectives were to increase diabetes knowledge in at least half the participants to 80% on the DKT2 tool, to increase self-efficacy in at least half of the participants by 25%, and to increase self-management of at least half of the participants by 25% upon completion of the course. The objective of a 25% increase in diabetes self-management was met with an average increase of 33% in scores using the SDSCA tool. There was a modest increase of 14% in self-efficacy using the Stanford Diabetes Self-efficacy tool, and a marginal decrease of 3% on the DKT2 tool (See Table 2).

Discussion

Results of this project support the use of DSME/S classes like Partners in Care in improving diabetes self-efficacy and self-management. Survey results showed an increase awareness of diabetes self-management tasks and the initiation of those tasks. Self-efficacy also improved slightly, with participants feeling more confident in managing their diabetes. The use of DSME/S classes can be translated to many settings such as a primary care offices, other hospital settings, or community settings to promote greater management of T2DM. Partners in Care was designed to cater towards NHOPI and the unique multicultural setting of Hawaii, making it applicable to many of those living in Hawaii with T2DM. By acknowledging health disparities those of NHOPI and the unique multicultural setting of those living in Hawaii may

face, this project aimed to improve T2DM knowledge, self-efficacy, and self-management of those participating in the course.

Strengths/Limitations

A strength of this project was the relationship between the diabetes specialist and the DNP student, as well as the expanse of DSME information presented in the course. The Partners in Care Program covered glucose checks, medications, diet, exercise, stress, heart health, cholesterol, preventing complications, and support for diabetes self-management. The material was presented with relatable stories, pictures, and reading at a 4th grade level. The diabetes specialist also had a PowerPoint presentation to focus on key points. The diabetes specialist created an environment that was conducive to learning for the participants as well as the DNP student. There was always time to answer questions and have discussions on the materials taught throughout the course. The participants weren't rushed through their thoughts and often spoke of difficulties they faced or shared things that helped them in regards to their T2DM management. The participants were very open and willing to take the pre-/post-test surveys and discuss topics/questions with the DNP student.

The project was limited by COVID-19 related health precautions and a small sample size of participants. Due to health precautions, if a participant did not feel well, they were encouraged to skip the class until the following week. Two participants missed one class on differing days. This may have contributed to the outcome of the post-test surveys because 25% of the course information was missed. It is not certain if the participant caught up on the missed day. Although the classes were multi-culturally inclusive (especially to Hawaii), the survey questions (specifically the DKT2) were worded using specific wording that may have confused the participant. The DKT2 was found to be valid and reliable instrument with a Cronbach's alpha

≥ .70 (Fitzgerald et al., 2016). One question that was missed by 5 out of 7 participants in the post survey was question 7: What effect does unsweetened fruit juice have on blood glucose. The word unsweetened may have confused the participants in selecting the wrong answer. Further DSME/S evaluation projects may involve the use of a different evaluation tool for knowledge.

Sustainability

This project was designed to evaluate a DSME/S program already in use by QMC-WO DMEC. With the results of this project and the improvements in diabetes self-efficacy and self-management, further promotion for Partners in Care DSME/S should be implemented. The end of the course is just the beginning for the participants involved. The course was an introduction to the customized care they are to receive at QMC-WO DMEC once appointments are made. Going forward with health precautions for COVID-19 in place, regular courses can be held with the diabetes specialist. A key component of moving the Partners in Care program forward is to increase staff members who are trained diabetes specialists or educators to provide classes not only at QMC-WO DMEC, but perhaps at other clinic sites or community centers. Food items brought in to teach the students were purchased by the DNP student. Perhaps with additional funding or donations from companies that provide diabetes friendly products, more relevant items can be brought for the participants to study, try, and implement healthier choices into their lives.

