



SB 972

DIABETES SELF-MANAGEMENT TRAINING REPORT

Oklahoma **HealthCare** Authority

4345 N. Lincoln Blvd., OKC | 800-987-7767 | okhca.org |    

SB 972 Diabetes Self-Management Training

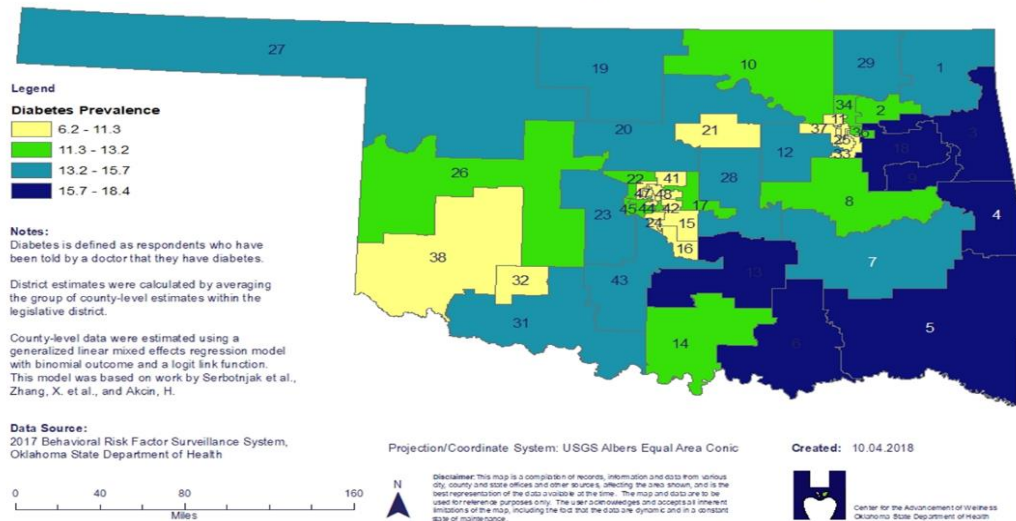
Introduction

Diabetes is a chronic disease that affects how the body turns food into energy. When food is eaten, most of it is broken down into sugar (also called glucose) and released into the bloodstream. The pancreas makes a hormone called insulin, which acts like a key to let the blood sugar into the body's cells for use as energy.

When a person develops diabetes, their body either doesn't make enough insulin or can't use the insulin it makes as well as it should. When there isn't enough insulin or cells stop responding to insulin, too much blood sugar stays in the bloodstream, which over time can cause serious health problems, such as heart disease, vision loss, and kidney disease.

Diabetes is a serious public health concern in the United States. In 2015, it was the seventh leading cause of death in the United States.¹ The risk of death for people diagnosed with diabetes is two times that of a similar aged person who does not have the disease. According to the American Diabetes Association (ADA), nearly 26 million adults and children have the disease. The Centers for Disease Control (CDC) reports 440,000 (11.7%) Oklahomans have a diabetes diagnosis. An additional 79 million people have pre-diabetes, which includes 1,036,000 Oklahomans. Nine out of 10 people do not know they are pre-diabetic, which places them at increased risk for converting from a pre-disease state to full blown type 2 diabetes. The CDC reports from 1980 through 2011, the number of Americans diagnosed with diabetes has more than tripled from 5.6 million to 20.9 million. Diabetes is seven times more prevalent in people ages 65 years and older compared to those in the 20-44 age group.²

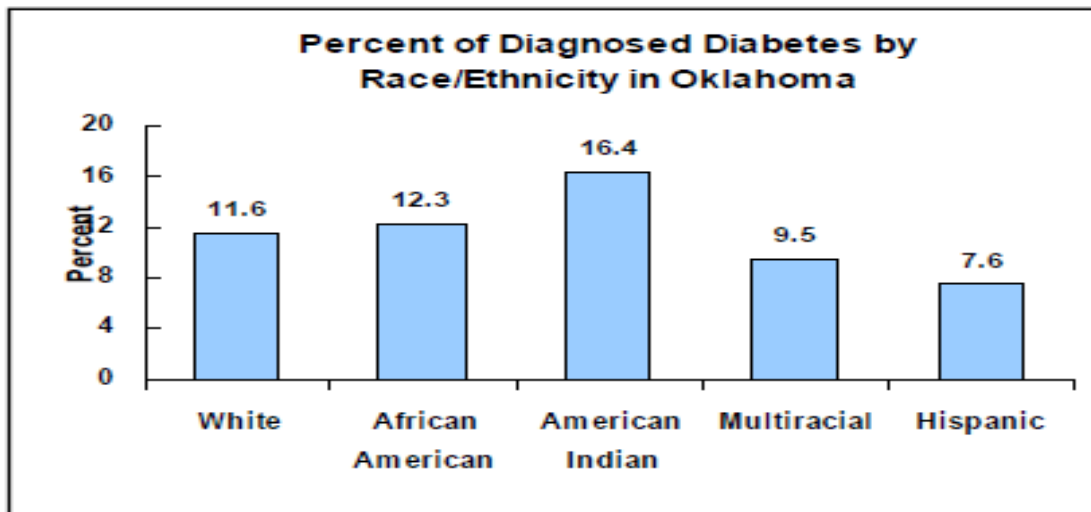
Oklahoma Diabetes Prevalence by Senate District, 2017



¹ Centers for Disease Control and Prevention. About Underlying Cause of Death 1999–2015. CDC WONDER Database. <http://wonder.cdc.gov/ucd-icd10.html>. Updated December 2016. Accessed April 4, 2017.

² www.cdc.gov/diabetes/data

People of certain races and ethnicities experience higher rates of the disease. Specifically, Hispanic Americans, non-Hispanic Blacks, Asian Americans, Native Americans and Alaskan Natives experience higher rates of diabetes. According to the U.S. Office of Minority Health, African Americans are two times more likely to have a diagnosis of diabetes compared to non-Hispanic Whites. As of 2010, 13.2% of the Hispanic population has diabetes. Diabetes is the fifth leading cause of death among the Asian American and Pacific Islander population. People within these minority groups are more likely to be diagnosed with diabetes at a younger age compared to non-Hispanic whites, resulting in the prevalence of diabetes-related complications earlier in life. Age-adjusted prevalence rates for diagnosed diabetes have consistently been higher among African Americans and Hispanics compared with whites. African-American women have the highest prevalence of diabetes compared with other racial or ethnic and gender groups. In 2005, the age-adjusted prevalence rate for diagnosed diabetes was 8.3% in African-American women compared with 8.0% in African-American men, 7.5% in Hispanic women, 7.1% in Hispanic men, 4.7% in white women, and 5.4% in white men.³ The number of individuals with diagnosed diabetes is estimated to triple by the year 2050.⁴ Estimates show that 3.2 million African Americans currently have diabetes.⁵ The number of African Americans with diabetes is projected to triple by the year 2050, but the number of whites with diabetes is estimated to only double.⁶



Overview

There are three main types of diabetes: type 1, type 2, and gestational diabetes (diabetes while pregnant)

Type 1 (5-10%)
Type 2 (90-95%)
Gestational (2-10% pregnancies)

³ Centers for Disease Control and Prevention. (2013, January 11). *Leading Causes of Death*. Retrieved from <http://www.cdc.gov/nchs/fastats/lcod.htm>

⁴ Centers for Disease Control and Prevention. (2013, January 11). *Leading Causes of Death*. Retrieved from <http://www.cdc.gov/nchs/fastats/lcod.htm>

⁵ www.cdc.gov/diabetes/data

⁶ Zimmet P, Alberti KG, Shaw J. Global and societal implications of the diabetes epidemic. *Nature*. 2001;414:782-787. [PubMed]

Type 1 diabetes is caused by an autoimmune reaction that stops the body from making insulin. In other words, the body attacks itself by mistake. About 5% of the people who have diabetes have type 1. Symptoms of type 1 diabetes often develop quickly. It's usually diagnosed in children, teens, and young adults. Persons with type 1 diabetes need to take insulin every day to survive. Currently, no one knows how to prevent type 1 diabetes.

With type 2 diabetes, the body doesn't use insulin well and is unable to keep blood sugar at normal levels. Nine out of 10 people have type 2 diabetes. It develops over many years and is usually diagnosed in adults (though increasingly in children, teens, and young adults). The person with diabetes may not notice any symptoms, which is why it's important to get blood sugar tested, even for persons not at risk. Type 2 diabetes can be prevented or delayed with healthy lifestyle changes. For example, losing weight (if overweight), healthy eating, and getting regular physical activity.

Gestational diabetes develops in pregnant women who have never had diabetes. Their babies are at higher risk for health complications. Gestational diabetes usually goes away after the baby is born but increases the woman's risk for type 2 diabetes later in life. The baby is more likely to become obese as a child or teen, and more likely to develop type 2 diabetes later in life.

Gestational diabetes is a severe and neglected threat to maternal and child health. Every year in the United States, 2% to 10% of pregnancies are affected by gestational diabetes. Managing gestational diabetes will ensure a healthy pregnancy and a healthy baby.

During pregnancy, the body produces additional hormones and goes through other physical changes, such as weight gain. These changes cause the body's cells to use insulin less effectively, a condition called insulin resistance. Insulin resistance increases the body's need for insulin. All pregnant women have some insulin resistance during late pregnancy. However, some women have insulin resistance even before they get pregnant. They start pregnancy with an increased need for insulin and are more likely to have gestational diabetes.

Many women with gestational diabetes experience pregnancy-related complications including high blood pressure, large birth weight babies and obstructed labor. Approximately half of women with a history of gestational diabetes, develop type 2 diabetes within five to ten years after delivery.

Gestational diabetes increases rapidly with maternal age and is highest in women over the age of 45. In 2017⁷:

- An estimated 1.3 million **women of reproductive age in the U.S. have diabetes**⁸ ;
- GDM is estimated to affect 1% to 14% of pregnancies in the **United States** annually⁹,

It is important for women with gestational diabetes to control and monitor their blood glucose levels to reduce the risk of adverse pregnancy outcomes and avoid long-term consequences for themselves and their babies, and transgenerational effects (higher risk of obesity, diabetes, hypertension and kidney disease in offspring).

⁷ International Diabetes Federation. IDF Diabetes Atlas, 8th ed. Brussels, Belgium: International Diabetes Federation, 2017

⁸ <https://diabetessisters.org/women-diabetes>

⁹ https://www.cdc.gov/pcd/issues/2014/13_0415.htm

Type 1	Type 2	Gestational	Prediabetes
<ul style="list-style-type: none"> -Body does not produce insulin -5-10 % of cases -Requires insulin therapy -Typically occurs in children and young adults 	<ul style="list-style-type: none"> -Body does not make enough insulin or use insulin properly -90-95 % of cases -Usually diagnosed in adults over age 40 but is becoming more common in younger adults and children 	<ul style="list-style-type: none"> -Develops during pregnancy -Greater risk for developing type 2 diabetes 	<ul style="list-style-type: none"> -Higher than normal blood sugar -15-30% risk of developing type 2 diabetes within 5 -10 years

Senate Bill 972 mandate

Senate Bill 972, effective Nov. 1, 2018, authored by Senator Frank Simpson, Senator Anastasia Pittman and Representative Pat Ownbey, directs the Oklahoma Health Care Authority (OHCA), to examine the feasibility of a State Plan Amendment (SPA) to the Oklahoma Medicaid program (SoonerCare) for Diabetes Self-Management Training (DSMT). This legislation requires the OHCA to submit a report to the President Pro Temp, the House Speaker and the Governor, by Dec. 1, 2018, to include the estimated potential costs to the State for a DSMT benefit for the SoonerCare program; clinical findings of the impact of DSMT on persons with diabetes as a primary diagnosis; review of DSMT pilot projects and research of other states’ effects of a DSMT benefit on persons with diabetes as a primary diagnosis. If the report demonstrates DSMT to be evidence-based and essential to qualifying participants enrolled in Oklahoma Medicaid (SoonerCare), the legislation mandates the OHCA to draft a SPA, beginning 07-01-19, subject to funding availability, for DSMT for persons with diabetes.

Diabetes Self-Management Training (DSMT)

Effectively managing diabetes can be a complex and time consuming endeavor that falls mainly upon the patient. The person with diabetes must learn about the disease, treatment options and the skills necessary for effective self-care. It is estimated 80% of patients’ diabetes care is accomplished through clinical collaboration with a primary care provider versus other healthcare providers¹⁰. Thus, the primary care setting plays a crucial role in guiding patients with diabetes to the most beneficial interventions. According to the CDC, the average length of a primary care visit was 18.7 minutes in 2004¹¹. Due to system and time constraints inherent in the primary care setting, it is difficult for the primary care provider to deliver the comprehensive diabetes education patients need to effectively manage the disease. The challenge, therefore, is to expand the delivery of diabetes knowledge beyond the primary care provider and in a meaningful way to the patient.

Diabetes Self-Management Education (DSME) may also be referred to as diabetes self-management training (DSMT). The terms DSME and DSMT are often used interchangeably. Although DSME is the preferred term, the Centers for Medicare and Medicaid Services [CMS] refers to this educational program as DSMT, and requires the use of this term in reimbursement documentation. Also, DSMT is the term used in the verbiage for SB 972, which mandates this report. Therefore, “DSMT” will primarily be used throughout this report.

¹⁰National Diabetes Education Program. (2011, June). *Redesigning the Health Team: Diabetes Prevention and Lifelong Management*. Retrieved from http://www.ndep.nih.gov/media/NDEP37_RedesignTeamCare_4c_508.pdf?redirect=true

¹¹ Burt, C.W., McCaig, L.F., & Rechtsteiner, E.A. (2010, April 6). *NCHS Health E-Stat*. Retrieved from <http://www.cdc.gov/nchs/data/hestat/estimates2004/estimates2004.htm#fig4>

DSMT is an evidence-based intervention that facilitates the knowledge and skills of people with diabetes to optimize their ability to effectively self-manage their disease. Throughout the literature, researchers and commentators commonly define DSMT as “the ongoing process of facilitating the knowledge, skill, and ability necessary for prediabetes and diabetes self-care ... [which] incorporates the needs, goals, and life experiences of the person with diabetes or prediabetes and is guided by evidence-based standards.”^{12, 13} This description aligns with the definition provided by the American Diabetes Association (ADA), the American Association of Diabetes Educators (AADE), and the Academy of Nutrition and Dietetics.¹⁴

Certified diabetes educators (CDEs) utilize DSMT curricula to engage participants in informed decision-making, and reinforce self-care, problem-solving behaviors and as a collaborative approach with their healthcare providers to improve clinical outcomes¹⁵.

To ensure people receive high-quality, evidence-based DSMT, a joint task force with experts from both AADE and ADA, developed the National Standards for Diabetes Self-Management Education and Support. CMS currently requires DSMT programs be accredited by either the AADE or recognized by the ADA to receive reimbursement. The AADE and the ADA use the National Standards of Diabetes Self-Management Education and Support as guidelines for accreditation.¹⁶

The National Standards for Diabetes Self-Management Education and Support include:

- *Program Structure* Providers of DSME/T must document their organization’s internal structure, including its mission statement and goals. This standard aims to encourage communication about and commitment to the provision of DSME/T.
- *External input* to improve the quality of DSME/T services, providers of DSME/T must seek continuous input from experts and the surrounding community.
- *Access* Providers of DSME/T must identify the populations they serve and determine how to best provide access to DSME/T services based on those populations’ needs.
- *Program coordination* Providers of DSME/T services must have a designated coordinator to oversee and implement the program.
- *Instructional staff:* Staff responsible for working with DSME/T program participants must have relevant experience and must include at least 1 registered nurse, registered dietitian, pharmacist, or otherwise certified diabetes educator.
- *Curriculum:* Providers of DSME/T programs must develop a curriculum that incorporates courses or other educational tools, outcomes, and teaching strategies. The National Standards lay out a curriculum outline,

¹² Centers for Disease Control and Prevention. (2013, January 11). *Leading Causes of Death*. Retrieved from <http://www.cdc.gov/nchs/fastats/lcod.htm>

¹³ Centers for Disease Control and Prevention/Nat'l Center for Chronic Disease Prevention & Health Promotion. (2012). *Diabetes Report Card 2012*. Atlanta, GA.

