A DNP PROJECT

TITLE: Applying the Summary of Diabetes Self-Care Activities (SDSCA) Questionnaire to Improve the Referral Process for Diabetes Self-Management Education and Support (DSMES) Services

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Abstract

Purpose of Project: Diabetes is a very prevalent chronic disease that is associated with significant morbidity and mortality. Diabetes Self-Management Education and Support (DSMES) is recommended for all diabetic patients to improve glycemic control. The purpose of this project was to improve referral of diabetic patients to DSMES services by assessing their diabetes self-management behaviors with the Summary of Diabetes Self-Care Activities (SDSCA) questionnaire. Methodology: The design for this DNP project was a pre-post intervention study. A retrospective chart review was performed pre and post intervention to compare DSMES referral rates. Twenty-five diabetic participants in a single provider primary care practice participated in this project. Results: Most of participants were white males with a long history of diabetes (more than 5 years). The results demonstrated that utilization of the SDSCA resulted in a statistically significant increase in referrals from 0 to 6 (24%) patients ($p = 0.014$). Implications for Practice: This project showed the importance of assessing self-management behaviors in all diabetes patients. Future scholarly work should determine whether implementing the SDSCA and referring to DSMES reduce diabetes-related complications and decrease the burden of the disease.

**Keywords:** Diabetes, Self-Management, Summary of Diabetes Self-Care Activities (SDSCA), Diabetes Self-Management Education and Support (DSMES), Primary Care.
Applying the Summary of Diabetes Self-Care Activities (SDSCA) Assessment Tool to Improve the Referral Process for Diabetes Self-Management Education and Support (DSMES) services

**Introduction**

Diabetes is a chronic health condition that affects individuals both directly and indirectly worldwide. According to the Centers for Disease Control and Prevention (CDC, 2017) the number of individuals diagnosed with diabetes within the United States has tripled in the past twenty years, and 1 in 4 Americans have diabetes and do not know they have it. It is predicted that by 2050, 1 in 3 adults will have diabetes (Boyle et al., 2010; Powers et al., 2017). Currently diabetes is the seventh leading cause of death both nationally and worldwide (CDC, 2017; World Health Organization [WHO], 2018b). With this continued increase in incidence, diabetes may climb the ranks as one of the leading causes of death among individuals both worldwide and nationally.

When an individual is diagnosed with diabetes a change in lifestyle and self-care modalities are key to preventing the debilitating effects and complications of the disease. Healthcare providers assess the patient’s self-care habits during the appointment, re-educate and continue or modify the treatment plan; all of which occurs within a 15-20-minute time span. Some patients may need more support, education, and time to help them cope with the disease process, disease management and require additional services to conquer and live with diabetes. Interestingly, 60% of healthcare providers worldwide feel that diabetes self-management education needs to be improved (Funnell, Bootle, Stuckey, 2015; Holt et al., 2013). The use of Diabetes Self-Management Education and Support (DSMES) services are recommended for all patients diagnosed with diabetes to help manage the disease in everyday life (American Diabetes Association [ADA], 2019).
Background

Diabetes affects 30.3 million Americans and 422 million individual's world-wide (Centers for Disease Control and Prevention [CDC], 2017; World Health Organization [WHO], 2018a). A multitude of risk factors exist for an individual to develop type 2 diabetes, which tends to be the more common form of diabetes. These risk factors include having a familial history of diabetes, age of 45 or older, increase body mass index, having prediabetes, a history of gestational diabetes, delivering a baby over 9 pounds, being physically inactive, elevated triglycerides, and history of medical conditions such as hypertension, heart disease, stroke, depression, and polycystic ovarian syndrome (National Institute of Diabetes and Digestive and Kidney Diseases [NIDDK], 2016). Races that are more prevalent to develop type 2 diabetes are African American, Hispanic/Latino, Asian American, Alaska Native, American Indian, Pacific Islander, or Native Hawaiian (NIDDK, 2016). An individual who is aware of these risk factors and makes changes in his/her lifestyle can prevent or delay the development of type 2 diabetes. However, for those living with diabetes, over time the disease can lead to other comorbid conditions such as retinopathy, neuropathy, nephropathy, cardiovascular disease, stroke, and limb amputations (CDC, 2018c). Diabetes is the leading cause of lower-limb amputations, blindness and renal failure (CDC, 2018c).

Diabetes and these other comorbid conditions may impact an individual physically, emotionally, socially and economically (Chew, Shariff-Ghazali, & Fernandez, 2014). The individual may not be able to work or provide for his/her family due to disabilities, which can also affect the individual’s psycho-social well-being and over-all quality of life. The average cost of medical expenditures for an individual with diabetes in the United States is around $9,601 annually, which is a 14% increase from 2012 at $8,417 (National Library of Medicine [NLM],
A patient with diabetes is required to change their lifestyle which can be difficult with a limited income due to complications of the disease. The individual may not be able to pay for healthy food choices, he/she may not have access to a gym or an area to perform physical exercise, and/or medications may be too expensive. The rising cost, increasing prevalence, and debilitating comorbid conditions that arise from diabetes demonstrates that an improvement is needed by healthcare providers to tackle this disease.

**Current Practice**

At the time of diagnosis of diabetes, and throughout treatment, the patient is educated about the disease process, complications of the disease, importance of medication adherence, and daily self-care modalities. Self-care tasks include lifestyle modification, such as dietary modifications, physical activity, blood sugar monitoring, smoking cessation, and daily inspection of the feet (ADA, 2019). This type of education occurs in a 15-30-minute visit with the healthcare provider and is usually discussed again upon at future visits. The lifestyle modifications a diabetic needs to perform on a daily basis can be overwhelming without adequate support, time and education from the healthcare provider. Proper education on the self-management and support is crucial to prevent disease progression and complications of diabetes (ADA, 2019).

The 2019 ADA standards of medical care in diabetes requires healthcare providers to assess an individual's smoking, alcohol and substance abuse use initially and then annually, as well as evaluate other lifestyle factors, such as diet, weight, physical activity, medications adherence, glucose monitoring, and visits to specialist initially and at every follow up visit (ADA, 2019). It is simple for providers to assess physical adherence to treatment by checking the patient’s glycemic targets with the hemoglobin A1C, fasting blood sugar, home blood sugar logs,
body mass index, and electronic tracking of medication refills. However, assessing other lifestyle factors can be challenging for providers. Providers inquire about self-management with reference to diet, exercise, medication adherence, foot care, and smoking; however, there is not a standardized tool in practice to assess self-care of diabetes management. Patients may not inform the provider of the struggles they are having managing these tasks at home in fear of judgement or lack of time from the provider.

**Summary of Diabetes Self Care Activities (SDSCA) Questionnaire**

It can be difficult for patients to manage their self-care with regards to diabetes at home, and the provider may not ask the patient the right questions about self-care during their scheduled 15-20-minute allotted visit to prompt the sharing of these challenges. A standardized assessment tool may offer assistance for the provider to identify where the patient is struggling in his/her self-management of diabetes. One such tool that could be utilized is the Summary of Diabetes Self-Care Activities (SDSCA) questionnaire. The SDSCA is a valid tool that asks the patient to self-report about his/her diet, exercise, blood glucose, foot care, and smoking habits over the past 7 days (Toobert, Hampson, Glasgow, 2000). This tool has been utilized worldwide to assess an individual's self-management of diabetes. According to Beck et al. (2018) the SDSCA is one diabetic assessment tool that can be used to aide in the referral for patients to Diabetes Self-Management Education and Support (DSMES) services.

**Diabetes Self-Management Education and Support (DSMES)**

DSMES are essential for patients who are diabetic and is an evidence-based process that provides knowledge and assistance to guide the patient to change self-care behaviors (Beck et al., 2018). DSMES programs have been shown to reduce an individual’s A1C by 0.6%-1%, improve physical and emotional outcomes, increase quality of life, and lower health care costs and
hospitalizations (Beck et al., 2018; Harris, 2019). According to the CDC (2018a), any individual who has been diagnosed with diabetes, should be referred by a healthcare provider for DSMES at diagnosis, annually, during transitional care, and during new complicating factors. In addition, this is a recommended standard of care amongst the ADA 2019 standards for management of diabetes.

Patients and family members who have attended DSMES programs have found it useful in the management of diabetes (Funnell, Bootle & Stuckey, 2015; Nicolucci et al., 2013). Nicolucci et al. (2013) found that out of 48.8% of patients who attended DSMES programs, 81.1% of patients found it helpful. And out of 23.1% of family members who attended DSMES, 72.1% of individuals stated it was beneficial (Funnell, Bootle & Stuckey, 2015).

DSMES is a covered service under Medicare and most insurance plans (CDC, 2018a). However, for the DSMES to be covered by insurance the patient must attend services that are recognized through national accredited organizations; that being the ADA or the American Association of Diabetes Educators (AADE) (Powers et al., 2017). When a patient is initially diagnosed with diabetes, the Centers for Medicare and Medicaid Service covers up to 10 hours for the first year and then two hours for each following year (Powers et al., 2017).

The cost and incidence of diabetes continues to grow, despite having the knowledge and technology at our fingertips to help prevent it. DSMES has shown to be beneficial in the overall health outcomes of individuals with diabetes, yet it is an under-utilized service. Only 5% of Medicare and 6.8% of privately insured patients are being referred for DSMES, while yet it is covered by both insurance plans (CDC, 2018a).
**Needs Assessment**

As mentioned above, 30.3 million Americans are living with diabetes on a daily basis, and it affects all individuals regardless of race, age, or gender. According to the NLM (2018), the prevalence of diabetes per age group are as follow: <18—110,000, 18-34—1.02 million, 35-44—1.92 million, 45-54—4.06 million, 55-59—3.05 million, 60-64—3.53 million, 65-69—3.59 million, and 70 or older—7.43 million. When it comes to race/ethnicity and diabetes prevalence, White, non-Hispanic individuals are at greater prevalence (NLM, 2018). However, the average cost per person with diabetes is larger in Black, non-Hispanics when compared to other races (NLM, 2018).