Connections to DNP Essentials

This DNP evaluation project addressed each of the eight DNP essentials (American Association of Colleges of Nursing, 2006) through its literature search, project design, implementation, and evaluation of the results. Essentials I and III were demonstrated through the in-depth literature search and synthesis of the literature for the development of the evaluation project of this

evidence-based practice (Table 3). Essential II Organizational and Systems Leadership was demonstrated through the implementation of this project under the leadership of the DNP student. Essential IV was demonstrated through effective use of video conferencing and using information technology to organize and improve surveys for utilization. Essential V was demonstrated through focused culturally sensitive DSME education to NHOPI (and Filipinos) with greater health disparities in Hawaii. Essential VI was demonstrated through collaboration with the QMC-WO and the internal review board to create and implement this project. Essential VII was demonstrated through addressing a population health need of T2DM DSME/S for disease management. Essential VIII was demonstrated through identifying a health issue in a specific population, designing an evaluation that was evidence based for the DSME/S course, assisting in the Partners in Care course, implementation of the project, and dissemination of the data collected. A summary of application of each DNP essential is illustrated in Table 3.

Table 3

The Essentials of Doctoral Education for Advanced Nursing Practice

The Essentials of Doctoral Education for Advanced Nursing Practice	**Application of the Essentials**
I. Scientific Underpinnings for Practice	Analysis of the positive impacts of DSME/S and the lack of time for T2DM education in primary care supported the project's design and evaluation.
II. Organizational and Systems Leadership for Quality Improvement and Systems Thinking	A project was designed to evaluate whether DSME/S currently used in practice could lead to improvements in T2DM disease management upon completion of program.
III. Clinical Scholarship and Analytical Methods for Evidence-Based Practice	Executed an extensive literature search and synthesis to support the importance of an DSME/S program
IV. Information Systems/Technology and Patient Care Technology for the Improvement and Transformation of Health Care	Technological resources such as conferencing software was used to collaborate during the COVID-19 pandemic. Technological tools were utilized in the organization and improvement of surveys used in project.

V. Health Care Policy for Advocacy in Health Care	Focused multiculturally inclusive DSME education and evaluation towards NHOPI and multicultural people of Hawaii, aware of significant health disparities in this population.
VI. Interprofessional Collaboration for Improving Patient and Population Health Outcomes	Collaboration occurred with QMC, the Internal Review Board, faculty, staff, and diabetes specialist.
VII. Clinical Prevention and Population Health for Improving the Nation's Health	Evaluation project created to address the population health need of T2DM DSME/S courses for improved disease management.
VIII. Advanced Nursing Practice	DNP student identified complex health problem, disparities were identified, designed appropriate evaluation project of current DSME/S course being utilized, implemented and evaluated data to address the problem.

Conclusion

T2DM is a lifelong condition that requires consistent attention to glycemic monitoring, lifestyle therapies, and self-management to adequately control the disease. The lack of time during a typical primary care office visit for DMSE/S and the cultural barriers (language and relatability of educational materials) an individual encounters, can hinder adequate T2DM self-management and glycemic control. Through the evaluation of the Partners in Care DSME/S course offered at QMC-WO DMEC, diabetes self-efficacy and self-management were improved among participants. DSME/S courses require low financial and staffing requirements and can be implemented anywhere there are willing T2DM patients. Given the positive outcomes of this project, expansion of the number of classes, students, and locations may need to be explored going forward.

References

Ahola, A. J., & Groop, P. (2013). Barriers to self-management of diabetes. *Diabetic Medicine, 30*(4), 413-420. doi:10.1111/dme.12105

American Association of Colleges of Nursing. (2006). *The essentials of doctoral education for advanced nursing practice.* Washington, DC: AACN.