¹⁴ American Diabetes Association. (2013, March 6). *The Cost of Diabetes*. Retrieved from <http://www.diabetes.org/advocate/resources/cost-of-diabetes.html>

¹⁵ Funnell, M.M., Brown, T.L., Childs, B.P., Haas, L.B., Hoseney, G.M., Jensen, B., ... Weiss, M.A. (2012, January). *National Standards for Diabetes Self-Management Education*. Retrieved from http://www.ncpanet.org/pdf/conferences/2013/daspa/national_standards_for_dsme.pdf

¹⁶ Haas L, Maryniuk M, Beck J, et al. National standards for diabetes self-management education and support. *Diabetes Care*. 2014;37(Supplement 1):S144-S153. doi: <http://dx.doi.org/10.2337/dc14-S144>

but there is an expectation teaching materials will be adapted to meet participants' needs and take into account characteristics such as age, type of diabetes, ethnicity, health literacy, and other comorbidities.

- *Individualization:* Each participant in the DSME/T program must be assessed by an educator. Subsequently, a plan must be developed to meet the individual's needs.
- *Ongoing support:* Providers of DSME/T must also develop a follow-up plan integrating the support necessary to encourage sustainable diabetes self-management.
- *Patient progress:* Providers of DSME/T must monitor the effectiveness of the program as it relates to individual goals and outcomes.
- *Quality improvement:* Providers of DSME/T must monitor their programs for opportunities to improve, as applicable process advances and outcome data emerge.¹⁷

In a systematic review with meta-analysis of 21 studies comparing group-based DSMT with standard diabetes treatment, found participants with type 2 diabetes randomized to the group-based intervention showed improvement in clinical, lifestyle and psychosocial outcomes.¹⁸ In a three year retrospective claims analysis of 4 million covered lives, which included 250,000 Medicare beneficiaries, there was a reported Medicare average costs savings of \$135 per month among those beneficiaries who completed a DSMT program.¹⁹

Canary Insights is an on-demand digital intelligence search engine subscription service. It daily mines data for any changes to coverage and/or reimbursement for therapies and certain healthcare products/services. It performs a customizable search on over 200 payers and related healthcare sites including Medicare, Medicaid and hundreds of commercial insurance companies. They currently list DSMT as a covered benefit in these state Medicaid programs: AK, CO, FL, ID, KY, MD, ME, MI, MN, NC, NH, NY, NV, VA and WI.²⁰ It is important to note each state Medicaid program varies in the number of lives served, covered services, provider network, reimbursement rates, expenditures, etc.

Special Diabetes Program for Indians (SDPI)

In response to the burgeoning diabetes epidemic among American Indian and Alaska Native (AI/AN) people, Congress established the Special Diabetes Program for Indians (SDPI) through the Balanced Budget Act of 1997. The SDPI community-directed diabetes program is a \$150 million per year program providing grants for diabetes treatment and prevention services to 404 Indian Health Services (IHS), tribal and urban (I/T/U) Indian health programs across the United States.

Similar to the DSMT, the evidence-based SDPI has participation requirements for grantees for continued funding:

- Based on the Division of Grants Management federal policy, the grant application is due 120 days before the start of the tribal grantee's budget period or fiscal year.
- Grant applications are submitted via GrantSolutions.

¹⁷ Haas L, Maryniuk M, Beck J, et al. National standards for diabetes self-management education and support. *Diabetes Care*. 2014;37(Supplement 1):S144-S153. doi: <http://dx.doi.org/10.2337/dc14-S144>

¹⁸ Steinsbekke, A. (2012). Group based diabetes self-management education compared to routine treatment for people with type 2 diabetes mellitus. A systematic review with meta-analysis. *BMC Health Services Research*

¹⁹ Tomky, D. (2013). Diabetes Education: Looking Through the Kaleidoscope. *Clinical Therapeutics*, 734-739.

²⁰ Canary Insights DSME Diabetes Prevention Coverage June 2017/2018

- Each program site must have a Program Coordinator with relevant healthcare education and/or experience, to serve as the primary contact for the site.
- As part of their required activities, SDPI Community-Directed grantees must implement one SDPI Diabetes Best Practice (also referred to as "Best Practice"). The Best Practices are focused areas for improvement of diabetes prevention and treatment outcomes in communities and clinics. SDPI Best Practices include:
 - Aspirin or Other Antiplatelet Therapy in Cardiovascular Disease
 - Blood Pressure Control
 - Chronic Kidney Disease Screening and Monitoring
 - Dental Exam
 - Depression Screening
 - Diabetes-related Education
 - Eye Exam – Retinopathy Screening
 - Foot Exam
 - Glycemic Control
 - Hepatitis C Screening
 - Immunizations: Hepatitis B
 - Immunizations: Influenza
 - Immunizations: Pneumococcal
 - Immunizations: Tetanus/Diphtheria
 - Lipid Management in Cardiovascular Disease
 - Nutrition Education
 - Physical Activity Education
 - Tobacco Use Screening
 - Tuberculosis Screening
- To assess improvement on outcomes, each Best Practice includes one Required Key Measure (RKM) programs will track and report on regularly. Grantees collect data on the RKM for individuals in their Target Group, a carefully selected set of individuals the grant program can realistically serve (Note: each Best Practice provides guidance on selecting an appropriate Target Group. However, applicants choosing the same Best Practice may propose different activities/services with different Target Groups).
- Grantees are required to enter mid-year RKM data for their target group for their selected Diabetes Best Practice, using the SDPI Outcomes System (SOS).
- Grantees must attend and track SDPI required trainings, hosted by the Division of Diabetes, specific to the grant requirements for applications, activities and other related topics.
- Grantees must participate in/and be aware of the results of the annual IHS Diabetes Care and Outcomes Audit.
- Based on grants policy, two specific reports are due 90 days after the end of the grantee's budget period or fiscal year:
 - Program Progress Report: along with providing project narrative updates, grantees also report the SDPI trainings attendance.

- Federal Financial Report: must be submitted via the Payment Management System; along with a copy of the SF-425 via GrantSolutions as a Grant Note.

At the national level, the IHS Division of Diabetes provides supportive structures necessary for SDPI Community-Directed Diabetes Programs to implement these interventions successfully, including:

- National and Area Diabetes Consultants – expertise on diabetes and technical assistance to grantees for improving program implementation and grant accountability.
- Clinical tools – guidance for providing quality care, including Standards of Care, Best Practices, treatment algorithms, quick-reference cards.
- Data Infrastructure – resources and support for diabetes surveillance, IHS National Data Warehouse, IHS Electronic Health Record, and diabetes patient care tools.
- Diabetes Care and Outcomes Audit – annual review of patient charts to monitor the quality and outcomes of diabetes clinical care.²¹

States' Medicaid coverage with clinical findings and cost savings

SB 972 requests the OHCA to review other states' Medicaid coverage of diabetes self-management training (DSMT), including any clinical findings and/or cost savings. This section will provide a review of 8 neighboring states, conducted by Hayes Inc., a nationally-recognized Independent Review Organization, at the request of the OHCA: Arkansas, Kansas, Louisiana, Missouri, Nevada, New Mexico, Texas and Utah. Included in the review are the various approaches in coverage of DSMT. As previously stated, it is important to remember each state Medicaid program varies in the number of lives served, covered services, provider network, reimbursement rates, expenditures, etc., when comparing the DSMT benefit and any clinical findings and/or cost savings.

The Arkansas Department of Human Services is the single state agency authorized to administer the Medicaid program. As of March 2017, total enrollment was 912,043, with spending per enrollee at \$6,890. Medicaid accounted for 25.5% of the Arkansas state budget in 2015. Federal match rate (FMAP) was at 78.3%.²² In 2017, about 362,000 people (14.5% of the adult population) in Arkansas had diabetes. Of these, 75,000 adults had diabetes but did not know it; and 797,000 adults (36.4% of the adult population of Arkansas) had prediabetes. In 2017, direct medical expenses for diagnosed diabetes was estimated at \$2.2 billion, with an additional \$880 million spent on indirect costs from lost productivity due to diabetes.²³ The Arkansas DSMT program specifically indicates coverage only for populations receiving Medicaid benefits through an Alternative Benefits Plan, such as newly eligible adults under the Affordable Care Act.²⁴

In 2003, in response to increasing costs among Medicaid recipients with diabetes, the Arkansas Medicaid director called for proposals to test strategies to reduce associated healthcare costs. The Arkansas Diabetes Prevention and Control Program (ADPCP), in collaboration with Eli Lilly and Company, formed a partnership with public and private stakeholders, including the Arkansas Department of Human Services, Arkansas Foundation for Medical Care, Health Information Design, Arkansas Chapter of American Diabetes Association and Arkansas Minority Health Commission, with the goal to implement a DSMT program for Arkansas Medicaid recipients with diabetes to demonstrate that

²¹ https://www.ihs.gov/sdpi/includes/themes/responsive2017/display_objects/documents/SDPIAppInstrFY19.pdf

²² https://ballotpedia.org/Medicaid_spending_in_Arkansas

²³ <http://main.diabetes.org/dorg/assets/pdfs/advocacy/state-fact-sheets-Arkansas2018.pdf>

²⁴ https://www.changelabsolutions.org/sites/default/files/Arkansas_DSMET_Final.pdf

DSMT improves diabetes care and decreases overall healthcare costs among Medicaid recipients with diabetes. This grassroots collaborative considered different strategies to grapple with the lack of reimbursement for DSMT for Medicaid recipients, and ultimately decided to use a continuous quality improvement process approach, following the American Diabetes Association guidelines for effectiveness and sustainability evaluation of DSMT.

The project was funded through grants provided by Eli Lilly and Company, and assisted with transportation to and from the diabetes education visits in addition to funding the diabetes education training. DSMT was provided by a registered nurse and a registered dietician who utilized the American Association of Diabetes Educators' curriculum for diabetes education. Participants received 12 hours of diabetes education, along with three hours of medical nutritional education. The training occurred over the course of one year from the first educational visit to the final educational visit. Efforts to retain the participants during the one year period of diabetes education included follow-up telephone contact and postcard reminders. 84% of participants continued active participation at the midway visit and 74% of the core group were present at the year-end visit.²⁵

During the course of the project, the participants' mean Hemoglobin A-1C (HbA1c) and blood pressure (systolic and diastolic) levels decreased. The rate of emergency department visits was 38% lower among the DSMT participants, and their physician visits reduced by 15%. Similarly, DSMT participants also had fewer hospital admissions. These motivated participants engaged in more care-seeking behavior compared to non-participants. The 10-year projected disease event rate estimated reductions in both coronary heart disease (CHD) events and microvascular complications for those who completed the one year of diabetes education. The cost savings associated with averting a CHD event or stroke risk are significant. Studies have shown that for each myocardial infarction avoided, the average cost savings equal \$15,900 for a non-fatal event and \$11,300 for a fatal event. Preventing a coronary artery bypass saves approximately \$18,300, and stroke avoidance equates to nearly \$10,000.²⁶

As of March 2017, 393,881 Kansans were enrolled in Medicaid. Medicaid accounted for 21.7% of the Kansas state budget in 2015. Federal match rate (FMAP) was 56.2%.²⁷ In 2017, approximately 282,000 people (12% of the adult population) in Kansas had diabetes. Of these, 69,000 had diabetes but did not know it, and 749,000 adults (35.9%) of the total adult population of Kansas had prediabetes. In 2017, direct medical expenses for diagnosed diabetics was estimated at \$1.7 billion, with an additional \$690 million spent on indirect costs from lost productivity due to diabetes.²⁸ Kansas Medicaid does not explicitly indicate beneficiaries receive coverage for DSMT.²⁹

Louisiana's Medicaid enrollment in 2017 totaled nearly 1,447,315 individuals. Medicaid accounted for 27.6% of Louisiana's budget in 2015. Federal match rate was 63.6%.³⁰ In 2017, approximately 575,000 people (15.3% of adult population) had diabetes. Of these, 124,000 adults had diabetes but did not know it. 1,272,000 additional adults (37.5% total adult population) had prediabetes. Direct medical expenses for diagnosed diabetics was estimated at \$4.2 billion in 2017, with an additional \$1.5 billion spent on indirect costs from lost productivity due to diabetes.³¹

²⁵ Balamurugan, A., Ohsfeldt, R., Hughes, T., Phillips, M. Diabetes Self-management Education Program for Medicaid Recipients. Vol 32, no 6; Nov/Dec 2006; 893-900.

²⁶ Sarasin, FP, Gaspoz, J-M, Bounameaux, H. Cost-effectiveness of new antiplatelet regimens used as secondary prevention of stroke or transient ischemic attack. Arch Intern Med 2000; 160:2773-2778.

²⁷ https://ballotpedia.org/Medicaid_spending_in_Kansas

²⁸ <http://main.diabetes.org/dorg/assets/pdfs/advocacy/state-fact-sheets-Kansas2018.pdf>

²⁹ https://www.changelabsolutions.org/sites/default/files/Kansas_DSMET_FINAL.pdf

³⁰ https://ballotpedia.org/Medicaid_spending_in_Louisiana

³¹ <http://mail.diabetes.org/dorg/assets/pdfs/advocac/state-fact-sheets/Louisiana2018.pdf>

Louisiana's Medicaid program provides up to one hour of individual DSMT and 9 hours of group DSMT for beneficiaries who have a diabetes diagnosis in the 12 month period following the initial training date. The program also covers up to two hours of individual follow-up instruction each subsequent year. DSMT programs must be accredited by the AADE, ADA or Indian Health Services (IHS), and comply with the National Standards. DSMT providers must be certified by the National Certification Board for Diabetes Educators as Certified Diabetes Educators (CDE) or have recent didactic and experimental preparation in education and diabetes management. DSMT instruction teams must include at least one CDE who is a registered nurse, registered dietician or registered pharmacist.³²

In 2017, total enrollment in Missouri's Medicaid program equaled 977,708 individuals. Medicaid accounted for 36.1% of Missouri's budget in 2015. The federal match rate was 63.4%.³³ In 2017, approximately 689,000 people (13.4% of the adult population) had a diabetes diagnosis. Of this number, 152,000 adults had prediabetes. Direct expenses for diagnosed diabetes was estimated at \$4.9 billion in 2017, with an additional \$1.8 billion spent on indirect costs from lost productivity due to diabetes.³⁴

Missouri Medicaid, "MO HealthNet", covers DSMT when prescribed by a healthcare professional with prescribing authority. Coverage is available after an initial diabetes diagnosis and upon a significant change in the beneficiary's symptoms, condition, or treatment. The program covers 1 initial assessment per lifetime and up to 2 subsequent visits per rolling calendar year. Additional visits may be covered with a "Certificate of Medical Necessity." A physician or certified diabetes educator (CDE) must complete the initial assessment, which should evaluate the beneficiary's medical and diet history, medication use, mental health status, lifestyle practices, physical and psychological issues, barriers and support structure, and previous diabetes education. Subsequent DSMT services must be provided by a certified diabetes educator, registered dietician, or registered pharmacist "approved and enrolled as a diabetes self-management" provider with MO HealthNet.³⁵

Medicaid and the Children's Health Insurance Program (CHIP) provide health and long-term care coverage to more than 631,000 low-income children, pregnant women, adults, seniors, and people with disabilities in Nevada in 2017.³⁶ Medicaid accounted for 25.6% of Nevada's budget in 2015. The federal match rate was 76.5%.³⁷ Approximately 291,000 people (12.6% of the adult population) in Nevada had diabetes. Of this number, 75,000 adults had the disease but did not know it. An additional 787,000 Nevada adults (38.5% of the total adult population) had prediabetes. In 2017, direct medical expenses for diagnosed diabetics was estimated at \$2 billion, with an additional \$700 million spent on indirect costs from lost productivity due to diabetes.³⁸

Nevada Medicaid provides coverage for outpatient DSMT. This includes up to 10 hours of initial training in a group setting; additional hours for the initial training or follow-up trainings require prior authorization. DSMT programs must "meet the National Diabetes Advisory Board (NDAB) standards, and hold an Education Recognition Program (ERP) certificate from the ADA and/or the AADE. Diabetes educators certified by the National Board of Diabetes Educators must provide DSMT services, and the DSMT instruction team "should include at least a nurse educator

³² https://www.changelabsolutions.org/sites/default/files/Louisiana_DSMET_FINAL.pdf

³³ https://ballotpedia.org/Medicaid_spending_in_Missouri

³⁴ <http://main.diabetes.org/dorg/assets/pdfs/advocacy/state-fact-sheets/Missouri2018.pdf>

³⁵ https://www.changelabsolutions.org/sites/default/Missouri_DSMET_FINAL.pdf

³⁶ <http://files.kff.org/attachment/fact-sheet-medicaid-state-NV>

³⁷ https://ballotpedia.org/Medicaid_spending_in_Nevada

³⁸ <http://main.diabetes.org/dorg/assets/pdfs/advocacy/state-fact-sheets/Nevada2018/pdf>

and dietician with recent didactic and training in diabetes clinical and educational issues.” Subject to additional requirements, DSMT may be provided as a telehealth service.³⁹

Total enrollment for New Mexico Medicaid in 2017 was close to 787,000 individuals. Medicaid accounted for 30.3% of New Mexico's budget in 2015. The federal match rate was 79.4%.⁴⁰ Approximately 241,000 adults (14.2%) in New Mexico had diabetes. Of this number, 59,000 adults had the disease but did not know it and an additional 603,000 adults (39.7% of the total adult population of New Mexico) had prediabetes. In 2017, direct medical expenses for diagnosed diabetics was estimated at \$1.5 billion, with an additional \$480 million spent on indirect costs from lost productivity due to diabetes.⁴¹

The New Mexico Medicaid program does not explicitly indicate that beneficiaries receive coverage for DSMT. However, for certain beneficiaries with chronic health conditions, New Mexico Medicaid managed care organizations must provide education regarding the beneficiary's chronic conditions, develop self-management plans, provide lifestyle interventions, and “reinforce strategies that support the individual's motivation to better understand and actively self-manage their chronic health condition.”⁴²

Texas Medicaid enrollment for 2017 was approximately 4.76 million individuals. Medicaid accounted for 30.6% of Texas' budget in 2015. The federal match rate was 57.5%.⁴³ Approximately 2,990,000 Texas residents (14.6% of the adult population) had diabetes during this timeframe. Of these, 663,000 adults had developed diabetes but did not know it. Another 6,884,000 adults (37.2% of the total adult population of Texas) had developed prediabetes. In 2017, direct medical expenses for diagnosed diabetics was estimated at \$18.9 billion, with an additional \$6.7 billion spent on indirect costs from lost productivity due to diabetes.