Diabetes is a costly disease, according to the NLM (2018) the average cost of diabetes in 2017 was $327 billion, which was a 26% increase since 2012. This value includes $237 billion in direct medical cost and $90 billion in indirect costs (NLM, 2018). Indirect costs were defined as absenteeism, reduced productivity, and premature mortality. Both direct and indirect costs affect not only those living with diabetes, but also the individual's families, co-workers, companies/organizations, and healthcare industries. Diabetes and complications due to diabetes put a strain on healthcare industries, it was estimated that $69.7 billion dollars were used for hospital inpatient services (NLM, 2018). This number could be reduced if individuals with diabetes were adequately screened and cared for in primary care offices.

The goal of primary care is to assess, educate, manage, and evaluate patients to prevent diseases processes and complications. Interestingly, according to Byrne et al., (2017) just 33.5% of healthcare providers worldwide stated that they received postgraduate education on self-management of diabetes. If the provider is not adequately trained or lacks the knowledge to discuss self-management techniques for the patient, is that not a failure to provide quality care.
Providers are trained to assess patients effectively using standardized tools and refer to specialties when he/she cannot provide the support the patient needs a disease process. So why are not all diabetic patients being evaluated with a standardized tool in primary care, and referred for DSMES services?

**Problem/Purpose Statement**

The number of individuals diagnosed with diabetes continues to rise throughout the country, and prevalence is greatest in adult patients (NLM, 2018). It can be challenging for patients to change his/her lifestyle and modify daily behaviors to manage diabetes and the potential complications that arise from the disease process. It is the role of primary healthcare providers to assess the individual’s self-care behaviors to see where he/she may be struggling, intervene by referring to DSMES to prevent further complications of the disease process, hospitalization and/or death. Therefore, the PICO question is as follows: In adult patients age 18-75, will the use of the Summary of Diabetes Self-Care Activities (SDSCA) questionnaire increase the number of referrals for Diabetes Self-Management Education and Support (DSMES) services?

**Aims & Objectives**

The aim of this project was to improve referral of diabetic patients to DSMES services in order to enhance their self-management, reduce A1C values, decrease hospitalizations and diabetes-related healthcare costs, and improve the individuals’ quality of life.

The secondary goals were to implement a valid screening tool to assess patient’s self-care management with diabetes and to identify the provider and patient to knowledge gaps in the patient’s diabetes self-management and to increase knowledge on self-care management of diabetes.
Review of Literature

Search Strategy and Results

Literature searches were conducted in MEDLINE, CINAHL, Scopus, PubMed, and Joanna Briggs Institute (JBI) databases. Searches were also conducted using governmental agency websites, professional organization websites, reference lists, and professional organization websites such as the American Diabetes Association (ADA) and the American Association of Diabetic Educators (AADE). The topics that were primarily searched were Summary of Diabetes Self-Care Activities (SDSCA) and Diabetes Self-Management Education and Support (DSMES). Both topics were searched separately because when applying “and” to the two topics in the databases above yielded with zero results.

The second search topic explored was the term “summary of diabetes self-care activities”. The search was further limited to humans, English language, and articles no later than 2014. A total of 57 articles were found, one other article was also included which was identified to be the original article on the founding of the screening tool. A total of 25 articles were reviewed after removing duplicates and reviewing abstracts.

Search terms that were utilized for diabetes self-management education included diabetes mellitus, as well as primary health care, general practitioners, family practice; these were grouped with “or” terms and joined with the subsequent search terms using “and”, self-care, self-management, and patient education. In a separate search the term of diabetes self-management education was also explored. The search was limited to English language, humans, all adults and articles no later than 2012. A total of 248 articles were discovered, eight additional articles were selected from other sources, particularly reference lists. After removing duplicates, reviewing abstracts and limiting references to within the last five years, 40 articles were reviewed.
Therefore, a total of 65 full-text articles were thoroughly reviewed. All references were managed using EndNote X9. Using the Johns Hopkins Research Evidence Appraisal Tool, a comprehensive appraisal of ten articles was performed, five with regards to DSMES and five on SDSCA (See Appendix A). The ten articles include three Level I systematic reviews and meta-analyses, one Level II quasi-experimental controlled study, four Level III studies, and two-Level V literature reviews.

**Synthesis of the Literature**

**Summary of Diabetes Self-Care Activities.**

The Summary of Diabetes Self-Care Activities (SDSCA) measure was developed in 1994 by Toobert and Glasgow and measured five areas of diabetes self-care which included general diet, special diet, medication taking, blood glucose testing and exercise (Toobert, Hampson, & Glasgow, 2000). An analysis of seven articles that used the original SDSCA questionnaire were reviewed and were proven to be statistically valid and was therefore found to be a reliable tool (Toobert, Hampson & Glasgow, 2000). Although the original SDSCA was found to be a valid instrument, a revision to the tool was adopted to include 11-items and an expanded 14 questions. The tool was modified based on the following criteria: “consistency in mean values across studies, sufficient variability and lack of ceiling or floor effects, temporal stability, internal consistency, predictive validity, sensitivity to change, and ease of scoring and ease of interpretation” (Toobert, Hampson, & Glasgow, 2000, p. 947). For example, questions about taking medications was omitted because of strong ceiling effects, lack of variability, and lowered test-retest reliability (Toobert, Hampson, & Glasgow, 2000). Questions about specific diet were also omitted because individuals with diabetes tend to follow different diets, and the inter-item
correlation of specific diet was found to be constantly unreliable when analyzed by Toobert, Hampson, and Glasgow, 2000.

Since the discovery of the validity of the SDSCA measure it has been widely used throughout research. A Scopus search of the original article written by Toobert, Hampson and Glasgow in 2000 has been referenced 1,101 times. The tool has been translated into various languages including Spanish, Arabic, and German just to name a few (AlJohani, Kendall & Snider, 2014; Kamradt et al., 2014; Vincent, McEwen & Pasvogel, 2008). Multiple studies have been performed to analyze the validity and psychometric analysis of the SDSCA being translated into different languages. Lu et al. (2016), indicates that even though the tool has been vastly translated, the psychometric properties still require more rigorous testing. The German version of the SDSCA is an example where validity and psychometric analysis were examined (Kamradt et al., 2014). Exploratory and confirmatory factor analysis were used to assess the validity of the translated tool. The validity and reliability increased when item 4 of the SDSCA was removed. Kamradt et al. (2014) identified that previous studies reported problems with item 4 of the SDSCA when analyzing statistics for validity and reliability.

Another great aspect of the Kamradt et al. (2014) study was that it included diabetic patients with comorbid conditions in the inclusion criteria. Comorbid conditions, such as hypertension, arthritis, or chronic obstructive pulmonary disease may affect the abilities of an individual to perform important self-care activities such as physical activities or foot care. Hence it provides valuable input by analyzing the data of the SDSCA and whether comorbidities influence performance of diabetic self-care activities.

The SDSCA can be utilized pertaining to anyone regardless of age, language, and race. Hernandez et al. (2014) performed a study looking at self-care activities of Latino and African
American patients living with diabetes at a lower socioeconomic status (SES) in Chicago, Illinois. The study indicated that both ethnicities scored lower in self-care activities related to physical activity (2.5/7 days) and best for foot care (4.5/7 days) (Hernandez et al., 2014). African American patients had a greater incidence of smoking and were more likely to check their blood glucose, however they were less likely to follow a healthy diet (Hernandez et al., 2014). Although these tendencies may not hold true for every Latino or African American patient it hones a provider in toward the application and results of the tool in a similar population.

The SDSCA can be utilized and applied at any site whether it is primary care, a clinic or federally qualified health center. Formosa and Muscat (2016) administered the SDSCA and Diabetes Knowledge Questionnaire (DKQ-24) at a primary care site in Malta. The goal was to utilize both tools to assess the individuals’ diabetic knowledge and self-care and see if there was a statistical significance between the two tools. The mean scores for the DKQ-24 was 14.40 out of 24 and the mean for the SDSCA was 2.89 out of 7; the results showed a lack of knowledge and a self-care deficit for individuals diagnosed with diabetes. Unfortunately, the data demonstrated that it was not statistically significant between the two variables; however, the results did indicate that diabetic education in primary care was ineffective and improvement was needed by providers (Formosa & Muscat, 2016).

A common limitation that was evident in reviewing studies about the SDSCA was that self-care measures were subject to biased response (Hernandez et al., 2014; Toobert, Hampson, & Glasgow, 2000). Individuals, for example, may not be able to recall what occurred over the past seven days and/or denote a value indicating they are compliant with self-care activities at home although they were not. While multiple studies were unable to provide valid psychometric
analysis of the SDSCA, it is considered a useful tool in research due to the availability of various languages and conciseness (Lu et al., 2016).

**Diabetes Self-Management Education and Support.**

*2017 National Standards for DSMES.*

Diabetes Self-Management Education and Support (DSMES) is essential for all individuals diagnosed and living with diabetes (Beck et al., 2017). DSMES programs have been shown to reduce an individual’s A1C by 0.6%-1%, improve physical and emotional outcomes, increase quality of life, and lower health care costs and hospitalizations (Beck et al., 2018; Harris, 2019). The National Standards for DSMES was revised and updated in 2017 to assure that they were concurrent with relevant evidence-based practice.

One of the highlights of the revised standards included having the patient as the center of the care team. Beck et al. (2017) state, “the focus of the Standards should include helping the person with diabetes develop problem-solving skills and attain ongoing decision-making support necessary to self-manage diabetes” (p. 36). One way this can be achieved is by utilizing valid assessment tools. Beck et al. (2017) suggests that using validated assessment tools will provide more indication to support DSMES. The number of tasks and treatment plans that a patient has to follow to manage their diabetes is cumbersome. Therefore, it is important for DSMES to assist the patient to develop ways and provide knowledge to make living with diabetes more practicable and improve overall patient outcomes.

Other highlights of the updated Standards found that DSMES should be expanded and incorporated in all models of care including Patient-Centered Medical Homes, virtual visits, population health, Accountable Care Organizations, and value-based payment models (Beck et al., 2017). Providers of DSMES services should be keen to the input of stakeholders and aware
of the population served to provide the best quality services for those in need (Beck et al., 2017). These Standards are important to continue to provide quality, relevant and consistent care for all individuals living with diabetes.