American Diabetes Association. (2018). Economic costs of diabetes in the U.S. in 2017. *Diabetes Care, 41*(5), 917-928. doi:10.2337/dci18-0007

Bommer, C., Heesemann, E., Sagalova, V., Manne-Goehler, J., Atun, R., Bärnighausen, T., & Vollmer, S. (2017). The global economic burden of diabetes in adults aged 20–79 years: A Cost-of-illness study. *The Lancet Diabetes & Endocrinology, 5*(6), 423-430. doi:10.1016/s2213-8587(17)30097-9

Centers for Disease Control and Prevention. (2020, August 28). Diabetes Report Card 2020. Retrieved July 06, 2021, from https://www.cdc.gov/diabetes/library/reports/reportcard.html

Chrvala, C. A., Sherr, D., & Lipman, R. D. (2016). Diabetes self-management education for adults with type 2 diabetes mellitus: A systematic review of the effect on glycemic control. *Patient Education and Counseling, 99*(6), 926-943. doi:10.1016/j.pec.2015.11.003

Cradock, K. A., Ólaighin, G., Finucane, F. M., Gainforth, H. L., Quinlan, L. R., & Ginis, K. A. (2017). Behavior change techniques targeting both diet and physical activity in type 2 diabetes: A systematic review and meta-analysis. *International Journal of Behavioral Nutrition and Physical Activity, 14*(1). doi:10.1186/s12966-016-0436-0

Dorland, K., & Liddy, C. (2014). A pragmatic comparison of two diabetes education programs in improving type 2 diabetes mellitus outcomes. *BMC Research Notes, 7*(1). doi:10.1186/1756-0500-7-186

Fitzgerald, J. T., Funnell, M. M., Anderson, R. M., Nwankwo, R., Stansfield, R. B., & Piatt, G. A. (2016). Validation of the Revised Brief Diabetes Knowledge Test (DKT2). *The Diabetes Educator, 42*(2), 178-187. doi:10.1177/0145721715624968

Gucciardi, E., Xu, C., Vitale, M., Lou, W., Horodezny, S., Dorado, L., . . . Shah, B. R. (2020). Evaluating the impact of onsite diabetes education teams in primary care on clinical outcomes. *BMC Family Practice, 21*(1). doi:10.1186/s12875-020-01111-2

Juárez-Ramírez, C., Théodore, F., Villalobos, A., Allen-Leigh, B., Jiménez-Corona, A., Nigenda, G., & Lewis, S. (2019). The importance of the cultural dimension of food in understanding the lack of adherence to diet regimens among Mayan people with diabetes. *Public Health Nutrition, 22*(17), 3238-3249. doi:10.1017/S1368980019001940

Karimy, M., Koohestani, H. R., & Araban, M. (2018). The association between attitude, self-efficacy, and social support and adherence to diabetes self-care behavior. *Diabetology & Metabolic Syndrome, 10*(1). doi:10.1186/s13098-018-0386-6

Li, R., Zhang, P., Barker, L. E., Chowdhury, F. M., & Zhang, X. (2010). Cost-effectiveness of interventions to prevent and control diabetes mellitus: A systematic review. *Diabetes Care, 33*(8), 1872-1894. doi:10.2337/dc10-0843

Odgers-Jewell, K., Ball, L., Kelly, J., Isenring, E., Reidlinger, D., & Thomas, R. (2017). Effectiveness of group-based self-management education for individuals with type 2 diabetes: A systematic review with meta-analyses and meta-regression. *Diabetic Medicine, 34*(8), 1027-1039. doi:10.1111/dme.13340

Perrin, N. E., Davies, M. J., Robertson, N., Snoek, F. J., & Khunti, K. (2017). The prevalence OF diabetes-specific emotional distress in people with type 2 diabetes: A systematic review and meta-analysis. *Diabetic Medicine, 34*(11), 1508-1520. doi:10.1111/dme.13448

Piccinino, L. J., Devchand, R., Gallivan, J., Tuncer, D., Nicols, C., & Siminerio, L. M. (2017). Insights from the national diabetes education program national diabetes survey: Opportunities for diabetes self-management education and support. *Diabetes Spectrum, 30(2)*, 95-100. doi:10.2337/ds16-0056