Texas Medicaid managed care providers, who provide care to more than 78% of Texas Medicaid beneficiaries, are required to provide disease management services, including patient self-management education. Moreover, the Texas Medicaid Wellness Program provides select high-cost/high-risk beneficiaries with a diabetes diagnosis, with up to 10 hours of DSMT plus three hours of nutritional counseling. This program also covers group clinical services and educational counseling for beneficiaries with diabetes.

Utah's Medicaid enrollment for 2017 encompassed 308,957 individuals. Medicaid accounted for 19% of Utah's budget in 2015. The federal match was 70.3%.⁴⁴ In 2017, approximately 201,000 people (10.2% of the adult population) in Utah had diabetes. Of these, 54,000 adults had diabetes but did not know it and 619,000 adults (32.7% of Utah's total adult population) had prediabetes. In 2017, direct medical expenses for diagnosed diabetics was estimated at \$1.3 billion, with an additional \$500 million spent on indirect costs from lost productivity due to diabetes.⁴⁵

Utah's Medicaid program provides coverage for up to 10 outpatient DSMT sessions per year when a beneficiary receives approval from a physician and prior authorization from Utah Medicaid. Group sessions are permitted so long as they allow “direct, face to face interaction.” DSMT programs must be recognized by the AADE or certified by the

³⁹ https://www.changelabsolutions.org/sites/default/files/Nevada_DSMET_FINAL.pdf

⁴⁰ https://ballotpedia.org/Medicaid_spending_in_New_Mexico

⁴¹ <https://main.diabetes.org/dorg/assets/pdfs/advocacy/state-fact-sheets/NewMexico2007.pdf>

⁴² https://www.changelabsolutions.org/sites/default/files/NewMexico_DSMET_FINAL.pdf

⁴³ https://ballotpedia.org/Medicaid_spending_in_Texas

⁴⁴ https://ballotpedia.org/Medicaid_spending_in_Utah

⁴⁵ <http://main.diabetes.org/dorg/assets/pdfs/advocacy/state-fact-sheets/Utah2018.pdf>

Utah Department of Health (DOH). They must meet the National Diabetes Advisory Board's standards, which address the 15 main components of the ADA curriculum. Registered nurses, registered pharmacists, and registered dietitians may provide DSMT if they are "certified or recognized by the [AADE] or approved through the Utah DOH as diabetes instructors." DSMT offered through a home health agency must be provided by an ADA-certified or DOH-approved licensed healthcare provider.⁴⁶

There is a large amount of evidence-based research suggesting Diabetes Self-Management Training can have a positive impact on glycemic control (generally measured as HbA1C) in persons diagnosed with diabetes. Other benefits may include a reduction in diabetic-related complications, an improvement in dietary patterns, an adoption of a more physically active lifestyle, and an overall sense of empowerment and self-control over the disease with decreased diabetes-related stress and depression. Some studies indicate that post-DSMT individuals are more likely to adopt healthy lifestyle choices for diabetics, including influenza and pneumococcal vaccinations and regular foot examinations. Diabetics armed with enhanced knowledge and self-care skills may place a lower demand on healthcare expenditures related to diabetes-related complications.⁴⁷ An evidence-based analysis was conducted by Hayes, Inc., per request of the OHCA, pertaining to studies and evaluation of the effectiveness of various DSMT interventions, with consideration given to the duration and frequency of goal-directed interactions, personalization of training, including cultural modifications, setting, and incorporation of technology. A summary of this analysis is listed in appendix I.

Oklahoma Landscape

In 2015, more than one out of every nine adults in Oklahoma had a diabetes diagnosis, according to the Behavioral Risk Factor Surveillance System (BRFSS). Of the estimated 11.7% of adult Oklahomans with diabetes, 0.8% of these were diagnosed with gestational diabetes. Many Oklahomans have elevated blood sugar that puts them at risk of developing type 2 diabetes.⁴⁸ Per 2015 data from the Oklahoma State Department of Health, among adults (18 years and over), approximately 295,500 Oklahomans (10.4%) reported being diagnosed with diabetes by health professionals in 2010. Including those who may be undiagnosed, the total number of Oklahoma citizens who have diabetes is about 416,200 (15%). This equates to over 9,400 constituents per Senate district, with a diabetes diagnosis.⁴⁹

For non-gestational diabetes, a statistically higher proportion occurs among males (51.7%) than females (48.3%). Type 2 diabetes occurs most often among persons 65 years or older, with nearly one-quarter (23.0%) of Oklahoma seniors with diagnosed diabetes. Among persons 35-64 years old, 13.0% have diabetes compared to 2.0% among those 13-34 year of age. Diagnosed diabetes is highest among American Indians (16.3%) and Blacks (13.6%), compared to Whites (11.2%) and Hispanics (7.9%). Those with reported household incomes of \$75,000 or higher were the least likely to have diabetes (7.8%).⁵⁰ Among persons 18-64 years old with diabetes, 30.3% reported being unable to work. The same group experienced health challenges during the previous year: 10.9% had a lapse in insurance coverage, 11.7% did not have a personal doctor or healthcare provider, and 22% did not take prescriptions because of the costs.⁵¹

⁴⁶ https://www.changelabsolutions.org/sites/default/files/Utah_DSMET_FINAL.pdf

⁴⁷ CUS4462 – Diabetes Self-Management Education, prepared for the State of Oklahoma on August 20, 2018; Winifred S. Hayes, Inc.

⁴⁸ BRFSS, 2015

⁴⁹ <https://www.ok.gov/health2/documents/CDS-Chronic%20data%20book%20AUG2013.pdf>

⁵⁰ BRFSS, 2015

⁵¹ BRFSS 2015

Disability is associated with an increased likelihood for hospitalization, institutionalization and loss of economic self-sufficiency and normal role behaviors.⁵² Disability affects large numbers of persons with diabetes in the United States, with estimates ranging from 20%-50% of the diabetic population. Activity limitations are two to three times higher among persons with diabetes. Diabetics who are disabled have lower rates of employment (49% not working versus 12% for non-diabetics). Those who do work report higher rates of absenteeism (13.8 days per year versus 3.0 days per year for persons without diabetes). Income levels are also lower for persons with diabetes. Disabled persons with diabetes use healthcare services more frequently, and they are hospitalized more often than persons without diabetes (32.4% versus 13.2%). The average number of physician visits among those who see a physician are 13.9 per year for persons diagnosed with diabetes who are limited in activity, compared with 6.5 visits for those who do not have any disability and do not have any activity limits. Limitation in personal care activities of daily living (ADLs) are more common among diabetic than nondiabetic individuals (8.8% versus 2.3%).⁵³

Medicare provides health coverage for people close to retirement age or who have life-altering disabilities. Medicaid provides medical assistance for low-income persons to shoulder the cost of healthcare regardless of age. In some cases, individuals may qualify for both Medicaid and Medicare; this is commonly known as being “dually-eligible.” Dual eligibility is the term used to explain that someone qualifies for both public insurance programs. This usually occurs when the individual already qualifies for Medicare, but because of their low income, they usually cannot afford any remaining costs such as deductibles or their portion of the medical bill. If someone is dually eligible for both programs, most of their healthcare expenses will likely be covered, so the individual has little or no out-of-pocket balance for the medical care they require. About nine million people in the United States have dual eligibility for Medicare and Medicaid.⁵⁴

Of Oklahomans with diabetes, 42.0% have Medicare as their primary insurance coverage (Medicare pays first for those with dual eligibility, with Medicaid reimbursing as the secondary payer). The next major payer for diabetic constituents is employer-held insurance (28.2%), Medicaid-only coverage is next (SoonerCare; 10.1%), followed by family insurance (7.0%), military (6.0%), Indian Health Service/Tribal care (5.4%) and other (1.2%).⁵⁵

SoonerCare (Oklahoma Medicaid), is the safety net healthcare benefits provider for low-income Oklahomans, primarily children, pregnant women, seniors and persons with disabilities, funded through a blend of state and federal funds. Since SFY 2011, the prevalence of diabetes in the SoonerCare (SC) population has increased by 17.1 percent. Type II diabetes continues to be the most common type of diabetes among the SC population with 52,744 unduplicated SC members with a diabetes diagnosis. Four out of every five SC members with diabetes, 90.3%, had a diagnosis of type II diabetes.⁵⁶

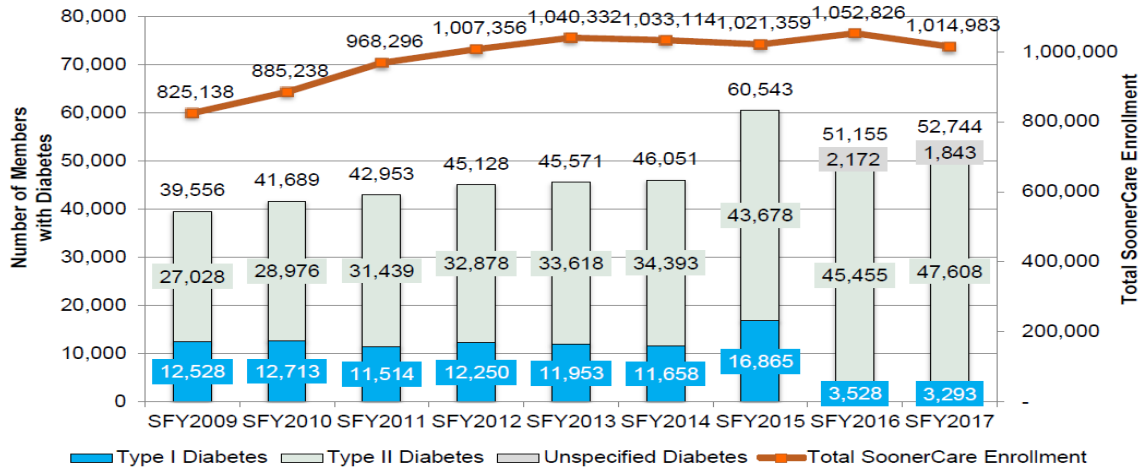
⁵² Locker, D: *Disability and Disadvantage: the Consequences of Chronic Illness*. London, England, Tavistock Publications, 1983.

⁵³ Adams PF, Benson V, National Center for Health Statistics: Current estimates from the National Health Interview Survey, 1989. *Vital and Health Statistics*, Series 10, no. 176, 1990.

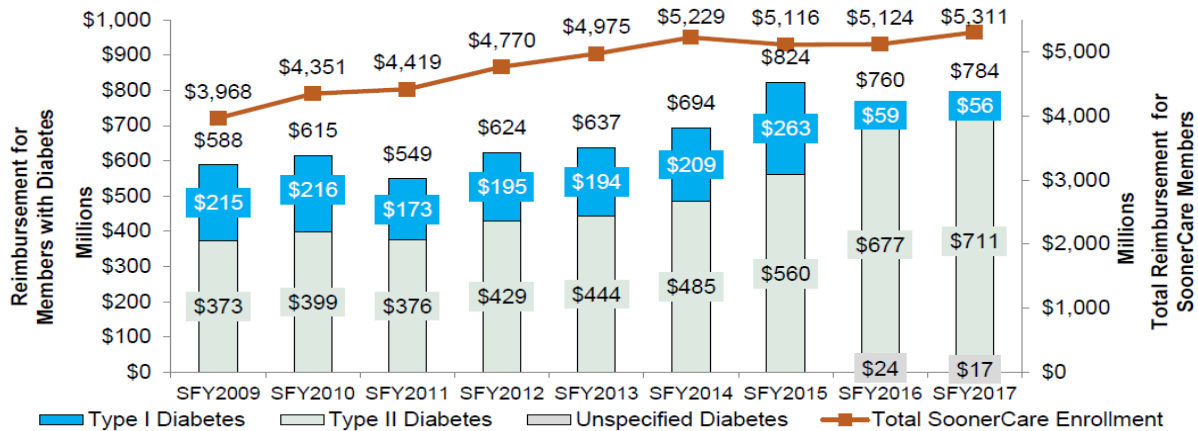
⁵⁴ <https://policyzip.com/medicare/dual-eligible-medicaid/>

⁵⁵ BRFSS 2015

⁵⁶ OHCA Diabetes Analysis SFY2017



SC members with diabetes comprised 5.2% of all SC enrollment in SFY2017. However, the total reimbursement for services rendered by members with diabetes in SFY2017 constituted 14.8% of reimbursements paid that year. The total reimbursement for SC members with diabetes has increased by 27.4% since SFY2010, while the overall SC reimbursement has increased by 17.1% during the same timeframe. The total reimbursement in SFY2017 for SC members with diabetes was \$783,991,193.⁵⁷



In calendar year (CY) 2016, SoonerCare provided coverage for 57% of the deliveries in Oklahoma (30,490 of 52,607). As the largest payer of delivery-related claims, gestational diabetes has a significant impact on expenditures within the SoonerCare program. In SFY 2017, 4% of the SC members with a diabetes diagnosis had gestational-type diabetes.⁵⁸ Total claims for these 2,095 pregnant women equaled \$16,951,800, which represents 2.2% of the total reimbursements for SC members with a diabetes diagnosis, with a date of service during SFY 2017.

⁵⁷ OHCA Diabetes Analysis SFY2017

⁵⁸ OHCA Office of Data Governance

Current Oklahoma efforts

The Oklahoma Medicaid program (SoonerCare), operated by the Oklahoma Health Care Authority (OHCA), insured about 988,008 (356,477 adults and 631,531 children) in SFY 2017⁵⁹, which represents about 25.8% of the state's constituency (3.9 million), and makes the OHCA one of the largest insurers in the state.

SoonerCare (SC) covers diabetic testing supplies, including meters, test strips, lancing devices, lancets, pen needles, syringes, ketone strips, and control solution as part of the pharmacy benefit, billing through the point of sale (POS) system. Insulin pumps and continuous glucose monitors are included as a SoonerCare benefit, billed as durable medical equipment (DME), and require prior authorization. These medical devices are reimbursed, using similar pricing methodology implemented by Medicare under the Cures Act of 2016, using competitive bidding.⁶⁰ This methodology has proven challenging for some suppliers.

SoonerCare offers a medical nutritional therapy (MNT) benefit that offers up to six hours of medically necessary nutritional counseling per calendar year by a licensed registered dietician (RD). The MNT must be prescribed by a physician, physician assistant, advanced practice nurse, or nurse midwife and be face-to-face encounters between an RD and the member. For adults, the MNT must be expressly for diagnosing, treating or preventing, or minimizing the effects of an illness. MNT for the treatment of obesity is not covered for adults unless there is documentation the obesity is a contributing factor in another illness.