**DSMES and Effects on Glycemic Control**

A total of three systematic reviews with meta-analyses were appraised in which all had a population of diabetic adult patients, as well as an intervention of participating in diabetes self-management education (DSME) services and the outcome of measuring the participants hemoglobin A1C (Chrvala, Sherr, & Lipman, 2015; Cunningham et al., 2018; & Ferguson, Swan, & Smaldone, 2015). The population of diabetic patients participating in DSME services was particular in each study; Chrvala, Sherr, and Lipman (2015) looked at all adult patients regardless of race or ethnicity, while Cunningham et al. (2018) looked at African Americans and Ferguson, Swan, and Smaldone (2015) looked at Hispanics. The method of DSME services, duration, and time were discussed in all the reviews. Heterogeneity of the DSME was measured and analyzed in two of the reviews and was found to be high (Cunningham et al., 2018; & Ferguson, Swan, & Smaldone, 2015).

In two of the three studies, it was found to be statistically significant that individuals who participated in DSME services reduced an individual’s hemoglobin A1C (Chrvala, Sherr, & Lipman, 2015; Ferguson, Swan, & Smaldone, 2015). Cunningham et al. (2018) found that there was no significance in African American diabetic patient’s A1C values when participating in DSME services. However, the meta-analysis that was performed utilized only eight articles which has a smaller sample size (n = 1630), while the sample size was larger for the other two reviews. Hence perhaps a larger sample size of this population may yield better results.
One common factor that occurred amongst the articles by Chrvala, Sherr and Lipman, (2015) and Ferguson, Swan and Smaldone (2015) was that DSME primarily delivered via telephone/telemedicine were found to be ineffective in reducing an individual’s A1C values. Chrvala, Sherr and Lipman (2015) indicate that participants that were involved in combination sessions had a greater reduction of an individual’s A1C (0.88). Multicultural education sessions led in a group, individual or multi-modular, were determined most effective for the Hispanic population (Ferguson, Swan & Smaldone, 2015). The mode of delivery was another factor in which participants that were involved in DSME with multiple types of educators had a better reduction in A1C values (Chrvala, Sherr & Lipman, 2015; Ferguson, Swan & Smaldone, 2015). Guiding DSME services with regards to culture was also discussed by Cunningham et al. (2018); the subgroup analysis examining culturally adapted DSME did not produce significant changes in A1C reduction in African American patients. Analyzing this data is helpful because it can guide the provider in referring patients to DSME services that can be more beneficial to their cultural needs.

**Patient Perception of DSMES**

Statistically, DSMES services have shown to be effective in reduction of A1C values, however limited studies discuss how patients interpret and feel after attending DSMES. Gildea, Lantaff, and Olenik (2017) performed a qualitative study involving patients whom attended DSME conducted by a pharmacist. Topics such as medications, diet, exercise, and coping strategies were discussed in the sessions, and it revealed that 82% of the participants found that DSME provided them with the groundwork to control and manage their diabetes (Gildea, Lantaff, & Olenik, 2017). Qualitative studies from patients who attend DSMES are helpful because it can show the provider different psychological obstacles in everyday life that they may
be struggling to manage their diabetes. For example, Gildea, Lantaff and Olenik (2017) found that social support, time constraints with work-hours and family activities, and feelings of frustration and denial were common themes that were found as everyday obstacles in managing an individual’s diabetes.

**Evaluation of DSME Using the SDSCA.**

Lastly, only one study was discovered utilizing the SDSCA with a diabetic education program in Iran. Ebadi Fardaza, Heidari, and Solhi (2016) conducted a quasi-experimental controlled study by implementing the SDSCA and multidimensional health locus of control (MHLC) questionnaires to adult diabetic patients. The control group completed the questionnaires initially and again at two-three months, while the intervention group completed the initial questionnaires and attended three 60-minute educational sessions using a variety of educational methods. The intervention group also repeated the questionnaires after two-three months. It was found that the mean scores of the SDSCA and locus of control improved in the intervention group (Ebadi Fardaza, Heidari, & Solhi, 2016). One limitation that was observed was the lack of detailed statistics related to each individual item of the SDSCA, instead only a mean score of self-care was reported (Ebadi Fardaza, Heidari, & Solhi, 2016). Nevertheless, this study demonstrates how DSME can improve diabetes self-care knowledge and improve scores in the SDSCA.

In conclusion, the literature has shown that the SDSCA is a valid assessment tool, that has been used world-wide and in multiple languages, to screen diabetic patient’s self-care activities (Lu et al., 2016; Toobert, Hampson, Glasgow, 2000). The tool demonstrates where self-care behaviors are deficient and guides the provider as to where patient knowledge may be lacking and require more support. Standard 7 of the 2017 National Standards for Diabetes Self-
Management and Support discussed that providers should be assessing diabetic patients with valid tools to evaluate the necessity for DSMES (Beck et al., 2017). It is recommended that patients who are diagnosed with diabetes be referred to DSMES at the time of diagnosis, annually, if there is complication in care, and during transition of care (Beck et al., 2017). DSMES have been statistically proven to reduce an individual’s hemoglobin A1C (Chrvala, Sherr, & Lipman, 2015; Ferguson, Swan, & Smaldone, 2015). Patients have also stated positive effects of DSMES in that it provides the framework for management of their diabetes (Gildea, Lantaff, & Olenik, 2017). Therefore, the screening tool and DSMES are evidence-based practices to apply to a primary care practice.

Conceptual Framework

The Chronic Care Model (CCM) was originally developed by Edward H. Wagner, MD, MHP, due to the growing number of Americans that were living with multiple chronic illnesses (Group Health Research Institute, 2019). Care of these conditions were deficient because of providers not following clinical guidelines due to time, poor care coordination and planned care, patients were not properly trained to manage their health condition, and an absence of follow-up (Group Health Research Institute, 2019). The goal of the model was to improve primary care through the use of essential elements to provide high-quality care. There are six elements to model which include the health system, delivery system design, decision support, clinical information systems, the community, and self-management support (Group Health Research Institute, 2019). The outcomes of the elements would provide an informed activated patient, prepared proactive practice and overall improved outcomes (See Appendix B).

The CCM applies to this project because diabetes is a chronic health condition in which the management is geared on patient self-care behaviors, education, support and resources to
adequately manage. Applying the six essentials of the CCM to the project concept would be as follows; first, the health system is the primary care practice. The next essentials, clinical information systems and delivery system design, are the clinical guidelines for diabetes management and the implementation of the SDSCA to assess the individuals self-management. The fourth essential, decision support, is the provider evaluating the results of the SDSCA, patient adherence to the diabetic treatment plan, reeducating, discussing treatment options and referring the patient to DSMES. The last essentials, community and self-management support, would include DSMES and other resources available to the patient through other organizations and institutions. As the model predicts, a utilization of all these services would improve health care practice, improve patient knowledge, increase utilization of DSME services, and improve not only diabetic outcome, but improved overall health outcomes; which will improve healthcare costs.

Methodology

The design for this DNP project was a pre-post intervention study. A retrospective chart review was performed to assess how many individuals that were previously referred to DSMES services and compare to how many individuals were referred after implementing the SDSCA questionnaire.

Setting

The study was performed at a single provider primary care practice located in Union County, New Jersey. A site agreement was obtained between the study coordinator and the provider. The population of the practice included various races and ethnicities and only treated adult patients. All patients at the practice were insured via private insurance and/or Medicare. The practice did not see patients on Medicaid.
Study Population

The population for the study included adult patients between the ages of 18 and 75, either male or female with a diagnosis of Diabetes Mellitus, either type 1 or type 2. Patients had to be currently receiving treatment for their diabetes. Also, individuals had to read and understand the English language and be cognitively intact; therefore, without dementia or have a cognitive impairment.

Subject Recruitment

Recruitment for the study occurred based off a convenience sample. The provider of the practice notified the study coordinator of patients whom qualified to participate in the study and patients were asked if they would like to participate. Consented participants were provided the demographic and SDSCA questionnaires. The goal was to provide the questionnaire to four patients each week over a three-month period to a total of one hundred individuals.

A recruitment flyer was posted in the waiting area of the office (Appendix C). The flyer included the project’s purpose, benefits, and the principle investigator’s cell phone number and Rutgers email address if individuals have any further questions.

Consent Procedure

An informed consent was obtained from all patients whom decided to participate in the project. Participants were assured that participation was voluntary and that no identifiable information, such as name, date of birth, or medical record number, would be collected or utilized in the study. The consent form was created based off requirements of the Rutgers IRB (Appendix D). Any question that the participant had, with regards to the project, was be answered before consents were signed. All signed consents were maintained at Rutgers University.
Study Intervention

The practice did not utilize a diabetic self-care assessment tool to screen patients with diabetes. The single provider of the practice was educated on the use of the SDSCA tool, the purpose of DSMES services and the referral process through the study coordinator’s project proposal. A retrospective chart review of consented participants was performed to assess if the individual was ever referred to DSMES services.

The study intervention required the patient fill out a demographic survey and the SDSCA questionnaire on paper, each paper was numbered from one to one hundred. The demographic data that was collected included age range, gender, race, highest level of education, number of years living with diabetes, and inquiring whether the patient had previously attended DSMES services (Appendix E). Next, the participant completed the 25-question SDSCA questionnaire (Appendix F). Permission was obtained from the original author of the SDSCA tool, Deborah Toobert (Appendix G). She provided access to the SDSCA questionnaire and the scoring; hence, the participants questionnaires were scored as directed by Toobert (Appendix H). After discussing the patient’s scores from the questionnaire with the primary care provider and the patient, and if the patient qualified for DSMES services, a referral was initiated using the recommended referral form from the American Association of Diabetes Educators and American Diabetic Association (Appendix I). This referral form was recommended by the CDC in the DSMES toolkit (CDC, 2018b).

Outcomes to be Measured

The outcomes that were measured included the retrospective analysis of referrals to DSMES, as well as the referrals to DSMES after performing the SDSCA questionnaire. The goal
was to assess whether the utilization of the SDSCA questionnaire increased the number of referrals to DSMES services.