Powers, M. A., Bardsley, J., Cypress, M., Duker, P., Funnell, M. M., Fischl, A. H., . . . Vivian, E. (2016). Diabetes self-management education and support in type 2 Diabetes: A joint position statement of the American Diabetes Association, the American Association of Diabetes Educators, and the Academy of Nutrition and Dietetics. *Clinical Diabetes, 34*(2), 70-80. doi:10.2337/diaclin.34.2.70

Rawshani, A., Rawshani, A., Franzén, S., Sattar, N., Eliasson, B., Svensson, A., . . . Gudbjörnsdottir, S. (2018). Risk factors, mortality, and cardiovascular outcomes in patients with Type 2 Diabetes. *New England Journal of Medicine, 379*(7), 633-644. doi:10.1056/nejmoa1800256

Ritter, P. L., Lorig, K., & Laurent, D. D. (2016). Characteristics of the Spanish and English language self-efficacy to manage diabetes scales. *The Diabetes Educator, 42*(2), 167-177. doi:10.1177/0145721716628648

Rowley, W. R., Bezold, C., Arikan, Y., Byrne, E., & Krohe, S. (2017). Diabetes 2030: Insights from yesterday, today, and future trends. *Population Health Management, 20*(1), 6-12. doi:10.1089/pop.2015.0181

Sami, W., Ansari, T., Butt, N. S., & Hamid, M. (2017). Effect of diet on type 2 diabetes mellitus: A review. *International Journal of Health Sciences, 11*(2), 65–71.

Siegel, K. R., Ali, M. K., Zhou, X., Ng, B. P., Jawanda, S., Proia, K., . . . Zhang, P. (2020). Cost-effectiveness of interventions to manage diabetes: Has the evidence changed since 2008? *Diabetes Care, 43*(7), 1557-1592. doi:10.2337/dci20-0017

Sinclair, K. A., Makahi, E. K., Shea-Solatorio, C., Yoshimura, S. R., Townsend, C. K., & Kaholokula, J. K. (2012). Outcomes from a diabetes self-management intervention for Native Hawaiians and Pacific people: Partners in Care. Annals of Behavioral Medicine, 45(1), 24-32. doi:10.1007/s12160-012-9422-1

Stanford School of Medicine, Department of Patient Education. Diabetes self-efficacy tool. Retrieved June 6, 2021, from https://www.selfmanagementresource.com/

Steinsbekk, A., Rygg, L., Lisulo, M., Rise, M. B., & Fretheim, A. (2012). Group based diabetes self-management education compared to routine treatment for people with type 2 diabetes mellitus. a systematic review with meta-analysis. *BMC Health Services Research, 12*(1). doi:10.1186/1472-6963-12-213

Stetler, C. B. (2001). Research: Updating the Stetler Model of research utilization to facilitate evidence-based practice. Nursing Outlook,49 272-279. doi:10.1067/mno.2001.120517

Swavely, D., Vorderstrasse, A., Maldonado, E., Eid, S., & Etchason, J. (2014). Implementation and evaluation of a low health literacy and culturally sensitive diabetes education program. *Journal for Healthcare Quality, 36*(6), 16-23. doi:10.1111/jhq.12021

Toobert, D. J., Hampson, S. E., & Glasgow, R. E. (2000). The summary of Diabetes self-care activities measure: Results from 7 studies and a Revised scale. *Diabetes Care, 23(7)*, 943-950. doi:10.2337/diacare.23.7.943

Tricco, A. C., Ivers, N. M., Grimshaw, J. M., Moher, D., Turner, L., Galipeau, J., . . . Shojania, K. (2012). Effectiveness of quality improvement strategies on the management of diabetes: A systematic review and meta-analysis. *The Lancet, 379*(9833), 2252-2261. doi:10.1016/s0140-6736(12)60480-2