For children enrolled in SoonerCare, payment is made for medically necessary MNT as described above for SC adults. MNT for the treatment of obesity may be covered for children as part of the federally-mandated Early Periodic Screening Diagnosis and Treatment (EPSDT) benefit. Additional MNT determined to be medically necessary and allowable under federal regulations may be covered by the EPSDT benefit.⁶¹

A host of organizations in Oklahoma have expressed growing concern because the health status of Oklahomans ranks near the bottom of all states in the United States. In response, the Oklahoma State Legislature passed Enrolled Senate Joint Resolution No. 41 on March 11, 2008, requiring the Oklahoma State Board of Health to “prepare and return to the Legislature a health improvement plan for Oklahoma for the general improvement of the physical, social, and mental well-being of all people in Oklahoma through a high functioning public health system.” The five-year health improvement plan, the Oklahoma Health Improvement Plan (OHIP) was initially issued in 2010 and updated in 2015.⁶² Four flagship issues were identified, and corresponding workgroups formed, that best reflect the importance of healthy living as a necessary condition to achieving and maintaining a state of wellness: Tobacco Use, Obesity, Children's Health and Behavioral Health.

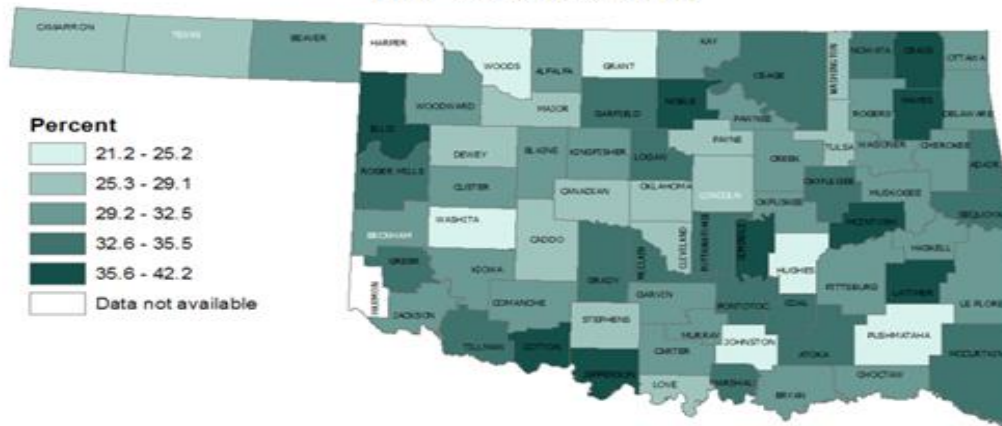
⁵⁹ SoonerCare Fast Facts, SFY 2017;
<http://sharepoint/sites/COMM/reporting/Fast%20Facts/SFY%20Fast%20Facts/SoonerCare%20Fast%20Facts%20SFY%202017.pdf>

⁶⁰ <https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/DMEPOSFeeSched/index.html>

⁶¹ Oklahoma Medicaid Rule 317:30-5-1076,
<https://www.okhca.org/xPolicyPart.aspx?id=611&chapter=30&subchapter=5&part=108&title=NUTRITION%20SERVICES>

⁶² [https://www.ok.gov/health/Board_of_Health/Oklahoma_Health_Improvement_Plan_\(OHIP\)/index.html](https://www.ok.gov/health/Board_of_Health/Oklahoma_Health_Improvement_Plan_(OHIP)/index.html)

Prevalence of Obesity BRFSS 2005-2010



In 2015, a childhood obesity workgroup was formed to pilot test a quality improvement initiative aimed at increasing utilization of nutritional counseling services in Comanche County. The workgroup recognized rates of obesity differed by county, and tended to be lower in the counties with the most populous cities (Oklahoma, Tulsa, and Cleveland Counties). They noted that during 2000-2004, Comanche County had a 21.3% obesity rate; and during the next few years (2005-2010), the rate increased to 31.4% (47.4% change).⁶³ The percentage of obese SoonerCare children in Comanche County increased from 2.2 percent in SFY2015 to 7.1 percent in the reporting period.⁶⁴

The obesity work group developed a short-term pilot with the Comanche County Health Department and the Lawton Community Health Center (a federally-qualified health center (FQHC), whose focus is the medically-underserved). The pilot strategy was for the FQHC to refer obese SC children to the CCHD for MNT services. CCHD employed two registered dietitians/licensed dietitians (RD/LDs) during the pilot to provide the MNT. In SFY2015, slightly more than half of the SC children in Comanche County who received MNT services (54.5%) were also diagnosed with obesity. During the reporting period, the proportion of SC children in Comanche County who received MNT counseling increased to 71.6 percent.

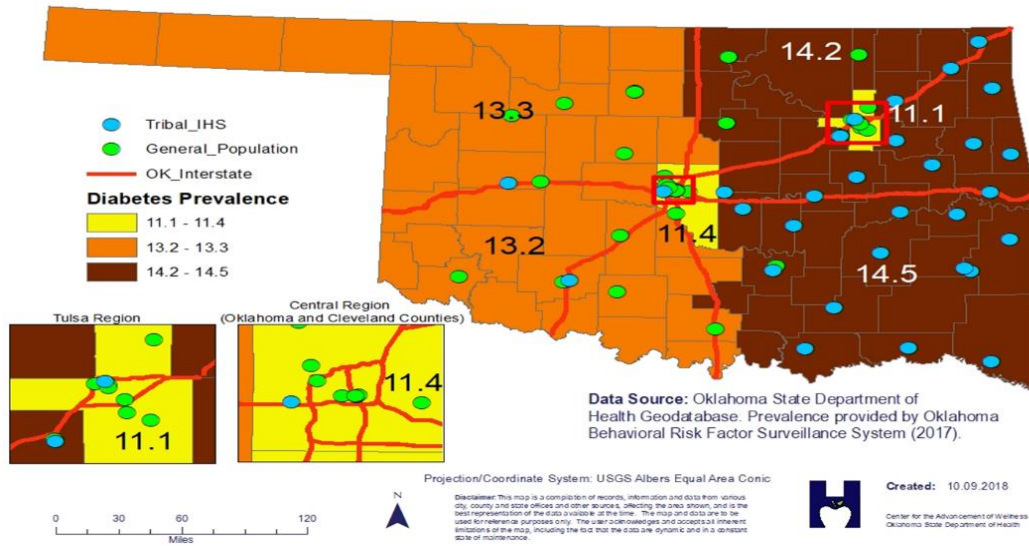
Diabetes Self-Management Training (DSMT) is not currently covered under the Oklahoma Medicaid program.

Currently, there are 55 ADA/AADE-accredited DSMT programs throughout the state. Some 31 of these certified diabetes educational programs are tribal-affiliated. Some of them allow non-tribal citizens to participate in their DSMT classes through private pay.

⁶³ The State of Obesity in Oklahoma, 1st qtr, 2012, p. 2.

⁶⁴ http://sharepoint/sites/COMM/reporting/Shared%20Documents/Completed%20Reports/Comanche%20County%20Obesity%20Analysis_Jan-Aug2015.pdf

Diabetes Self-Management Education (DSME) Sites in Oklahoma



The OHCA Health Management Program (HMP) embeds Health Coaches (registered nurses – RNs) within identified SoonerCare patient-centered medical homes (PCMH) that have a high burden of chronic disease. SC members who have, or are at risk of developing chronic disease conditions are identified through data mining and/or the provider and staff. The HMP health coach provides care management for these identified members through face-to-face encounters at the office, with telephonic contact in between.

In 2017, the HMP launched a diabetes prevention program (DPP) pilot in partnership with the Oklahoma State Department of Health (OSDH) and the Choctaw Nation, through a CDC grant, to conduct pre-diabetes screening on SC members at the embedded PCMH sites. Positive screens are forwarded to the medical provider at the patient centered medical home (PCMH) for referral to a DPP operated by the Choctaw Nation. The OSDH is billed for SC members who participate in the DPP, which is paid through the grant funding. To date, 49 members have accepted enrollment into the DPP program through this collaborative pilot (8 into the Choctaw DPP, 41 were referred to participating county health departments).

In collaboration with the HMP, the OHCA SoonerQuit program, funded through the Tobacco Settlement Endowment Trust (TSET) will implement a new strategy to address obesity in adults enrolled in SoonerCare. Aggressive recruitment of registered dietitians to contract with SoonerCare to expand the network of contracted providers and increase access to the medical nutritional counseling benefit is a top strategy for this new SoonerQuit project. Targeted provider and member education about this little-used benefit, with promotion through formal trainings, social media, newsletters, palm cards (English and Spanish), and OHCA's SoonerFit.org website are among the outreach efforts planned,

Similarly, the SoonerQuit staff launched the SoonerFit website (www.soonerfit.org) in 2014. This health-minded website contains information for SC members and all Oklahoma constituents to use as an aid to achieving a fit and healthy lifestyle in a fun and affordable way. The website includes links to local farmers' markets that take SNAP (Supplemental Nutrition Assistance Program) benefits, tobacco cessation resources, healthy recipes, low-cost gyms, cooking demos, motivational videos, exercise routines and toolkits for parents to aid in maintaining the health of their

children. Visitors to the website are encouraged to take the SoonerFit pledge, and join other Oklahomans who are living healthier lifestyles and being SoonerFit.⁶⁵

During CY 2015, OHCA, the George Kaiser Family Foundation and Voxiva partnered to implement a two-year pilot study expanding the Text4baby program to include mobile health messages for SoonerCare members ages 1 to 18 and adults covered by SoonerCare. This health-oriented text package, called Connect4Health, encompasses three text programs: Text4Baby, Text4Kids and Text4Health. The mobile health messages were customized by OHCA staff and partners to promote specific preventive health benefits, well-child visits, immunizations, medication compliance, appropriate ER utilization, and SoonerCare application renewal reminders. Implementation of Connect4health was initiated in October 2016. Eligible SoonerCare members began receiving text message invitations to enroll in Connect4health's member engagement and health messaging services. As they replied to the text messages with the consent to enroll, the members were then enrolled in to the health intervention messaging programs. In December 2016, SoonerCare's Online Application began collecting consent from members to opt in to the health and member engagement messaging programs. In January 2017, every SoonerCare member who provided consent was automatically enrolled in to this innovative mobile technology platform to receive information about general health and wellness services, as well as condition-specific benefits (including diabetes) available through SoonerCare. As of November 2017, nearly 85,000 SoonerCare members were actively receiving mobile health messages from OHCA.⁶⁶

Obesity will soon be added as a component of the SoonerQuit practice facilitation services offered in both urban and rural Oklahoma. SoonerQuit staff are working with a third year physician resident to research effective and sustainable methods to train medical providers in implementing adult obesity best practices. This strategy is currently in a pilot phase in an area family practice clinic. This includes measurement and documentation of body mass index (BMI) in the medical record, utilization of BMI ICD-10 codes on claims, patient-centered conversation regarding BMI (motivational interviewing) and discussion about the SoonerCare MNT benefit and how to access, including referral to a registered dietician and, if applicable, referral to a behavioral health provider (i.e., eating disorder, etc.).

SoonerQuit staff are also reviewing current policy to examine options for reducing/removing barriers to access to this life-changing/cost-saving SoonerCare benefit. This includes options to expand provider types who can refer and/or provide nutritional counseling and options to increase the number of hours per calendar year (currently at six hours per rolling calendar year).

OHCA staff actively contribute to the mandated legislative reports for Senate Bill 250 (diabetes prevention; due January 2019, with updates on the status of diabetes in Oklahoma and the subsequent impact on Oklahoma Medicaid) and Senate Bill 972 (diabetes self-management, due December 2018, related to the impact of offering DSMT as a Medicaid compensable service), as well as educating providers and members on current in-state diabetes prevention programs (DPP) and any payment mechanisms such as grants that increase their affordability and accessibility.

The Oklahoma Legislative Diabetes Caucus was established by Senator Susan Paddack (D-Ada) and Representative Jeannie McDaniel (D-Tulsa), with the goal of directing statewide health efforts toward diabetes and secure funding for diabetes-related initiatives. Caucus participants include health system representatives, representatives from state agencies and local health departments, tribal representatives, lobbyists, legislators and staff, advocacy groups, and quality improvement organizations.⁶⁷

⁶⁵ Fall2014 SC Companion, p 1

⁶⁶ http://oksenate.gov/AppComm/SubHealth/Agencies/2018/OHCA_M&G.pdf

⁶⁷ <https://www.ok.gov/health2/documents/Diabetes%20Prevention%20Report.pdf>

In November 2015, the Caucus presented an interim study to members of the Oklahoma State Senate regarding diabetes. The presentation was well-received by the state legislators in attendance.

Some members of the Caucus established a Diabetes Prevention Group (October 2015) to explore ways to develop and expand lifestyle training, primarily DPP. Group membership is growing and expected to continue to grow as public awareness increases about diabetes in Oklahoma.

To highlight the 2018 World Diabetes Day on November 1st, the Diabetes Prevention Group presented to representatives from Oklahoma's leading health plans during the regular Caucus meeting with an overview of the Caucus: why it was created and shared current action steps for this functional workgroup. They also presented Oklahoma's ranking in the incidence of diabetes, with an overview of the National Diabetes Prevention Program (NDPP) and the Diabetes Self-Management Training (DSMT), including the benefits of these evidence-based educational programs, as well as the unique successes and barriers they face in Oklahoma. Christine Fallabel, MPH, Director, State Government Affairs and Advocacy, American Diabetes Association, shared information regarding the unique burden of diabetes in Oklahoma. The presentation concluded with specific requests for the health plans: cover the cost of diabetes prevention education in full, exempt diabetes self-management education from deductible and co-payment requirements, and implement a targeted referral campaign for their members to accredited NDPP/DSMT programs.

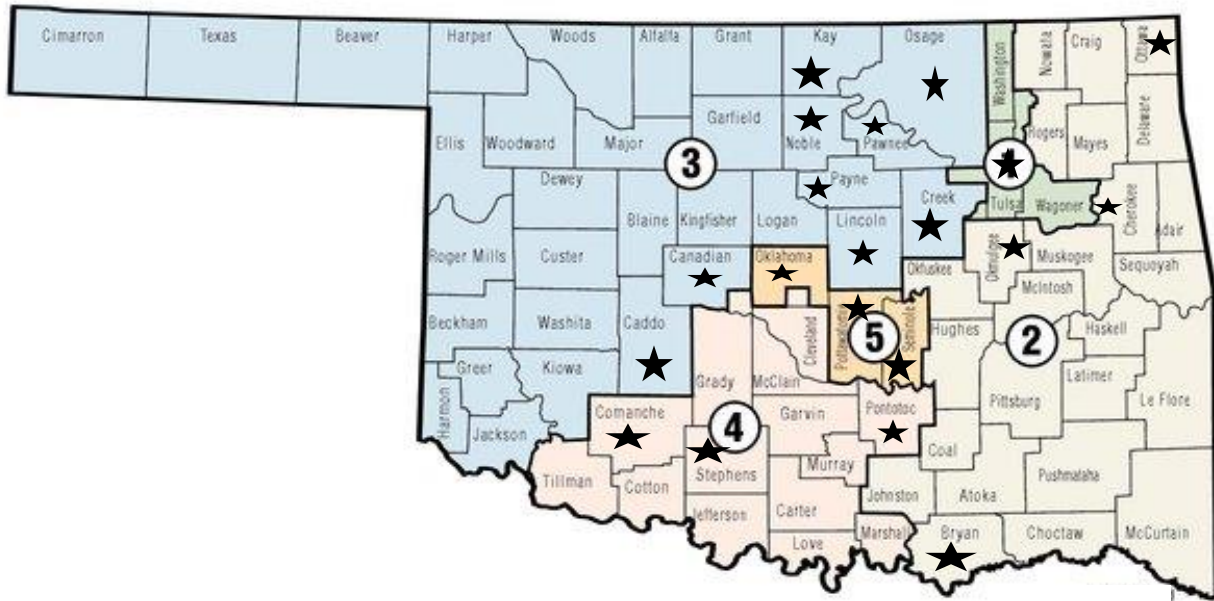
In November 2018, Senate Bill 972, as mentioned earlier, became effective, directing the OHCA to examine the feasibility of a State Plan Amendment (SPA) to the Oklahoma Medicaid program (SoonerCare) for Diabetes Self-Management Training (DSMT). If the report demonstrates DSMT to be evidence-based and essential to qualifying participants enrolled in Oklahoma Medicaid (SoonerCare), the legislation mandates the OHCA to draft a SPA, beginning 07-01-19, subject to funding availability, for DSMT for persons with diabetes.