**Risks/Harms**

There were no anticipated risks of this study. There was a minor increase in appointment time to review the results of the questionnaire with the patient. Identifiable information was not collected, all surveys and questionnaires were numbered from one to one hundred to protect anonymity.

**Subject Costs and Compensation**

There was no compensation or cost for patients to participate in the study. However, one potential cost that could incur was the cost of attending DSMES. According to the CDC (2018) DSMES should be covered by Medicare and most private insurance plans. Medicare covers 80% of services while the individual may be responsible for 20% of the Medicare approved amount (U.S. Centers for Medicare & Medicaid Services, n.d.). Therefore, the patient may need to pay some money out of pocket to attend.

**Project Timeline**

IRB approval was obtained for this project August 2019, and implementation began September 2019. The project took place between September 2019 until December 2019. An analysis and interpretation of the data began in December 2019 in preparation for presentation of the final project in January 2020 (Table 1).
Table 1. Timeline of project

**Resources Needed/Project Budget**

The estimated cost of this project was approximately $25. This included the cost of paper and printing of the consent, demographic survey, SDSCA questionnaire, and referral form for DSMES services.

**Evaluation**

**Data Analysis**

Demographic data were analyzed using descriptive statistics. A univariate analysis was performed to assess mean, median, and frequencies (percentages). A bivariate analysis was performed to compare frequencies of referrals pre and post intervention. A Wilcoxon Rank Sum Test was performed for this purpose, setting a $p$ value of $<0.05$. SPSS statistical package (IBM Corp. Released 2017. IBM SPSS Statistics for Mac, Version 25.0. Armonk, NY: IBM Corp.) was used for data analysis.

**Data Maintenance**

The demographic survey and SDSCA questionnaires were conducted on paper and numbered from one to one hundred. The signed consents and results of the questionnaires were
Results

Implementation occurred between September 10, 2019 to December 13, 2019. In total, twenty-five individuals consented to participate in this project. Six individuals declined participation due to time, one had a cognitive impairment, and twenty-two were excluded due to age. All data analysis was performed using SPSS. Characteristics from the demographic data collection can be found in Table 2 in Appendix J. Of the twenty-five participants, 60% were male and 40% were female. A majority fell within the age range of 66-75 (44%) and there were no participants falling within the age range of 18-45. The predominant race that was represented were White at 56%, followed by Hispanics at 15%, African Americans at 12%, Asians at 12%, and Other at 4%. More than half of the participants (56%) had a highest educational achievement of high school.

When it came to the number of years living with Diabetes, 8% were less than 1 year, 32% were 1-5 years, 16% were 5-10 years, and 44% were greater than 10 years. An inquiry was performed to assess if patients had ever attended DSMES services, 9 participants stated that they had attended DSMES without being referred by the provider because they wanted to receive more information on diabetes.

Twenty five charts were reviewed in the retrospective analysis, of those individuals zero participants were referred to DSMES services by the provider. After analysis of the participants answers from the SDSCA questionnaire, 6 (24%) individuals were referred to DSMES services compared to 0% pre-intervention. See Table 3 (Appendix K). A Wilcoxon Rank Sum Test was run to determine whether the difference in referral was statistically significant. The results
showed that there were a statistically significant difference in referring patients to DSMES pre and post intervention \( (Z = -2.449, p = 0.014) \).

Further analysis was performed with regards to self-care behaviors from the questions asked in the SDSCA, by looking at the mean and standard deviation from all the participants answers. Results are documented in Table 5 (Appendix L). The questions that scored the best were with regards to diet, foot care and medication adherence. The questions that scored on the lower end were activity, checking of blood sugar, and checking inside of the individuals shoes. The mean number of days that individuals participated in at least 30 minutes of exercise was 4.32 days, and the number of days an individual participated in a specific exercise session was 3.2 days. A majority of individuals stated that they did not perform daily blood glucose monitoring because it was not ordered by the provider. Lastly, participants did admit to checking his/her feet daily (mean = 5.88 days), washing feet and drying feet (mean = 6.96 days; 6.92 days); however, patients admit that they do not regularly inspect the insides of his/her shoes (mean = 2.2 days).

**Discussion**

The number of individuals living with diabetes continues to rise nationally and worldwide. An extra educational intervention to help the patient manage his/her self-care activities with regards to diabetes is available, but it is underutilized. The 2017 National Standards for Diabetes Self-Management Education and Support state that a valid self-assessment tool can and should be used to guide the provider in referrals to and support of DSMES (Beck et al., 2018). Hence, the primary objective of this project was to increase referrals to DSMES services by through the use of the SDSCA. This objective was attained by having an increase in referrals from 0 (0%) to 6 patients (24%). The provider, whom was unaware of the
SDSCA questionnaire and DSMES, became aware and knowledgeable in both tools and the referral process.

Another objective of the project was to evaluate knowledge gaps with the assistance of the SDSCA. From the individuals that participated in the project, the questions that scored poorly were with regards to activity and shoe inspection. The finding of poor physical activity mean scores was consistent with studies conducted by Toobert, Hampson and Glasgow (2000), as well as in the study performed by Hernandez et al. (2014). Reviewing the poorly scored questions from the questionnaire showed the provider and the study coordinator lapse in knowledge and a chance to reinforce education.

One facilitating factor that affected the projects objectives was the provider of the practice. He was receptive to learning about the SDSCA questionnaire and was unaware of DSMES services and the underutilization of services. He was eager to assist the study coordinator to screen patients who fit within the inclusion criteria. Another facilitating factor was the eagerness of the participants to perform the SDSCA questionnaire, they wanted to see how well they were managing their diabetes at home based on the screening tool.

**Limitations**

One barrier of this project was time. The implementation period occurred over a 3 month period and the study coordinator was present at the office one day per week. The sampling was performed based off convenience sampling; therefore, some office days could have had more diabetic patients versus the days that the study coordinator was present. Due to this limitation, the goal of one hundred participants was not reached which in turn could have affected the results from this project.
One unintended consequence of this project was the age of screening. The age of 75 was determined as the cut-off age of this project due to the possibility of the patient not driving or being able to attend DSMES services or being of cognitively sound mind. A majority of the patients that present to this particular office are of a geriatric age-range, hence by increasing the screening to age 85 could have warranted more participants.

Another unintended consequence was the use of the 25-question SDSCA questionnaire. Feedback that was provided from participants was that the questionnaire was repetitive, such that, it asked the same question a different way in two places. Other patients declined participation because of the 25-questions and the lack of time he/she had for the appointment. Moving forward, the 11-question tool would be used or investigation into another diabetes self-care assessment tool. The last unintended consequence was the limited places that DSMES services are offered. In Union County, there are three locations for DSMES services, four of the patients stated that they would not attend services because of the physical location of the classes and/or the time the classes were offered was during his/her work schedule.

**Implication**

**Clinical Practice**

With regards to clinical practice, the implication was to utilize a diabetes self-care assessment tool to increase referrals to DSMES. The utilization of a standardized self-care assessment tool is not a standard of care in clinical practice for patients living with diabetes. The project showed that the use of the SDSCA questionnaire gave the provider another way to assess diabetic patients self-care behaviors, in turn demonstrating knowledge gaps in home management of diabetes.
The performance of this project made an impact on a single provider practice by increasing the number of referrals to DSMES services. This project provided information to the provider as to what DSMES services entailed and why it would be beneficial to the patients served. The services are available to all patients within the United States, yet they are not being utilized. Providers and/or patients might not be aware that these services are available. Providers need to be educated about how DSMES services assist patients and improve the overall quality of patient care when managing diabetes.

**Healthcare Policy**

The current standards of care for patients with Diabetes does not require healthcare professionals to utilize a screening tool to assess a patient’s self-care behaviors. There are a variety of self-care assessment tools available for providers to use, such as the Problem Areas in Diabetes (PAID), Diabetes Self-Efficacy, and the Self-Care Inventory-Revises (SCI-R) just to name a few (Beck et al, 2018). The SDSCA was chosen because it had the patient self-reflect on their behaviors over the past week to assess if they were following the recommended treatment plan. Many patients, especially diabetic patients, have multiple co-morbid conditions to manage in a twenty minute visit, having the patient complete a self-care assessment form prior to seeing the provider can assist the provider as to where the patient may be having difficulty at home and where further assistance may be warranted. Therefore, the use of a diabetes self-care assessment tool should be recommended as a valid way to assess self-care behaviors and to refer to appropriate services (DSMES). Utilizing self-care screening tools for referrals may be used as a quality metric in primary care with a purpose of quality improvement, benchmarking, accountability and pay for performance.
Education

This DNP project showed that education was lacking amongst the healthcare provider with regards to the SDSCA questionnaire and benefits of DSMES. The provider was educated on both topics with the use of the DNP candidates proposal. Prior to implementation, the retrospective chart review showed zero patients had been referred to DSMES services. After implementation there were 24% (n=6) of patients that were referred to DSMES services. Thus, there was an increase in knowledge from the provider in referring patients in need to DSMES.

DSMES services are nationally recommended for all patients living with diabetes, it is a covered service with most insurance plans, but it is under-utilized. Healthcare providers should be educated of the services that are offered through DSMES and presented with the many research studies that have demonstrated the positive effects of patients whom attended these services. If providers knew more of these services they could educate their patients on the purpose and benefits they could receive by attending DSMES.

The project also showed where patients were lacking in diabetic self-care knowledge and ability to attend DSMES. The SDSCA demonstrated that participants scored lower in self-care activities such as physical activity and shoe inspection. Of the 25 participants, 56% (n=14) of individuals stated that they did not inspect inside their shoes over a 7 day period, and patients didn’t know why they had to do so. This demonstrated a gap in knowledge with respect to diabetes and foot care and allowed the provider to re-educate the patient. Secondly, an inquiry was proposed if the participants had ever attended DSMES services; 64% (n=16) of participants had never attended DSMES services and were unsure of the purpose of the services. In having a provider who is aware of available services for diabetic patients it allows patients to know of services that they are entitled to through their insurance.
Quality & Safety

The implication of the SDSCA questionnaire and referrals to DSMES can help practice performance measures and increase compliance with treatment. For example, if the patient is able to seek more services to help control his/her diabetes this can help improve their health maintenance, which could increase compliance and reduce A1C values. Compliance with treatment regimen and reduction of A1C values of diabetic patients are two ways this practice measures performance improvement. Overall, improving patient’s self-care behaviors can help improve the patients control on their diabetes and in turn reduce the overall cost to care for diabetes.