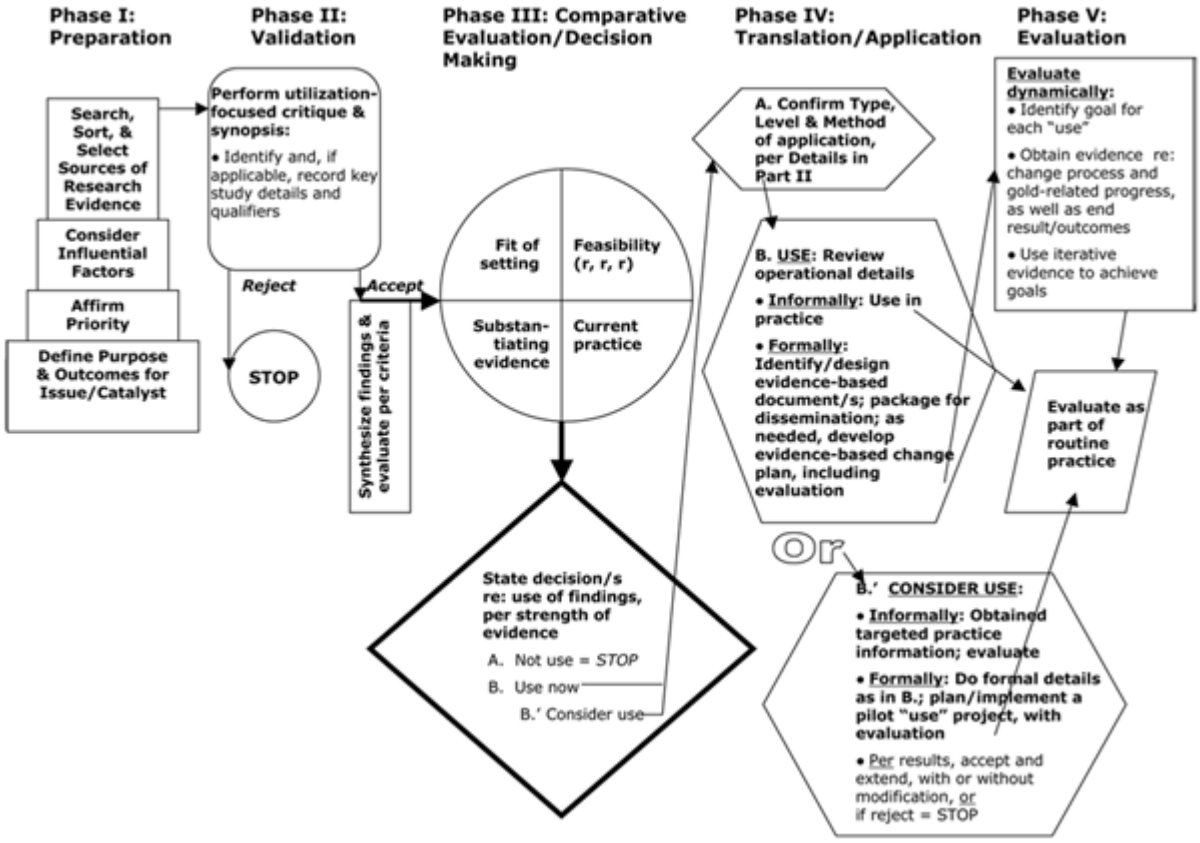
Uchima, O., Wu, Y. Y., Browne, C., & Braun, K. L. (2019). Disparities in diabetes prevalence among Native Hawaiians/other Pacific Islanders and Asians in Hawai‘i. *Preventing Chronic Disease, 16*. doi:10.5888/pcd16.180187

University of Hawaii. (2013). Partners in Care. Retrieved from http://www2.jabsom.hawaii.edu/pili/pili-facilitator-training/PIC%20-overview.html

Tricco, A. C., Ivers, N. M., Grimshaw, J. M., Moher, D., Turner, L., Galipeau, J., . . . Shojania, K. (2012). Effectiveness of quality improvement strategies on the management of diabetes: A systematic review and meta-analysis. *The Lancet, 379*(9833), 2252-2261. doi:10.1016/s0140-6736(12)60480-2