Special Diabetes Program for Indians

The likelihood of American Indian and Alaska Native adults to have a diabetes diagnosis is 2.3 times higher, compared with non-Hispanic whites (16.1% vs 7.1% in 2009).⁶⁸ In 1997, Congress established the Special Diabetes Program for Indians (SDPI) in response to the growing epidemic of diabetes in American Indian and Alaska Native (AI/AN) communities. This robust program has become the nation's most strategic and effective federal initiative to combat diabetes. SDPT funding supports over 300 diabetes treatment and prevention programs in 35 states. As illustrated in the following map, FY 2017 SDPI funding in Oklahoma supports 27 community-directed grant programs in these counties: Bryan, Caddo, Canadian, Cherokee, Comanche, Kay, Lincoln, Noble, Oklahoma, Okmulgee, Osage, Ottawa, Pawnee, Payne, Pontotoc, Pottawatomie, Seminole, Stephens and Tulsa.⁶⁹

⁶⁸ National Diabetes Fact Sheet, 2001 (http://www.cdc.gov/diabetes/pubs/pdf/ndfs_2011.pdf)

⁶⁹ [https://www.nihb.org/sdpi/docs/states/SDPI%20Fact%20Sheet%20\(Oklahoma\).pdf](https://www.nihb.org/sdpi/docs/states/SDPI%20Fact%20Sheet%20(Oklahoma).pdf)



During the 17 years of the SDPI, the grant programs have successfully implemented evidence-based and community-driven strategies to prevent and treat diabetes. AI/AN people no longer have to rely on hope alone, because now there is strong evidence the SDPI is helping to change the trajectory of the AI/AN diabetes epidemic.

Recent data show the rate of increase in diabetes prevalence is slowing in AI/AN adults (aged 20 and older), with a minimal increase from 15.2 percent to 15.9 percent from 2006 through 2012. This trend, plus the continued rise in the U.S. prevalence rate during those years, narrowed the gap in prevalence rates between AI/AN adults (15.9 percent) and U.S. adults (11.7 percent) in 2012.

Obesity in youth is an indicator of future risk for developing diabetes. Because of SDPI, the obesity rates in AI/AN children and youth aged 2-19 years has remained nearly constant from 2006 through 2012.

The rate of new cases of end stage renal disease (ESRD), due to diabetes among AI/AN people, has also decreased due to the influence of SDPI, beginning in 2000 after steadily increasing for the previous two decades. Between 2000 and 2011, incidence rates of ESRD in AI/AN people with diabetes decreased 43 percent—more than for any other racial group in the U.S. This decrease reduced dialysis costs that would have been incurred. Medicare costs per year for one patient on hemodialysis were \$87,945 in 2011. Reducing the rate of progression to kidney failure requiring dialysis translates into millions of dollars in cost savings for Medicare, Medicaid and the IHS.⁷⁰

Per Steve Rith-Najarian, M.D., Area Diabetes Consultant, Bemidji Area Indian Health Service, “American Indians and Alaska Natives have lower-extremity amputation rates 2–3 times higher than other groups. Studies in Alaska and northern Minnesota show that SDPI efforts that focus on high-risk individuals for self-care foot education, provision of protective footwear, and routine podiatry care, resulted in 20–25% reductions in amputation rates. When these

⁷⁰https://www.ihs.gov/newsroom/includes/themes/responsive2017/display_objects/documents/RepCong_2016/SDPI_2014_Report_to_Congress.pdf

efforts were augmented with comprehensive foot care practice guidelines, team coordination, patient-tracking, and outreach, amputation rates reduced 50–75%.⁷¹

These trends demonstrate the course of diabetes is changing in a positive direction for AI/AN people. SDPI is producing significantly improved health status and saving taxpayer dollars in those who participate in this community-based and culturally-appropriate diabetes program.

Recommendation

Medicare DSMT benefit

Many state Medicaid programs leverage their fee schedules against the Medicare fee schedule when determining reimbursement rates. Similarly, many state Medicaid programs model their benefit package based upon services covered by Medicare. An earlier section in this report looked at other states' Medicaid benefit for DSMT. This section will examine the Medicare benefit for DSMT.

In 1997, section 4105 of the federal Balanced Budget Act expanded Medicare coverage for outpatient diabetes education, if provided by a certified diabetes educator who meets certain quality standards recognized by the U.S. Health Care Finance Administration – now called the Centers for Medicare and Medicaid Service (CMS).

According to Medicare guidelines, diabetes is defined as a condition of abnormal blood glucose metabolism, using the following diagnostic criteria:

- Fasting glucose > 126 mg/dL on two separate occasions; or
- Two-hour post glucose challenges > 200 mg/dL on two separate occasions; or
- A random glucose test > 200 mg/dL for a person with symptoms of uncontrolled diabetes.⁷²

The Centers for Medicare and Medicaid (CMS) provides Medicare reimbursement for Diabetes Self-Management Training (DSMT) to beneficiaries under certain conditions. This benefit provides:

- Up to 10 hours of diabetes-related training within a consecutive 12-month period following the submission of the first claim for the benefit, which includes:
 - One hour for either a group or individual assessment;
 - Nine hours for group-only diabetes education;
- Up to two hours of follow-up training each year after the initial 12-month period;
- The training can be performed in any combination of 30 minute increments.

⁷¹ https://www.ihs.gov/MedicalPrograms/Diabetes/HomeDocs/Programs/SDPI/IHSDDTP_RTCfinal.pdf

⁷² Department of Health & Human Services. (2011, May). Retrieved from <http://www.cms.gov/Outreach-and-Education/Medicare-Learning-Network-MLN/MLNProducts/downloads/DiabetesSvc.pdf>

Medicare will cover additional hours of individual training based on:

- No group session is available within two months of the date the training is ordered;
- The beneficiary's physician or qualified non-physician provider (defined by CMS as a nurse practitioner, clinical nurse specialist, physician assistant, nurse midwife, clinical psychologist or clinical social worker who is managing a beneficiary's diabetes condition) documents in the beneficiary's medical record the beneficiary has special needs resulting from conditions that will hinder effective participation in a group training session;
- It is deemed necessary for the beneficiary to review additional insulin administration training.

Medicare covers outpatient DSMT for beneficiaries who:

- Recently diagnosed with type 1 or type 2 diabetes; and
- Determined to be at risk for complications from diabetes by a physician or qualified non-physician provider; or
- Were previously diagnosed with diabetes before meeting Medicare eligibility requirements, and are now eligible for coverage.⁷³

Medicare entities and healthcare providers eligible for payment of outpatient DSMT include:

- Private provider practices, including individual physicians, mid-level providers (nurse practitioner, clinical nurse specialist, physician assistant, nurse midwife, clinical psychologist, clinical social worker) and registered dietitians
- Hospital outpatient departments
- Outpatient clinics
- Skilled nursing facilities
- Durable medical equipment (DME) suppliers
- Home health agencies
- Federally qualified health centers (FQHCs)
- Pharmacies

A healthcare provider or entity interested in obtaining Medicare reimbursement for DSMT must become an accredited program provider. There are two accrediting organizations recognized by CMS: the American Diabetes Association's (ADA) Education Recognition Program (ERP), and the American Association of Diabetic Educators' (AADE) Diabetes Education Accreditation Program (DEAP). Both programs meet the ten guiding principles of the National Standards for Diabetes Self-Management Education (NSDSME). These standards were established to ensure quality evidence-based diabetes self-management education. The standards are reviewed every five years to ensure they incorporate the latest research related to diabetes.⁷⁴

To bill Medicare for DSMT, key elements must be in place. The beneficiary must have:

- A diabetes diagnosis;

⁷³ <https://qioprogram.org/sites/default/files/DSME-Toolkit.pdf>

⁷⁴ Funnell, M.M., Brown, T.L., Childs, B.P., Haas, L.B., Hosey, G.M., Jensen, B., ... Weise, M.A. (2012, January). *National Center for Biotechnology Information*. Retrieved from <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3632167/>.

- A written referral for DSMT, provided by a physician provider, or a qualified non-physician provider;
- Medicare, Medicaid or other health insurance coverage (i.e., Medigap) that pays the Medicare deductible.

The DSMT program must have:

- Accreditation from either AADE or ADA, both of which are the only recognized accrediting organizations by CMS;
- A partnership with a Medicare provider able to bill the Medicare program, or be a Medicare provider who is able to bill;
- Recognition by CMS of the accredited Medicare provider location where DSMT will be provided;
- A program for maintaining documentation of the beneficiary's diabetes diagnosis in his/her medical record;
- Ability to verify a beneficiary's part B coverage for DSMT;
- Ability to verify the beneficiary has already met the annual deductible;
- Ability to determine whether the beneficiary has Medicare supplemental coverage through Medicaid or a private insurance policy;
- Ability to collect the 20% coinsurance from the beneficiary or supplemental coverage, as applicable.⁷⁵

Budget

The Current Procedural Terminology (CPT) code set is a medical code set developed and maintained by the American Medical Association through the CPT Editorial Panel.⁷⁶ The CPT code set (copyright protected by the AMA) describes medical, surgical, and diagnostic services and is designed to communicate uniform information about medical services and procedures among physicians, coders, patients, accreditation organizations, and payers for administrative, financial, and analytical purposes. New editions are released each October.⁷⁷

The two CPT codes used for diabetes self-management training are G0108, diabetes outpatient self-management training services, individual, per 30 minutes, and G0109, diabetes outpatient self-management training services, group (2 or more), per 30 minutes.

As stated earlier, many state Medicaid programs leverage their fee schedules against the Medicare fee schedule when determining reimbursement rates. The Oklahoma Medicaid provider fee schedule is currently set at 89.17% of Medicare rates⁷⁸; G0108 would currently pay at \$46.42 per 30 minutes, and G0109 would currently pay at \$12.62 per 30 minutes.

The number of people with type 2 diabetes who receive DSMT, despite its proven benefits, is low. For example, only 6.8% of individuals with newly diagnosed type 2 diabetes who have private health insurance participate in DSMT

⁷⁵ <https://qioprogram.org/sites/default/files/DSME-Toolkit.pdf>

⁷⁶ [AMA \(CPT\) CPT Process Archived](#) May 11, 2016, at the [Wayback Machine](#).

⁷⁷ Laura Southard Durham (1 June 2008). [Lippincott Williams and Wilkins' Administrative Medical Assisting](#). Lippincott Williams and Wilkins. pp. 2-. ISBN 978-0-7817-9789-4. Retrieved 26 May 2011.

⁷⁸ http://www.okoha.com/OHA/Hotline/2018/Sept_18/OHCA_to_increase_provider_reimbursement_rates_for_first_time_since_2009.aspx

within 12 months of their diagnosis. This participation percentage decreases for Medicare participants, with only 4% of beneficiaries receiving DSMT.⁷⁹

This failure to receive DSMT may be due to several factors, including affordability. Reimbursement for DSMT is a major factor influencing affordability. While coverage of DMST is growing among private insurance providers, not all public insurance providers reimburse for DSMT.⁸⁰ Medicare recipients were reimbursed for DSMT after the Balanced Budget Act of 1997.⁸¹ However, the Medicaid reimbursement policy for DSMT is determined at the state level. More than half of states do not cover DSMT under Medicaid.⁸² This lack of coverage poses a substantial threat to the health of those persons with diabetes who are insured through Medicaid (i.e., those who have low income or who are blind or disabled). This public health challenge is compounded by the disproportionately high burden of diabetes among persons in low socioeconomic strata.

Many DSMT programs report lack of transportation as a common barrier to sustained participation in this evidence-based program. If diabetes self-management training were a covered benefit under Oklahoma Medicaid, enrollees would have access to the SoonerRide transportation assistance program. This capitated benefit allows transport for the member, and up to three family members to appointments for healthcare services that are covered by SoonerCare. The provision would support spousal/parent/family involvement in DSMT which promotes better success at sustaining healthy lifestyle changes.

If DSMT is added as a new benefit for SC members with diabetes, the OHCA estimates a 4% participation initially, based on the Medicare utilization rate cited above⁷⁶.

Federal Medical Assistance Percentages (FMAP) are the percentage rates used to determine the matching funds rate allocated annually to certain medical and social service programs in the United States of America. Funds eligible for FMAP match include Medicaid. State governments use FMAP percentages to determine the federal government's contribution to specific state administered programs and assess their related budgetary outlays. Pursuant to Section 1905(b) of the Social Security Act, the Secretary of Health and Human Services calculates the Federal Medical Assistance Percentages each year. This calculation is based upon a formula which compares individual state income to the continental United States income in order to determine ratios the federal government will utilize in assisting each state under the Act.⁸³ Currently, Oklahoma's FMAP rate is at 62.3%.

AI/ANs have limited access to employer-sponsored coverage because they have a lower employment rate and those working often are employed in low-wage jobs and industries who typically do not offer health coverage. Medicaid and other public coverage help fill this gap. Medicaid provides coverage to more than one in four (27%) nonelderly AIAN adults and half of AIAN children.⁸⁴ The federal government covers 100% of costs for services provided to AIAN Medicaid enrollees through an IHS- or Tribally-operated facility.⁸⁵ This 100% matching rate reflects a policy judgment

⁷⁹ Li, R, Shrestha, SS, Lipman, R, Burrows, NR, Kolb, LE, Rutledge, S. Diabetes self-management and training among privately insured persons with newly diagnosed diabetes-United States, 2011-2012. *MMWR Morb Mortality Wkly Rep.* 2014;63: 1045-1049.

⁸⁰ American Association of Diabetes Educators. *The Guide to Reimbursement.* Chicago, IL. American Association of Diabetes Educators; 2003.

⁸¹ Balanced Budget Act of 1997. §4105 (1998).

⁸² American Association of Diabetes Educators. *The Guide to Reimbursement.* Chicago, IL. American Association of Diabetes Educators; 2003.

⁸³ [Medicaid Home - Medicaid.gov](https://www.hhs.gov/medicaid/). hhs.gov.

⁸⁴ <https://www.kff.org/medicaid/issue-brief/medicaid-and-american-indians-and-alaska-natives/>

⁸⁵ Section 1905(b) of the Social Security Act (third sentence).

that states should not have to contribute state general funds to the cost of care provided by a federal facility, whether operated by the IHS or on its behalf by a Tribe.⁸⁶ In 2016, the Centers for Medicare and Medicaid Services (CMS) released guidance expanding the scope of services considered “received through” an IHS/Tribal facility that may qualify for 100% federal match.⁸⁷ Expanding the scope of services that can qualify for 100% federal match provides potential increased savings to states and incentives to increase access to care for AIANs and expand capacity of IHS and Tribal services. Any DSMT services provided to AIAN constituents who are enrolled in SoonerCare would be eligible for 100% federal match and would therefore be at no cost to the state.

Following the Medicare benefit allowance for DSMT, which permits up to 10 hours DSMT for first year, and two hours yearly follow-up thereafter, the cost of this new benefit is estimated at \$218,214 total dollars, with \$84,165 as the State share (based on 62.3% FMAP). This sum is based on 4% participation of 52,744 SoonerCare members with a diabetes diagnosis.

Savings in diabetes-related costs projected from observed pre/post HbA1c levels are estimated at \$415 per DSMT program completer over three years (n = 157). This largely offsets the program costs of \$335 per initial program participant (n = 212), resulting in a net cost per participant of \$28 for the DSMT training over three years. Further, over ten years, DSMT participation is projected to reduce diabetes-related mortality by 9% and microvascular disease events by 15% among those who complete the training. Together, DSMT and MNT can reduce resource utilization among Medicaid recipients with diabetes within one year, and will likely improve diabetes outcomes over time at little or no incremental cost.⁸⁸

Forecast

Diabetes is a chronic disease requiring a person with the disease to make a multitude of daily self-management decisions and perform complex care activities. Diabetes self-management training and support provides the foundation to help people with diabetes to navigate these decisions and activities and has been shown to improve health outcomes.⁸⁹

Reduced health care use was seen (i.e., decreased hospital admissions and emergency department visits) within a one-year follow-up period in Arkansas pilot project referenced earlier.⁹⁰ The cost of a DSMT benefit for SoonerCare members with diabetes would likely be offset by short- and long-term savings in health care use.

The cost of providing health care services for SoonerCare members with diabetes and associated co-morbidities, on average, was \$14,864 per member in SFY2017. The average reimbursement for members with diabetes without comorbidities was \$5,590 per member. The average reimbursement increases by 278.3% for members with diabetes who have six or more comorbidities. A linear regression model shows that for every increase in the number of comorbidities the total reimbursement will increase on average \$2,379 per year per member with diabetes.

⁸⁶ This 100% federal matching rate is separate from the 100% federal matching provided to the “newly eligible” ACA expansion population and will remain in place when the 100% federal matching rate provided for all new eligibles begins to phase down.

⁸⁷ Centers for Medicare and Medicaid Services, op cit.

⁸⁸ <https://professional.diabetes.org/abstract/cost-effectiveness-diabetes-education-program-medicaid-patients>

⁸⁹ Brunisholz, KD, Briot, P, Hamilton, S, et al. Diabetes self-management education improves quality of care and clinical outcomes determined by a diabetes bundle measure. *J Multidisp Healthc.* 2014; 7:533-542.