Economic

The application of the SDSCA to this project was a relatively cheap process. Permission was obtained from the original author and the questionnaires were printed on paper for participants to answer. There was a slight increase in the patient’s appointment time to read, sign the consent, fill out the survey and discuss the answers with the patient and the provider. However, if this becomes a standard of practice, the medical assistants can provide the patient with the questionnaire as they sign in and it could be completed in the waiting room while waiting to be brought into the room; in turn reducing appointment time.

As mentioned previously, DSMES services are a covered service for patient with private insurance, Medicare or Medicaid. In conducting research with regards to diabetes self-care assessment tool, it does not directly state that a provider can bill for performance of the tool. However, according to Hughes (2017) assessment tools that inquire about behaviors that can have an effect on health can be billed under the CPT code 96160. The purpose for code 96160 is “Instrument-based assessment of the patient’s risk for certain health conditions, behaviors that
may negatively impact health, and pros and cons for initiating behavior change” (Hughes, 2017). Therefore, providers can receive some reimbursement by utilizing an assessment tool to focus on how the patients behaviors positively or negatively affect their health.

**Sustainability**

Due to the ease of screening patients with a self-care assessment tool, this project can be applied at any primary care practice to help assess diabetic patient’s self-care knowledge, make healthcare providers aware of the benefits and purpose of DSMES and increase referrals to DSMES. This project can also gain sustainability by partnering with diabetic educators providing DSMES services. Participants of this project stated that they would not attend DSMES services because the times were not effective with their work schedule. If the health care providers collaborated with diabetic educators at DSMES sites they can work together to provide the services that are recommended for all patients living with diabetes.

**Future Scholarship**

The completed project will be shared for others to view on the Rutgers University Repository. The goal is to publish the project findings in a journal such as *The Diabetic Educator* to share the results and for others to perform the same study and hopefully get a better outcome. Throughout research of this project only one article was found linking the use of the SDSCA with DSMES services. Hence, another goal would be for others to learn from this study and more research be conducted on how diabetes self-assessment tools increase referrals to DSMES.

**Summary**

Diabetes is a growing disease that is affecting millions of individuals worldwide and is one of the major causes of comorbid conditions. Support and services are available to help patients manage their self-care activities at home, however they are not being utilized. This
project provided education to a provider in a primary care practice site about the utilization of the SDSCA and the purpose and benefits of DSMES. The SDSCA demonstrated lapse in knowledge with regards to self-care of their diabetes, which justified a need for further education. Also, the patient’s answers from the SDSCA aided in referring patients to DSMES services. The primary objective of increasing referrals was achieved, the practice went from referring zero patients to DSMES prior to implementation of the SDSCA to referring 6 patients (24%), and this increase was statistically significant ($p = 0.014$). Future scholarly projects should determine whether implementing the SDSCA and referring to DSMES services improve clinically important outcomes, such as diabetes control, healthcare cost and quality of life of diabetic patients.
References


Ferguson, S., Swan, M., & Smaldone, A. (2015). Does diabetes self-management education in conjunction with primary care improve glycemic control in Hispanic patients?: A

https://doi.org/10.7547/15-07.


# Appendix A: Table of Evidence

## Table of Evidence

<table>
<thead>
<tr>
<th>Article Number</th>
<th>Author &amp; Date</th>
<th>Evidence Type</th>
<th>Sample &amp; Setting</th>
<th>Interventions &amp; Findings</th>
<th>Limitations</th>
<th>Evidence Level &amp; Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Beck, J., Greenwood, D., Blanton, L., Bollinger, S., Butcher, M., Condon, J., … Wang, J. (2017)</td>
<td>Literature Review</td>
<td>Review of literature related to DSMES to support that the National Standards are up to date with evidence-based practices. The 10 Standards were reviewed by interdisciplinary group members.</td>
<td>DSMES should be individualized to the patient. The patient should be at the center of the care team and assisted in problem solving skills to make adequate decisions regarding their overall health. Diabetes is hard work for the patient, the team should set goals and guide the patient towards techniques to manage their diabetes. Assessment and evaluation with valid tools can help support DSMES. Services should be expanded to other healthcare models. Providers of DSMES need to be aware of the surrounding</td>
<td>No limitations discussed in the article. This article guides practices towards what should be included in DSMES.</td>
<td>Level V High Quality</td>
</tr>
</tbody>
</table>
|  | Chrvala, C. A., Sherr, D., & Lipman, R. D. (2015) | Systematic Review of RCT | Participants included from the 120 studies included:  
- Intervention group (IG)—11,854  
- Control group (CG)—11,093  
Validity of selection was evaluated using the Cochrane Collaboration Criteria.  
Inclusion criteria:  
- RCT  
- Adults 18 years of age or older.  
- Diagnosis of type 1 or type 2 diabetes mellitus.  
- Documented A1C level.  
- With or without comorbid conditions.  
- Intervention with DSME services that met the requirements of the National | The mean reduction in A1C was higher in the IG at 0.74 versus the CG at 0.17.  
Participants who were involved in combination DSME had the largest change in A1C levels (85.71%), followed by group (65.71%), single provider (53.06%), and last remote (41.67%).  
Participants with a higher A1C level had a significant reduction when involved in DSME.  
Individuals that participated in DSME longer than 10 hours had significant reduction in A1C values.  
The amount of time an individual participated in DSME did not | Data abstraction was not blinded for participants, providers or assessors.  
The selected studies used different statistical methods to analyze the data.  
Various studies did not provide a description of the DSME intervention or population characteristics.  
A large amount of studies relied on volunteer participants, which restricts generalizability of the results. | Level I  
High Quality |
<table>
<thead>
<tr>
<th>Study</th>
<th>Methodology</th>
<th>Participants</th>
<th>Intervention</th>
<th>Control</th>
<th>Results</th>
<th>Limitations</th>
<th>Quality</th>
</tr>
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<tbody>
<tr>
<td>Cunningham, A. T., Crittendon, D. R., White, N., Mills, G. D., Diaz, V., &amp; LaNoue, M. D. (2018)</td>
<td>Systematic Review and Meta-Analysis</td>
<td>n = 14 studies (RCT, cluster RCT, and quasi-experimental studies) n = 1630 participants</td>
<td>DSME</td>
<td>‘usual care’</td>
<td>A1C was measured 3-12 months after intervention. The heterogeneity was high, $\chi^2 = 84.79$, ($p &lt; .001$), $I^2 = 92%$ ($n = 1630$). The mean attrition rate was 22.1%. The random-effects meta-analysis was performed on 8 of the 14 studies and found no statistical significance between the control group and the intervention group of their mean baseline A1C: 0.1% [95% CI -0.25 – 0.5%]. Only 4 studies measure quality of life with regards to diabetes.</td>
<td>Limited number of studies available with the inclusion criteria could have limited conclusions if DSME was effective for AA patients. There was a limited sample relating how DSME impacts quality of life.</td>
<td>Level I High Quality</td>
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<tr>
<td>Combination of services</td>
<td>The quality of the evidence was rated moderate.</td>
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**Studied measured A1C and quality of life.**

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<tr>
<td>n = 180 patients selected by simple random sampling; 90 patients in the control group and 90 patients in the intervention group.</td>
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<tr>
<td>Inclusion criteria:</td>
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<tr>
<td>- Member of Babol Diabetes Association</td>
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<tr>
<td>- Diagnosis of type 2 diabetes</td>
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<td>Setting: Iran</td>
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<tr>
<td>Administration of the Multidimensional Health Locus of Control (MHLC) and 11-item SDSCA was provided to both the control and intervention group.</td>
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<td>No age was specified for inclusion criteria, but population was adult patients, with the youngest being 35-years-old.</td>
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<td>The intervention group received three 60-minute educational sessions.</td>
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<td>The questionnaires were administered again 2-3 months after the intervention.</td>
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<td>Mean self-care scores increased in the educational intervention group and</td>
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<td>Self-reporting on the questionnaires was stated as a limitation, the authors recommended obtaining the answers to the questionnaires through an interview method.</td>
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<td>Level II, Good Quality</td>
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</table>
- n = 2976 participants; 2784 were Hispanic.

n = 11 included for Meta-Analysis
- n = 2616 Hispanic participants.

Cochrane Collaboration’s tool was used to screen RCT’s for bias and quality.

Inclusion criteria:
- Hispanic adults
- Use of DSME services within the community or primary care
- Participants needed to be followed up by primary care
| decreased in the control group.
Mean score of locus of control increased in the intervention group.
A majority of studies recruited patients from primary care facilities.
Baseline A1C values were between 7.4%-11.8%.
A1C was measured in all studies.
Seven studied found a statistically significant change in A1C after DSME intervention.
Attrition rate for 8 studies was <20%.
The random effects model for the intervention group showed pooled effects at -0.25 (95% CI, -0.42 to -0.07, P = .01) which was a great improvement of The review was limited to measure only one outcome which was A1C.
The follow up period for half of the studies was only 6 months, therefore they were unable to see if A1C diminished further over time.
Unable to declare the most appropriate DSME design due to heterogeneity of the studies.
<p>| Level I, High Quality |</p>
<table>
<thead>
<tr>
<th>Study</th>
<th>Authors</th>
<th>Study Design</th>
<th>Sample Size</th>
<th>Inclusion Criteria</th>
<th>Study Interventions</th>
<th>Findings</th>
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<tbody>
<tr>
<td>6</td>
<td>Formosa, C., &amp; Muscat, R. (2016)</td>
<td>Non-Experimental Prospective Study</td>
<td>n = 50</td>
<td>Age &gt; 18, Type 2 Diabetes, Independent with healthcare</td>
<td>The Diabetes Knowledge Questionnaire (DKQ-24) and SDSCA were read to the patient in a one to one interview. The topics of diet, exercise, foot care, medication, blood sugar testing and smoking of the SDSCA were asked. 16% of Maltese individuals stated they attended a diabetes education program.</td>
<td>Small sample size. Patients recruited for the study were unable to recall if they had diabetes education in primary care. Level III Good Quality</td>
</tr>
</tbody>
</table>
It was found that there was a lack of knowledge and a deficit in self-care practices. Also, there was no significant correlation between diabetic knowledge and self-care practices ($r = 0.190, P = .187$). There was no statistically significant correlation amongst the two variables.