Appendix A

Figure 1: Stetler's Model



Appendix B

DKT2 tool

1. The diabetes diet is:
   a. the way most American people eat
   b.[b] a healthy diet for most people
   c. too high in carbohydrate for most people
   d. too high in protein for most people

2. Which of the following is highest in carbohydrate?
   a, Baked chicken
   b. Swiss cheese
   c.[b] Baked potato
   d. Peanut butter

3. Which of the following is highest in fat?
   a.[b] Low fat (2%) milk
   b. Orange juice
   c. Corn
   d. Honey

4. Which of the following is a "free food"?
   a. Any unsweetened food
   b. Any food that has "fat free" on the label
   c. Any food that has "sugar free" on the label
   d.[b] Any food that has less than 20 calories per serving

5. A1C is a measure of your average blood glucose level for the past:
   a. day
   b. week
   c.[b] 6-12 weeks
   d. 6 months

6. Which is the best method for home glucose testing?
   a. Urine testing
   b.[b] Blood testing
   c. Both are equally good

9. For a person in good control, what effect does exercise have on blood glucose?
   a.[b] Lowers it
   b. Raises it
   c. Has no effect

10. What effect will an infection most likely have on blood glucose?
   a. Lowers it
   b.[b] Raises it
   c. Has no effect

11. The best way to take care of your feet is to:
   a.[b] look at and wash them each day
   b. massage them with alcohol each day
   c. soak them for 1 hour each day
   d. buy shoes a size larger than usual

12. Eating foods lower in fat decreases your risk for:
   a. nerve disease
   b. kidney disease
   c.[b] heart disease
   d. eye disease

13. Numbness and tingling may be symptoms of:
   a. kidney disease
   b.[b] nerve disease
   c. eye disease
   d. liver disease

14. Which of the following is usually <u>not</u> associated with diabetes:
   a. vision problems
   b. kidney problems
   c. nerve problems
   d.[b] lung problems

17. If you have taken rapid-acting insulin, you are most likely to have a low blood glucose reaction in:
   a.[b] Less than 2 hours
   b. 3-5 hours
   c. 6-12 hours
   d. More than 13 hours

18. You realize just before lunch that you forgot to take your insulin at breakfast. What should you do now?
   a. Skip lunch to lower your blood glucose
   b. Take the insulin that you usually take at breakfast
   c. Take twice as much insulin as you usually take at breakfast
   d.[b] Check your blood glucose level to decide how much insulin to take

19. If you are beginning to have a low blood glucose reaction, you should:
   a. exercise
   b. lie down and rest
   c.[b] drink some juice
   d. take rapid-acting insulin

20. A low blood glucose reaction may be caused by:
   a.[b] too much insulin
   b. too little insulin
   c. too much food
   d. too little exercise

21. If you take your morning insulin but skip breakfast, your blood glucose level will usually:
   a. increase
   b.[b] decrease
   c. remain the same

22. High blood glucose may be caused by:
   a.[b] not enough insulin
   b. skipping meals
   c. delaying your snack
   d. skipping your exercise

(continued)

7. What effect does unsweetened fruit juice have on blood glucose?
   a. Lowers it
   b.[b] Raises it
   c. Has no effect

8. Which should <u>not</u> be used to treat a low blood glucose?
   a. 3 hard candies
   b. 1/2 cup orange juice
   c.[b] 1 cup diet soft drink
   d. 1 cup skim milk

15. Signs of ketoacidosis (DKA) include:
   a. shakiness
   b. sweating
   c.[b] vomiting
   d. low blood glucose

16. If you are sick with the flu, you should:
   a. Take less insulin
   b. Drink less liquids
   c. Eat more proteins
   d.[b] Test blood glucose more often

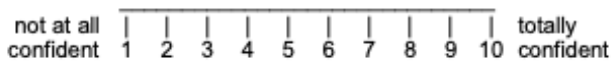
23. A low blood glucose reaction may be caused by:
   a.[b] heavy exercise
   b. infection
   c. overeating
   d. not taking your insulin

[a]For non-US patient populations, we recommend reviewing the terms used in items 1, 2, 3, 4, and 8 for appropriateness.
[b]Correct answer.