⁹⁰ Balamurugan, A., Ohsfeldt, R., Hughes, T., Phillips, M. Diabetes Self-management Education Program for Medicaid Recipients. Vol 32, no 6; Nov/Dec 2006; 893-900.

Therefore, early intervention with SoonerCare members to improve their health can financially benefit the agency.⁹¹ The benefits of DSMT would be realized at the state level as well as constituents with diabetes who are enrolled in SoonerCare gain knowledge and skills to better manage their condition and become more efficient consumers of state health care resources.

Some chronic diseases are preventable and their progression can be delayed through early identification, lifestyle changes and/or clinical treatment. As a publicly-funded state agency, and one of the largest payers of health care in Oklahoma, it is important that SoonerCare members with a diabetes diagnosis are educated about self-management and understand the importance of healthy lifestyles as well as the risks of complex health issues. The more complex a member's health becomes, the more it costs to provide the necessary health care services with each additional comorbidity. Therefore, the OHCA and the State of Oklahoma could benefit from adopting diabetes self-management training as a covered benefit for SoonerCare members with diabetes to help educate and promote managing healthy lifestyles.

People with diabetes can live well by being thoughtful about the lifestyle choices they make and learning effective techniques for managing their disease. Controlling diabetes significantly reduces the risk of complications, slows the progression of the disease and improves health outcomes. Control is accomplished through a combination of diabetes self-management training and clinical preventive services, as well as collaboration between the person with diabetes and the health care provider.

⁹¹ OHCA Diabetes Analysis SFY 2017;
<http://sharepoint/sites/COMM/reporting/Shared%20Documents/Completed%20Analysis/Diabetes%20Analysis%20SFY2017.pdf>

Appendix I

Diabetes Self-Management Education
Prepared for the State of Oklahoma on August 20, 2018

Evidence-Based Analysis

Diabetes self-management education (DSME) is an evidence-based, collaborative process intended to facilitate the knowledge and capacity for an individual to effectively manage the complexity of daily diabetes self-care. The objective of DSME is to support informed decision making, self-care behaviors, problem solving, and active collaboration with the healthcare team.⁹² The long-term goal of DSME is improvement in clinical outcomes (glycemic control and improved hemoglobin A1c [HbA1c]), overall health status, and quality of life (QOL). DSME is patient-centered, addressing the individuality of the patient; designed to appreciate personal preferences, needs, and values. The comprehensive education must be delivered in the context of health literacy, cultural needs, financial status, caregiver support, and health history. DSME may also be referred to as diabetes self-management training (DSMT) or diabetes self-management education and training (DSMET). Seven specific self-care areas are covered, including healthy eating, activity level, monitoring, medications, problem solving, coping skills, and reducing risks.⁹³ Diabetes self-management support (DSMS) refers to the support that is required for implementing and sustaining coping skills and behaviors needed to self-manage on an ongoing basis.⁹⁴

Evidence-based practice is defined as the practice of healthcare in which the practitioner systematically finds, appraises, and uses the most current and valid research findings as the basis for clinical decisions. The term is sometimes used to denote evidence-based medicine specifically but can also include other specialties, such as evidence-based nursing, pharmacy, and dentistry. There are multiple methods of performing research to ascertain information to support clinical decision making. Those include the following:

- **Case series and case reports** consist of collections of reports on the treatment of individual patients or a report on a single patient. Because they are reports of cases and use no control groups to compare outcomes, they have little statistical validity.
- **Case control studies** are studies in which patients who already have a specific condition are compared with people who do not have the condition. The researcher looks back to identify factors or exposures that might be associated with the illness. They often rely on medical records and patient recall for data collection. These types of studies are often less reliable than randomized controlled trials and cohort studies because showing a statistical relationship does not mean that 1 factor necessarily caused the other.
- **Cohort studies** identify a group of patients who are already taking a particular treatment or have an exposure, follow them forward over time, and then compare their outcomes with a similar group that has not been affected by the treatment or exposure being studied. Cohort studies are observational and not as reliable as randomized controlled studies, since the 2 groups may differ in ways other than in the variable under study.

⁹² National Association of Chronic Disease Directors

⁹³ Ibid

⁹⁴ Powers et al. (2015) Diabetes Self-Management Education and Support in Type 2 Diabetes: A Joint Position Statement of the American Diabetes Association, the American Association of Diabetes Educators, and the Academy of Nutrition and Dietetics

- **Randomized controlled clinical trials** are carefully planned experiments that introduce a treatment or exposure to study its effect on real patients. They include methodologies that reduce the potential for bias (randomization and blinding) and that allow for comparison between intervention groups and control (no intervention) groups. A randomized controlled trial is a planned experiment and can provide sound evidence of cause and effect.
- **Systematic reviews** focus on a clinical topic and answer a specific question. An extensive literature search is conducted to identify studies with sound methodology. The studies are reviewed, assessed for quality, and the results summarized according to the predetermined criteria of the review question.
- **Meta-analysis** will thoroughly examine a number of valid studies on a topic and mathematically combine the results using accepted statistical methodology to report the results as if it were 1 large study.
- **Cross-sectional studies** describe the relationship between diseases and other factors at 1 point in time in a defined population. Cross-sectional studies lack any information on timing of exposure and outcome relationships and include only prevalent cases. They are often used for comparing diagnostic tests. Studies that show the efficacy of a diagnostic test are also called prospective, blind comparison with a gold standard study. This is a controlled trial that looks at patients with varying degrees of an illness and administers both diagnostic tests—the test under investigation and the “gold standard” test—to all of the patients in the study group. The sensitivity and specificity of the new test are compared with that of the gold standard to determine potential usefulness.
- **Qualitative research** answers a wide variety of questions related to human responses to actual or potential health problems. The purpose of qualitative research is to describe, explore, and explain the health-related phenomena being studied.
- **Retrospective cohort (or historical cohort)** follows the same direction of inquiry as a cohort study. Subjects begin with the presence or absence of an exposure or risk factor and are followed until the outcome of interest is observed. However, this study design uses information that has been collected in the past and kept in files or databases. Patients are identified for exposure or non-exposures and the data is followed forward to an effect or outcome of interest.⁹⁵

There is a large body of evidence pertaining to DSME. Heterogeneous studies evaluated the effectiveness of various interventions; duration and frequency of goal-directed interactions; personalization of training, including cultural modifications, setting, and incorporation of technology. Research suggests that DSME can positively affect glycemic control, generally measured as HbA1C. Secondary benefits may include a reduction in diabetic-related complications, an improvement in dietary patterns, an adoption of a more physically active lifestyle, and an overall sense of empowerment and self-control over the disease with decreased diabetes-related stress and depression. Some studies indicate that post-DSME individuals are more likely to adopt healthy lifestyle choices for diabetics, including influenza and pneumococcal vaccinations and regular foot examinations. Diabetics armed with enhanced knowledge and self-care skills may place a lower demand on healthcare expenditures related to diabetes-related complications. Research suggests that better outcomes are reported when interventions are longer (4-10 weeks) and include follow-up support. Personalized, culturally and age-appropriate interventions that address psychosocial issues and incorporate behavioral strategies promote changes that improve clinical outcomes. Incorporation of technologies (including mobile telephone apps, computer-based training, and

⁹⁵ Introduction to Evidence-Based Practice: Type of Study (Nov 22, 2016); <http://guides.mcclibrary.duke.edu/c.php?g=158201&p=1036068>

telehealth support) are also yielding favorable clinical trends, especially in resource-strained healthcare systems.

Below are excerpts from national guidelines and multiple studies with the abstract citations. A full citation list for the articles, studies, and guidelines reviewed is available in Appendix I.

EXCERPTS FROM NATIONAL GUIDELINES (reverse chronological order)

General Diabetes Self-management and Education (Institute for Clinical Systems Improvement, 2018)

Diabetes self-management or education by a qualified healthcare professional (which may include a clinician, dietician, nursing staff, and pharmacist) should be offered to patients diagnosed with T2DM [type 2 diabetes mellitus].

Diabetes self-management education and support improves patient understanding of the disease, empowers patients to manage their care and reduces distress. It is cost effective and has been shown to improve knowledge, self-efficacy and self-care behavior skills, and modestly improves glycemic control.

Mobile Health Applications for Self-management of Diabetes (Agency for Healthcare Research and Quality, May 2018)

Although there is limited evidence that commercially available mobile apps improve diabetes-related outcomes, patients are downloading and using them anyway. Strong evidence can help people make informed choices, but when evidence is limited, patients who use these apps are essentially experimenting on themselves. Considering this, clinicians should consider asking their patients if they use apps in their self-management, and determine if the information provided by these apps adheres to current guidance for diabetes self-management. Patients should be aware that there is little evidence supporting the effectiveness of these apps, and should be wary of claims that these apps will improve their outcomes if not supported by evidence.

2017 National Standards for Diabetes Self-Management Education and Support (Beck et al., 2017)

- Standard 1. The provider(s) of DSMES services will define and document a mission statement and goals. The DSMES services are incorporated within the organization—large, small, or independently operated.
- Standard 2. The provider(s) of DSMES services will seek ongoing input from valued stakeholders and experts to promote quality and enhance participant utilization.
- Standard 3. The provider(s) of DSMES services will evaluate the communities they serve to determine the resources, design, and delivery methods that will align with the population's need for DSMES services.
- Standard 4. A quality coordinator will be designated to ensure implementation of the Standards and oversee the DSMES services. The quality coordinator is responsible for all components of DSMES, including evidence based practice, service design, evaluation, and continuous quality improvement.
- Standard 5. At least one of the team members responsible for facilitating DSMES services will be a registered nurse, registered dietitian nutritionist, or pharmacist with training and experience pertinent to DSMES, or be another health care professional holding certification as a diabetes educator (CDE) or Board Certification in Advanced Diabetes Management (BC-ADM). Other health care workers or diabetes paraprofessionals may contribute to DSMES services with

appropriate training in DSMES and with supervision and support by at least one of the team members listed above.

- Standard 6. A curriculum reflecting current evidence and practice guidelines, with criteria for evaluating outcomes, will serve as the framework for the provision of DSMES. The needs of the individual participant will determine which elements of the curriculum are required.
- Standard 7. The DSMES needs will be identified and led by the participant with assessment and support by one or more DSMES team members. Together, the participant and DSMES team member(s) will develop an individualized DSMES plan.
- Standard 8. The participant will be made aware of options and resources available for ongoing support of their initial education, and will select the option(s) that will best maintain their self-management needs.
- Standard 9. The provider(s) of DSMES services will monitor and communicate whether participants are achieving their personal diabetes self-management goals and other outcome(s) to evaluate the effectiveness of the educational intervention(s), using appropriate measurement techniques.
- Standard 10. The DSMES services quality coordinator will measure the impact and effectiveness of the DSMES services and identify areas for improvement by conducting a systematic evaluation of process and outcome data.

Management of Diabetes: a National Clinical Guideline Scottish Intercollegiate Guidelines Network, 2010, updated 2017)

- Any programme should have an underpinning philosophy, should be evidence based, and suit the needs of the individual. The programme should have specific aims and learning objectives, and should support the development of self-management attitudes, beliefs, knowledge and skills for the learner, their family and carers.
- The programme should have a structured curriculum which is theory driven, evidence based, resource effective, have supporting materials and be written down.
- It should be delivered by trained educators who have an understanding of the educational theory appropriate to the age and needs of the programme learners, and be trained and competent in delivery of the principles and content of the specific programme they are offering.
- The programme should be quality assured, be reviewed by trained, competent, independent assessors and be assessed against key criteria to ensure sustained consistency.
- The outcomes from the programme should be regularly audited.

VA/DoD Clinical Practice Guideline the Management of Type 2 Diabetes Mellitus in Primary Care (Veterans Administration/Department of Defense, 2017)

Diabetes Self-Management Education (DSME) and Diabetes Self-Management Support (DSMS) provide a framework involving a collaborative, on-going, interactive process focusing on the patient with DM to gain knowledge, modify behavior, and successfully manage the disease. The process requires ongoing interactive information-sharing between the diabetes team and the patient.

The goal of diabetes education in DM is to ensure the patient has sufficient knowledge and skills to achieve the treatment goals they agreed upon with their healthcare provider.

We recommend shared decision-making to enhance patient knowledge and satisfaction.

We recommend that all patients with diabetes should be offered ongoing individualized diabetes self-management education via various modalities tailored to their preferences, learning needs and abilities based on available resources.

We suggest offering one or more types of bidirectional telehealth interventions (typically health communication via computer, telephone or other electronic means) involving licensed independent practitioners to patients selected by their primary care provider as an adjunct to usual patient care.

Health coaching and motivational interviewing strategies can assist clinicians to understand patients' perceptions, values and beliefs regarding their condition, treatment and self-management options, particularly when patients appear to be reluctant to fully participate in decisions and care.

Diabetes Self-Management Education and Support in Type 2 Diabetes: A Joint Position Statement of the American Diabetes Association, the American Association of Diabetes Educators, and the Academy of Nutrition and Dietetics (Powers et al., 2015)

It is the position of the American Diabetes Association (ADA) that all individuals with diabetes receive DSME/S at diagnosis and as needed thereafter.

The goals of the position statement are ultimately to improve the patient experience of care and education, to improve the health of individuals and populations, and to reduce diabetes-associated per capita health care costs.

There are four critical times to assess, provide, and adjust DSME/S: 1) with a new diagnosis of type 2 diabetes, 2) annually for health maintenance and prevention of complications, 3) when new complicating factors influence self-management, and 4) when transitions in care occur.

It is recommended that all health care providers and/or systems develop processes to guarantee that all patients with type 2 diabetes receive DSME/S services. All patients should be assessed and referred for nutritional, educational and emotional health needs.

DSME/S should be provided through patient engagement, information sharing, psychosocial and behavioral support, integration with other therapies, and coordinated care.

In order to be eligible for DSME/S reimbursement, DSME/S programs must be recognized or accredited by a CMS-designated national accreditation organization (NAO). Current NAOs are the ADA and the American Association of Diabetes Educators (AADE). Both bodies assess the quality of programs using criteria established by the National Standards for DSME/S. Currently, CMS reimburses for 10 program hours of initial diabetes education and 2 hours in each subsequent year. Referrals for DSME/S must be made by a health care provider and include specified indicators, such as diabetes type, treatment plan, and reason for referral.

Type 1 Diabetes in Adults: Diagnosis and Management (National Institute for Health and Care Excellence, 2015)

One of the most important roles of healthcare professionals providing diabetes care to adults with type 1 diabetes is to ensure that systems are in place to provide informed, expert support, education and training for insulin users, as well as a range of other more conventional biomedical services and interventions.

The evidence that sustained near-normoglycaemia substantially reduces the risk of long-term complications in adults with type 1 diabetes is unequivocal. Current methods for achieving such blood glucose control require skills in glucose monitoring and insulin dose adjustment, injection technique and site management, and the ability to use such self-management skills on a day-to-day basis life-long.

Offer carbohydrate-counting training to adults with type 1 diabetes as part of structured education programmes for self-management.

Knowledge and self-management skills should be considered in optimizing insulin therapy, managing hyper- and hypo-glycemia, and ketone monitoring.

Type 2 Diabetes in Adults: Management (National Institute for Health and Care Excellence, 2015)

Necessary lifestyle changes, the complexities and possible side effects of therapy make patient education and self-management important aspects of diabetes care. This guideline contains recommendations for managing type 2 diabetes in adults, and focuses on patient education, dietary advice, managing cardiovascular risk, managing blood glucose levels, and identifying and managing long-term complications.

Offer structured education to adults with type 2 diabetes and/or their family members or carers (as appropriate) at and around the time of diagnosis, with annual reinforcement and review.

Explain to people and their carers that structured education is an integral part of diabetes care.

Ensure that any structured education programme for adults with type 2 diabetes includes the following components:

- It is evidence-based, and suits the needs of the person.
- It has specific aims and learning objectives, and supports the person and their family members and carers in developing attitudes, beliefs, knowledge and skills to self-manage diabetes.
- It has a structured curriculum that is theory-driven, evidence-based and resource-effective, has supporting materials, and is written down.
- It is delivered by trained educators who have an understanding of educational theory appropriate to the age and needs of the person, and who are trained and competent to deliver the principles and content of the programme.
- It is quality assured, and reviewed by trained, competent, independent assessors who measure it against criteria that ensure consistency.
- The outcomes are audited regularly.