Performance of the SDSCA was suboptimal, mean score 2.89/7.

Education level and age was significantly correlated to self-care ($r = 0.317, P = 0.025; P = 0.035$).

| 7 | Gildea, C. M., Lantaff, W. M., & Olenik, N. L. (2017) | Qualitative, semi-structured interviews and thematic analyses | n = 17 | Semi-structured interview was guided by the Barrier Assessment Tool (BAT). Patients were unaware of their targeted A1C goal. | This particular DSME site was run by a pharmacist and there was a lack of collaboration with referring providers. | Level III High Quality |
### DIABETES SELF-CARE ASSESSMENT

- **A1C 3 months after completing DSME that was greater than 6.5%**

  **Setting:** Diabetes center run by a pharmacist in Southern Indiana.

  **Outcome measure:** Barriers to attaining glycemic control after completing DSME program.

  Eighty-two percent of participants admitted to poor diet or physical inactivity, which impeded self-management.

  Time constraints and family activities prevented proper self-care behaviors.

  Participants stated nutritional counseling helped to control A1C.

  Eighty-two percent of participants who attended DSME stated it provided a foundation to help control their diabetes, 35% of participants stated follow-up education was necessary.

  Responses were subject to memory. Selection bias may have occurred because participants were recruited only if they had an A1C performed 3 months after completion of the DSME, patients who had serial A1C were not represented.

  May not have represented a low socioeconomic status.

  Ethnicity and A1C levels were not reported.

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<td>• Age greater than or equal to 18-years-old</td>
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<td>• Latino or African American</td>
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<td>• Fluent in English or Spanish</td>
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<td>53.2% African American (AA), 46.8% Latinos.</td>
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<td>Predominant lower socioeconomic status.</td>
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<td>AA were more likely to check their blood sugar,</td>
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<td>The cross-sectional design led to inability to define implications about causality. However, it can inform clinical practice.</td>
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<td>Level III Good Quality</td>
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<td>Inclusion Criteria</td>
<td>Exclusion Criteria</td>
<td>Setting</td>
<td>Study Type</td>
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<td>At least 2 chronic diseases</td>
<td>Comorbid or mental health conditions or serious complications of diabetes</td>
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<td>Unavailability by phone</td>
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<td>&lt;18 years of age</td>
<td>Emergency cases</td>
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Patients were selected by their primary care provider and randomly assigned.

German and tested for validity. The Cronbach’s alpha was $\alpha = 0.618$.

Checking blood sugar performed best ($\alpha = 0.947$), followed by foot care ($\alpha = 0.607$). Diet and exercise performance were poor at ($\alpha = 0.566$, and $\alpha = 0.498$).

A Confirmatory factor analysis (CFA) was performed when item 4 of the SDSCA-G was included it demonstrated low factor loading, removing the item improved the $\chi^2$ of the model from 47.997, degrees of freedom were 29 and $p = 0.015$ to 29.895, degrees of freedom were 21, and $p = 0.095$.

The German SDSCA proved to be valid, reliable and adequate.

There was no retest due to the cross-sectional design.

n = 7 studies where the SDSCA were used; 5 were randomized intervention studies and 2 were observational.  

All participants were adults and had type 1 or type 2 diabetes.  

3 studies were convenience samples, 4 studies participants were drawn from a lists of primary care patients. | psychometric properties.  

Removing item-4 from analysis increased the alpha coefficient. | Of the studies reviewed, data was lacking from ethnic minority participants.  

Participants were typically older and with type 2 diabetes.  

The diet subscale was the least reliable of the subscales, because a component of a healthy diet are not highly associated.  

Weakened analysis due to inconsistent use of subscale of the SDSCA with the 7 studies. | Level V, High Quality |
reliability, it is valid and sensitive to change.
Appendix B: Conceptual Framework

The Chronic Care Model

Community
Resources and Policies
Self-Management Support

Health Systems
Organization of Health Care
Delivery System Design
Decision Support
Clinical Information Systems

Informed, Activated Patient
Productive Interactions
Prepared, Proactive Practice Team

Improved Outcomes

Developed by The MacColl Institute
© ACP-ASIM Journals and Books
Invitation to Participate in a Research Study:

Applying the Summary of Diabetes Self-Care Activities Assessment Tool to Improve the Referral Process for Diabetes Self-Management Education and Support Services

How well do you think you are monitoring your diabetes?

**Purpose:** Diabetes is a chronic condition that affects 30.3 million Americans and is the 7th leading cause of death in the United States (Centers for Disease Control and Prevention, 2018). It is a disease of self-management that involves the individual to change his/her diet, physical activity, smoking, foot care, and blood sugar monitoring.

**Description:** This research study aims at using a valid diabetes self-care assessment questionnaire to evaluate an individual’s self-management of the his/her diabetes. The results of the questionnaire will be reviewed, and the participant may be referred to a supportive program called Diabetes Self-Management Education and Support.

The 25-question Summary of Diabetes Self-Care Activities questionnaire should take you about 5-10 minutes to complete. Your answers will be reviewed and discussed prior to your appointment with Dr. [Redacted].

**Location:** The office of Dr. [Redacted]

**Criteria:** Participants should be male or female; 2) between the ages of 18-75 years of age; 3) diagnosed with diabetes mellitus, type 1 or type 2 and currently undergoing treatment; 4) able to understand the English language; 5) be cognitively intact (without dementia or cognitive impairment). Individuals under the age of 18 or over the age of 75, do not have a diagnosis of diabetes, not currently being treated for their diabetes, or unable to understand the English language will be excluded from the study.

**Benefits:** The benefits of taking part in this study may include increased self-awareness of tasks that are part of diabetic management and a referral to Diabetic Self-Management Education and Support services to provide you with more education and support to manage your diabetes.

**Risks:** There are no anticipated risks of participating in the research study. The questionnaire will be provided on the day of your appointment and reviewed with you that day, it is possible you may have a slight increase in your appointment time.

Please contact for any questions:
Principal Investigator: Cara Padoano, DNP, APN
Study Coordinator: Holly Gonzalez, BSN, RN

Version #4, August 21, 2019
Appendix D: Informed Consent

RUTGERS
School of Nursing

CONSENT TO TAKE PART IN A RESEARCH STUDY

TITLE OF STUDY: Applying the Summary of Diabetes Self-Care Activities (SDSCA) Assessment Tool to Improve the Referral Process for Diabetes Self-Management Education and Support (DSMES) Services

Principal Investigator: Cara Padovano, DNP, APN
Study Coordinator: Holly Gonzalez, BSN, RN

STUDY SUMMARY: This consent form is part of an informed consent process for a research study and it will provide information that will help you decide whether you want to take part in this study. It is your choice to take part or not. The purpose of the research is to: evaluate your self-management of diabetes by using a valid questionnaire, based off your answers you may be referred to Diabetes Self-Management Education and Support services. If you take part in the research, you will be asked to fill out a demographic survey and the Summary of Diabetes Self-Care Activities (SDSCA) questionnaire. Your results will be scored and discussed with you and Dr. [redacted]. Your time in the study will take approximately 5-10 minutes to complete the survey. There are no anticipated risks in this study, however it may require a minor increase in your appointment time to discuss results. Possible benefits of taking part in this study may include an increased self-awareness of tasks that are part of diabetic management and a referral to Diabetic Self-Management Education and Support services to provide you with more education and support to manage your diabetes. Your alternative to taking part in the research study is to not take part in it.

The information in this consent form will provide more details about the research study and what will be asked of you if you choose to take part in it. If you have any questions now or during the study, if you choose to take part, you should feel free to ask them and should expect to be given answers you completely understand. After all of your questions have been answered and you wish to take part in the research study, you will be asked to sign this consent form. You are not giving up any of your legal rights by agreeing to take part in this research or by signing this consent form.

Who is conducting this research study?
Cara Padovano is the Principal Investigator of this research study. A Principal Investigator has the overall responsibility for the conduct of the research. However, there are often other individuals who are part of the research team, such as the study coordinator, Holly Gonzalez.

Cara Padovano may be reached at [redacted], while Holly Gonzalez may be reached at [redacted].

The Principal Investigator or another member of the study team will also be asked to sign this informed consent. You will be given a copy of the signed consent form to keep.
Sponsor of the study: Rutgers University

**Why is this study being done?**
The goal of the study is to evaluate diabetic patient’s self-care activities using a valid diabetic screening tool and referring patients to Diabetes Self-Management Education and Support Services based off the answers to the screening tool to improve management of his/her diabetes.

**Who may take part in this study and who may not?**
Participants should be male or female; 2) between the ages of 18-75 years of age; 3) diagnosed with diabetes mellitus, type 1 or type 2 and currently undergoing treatment; 4) able to understand the English language; 5) be cognitively intact, without dementia or cognitive impairment.
Individuals under the age of 18 or over the age of 75, do not have a diagnosis of diabetes, not currently being treated for their diabetes, or unable to understand the English language will be excluded from the study.

**Why have I been asked to take part in this study?**
You have been asked to participate in this study to help use a screening tool to see how you are managing your diabetes and to see where there may be gaps in knowledge with your home management. You may qualify for services to help you learn to live with your diabetes.

**How long will the study take and how many subjects will take part?**
The survey and questionnaire may take you 5-10 minutes to complete, the results of the questionnaire will be reviewed by the study coordinator and Dr. and discussed with you during your appointment. Therefore, you may have a minor increase in your appointment time. Fifty participants are anticipated to be included in this study.