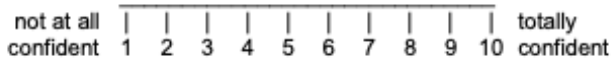
Appendix C

Stanford Self-Efficacy Tool

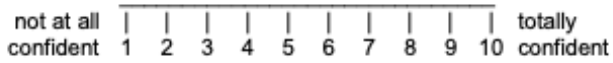
1. How confident do you feel that you can eat your meals every 4 to 5 hours every day, including breakfast every day?



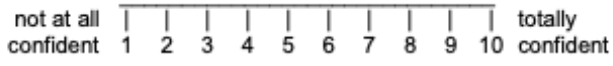
2. How confident do you feel that you can follow your diet when you have to prepare or share food with other people who do not have diabetes?



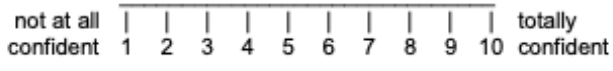
3. How confident do you feel that you can choose the appropriate foods to eat when you are hungry (for example, snacks)?



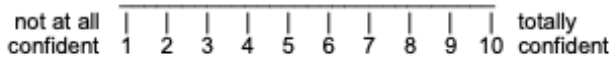
4. How confident do you feel that you can exercise 15 to 30 minutes, 4 to 5 times a week?



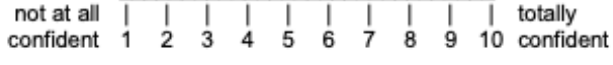
5. How confident do you feel that you can do something to prevent your blood sugar level from dropping when you exercise?



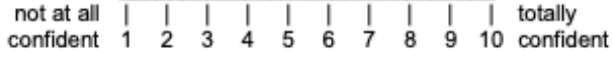
6. How confident do you feel that you know what to do when your blood sugar level goes higher or lower than it should be?



7. How confident do you feel that you can judge when the changes in your illness mean you should visit the doctor?



8. How confident do you feel that you can control your diabetes so that it does not interfere with the things you want to do?



Appendix D

SDSCA tool

The Summary of Diabetes Self- Care Activities *

The questions below ask you about your diabetes self-care activities during the past 7 days. If you were sick during the past 7 days, please think back to the last 7 days that you were not sick.

Diet How many of the last SEVEN DAYS have you followed a healthful eating plan? 0 1 2 3 4 5 6 7	On how many of the last SEVEN DAYS did you participate in a specific exercise session (such as swimming, walking, biking) other than what you do around the house or as part of your work? 0 1 2 3 4 5 6 7	**Smoking** Have you smoked a cigarette—even one puff—during the past SEVEN DAYS? 0. No 1. Yes. *If yes*, how many cigarettes did you smoke on an average day? Number of cigarettes:
On average, over the past month, how many DAYS PER WEEK have you followed your eating plan? 0 1 2 3 4 5 6 7	**Blood Sugar Testing** On how many of the last SEVEN DAYS did you test your blood sugar? 0 1 2 3 4 5 6 7	
On how many of the last SEVEN DAYS did you eat five or more servings of fruits and vegetables? 0 1 2 3 4 5 6 7	On how many of the last SEVEN DAYS did you test your blood sugar the number of times recommended by your health care provider? 0 1 2 3 4 5 6 7	
On how many of the last SEVEN DAYS did you eat high fat foods such as red meat or full-fat dairy products? 0 1 2 3 4 5 6 7	**Foot Care** On how many of the last SEVEN DAYS did you check your feet? 0 1 2 3 4 5 6 7	
Exercise On how many of the last SEVEN DAYS did you participate in at least 30 minutes of physical activity? (Total minutes of continuous activity, including walking). 0 1 2 3 4 5 6 7	On how many of the last SEVEN DAYS did you inspect the inside of your shoes? 0 1 2 3 4 5 6 7	