EXCERPTS FROM PROFESSIONAL JOURNALS (reverse chronological order)

The excerpts included below are limited to queries specific to diabetes self-management education, training, and/or support within the time frame 2008 to 2018 (approximately). The query was limited to randomized controlled trials, systematic reviews, or meta-analyses published in the peer-reviewed literature or in the grey literature by a reputable organization. Articles were selected for inclusion if they were published in English and assessed studies conducted in adult humans with diabetes. Studies were selected that measured outcomes related to effect on glycemic control, health-related quality of life, or cost-effectiveness. In addition, studies that evaluated different features of a DSME program, including duration of program, personalization or cultural modifications, and incorporation of technologies, were also retrieved.

Cunningham AT, Crittendon DR, White N, Mills GD, Diaz V and LaNoue MD (May, 2018) The effect of diabetes self-management education on HbA1c and quality of life in African-Americans: A systematic review and meta-analysis. *BMC Health Serv Res.* 2018; May 16;18(1):367. *BMC Health Serv Res.* 2018; May 16;18(1):367 DOI: 10.1186/s12913-018-3186-7

BACKGROUND: Type 2 diabetes presents a major morbidity and mortality burden in the United States. Diabetes self-management education (DSME) is an intervention associated with improved hemoglobin A1c (HbA1c) and quality of life (QOL) and is recommended for all individuals with type 2 diabetes. African Americans have disproportionate type 2 diabetes morbidity and mortality, yet no prior meta-analyses have examined DSME outcomes exclusively in this population. This systematic review and meta-analysis examined the impact of DSME on HbA1c and QOL in African Americans compared with usual care. **METHODS:** Randomized controlled trials, cluster-randomized trials, and quasi-experimental interventions were included; 352 citations were retrieved, 279 abstracts were reviewed, and 44 full-text articles were reviewed. *Fourteen studies* were eligible for systematic review and 8 for HbA1c meta-analysis; QOL measures were too heterogeneous to pool. Heterogeneity of HbA1c findings was assessed with Cochran's Q and I(2). **RESULTS:** HbA1c weighted mean difference between intervention and usual care participants was not significant: -0.08% [-0.40 to 0.23]; $\chi^2(2) = 84.79$ ($P < 0.001$), $I^2 = 92\%$, ($n = 1630$). Four of 5 studies measuring QOL reported significant improvements for intervention participants. **CONCLUSIONS:** Meta-analysis results showed *nonsignificant effect of DSME on HbA1c in African Americans. QOL did show improvement and is an important DSME outcome* to measure in future trials. Further research is needed to understand the effectiveness of DSME on HbA1c in this population. The variation in DSME settings, delivery methods, intensity, and contact hours is similar to the findings of other DSME meta analyses. The high heterogeneity of HbA1c changes ($I^2 = 92\%$) may be a result of the substantial variations in these intervention characteristics. Notably, in a subgroup analysis, *culturally adapted DSME interventions did not yield better HbA1c results than nonculturally adapted DSME*. Prior DSME meta-analyses have not compared culturally with nonculturally tailored DSME. More detailed guidelines are needed for the development and evaluation of culturally adapted DSME in specific populations. The included studies in this meta-analysis did not explicitly address social and systems-level contributors to diabetes disparities in African Americans, such as socioeconomic status, racial discrimination, or mistrust in the medical system. *When developing DSME in the United States and globally, educators should be sensitive to the experiences of marginalized groups and how these experiences can impact diabetes self-management.*

Wu IXY, Kee JCY, Threapleton DE, Ma RCW, Lam VCK, Lee EKP, Wong SYS and Chung VCH (June, 2018) Effectiveness of smartphone technologies on glycaemic control in patients with type 2 diabetes: Systematic review with meta-analysis of 17 trials. *Obes Rev.* 2018;Jun;19(6):825-838 DOI: 10.1111/obr.12669

Patient education and behavioral interventions for self-management of type 2 diabetes mellitus (T2DM) are effective but place demands on manpower resources. This systematic review aimed to *investigate the effectiveness of smartphone technologies (STs) for improving glycaemic control among T2DM patients.* CENTRAL, MEDLINE, Embase, CINAHL, and ScienceDirect were searched through December 2016. Randomized controlled trials comparing STs with usual diabetes care among T2DM patients and reporting change in glycated hemoglobin (HbA1c) level were included. *Seventeen trials (2225 participants)* were included. There was a significant reduction in HbA1c (pooled weighted mean difference: -0.51%; 95% confidence interval, -0.71% to -0.30%; $P < 0.001$), favoring ST intervention. The pooled weighted mean difference was -0.83% in patients with T2DM < 8.5 years and -0.22% in patients with T2DM \geq 8.5 years, with significant subgroup difference ($P = 0.007$). No subgroup differences were found among different follow-up durations, trial locations, patients' age, healthcare

provider contract time, baseline body mass index, and baseline HbA1c. *Compared with usual diabetes care, STs improved glycemic control among T2DM patients, especially for patients at earlier disease stages (duration of diagnosis < 8.5 years).* Results from the subgroup analysis of patients in different age groups suggest that *ST interventions may provide a similar benefit to both younger (age < 55 years) or older (age ≥ 55 years) T2DM patients.* STs could be an *effective adjunct to exercise for controlling HbA1c, or more generally to augment lifestyle modification efforts* among DM patients. STs could be a *complement or alternative to labor-intensive patient education and behavioral interventions*, but more studies on up-to-date technologies are needed.

Pirbaglou M, Katz J, Motamed M, Pludwinski S, Walker K and Ritvo P (January, 2018) Personal health coaching as a type 2 diabetes mellitus self-management strategy: A systematic review and meta-analysis of randomized controlled trials. *Am J Health Promot. 2018;Jan 1:890117118758234 DOI: 10.1177/0890117118758234*

OBJECTIVE: Personal health coaching (PHC) programs have become increasingly utilized as a type 2 diabetes mellitus (T2DM) self-management intervention strategy. This article evaluates the impact of PHC programs on glycemic management and related psychological outcomes. **DATA SOURCES:** Electronic databases (CINAHL, MEDLINE, PubMed, PsycINFO, and Web of Science). **STUDY INCLUSION AND EXCLUSION CRITERIA:** Randomized controlled trials (RCT) published from January 1990 to September 2017 and focused on the effectiveness of PHC interventions in adults with T2DM. **DATA EXTRACTION:** Using prespecified format guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses framework. **DATA SYNTHESIS:** Quantitative synthesis for primary (i.e., hemoglobin A1c [HbA1c]) and qualitative synthesis for selected psychological outcomes. **RESULTS:** Meta-analyses of **22 selected publications** showed PHC interventions favorably impact HbA1c levels in studies with follow-up at ≤ 3 months (-0.32% [95% confidence interval, CI, -0.55 to -0.09%]), 4 to 6 months (-0.50% [95% CI, -0.65 to -0.35%]), 7 to 9 months (-0.66% [95% CI, -1.04 to -0.28%]), and 12 to 18 months (-0.24% [95% CI, -0.38 to -0.10%]). Subsequent subgroup analyses led to no conclusive patterns, except for greater magnitude of effect size in studies with conventional (2-arm) RCT design. **CONCLUSIONS:** The *Personal Health Coaching appears effective in improving glycemic control. Further research is required to assess the effectiveness of specific program components, training, and supervision approaches and to determine the cost-effectiveness of PHC interventions.* Amidst the diverse T2DM self-management interventions (i.e., individual or group-based educational programming, in-person or remote-access programming, structured, or individually tailored programming), this article supports PHC effectiveness. *Programs that extend for 4 to 6 months appear most effective*, but additional investigation is required to establish optimal intensity (e.g., number of session per week/month) and optimal program duration. Altogether, there is empirical support for PHC as a patient-centered, collaborative approach to T2DM self-management.

Pamungkas RA, Chamroonsawasdi K and Vatanasomboon P (September, 2017) A systematic review: Family support integrated with diabetes self-management among uncontrolled Type II diabetes mellitus patients. *Behav Sci (Basel). 2017;Sep 15;7(3). DOI: 10.3390/bs7030062*

The rate of type 2 diabetes mellitus (T2D) is dramatically increasing worldwide. Continuing diabetes mellitus (DM) care needs effective self-management education and support for both patients and family members. This study aimed to *review and describe the impacts of diabetes mellitus self-management education (DSME) that involve family members on patient outcomes related to patient health behaviors and perceived self-efficacy* on self-management such as medication adherence; blood glucose monitoring; diet and exercise changes; health outcomes, including psychological well-being and self-efficacy; and physiological markers, including body mass index, level of blood pressure, cholesterol level, and glycemic

control. Three databases, PubMed, CINAHL, and Scopus were reviewed for relevant articles. The search terms were "type 2 diabetes," "self-management," "diabetes self-management education (DSME)," "family support," "social support," and "uncontrolled glycaemia." Joanna Briggs Institute (JBI) guidelines were used to determine which studies to include in the review. The study included details of the family support components of DSME intervention and the impacts of these interventions on improving the health outcomes of patients with uncontrolled glycemia. A total of **22 intervention studies** were identified. These studies involved different DSME strategies, different components of family support provided, and different health outcomes to be measured among T2D patients. Overall, family support had a positive impact on healthy diet, increased perceived support, higher self-efficacy, improved psychological well-being and better glycemic control. ***The combination of didactic with other methods such as participatory learning, goal setting, action planning, and problem-solving had a positive impact on health outcomes and improved health behaviors. This systematic review found evidence that DSME with family support improved self-management behaviors and health outcomes among uncontrolled glycemia T2D patients.*** The findings suggest ***DSME models that include family engagement can be a useful direction for improving diabetes care.*** The ***follow-up method is an essential*** component in diabetes self-management among patients with chronic conditions. Generally, follow-up methods are categorized into 4 strategies, including ***computer-based, phone call, short message service (mail), and home visits.*** ***The combination of telephone and face-to-face follow-up is very effective*** and significantly improves health outcomes by increasing knowledge and self-efficacy to carry out self-management behaviors.

Greenwood DA, Gee PM, Fatkin KJ and Peoples M (September, 2017) **A systematic review of reviews evaluating technology-enabled diabetes self-management education and support.** *J Diabetes Sci Technol.* 2017;Sep;11(5):1015-1027 DOI: 10.1177/1932296817713506.

BACKGROUND: Since the introduction of mobile phones, technology has been increasingly used to enable diabetes self-management education and support. This timely systematic review ***summarizes how currently available technology impacts outcomes for people living with diabetes.*** **METHODS:** A systematic review of high-quality review articles and meta-analyses focused on utilizing technology in diabetes self-management education and support services was conducted. Articles were included if published from January 2013 to January 2017. **RESULTS:** ***Twenty-five studies*** were included for analysis. The majority evaluated the use of mobile phones and secure messaging. Most studies described healthy eating, being active, and metabolic monitoring as the predominant self-care behaviors evaluated. Eighteen of 25 reviews reported significant reduction in A1c as an outcome measure. Four key elements emerged as essential for improved A1c: (1) communication, (2) patient-generated health data, (3) education, and (4) feedback. **CONCLUSION:** ***Technology-enabled diabetes self-management solutions significantly improve A1c.*** The most effective interventions incorporated all the components of a technology-enabled self-management feedback loop that connected people with diabetes and their healthcare team using 2-way communication, analyzed patient-generated health data, tailored education, and individualized feedback. The evidence from this systematic review indicates that organizations, policy makers, and payers should consider integrating these solutions in the design of diabetes self-management education and support services for population health and value-based care models. With the widespread adoption of mobile phones, ***digital health solutions that incorporate evidence-based, behaviorally designed interventions can improve the reach and access to diabetes self-management education and ongoing support.*** Entities that provide in-person DSMES services should consider finding cost-effective ways to incorporate technology-enabled solutions as part of their existing services to afford individualized ongoing support, monitoring of participant progress, and to provide data for improving quality of care and population health management.

Teljeur C, Moran PS, Walshe S, Smith SM, Cianci F, Murphy L, Harrington P and Ryan M (August, 2017) Economic evaluation of chronic disease self-management for people with diabetes: A systematic review. *Diabet Med.* 2017;Aug;34(8):1040-1049 DOI: 10.1111/dme.13281

AIMS: To systematically review the evidence on the costs and cost-effectiveness of self-management support interventions for people with diabetes. **BACKGROUND:** Self-management support is the provision of education and supportive interventions to increase patients' skills and confidence in managing their health problems, potentially leading to improvements in HbA1c levels in people with diabetes. **METHODS:** Randomized controlled trials, observational studies, or economic modelling studies were eligible for inclusion in the review. *The target population was adults with diabetes.* Interventions had to have a substantial component of self-management support and be compared with routine care. Study quality was evaluated using the Consensus on Health Economic Criteria and International Society of Pharmacoeconomic Outcomes Research questionnaires. A narrative review approach was used. **RESULTS:** A total of *16 costing and 21 cost-effectiveness studies of a range of self-management support interventions were identified.* There was reasonably consistent evidence across 22 studies evaluating education self-management support programs suggesting these interventions are cost-effective or superior to usual care. *Telemedicine-type interventions were more expensive than usual care and potentially not cost-effective.* There was insufficient evidence regarding the other types of self-management interventions, including pharmacist-led and behavioral interventions. The identified *studies were predominantly of poor quality,* with outcomes based on short-term follow-up data and study designs at high risk of bias. **CONCLUSIONS:** *Self-management support education programs may be cost effective.* There was limited evidence regarding other formats of self-management support interventions. The poor quality of many of the studies undermines the evidence base regarding the economic efficiency of self-management support interventions for people with diabetes. When assessing the applicability of the economic evidence, it is important to consider not just clinical effectiveness, but also the costs. The cost per person of interventions was highly variable, creating uncertainty about the typical implementation costs.

Essien O, Otu A, Umoh V, Enang O, Hicks JP and Walley J (January, 2017) Intensive patient education improves glycaemic control in diabetes compared to conventional education: A randomised controlled trial in a Nigerian tertiary care hospital *PLoS One.* 2017;12(1):e0168835 DOI: 10.1371/journal.pone.0168835

BACKGROUND: Diabetes is now a global epidemic, but most cases are now in low- and middle-income countries. Diabetes self-management education (DSME) is key to enabling patients to manage their chronic condition and can reduce the occurrence of costly and devastating complications. However, there is limited evidence on the effectiveness of different DSME programs in resource-limited settings. **METHODS:** We conducted an unblinded, parallel-group, individually *randomized controlled trial* at the University of Calabar Teaching Hospital (Nigeria) to evaluate whether an intensive and systematic DSME program, using structured guidelines, improved glycemic control compared with the existing ad hoc patient education (clinical practice was unchanged). Eligible patients (≥ 18 years of age, HbA1c $> 8.5\%$ and physically able to participate) were randomly allocated by permuted block randomization to participate for 6 months in either an intensive or conventional education group. The primary outcome was HbA1c (%) at 6 months. **RESULTS:** We randomized *59 participants* to each group and obtained six-month HbA1c outcomes from 53 and 51 participants in the intensive and conventional education groups, respectively. Intensive group participants had a mean 6-month HbA1c (%) of 8.4 (95% CI, 8 to 8.9), while participants in the conventional education group had a mean 6-month HbA1c (%) of 10.2 (95% CI, 9.8 to 10.7). *The difference was statistically ($P < 0.0001$) and clinically significant, with intensive group participants having HbA1c outcomes on average -1.8 (95% CI, -2.4 to -1.2) percentage points lower than*

conventional group participants. Results were robust to adjustment for a range of covariates and multiple imputation of missing outcome data. **CONCLUSIONS:** This *study demonstrates the effectiveness of a structured, guideline-based DSME intervention in a low- and middle-income countries (LMIC) setting versus a pragmatic comparator*. The intervention is potentially replicable at other levels of the Nigerian healthcare system and in other LMICs, where nurses/diabetes educators can run the program. The results presented here, indicate that (when properly functioning) DSME programs can lead to clinically important improvements in patients' management of their diabetes in LMIC settings.

Abualula NA, Jacobsen KH, Milligan RA, Rodan MF and Conn VS (October, 2016) Evaluating diabetes educational interventions with a skill development component in adolescents with type 1 diabetes: A systematic review focusing on quality of life *Diabetes Educ.* 2016;Oct;42(5):515-528 DOI: 10.1177/0145721716658356

PURPOSE: Adolescents with type 1 diabetes mellitus (T1DM) may have reduced quality of life (QOL) when compared with their peers. This systematic review evaluated the effectiveness of diabetes self-management education (DSME) interventions with a skills development component on the QOL of adolescents with T1DM. **METHODS:** Six databases were systematically searched for studies on the QOL outcomes of DSME interventions for adolescents with T1DM. *Fourteen studies* published from 1994 to 2014 met the inclusion criteria. **RESULTS:** Of the 14 studies, only 4 had significant QOL outcomes for the intervention participants. Successful DSME interventions had indirect behavioral skills foci or a combination of indirect and direct behavioral skills foci and a duration ≥ 2 months. **CONCLUSION:** This review provides *evidence that educational interventions with an indirect behavioral skills development that facilitates diabetes management may improve QOL among adolescents with T1DM*. Structured interventions targeting adolescents' QOL are needed to determine which are most effective in improving QOL. Adolescents with T1DM should be routinely screened and monitored for low QOL and referred to QOL-improving interventions. Future studies should also include more comprehensive sociodemographic, psychosocial, and family-related factors in their designs and should implement and test QOL interventions in more diverse adolescent populations.