**What will I be asked to do if I take part in this study?**
Participant’s medical records will be reviewed to check if the individual has previously attended or been referred to Diabetic Self-Management Education Services. Next, the participant will be asked to complete a 6-question demographic survey, followed by a 25-question Diabetes Self-Care Activities Questionnaire which will ask you questions with regards to your diet, physical activity, blood sugar monitoring, foot care, and smoking status. Your results of the Diabetes Self-Care Activities Questionnaire will be reviewed and discussed with you by the private investigator and Dr.  .

**What are the risks and/or discomforts I might experience if I take part in this study?**
There are no anticipated risks of participating in the study. There may be a minimal increase to your appointment time to review the results of the questionnaire with you. The survey nor the questionnaire will not be asking for any identifiable data, such as your name or date of birth, to protect your privacy.

**Are there any benefits to me if I choose to take part in this study?**
The benefits of taking part in this study may include an increased self-awareness of tasks that are part of diabetic management and a referral to Diabetic Self-Management Education and Support services to provide you with more education and support to manage your diabetes. However, it is possible that you may not receive any direct benefit from taking part in this study.
What are my alternatives if I do not want to take part in this study?
There are no alternative treatments available. Your alternative is to not take part in this study.

How will I know if new information is learned that may affect whether I am willing to stay in the study?
During the course of the study, you will be updated about any new information that may affect whether you are willing to continue taking part in the study. If new information is learned that may affect you after the study or your follow-up is completed, you will be contacted.

Will I receive the results of the research?
You will receive the results of your questionnaire after you complete it and it will be reviewed with you during your scheduled appointment.

Will there be any cost to me to take part in this study?
There is no costs for you to participate in the study.

Will I be paid to take part in this study?
You will not be paid to take part in the study.

Who might benefit financially from this research?
There is no financial benefit for any of the parties involved in this research study.

How will information about me be kept private or confidential?
All efforts will be made to keep your personal information in your research record confidential, but total confidentiality cannot be guaranteed. This study will not be collecting any personal identifiable information, instead all surveys will be numbered to protect anonymity. The signed consents will be maintained at Rutgers University and research records will be maintained at Rutgers University for 6 years after the study has been closed.

What will happen to my information or biospecimens collected for this research after the study is over?
The information that you have provided will not be used or distributed for any other research and will be maintained at Rutgers University for 6 years after the study has been closed.

What will happen if I do not wish to take part in the study or if I later decide not to stay in the study?
It is your choice whether to take part in the research. You may choose to take part, not to take part or you may change your mind and withdraw from the study at any time.

If you do not want to enter the study or decide to stop taking part, your relationship with Dr. Khimani's office will not change, and you may do so without penalty and without loss of benefits to which you are otherwise entitled.

Who can I call if I have questions?
If you have questions about taking part in this study you can call the study coordinator: Holly Gonzalez BSN, RN at [redacted], or the Principal Investigator, Cara Padovano, DNP, APN at [redacted].

If you have questions about your rights as a research subject, you can call the IRB Director at: Newark HealthSci (973)-972-3608 or the Rutgers Human Subjects Protection Program at (973) 972-1149.

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**PERMISSION (Authorization) TO USE OR SHARE HEALTH INFORMATION THAT IDENTIFIES YOU FOR A RESEARCH STUDY**

The next few paragraphs tell you about how investigators want to use and share identifiable health information from your medical record in this research. Your information will only be used as described here or as allowed or required by law. If you sign this consent form, you agree to let the investigators use your identifiable health information in the research and share it with others as described below. Ask questions if there is something you do not understand.

**What is the purpose of the research and how will my information be used?**
You are being invited to take part in this research study which is described at the beginning of this form. The purpose of collecting and using your health information for this study is to help investigators answer the questions that are being asked in the research.

**What information about me will be used?**
The information that will be reviewed is if you have ever been referred to Diabetes Self-Management and Support Services in the past.

**Who may use, share or receive my information?**
The Principal Investigator nor study coordinator will not share this information with any other research or institutions.

Those persons or organizations that receive your information may not be required by Federal privacy laws to protect it and may share your information with others without your permission, if permitted by the laws governing them.

**Will I be able to review my research record while the research is ongoing?**
No. We are not able to share information in the research records with you until the study is over. To ask for this information, please contact the Principal Investigator, the person in charge of this research study.

**Do I have to give my permission?**
No. You do not have to permit use of your information. But, if you do not give permission, you cannot take part in this study. (Saying no does not stop you from getting medical care or other benefits you are eligible for outside of this study.)

**If I say yes now, can I change my mind and take away my permission later?**
Yes. You may change your mind and not allow the continued use of your information (and to stop taking part in the study) at any time. If you take away permission, your information will no longer be used or shared in the study, but we will not be able to take back information that has already been used or shared with others. If you say yes now but change your mind later for use of your information in the research, you must call the researcher and tell her of your decision: Holly Gonzalez BSN, RN at [redacted]

How long will my permission last?
Your permission for the use and sharing of your health information will last until December 13, 2019.

---

**AGREEMENT TO PARTICIPATE**

1. **Subject consent:**

I have read this entire consent form, or it has been read to me, and I believe that I understand what has been discussed. All of my questions about this form and this study have been answered. I agree to take part in this study.

Subject Name: ______________________________________________________

Subject Signature: ___________________________ Date: ______________

2. **Signature of Investigator/Individual Obtaining Consent:**

To the best of my ability, I have explained and discussed all the important details about the study including all of the information contained in this consent form.

Investigator/Person Obtaining Consent (printed name): __________________________

Signature: ___________________________ Date: ______________
Appendix E: Demographic Survey

Diabetes Self-Care Demographic Survey

Please answer the following by checking the lines, please do not put your name:

Gender

Male ___________ Female ___________

Age

18-25 years old ___________  46-55 years old ___________
26-35 years old ___________  56-65 years old ___________
36-45 years old ___________  66-75 years old ___________

Race

White ___________ Asian ___________
African American ___________ Native American or American Indian ___________
Hispanic ___________ Other ___________

Highest Level of Educational Achievement

Less than high school ___________ Bachelor’s degree ___________
High school ___________ Master’s degree or higher ___________

How long have you been living with Diabetes?

Less than 1 year ___________  5-10 years ___________
1-5 years ___________ Greater than 10 years ___________

Have you ever attended a Diabetes Self-Management Education/Support class?

Yes ___________ No ___________
Appendix F: Summary of Diabetes Self-Care Activities Questionnaire

Summary of Diabetes Self-Care Activities Questionnaire

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**

<table>
<thead>
<tr>
<th>Number of Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
</tr>
</tbody>
</table>

1. How many of the last SEVEN DAYS have you followed a healthful eating plan?

2. On average, over the past month, how many DAYS PER WEEK have you followed your eating plan?

3. On how many of the last SEVEN DAYS did you eat five or more servings of fruits and vegetables?

4. On how many of the last SEVEN DAYS did you eat high-fat foods, such as red meat or full-fat dairy products?

**Physical Activity**

5. 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).*

6. 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?
Blood Sugar Testing

7. On how many of the last SEVEN DAYS did you test your blood sugar?  
   Number of Days: 0 1 2 3 4 5 6 7

8. On how many of the last SEVEN DAYS did you test your blood sugar the number of times recommended by your health-care provider?  
   Number of Days: 0 1 2 3 4 5 6 7

Foot Care

9. On how many of the last SEVEN DAYS did you check your feet?  
   Number of Days: 0 1 2 3 4 5 6 7

10. On how many of the last SEVEN DAYS did you inspect the inside of your shoes?  
    Number of Days: 0 1 2 3 4 5 6 7

Smoking

11. Have you smoked a cigarette, even a puff, in the past SEVEN DAYS?  
    Number of Days: 0 No 1 Yes  

11a. How many cigarettes did you smoke on an average day?  
    Number of cigarettes: _____
Additional Items for the Expanded Version of the Summary of Diabetes Self-Care Activities

Self-Care Recommendations

1A. Which of the following has your health-care team (doctor, nurse, dietitian, or diabetes educator) advised you to do? Please check all that apply.

a  Follow a low-fat eating plan
b  Follow a complex carbohydrate diet
c  Reduce the number of calories you eat to lose weight
d  Eat lots of food high in dietary fiber
e  Eat lots (at least 5 servings per day) of fruits and vegetables
f  Eat very few sweets (for example, desserts, non-diet sodas, candy bars)
g  Other (specify: ______________________________________________________)
h  I have not been given any advice about my diet by my health-care team

2A. Which of the following has your health-care team (doctor, nurse, dietitian, or diabetes educator) advised you to do? Please check all that apply.

a  Get low level exercise (such as walking) on a daily basis
b  Exercise continuously for a least 20 minutes at least 3 times a week
c  Fit exercise into your daily routine (for example, take stairs instead of elevators, park a block away and walk, etc.)
d  Engage in a specific amount, type, duration, and level of exercise
e  Other (specify: ______________________________________________________)
f  I have not been given any advice about exercise by my health-care team
3A. Which of the following has your health-care team (doctor, nurse, dietitian, or diabetes educator) advised you to do? *Please check all that apply.*

- a Test your blood sugar using a drop of blood from your finger and a color chart
- b Test your blood sugar using a machine to read the results
- c Test your urine for sugar
- d Other (*specify: ____________________________________________*)
- e I have not been given any advice about my blood or urine sugar level by my health-care team

4A. Which of the following medications for your diabetes has your doctor prescribed? *Please check all that apply.*

- a An insulin shot 1 or 2 times a day
- b An insulin shot 3 or more times a day
- c Diabetes pills to control my blood sugar level
- d Other (*specify: ____________________________________________*)
- e I have not been prescribed either insulin or pills for my diabetes

**Diet**

5A. On how many of the last SEVEN DAYS did you space carbohydrates evenly through the day?

0 1 2 3 4 5 6 7

**Medications**

6A. On how many of the last SEVEN DAYS, did you take your recommended diabetes medication?

0 1 2 3 4 5 6 7
OR

7A. On how many of the last SEVEN DAYS did you take your recommended insulin injections?

0 1 2 3 4 5 6 7

8A. On how many of the last SEVEN DAYS did you take your recommended number of diabetes pills?

0 1 2 3 4 5 6 7

Foot Care

9A. On how many of the last SEVEN DAYS did you wash your feet?

0 1 2 3 4 5 6 7

10A. On how many of the last SEVEN DAYS did you soak your feet?

0 1 2 3 4 5 6 7

11A. On how many of the last SEVEN DAYS did you dry between your toes after washing?

0 1 2 3 4 5 6 7

Smoking

12A. At your last doctor’s visit, did anyone ask about your smoking status?

0 No 1 Yes

13A. If you smoke, at your last doctor’s visit, did anyone counsel you about stopping smoking or offer to refer you to a stop-smoking program?
0 No       1 Yes       2 Do not smoke

14A. When did you last smoke a cigarette?

  a  More than two years ago, or never smoked
  b  One to two years ago
  c  Four to twelve months ago
  d  One to three months ago
  e  Within the last month
  f  Today
Permission to use the Summary of Diabetes Self-Care Questionnaire in your research

Tue, Mar 12, 2019 at 2:45 PM

Dear Holly,

Thank you for your payment of [redacted] for permission to use the Summary of Diabetes Self-Care Activities (SDSCA) in your study. Now that we have received your payment, you have our permission to use the English version of the Summary of Diabetes Self-Care Activities Questionnaire in your research project and we will be able to provide answers to any questions you may have. We have attached the 2000 Diabetes Care article with the SDSCA psychometric information. At the end of the article, there is an appendix with the English version of the questionnaire, and the scoring information. We have also attached a user-friendly copy of the English version of the SDSCA instrument.

If you need a translation of the SDSCA please contact me first, as the SDSCA has been translated into many languages.

Please be sure to check our website first for the most frequently asked questions:

http://www.orl.org/sdsc

We wish you every success with your research,
Appendix H: SDSCA Scoring

Scoring Instructions for the Summary of Diabetes Self-Care Activities

Scores are calculated for each of the five regimen areas assessed by the SDSCA: Diet, Exercise, Blood-Glucose Testing, Foot Care, and Smoking Status.

Step 1
For items 1–10, use the number of days per week on a scale of 0–7. Note that this response scale will not allow for direct comparison with the percentages provided in Table 1.

Step 2: Scoring Scales

General Diet = Mean number of days for items 1 and 2.

Specific Diet = Mean number of days for items 3 and 4, reversing item 4 (0=7, 1=6, 2=5, 3=4, 4=3, 5=2, 6=1, 7=0). Given the low inter-item correlations for this scale, using the individual items is recommended.

Exercise = Mean number of days for items 5 and 6.

Blood-Glucose Testing = Mean number of days for items 7 and 8.

Foot Care = Mean number of days for items 9 and 10.

Smoking Status = Item 11 (0 = nonsmoker, 1 = smoker) and number of cigarettes smoked per day.

Scoring for Additional Items

Recommended Regimen = Items 1A–4A and items 12A–14A, no scoring required.

Diet = Use total number of days for item 5A.

Medications = Use item 6A OR 7A AND 8A. Use total number of days for item 6A; use mean number of days if both 7A and 8A are applicable.

Foot Care = Mean number of days for items 9A–11A, after reversing 10A and including items 9 and 10 from the brief version.
Diabetes Self-Management Education/Training (DSME/T)

- Initial group DSME/T
- Follow-up DSME/T
- Telehealth

Patients with special needs requiring individual (1-on-1) DSME/T

- Vision
- Cognitive Impairment
- Additional training
- Telehealth

DSME/T Content
- Monitoring diabetes
- Psychological adjustment
- Nutritional management
- Medications
- Preconception/pre-pregnancy management or SMO
- Prevent; detect and treat chronic complications

Medical Nutrition Therapy (MNT)

- Initial MNT
- Annual follow-up MNT
- Telehealth

Additional hrs. requested __________________

Please specify change in medical condition, treatment and/or diagnosis:

- Medicare coverage: 3 hrs Initial MNT in the first calendar year, plus 2 hrs follow-up MNT annually. Additional MNT hours available for change in medical condition, treatment and/or diagnosis.

Definition of Diabetes (Medicare)

Medicare coverage of DSMT and MNT requires the physician to provide documentation of a diagnosis of diabetes based on one of the following:

- A fasting blood sugar greater than or equal to 126 mg/dL on two different occasions;
- An 2 hour post-glucose challenge greater than or equal to 200 mg/dL on two different occasions; or
- A random glucose test over 200 mg/dL for a person with symptoms of uncontrolled diabetes.


Other payers may have other coverage requirements.
### Characteristics of Participants

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Frequency, % (total, N = 25)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>60% (15)</td>
</tr>
<tr>
<td>Female</td>
<td>40% (10)</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
</tr>
<tr>
<td>18-25</td>
<td>0 % (0)</td>
</tr>
<tr>
<td>25-35</td>
<td>0 % (0)</td>
</tr>
<tr>
<td>36-45</td>
<td>0 % (0)</td>
</tr>
<tr>
<td>46-55</td>
<td>24 % (6)</td>
</tr>
<tr>
<td>56-65</td>
<td>32 % (8)</td>
</tr>
<tr>
<td>66-75</td>
<td>44 % (11)</td>
</tr>
<tr>
<td><strong>Race</strong></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>56% (14)</td>
</tr>
<tr>
<td>African American</td>
<td>12 % (3)</td>
</tr>
<tr>
<td>Hispanic</td>
<td>16 % (4)</td>
</tr>
<tr>
<td>Asian</td>
<td>12 % (3)</td>
</tr>
<tr>
<td>Native American/American Indian</td>
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<tr>
<td>Other</td>
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</tr>
<tr>
<td><strong>Education</strong></td>
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</tr>
<tr>
<td>Less than High School</td>
<td>4 % (1)</td>
</tr>
<tr>
<td>High School</td>
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</tr>
<tr>
<td>Bachelor’s Degree</td>
<td>36% (9)</td>
</tr>
<tr>
<td>Master’s Degree of Higher</td>
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</tr>
<tr>
<td><strong>Living with Diabetes</strong></td>
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<tr>
<td>Less than 1 year</td>
<td>8 % (2)</td>
</tr>
<tr>
<td>1-5 years</td>
<td>32% (8)</td>
</tr>
<tr>
<td>5-10 years</td>
<td>16% (4)</td>
</tr>
<tr>
<td>Greater than 10 years</td>
<td>44 % (11)</td>
</tr>
</tbody>
</table>
## Appendix K

### Table 3

*Referrals to DSMES Before and After Implementing SDSCA Questionnaire*

<table>
<thead>
<tr>
<th>Referral</th>
<th>Frequency, % (total, N=25)</th>
<th>p-value (Wilcoxon Signed Rank Sum Test)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-SDSCA Questionnaire</td>
<td>0% (0/25)</td>
<td>0.014</td>
</tr>
<tr>
<td>Post-SDSCA Questionnaire</td>
<td>24% (6/25)</td>
<td></td>
</tr>
</tbody>
</table>

Note: Assume p < 0.05
Appendix L

Table 4

Descriptive Statistics from SDSCA

<table>
<thead>
<tr>
<th>Descriptive Statistics</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diet-#1, Days followed a healthful eating plan</td>
<td>25</td>
<td>5.3600</td>
<td>1.70489</td>
</tr>
<tr>
<td>Diet-#2, Days per week followed eating plan</td>
<td>25</td>
<td>5.3600</td>
<td>1.62993</td>
</tr>
<tr>
<td>Diet-#3, Days eating 5 or more fruits and vegetables</td>
<td>25</td>
<td>4.7200</td>
<td>2.66958</td>
</tr>
<tr>
<td>Diet-#4, Days eating high fat foods</td>
<td>25</td>
<td>4.2000</td>
<td>2.12132</td>
</tr>
<tr>
<td>Activity-#5, Days 30 minutes of physical activity</td>
<td>25</td>
<td>4.3200</td>
<td>2.32236</td>
</tr>
<tr>
<td>Activity-#6, Days specific activity</td>
<td>25</td>
<td>3.3200</td>
<td>2.47857</td>
</tr>
<tr>
<td>Blood sugar-#7, Days checking blood sugar</td>
<td>25</td>
<td>3.3200</td>
<td>3.38772</td>
</tr>
<tr>
<td>Blood sugar-#8, Days checking blood sugar recommended by provider</td>
<td>25</td>
<td>2.7600</td>
<td>3.11288</td>
</tr>
<tr>
<td>Foot care-#9, Check your feet</td>
<td>25</td>
<td>5.8800</td>
<td>2.00666</td>
</tr>
<tr>
<td>Foot care-#10, check inside shoes</td>
<td>25</td>
<td>2.2000</td>
<td>2.85774</td>
</tr>
<tr>
<td>5A-Space carbohydrates evenly through day</td>
<td>25</td>
<td>3.5200</td>
<td>2.64764</td>
</tr>
<tr>
<td>6A-Number of days took diabetes medications</td>
<td>25</td>
<td>6.9600</td>
<td>.20000</td>
</tr>
<tr>
<td>7A-Number of days took insulin</td>
<td>25</td>
<td>.8800</td>
<td>2.31517</td>
</tr>
<tr>
<td>8A-Number of days took diabetes pills</td>
<td>25</td>
<td>6.9600</td>
<td>.20000</td>
</tr>
<tr>
<td>Question</td>
<td>Description</td>
<td>N</td>
<td>Mean</td>
</tr>
<tr>
<td>----------</td>
<td>------------------------------</td>
<td>----</td>
<td>-------</td>
</tr>
<tr>
<td>9A</td>
<td>Number of days wash feet</td>
<td>25</td>
<td>6.9200</td>
</tr>
<tr>
<td>Q10A</td>
<td>Number of days soak feet</td>
<td>25</td>
<td>1.5200</td>
</tr>
<tr>
<td>Q11A</td>
<td>Number of days dry between toes</td>
<td>25</td>
<td>6.3600</td>
</tr>
<tr>
<td>Valid N</td>
<td>(listwise)</td>
<td></td>
<td>25</td>
</tr>
</tbody>
</table>