Chrvala CA, Sherr D and Lipman RD (June, 2016) Diabetes self-management education for adults with type 2 diabetes mellitus: A systematic review of the effect on glycemic control *Patient Educ Couns.* 2016;Jun;99(6):926-943 DOI: 10.1016/j.pec.2015.11.003

OBJECTIVE: Assess effect of diabetes self-management education and support methods, providers, duration, and contact time on glycemic control in adults with type 2 diabetes. **METHOD:** We searched MEDLINE, CINAHL, Embase, ERIC, and PsycINFO to December 2013 for interventions that included elements to improve participants' knowledge, skills, and ability to perform self-management activities as well as informed decision-making around goal setting. **RESULTS:** This review included *118 unique interventions*, with 61.9% reporting significant changes in A1C. *Overall mean reduction in A1C was 0.74* and 0.17 for intervention and control groups; an average absolute reduction in A1C of 0.57. A combination of group and individual engagement results in the largest decreases in A1C (0.88). *Contact hours ≥ 10 were associated with a greater proportion of interventions with significant reduction in A1C (70.3%)*. In patients with persistently elevated glycemic values (A1C > 9), a greater proportion of studies reported statistically significant reduction in A1C (83.9%). **CONCLUSIONS:** This systematic review found *robust data demonstrating that engagement in diabetes self-management education results in a statistically significant decrease in A1C levels*. Review demonstrates that DSME benefited all participants regardless of baseline A1C level. However, almost two-thirds (65.6%) of studies that enrolled participants with baseline A1C levels ranging from > 8.3 to 9.0 reported a significant difference between the IG and CG and 78.1% of studies that enrolled participants with baseline A1C levels > 9.0 reported significant improvements in glycemic control in the IG compared with the CG. **PRACTICE**

IMPLICATIONS: The data suggest mode of delivery, hours of engagement, and baseline A1C can affect the likelihood of achieving statistically significant and clinically meaningful improvement in A1C. The United Kingdom Prospective Diabetes Study (UKPDS) revealed that a 0.9% decrease in A1C was associated with a 25% reduction in microvascular complications, a 10% decrease in diabetes-related mortality, and a 6% reduction in all-cause mortality.

van Eeden M, van Heugten CM, van Mastrigt GA and Evers SM (January, 2016) Economic evaluation studies of self-management interventions in chronic diseases: A systematic review *Int J Technol Assess Health Care*. 2016;Jan;32(1-2):16-28 DOI: 10.1017/s0266462316000027

BACKGROUND: To our knowledge, there has been no overall systematic review focusing on the methodological quality of full economic evaluation studies of self-management interventions (SMI). Our objective was to *systematically review the literature of full economic evaluation studies of self-management interventions in adult chronic patients and to investigate their methodological quality and cost-effectiveness*. **METHODS:** A data extraction form was developed to assess general and randomized controlled trial (RCT)-related characteristics, quality of the RCTs, economic information and quality of the economic evaluation studies by means of a quality assessment (CHEC-list for trial-based studies, adjusted CHEC-list for model-based studies). **RESULTS:** *Twenty-three reports* were found. Sixteen studies (73%) lack information on the control intervention(s). *Only 1 study fulfilled all 3 criteria for quality of RCTs and 5 studies (23%) did not meet any of these criteria*. This review included 1 model-based study; the other studies were trial-based economic evaluation studies based on a RCT. Eight studies (35%) used a societal perspective and 12 (60%) synthesized costs and effects. Seven studies were categorized into the highest category (< 15 score), 9 studies into the "moderate" group (9-14 score), and 6 studies received a "low" score (< 8) on the CHEC-list. *Eighteen studies found the self-management intervention(s) to be cost effective compared with other interventions* **CONCLUSIONS:** Self-management interventions for adult chronic patients were heterogeneous and there was no clear, well-considered definition of self-management. Overall, *the methodological quality of the full economic evaluation studies was moderate and, therefore, cost-effectiveness results must be interpreted with caution*. Future research will benefit from further improvements in methodological quality of both economic study design and analysis, as well as a taxonomy for describing self-management interventions and their contents. SMIs are usually multifaceted programs in which different strategies and techniques are used and applied to help patients to manage their disease over time. Furthermore, SMIs tend to increase understanding and awareness among patients considering their own disease. This allows them to, for example, get a better idea of which healthcare services are necessary to cope with their current situation and may improve medicine adherence. This could easily result in a decrease of healthcare consumption and, therefore, a decrease in costs; hence, it seems plausible for self-management interventions to prove to be cost effective.

Bowen ME, Cavanaugh KL, Wolff K, Davis D, Gregory RP, Shintani A, Eden S, Wallston K, Elasy T and Rothman RL (August, 2016) The diabetes nutrition education study randomized controlled trial: A comparative effectiveness study of approaches to nutrition in diabetes self-management education *Patient Educ Couns*. 2016;Aug;99(8):1368-1376 DOI: 10.1016/j.pec.2016.03.017

OBJECTIVE: To compare the effectiveness of different approaches with nutrition education in diabetes self-management education and support (DSME/S). **METHODS:** We *randomized 150 adults with type 2 diabetes* to either certified diabetes educator (CDE)-delivered DSME/S with carbohydrate gram counting or the modified plate method versus general health education. The primary outcome was change in HbA1C over 6 months. **RESULTS:** *At 6 months, HbA1C improved within the plate method (-0.83% [-1.29, -0.33], P<0.001) and carbohydrate counting (-0.63% [-1.03, -0.18], P=0.04) groups but not the*

control group (P=0.34). Change in HbA1C from baseline between the control and intervention groups was not significant at 6 months (carbohydrate counting, $P=0.36$; modified plate method, $P=0.08$). In a prespecified subgroup analysis of patients with a baseline HbA1C 7% to 10%, change in HbA1C from baseline improved in the carbohydrate counting (-0.86% [-1.47, -0.26], $P=0.006$) and plate method groups (-0.76% [-1.33, -0.19], $P=0.01$) compared with controls. **CONCLUSION:** *CDE-delivered DSME/S focused on carbohydrate counting or the modified plate method improved glycemic control in patients with an initial HbA1C from 7% to 10%.* **PRACTICE IMPLICATIONS:** Individualized DSME/S strategies that are sensitive to patient preferences, willingness to change, beliefs, knowledge, literacy, and numeracy skills are an important part of patient-centered diabetes care. Both carbohydrate counting and the modified plate method improve glycemic control as part of DSME/S. Increased awareness and understanding of patient characteristics may be important for tailoring approaches to nutrition education. HbA1C improved independently of increased contact time from diabetes education.

Carolan OMC (May, 2016) Educational and intervention programmes for gestational diabetes mellitus (GDM) management: An integrative review *Collegian*. 2016;23(1):103-114

INTRODUCTION: Gestational diabetes mellitus (GDM) is a serious pregnancy disorder, which is linked to stillbirth, birth damage, and later development of type 2 diabetes. Rates of GDM have increased dramatically in the past 20 years, related to obesity, sedentary lifestyles, and ethnicity. **AIM:** The aim of this integrative review was to identify and to *critically review existing self-management programs for GDM.* **METHOD:** A search for studies published from 2000 to 2013 was conducted on: PubMed, CINAHL, MeEDLINE, OvidSP, ProQuest, SCOPUS, and Wiley online library. GDM search terms included gestational diabetes mellitus; GDM, pregnancy, and diabetes. Search terms for self-management programs included educational programs; lifestyle intervention; exercise, diet, weight management in pregnancy; life-style interventions. **RESULTS:** Fifty papers were located in the search and *12 were included in the review.* Interventions fell into 3 main groups: (1) dietary and exercise interventions; (2) self-monitoring of blood glucose levels; and (3) counselling/behavioral interventions. This review found that although interventions varied in approach, most were successful in reducing insulin requirements; in reducing rates of macrosomia and hypertensive disorders, and in improving levels of knowledge and pregnancy outcomes. Only 1 study found that the intervention did not contribute some positive outcome. **CONCLUSION:** *Interventions that include adopting a low glycemic index diet and increasing levels of activity appear to be successful at reducing maternal blood glucose levels and reducing insulin requirements during pregnancy.* To obtain best results among culturally diverse women, it is *important to tailor health education messages to the particular population and to promote culturally appropriate healthcare.* The interventions described generally had a positive impact, regardless of their particular approach, and this *finding may relate to pregnant women's general receptiveness to interventions that will improve fetal health outcomes.* Reducing maternal blood glucose levels, in turn, is associated with a reduction of macrosomia and maternal weight gain.

Sugiyama T, Steers WN, Wenger NS, Duru OK and Mangione CM (March, 2015) Effect of a community-based diabetes self-management empowerment program on mental health-related quality of life: A causal mediation analysis from a randomized controlled trial *BMC Health Serv Res*. 2015;Mar 22;15:115 DOI: 10.1186/s12913-015-0779-2

BACKGROUND: There is a paucity of evidence supporting the effectiveness of diabetes self-management education (DSME) in improving mental health-related quality of life (HRQoL) for African American and Latinos. Also, among studies supporting the favorable effects of DSME on mental HRQoL, the direct effect of DSME that is independent of improved glycemic control has never been investigated. The *objectives of this study were to investigate the effect of community-based DSME intervention*

targeting empowerment on mental HRQoL and to determine whether the effect is direct or mediated by glycemic control. **METHODS:** We conducted *secondary analyses* of data from the Diabetes Self-Care Study, a randomized controlled trial of a community-based DSME intervention. **Study participants (n=516)** were African Americans and Latinos 55 years of age or older with poorly controlled diabetes (HbA1c \geq 8.0%) recruited from senior centers and churches in Los Angeles. The intervention group received 6 weekly small-group self-care sessions based on the empowerment model. The control group received 6 lectures on unrelated geriatrics topics. The primary outcome variable in this secondary analysis was the change in Mental Component Summary score (MCS-12) from the SF-12 Health Survey from baseline to 6-month follow-up. We used the change in HbA1c during the study period as the main mediator of interest in our causal mediation analysis. Additionally, possible mediations via social support and perceived empowerment attributable to the program were examined. **RESULTS:** MCS-12 increased by 1.4 points on average in the intervention group and decreased by 0.2 points in the control group (difference in change: 1.6 points, 95% CI, 0.1 to 3.2). In the causal mediation analysis, the intervention had a direct effect on MCS-12 improvement (1.7 points, 95% CI, 0.2 to 3.2) with no indirect effects mediated via HbA1c change (-0.1 points, 95% CI, -0.4 to 0.1), social support (0.1 points), and perception of empowerment (0.1 points). **CONCLUSIONS:** This Diabetes Self-Care Study empowerment intervention had a *modest positive impact on mental HRQoL not mediated by the improvement in glycemic control, as well as social support and perception of empowerment.* The effect size of the DSME intervention on mental HRQoL was small but clinically meaningful, and the *provision of the DSME intervention might offset reductions in mental HRQoL that are linked to having diabetes.* This favorable effect on mental HRQoL may be a separate clinical advantage of this DSME intervention.

Lepard MG, Joseph AL, Agne AA and Cherrington AL (June, 2015) Diabetes self-management interventions for adults with type 2 diabetes living in rural areas: A systematic literature review *Curr Diab Rep.* 2015;Jun;15(6):608 DOI: 10.1007/s11892-015-0608-3

In rural communities, high rates of diabetes and its complications are compounded by limited access to healthcare and scarce community resources. We systematically reviewed the evidence for the impact of diabetes self-management education interventions designed for patients living in rural areas on glycemic control and other diabetes outcomes. **Fifteen studies** met inclusion criteria. Ten were randomized controlled trials. Intervention strategies included in-person diabetes (n=9) and telehealth (n=6) interventions. **Four studies demonstrated between-group differences for biologic outcomes, 4 studies demonstrated changes in behavior, and 3 studies demonstrated changes in knowledge.** Intervention dose was associated with improved A1c or weight loss in 2 studies and session attendance in 1 study. Interventions that included collaborative goal-setting were associated with improved metabolic outcomes and self-efficacy. **Telehealth and face-to-face diabetes interventions are both promising strategies for rural communities.** In rural communities, where access to care is limited by a number of providers, distance to providers, and lack of transportation and community resources, telehealth presents a unique way to improve diabetes self-management using fewer resources. **Effective interventions included collaborative goal-setting. Intervention dose was linked to better outcomes and higher attendance.** Future studies are needed to examine the comparative effectiveness of implementing these strategies in real-world settings, with attention to not only health outcomes but also patient-centered outcomes and cost-effectiveness.

Garcia AA, Brown SA, Horner SD, Zuniga J and Arheart KL (June, 2015) Home-based diabetes symptom self-management education for Mexican Americans with type 2 diabetes *Health Educ Res.* 2015;Jun;30(3):484-496 DOI: 10.1093/her/cyv018

This pilot study evaluated an innovative diabetes symptom awareness and self-management educational program for Mexican Americans, a fast growing minority population experiencing a diabetes epidemic. Patients with diabetes need assistance interpreting and managing symptoms, which are often annoying and potentially life-threatening. A repeated measures *randomized controlled trial was conducted with 72 Mexican Americans* aged 25 to 75 years with type 2 diabetes. Experimental condition participants received 8 weekly, in-home, one-on-one educational and behavior modification sessions with a registered nurse focusing on symptom awareness, glucose self-testing and appropriate treatments, followed by 8 biweekly support telephone sessions. Wait-listed control condition participants served as comparisons at 3 time points. Hierarchical linear modeling was used to evaluate the effects of the intervention between and within groups on psychosocial, behavioral, and clinical outcomes. Participants were predominantly female, middle-aged, moderately acculturated, and in poor glycemic control. Participants with higher HbA1c at baseline have a higher potential for significant improvements in HbA1c. *Experimental group participants (n=39) significantly improved glycemic control, blood pressure, symptoms, knowledge, self-efficacy, empowerment, and quality of life.* Post-intervention *focus groups reported satisfaction with the symptom focus. Addressing symptoms led to clinical and psychosocial improvements.* Symptoms seem to be an important motivator and a useful prompt to engage patients in diabetes self-management behaviors to relieve symptoms and prevent complications.

Johnson TM, Richards J and Churilla JR (August, 2015) Care utilization patterns and diabetes self-management education duration *Diabetes Spectr.* 2015;Aug;28(3):193-200 DOI: 10.2337/diaspect.28.3.193

Objective. Previous studies have shown that receiving diabetes self-management education (DSME) is associated with increased care utilization. However, the relationship between DSME duration and care utilization patterns remains largely unexamined. Our purpose is to characterize DSME duration and examine the relationship between DSME duration and clinical and self-care utilization patterns. **Methods.** The study sample included *1446 adults* who were ≥ 18 years of age, had diabetes, and had participated in the 2008 Florida Behavioral Risk Factor Surveillance System survey. Clinical and self-care outcomes were derived using responses to the survey's diabetes module and were based on minimum standards of care established by the American Diabetes Association. The outcomes examined included self-monitoring of blood glucose at least once per day; receiving at least 1 eye exam, 1 foot exam, A1C tests, and an influenza vaccination in the past year; and ever receiving a pneumococcal vaccination. DSME duration was categorized as no DSME, > 0 to < 4 hours, 4 to 10 hours, and > 10 hours. **Results.** After adjusting for sociodemographic variables, compared with those who did not receive DSME, *those who had 4 to 10 or 10+ hours of DSME were more likely to receive 2 A1C tests* (odds ratio [95% CI] 2.69 [1.30-5.58] and 2.63 [1.10-6.31], respectively) and *have a pneumococcal vaccination* (1.98 [1.03-3.80] and 1.92 [1.01-3.64], respectively). *Having received at least 4 hours of DSME had the greatest impact on clinical care utilization, specifically A1C testing and influenza and pneumococcal vaccinations.* The results also indicate that those who use insulin have significantly higher odds of performing self-monitoring of blood glucose (SMBG) and having an annual foot examination. Those receiving 10+ hours of DSME were 2.2 times (95% CI, 1.18-4.09) as likely to have an influenza vaccination. **Conclusion.** These data reveal a *positive relationship between DSME duration and utilization of some diabetes clinical care services.* It is already widely accepted that DSME is associated with improved clinical/self-care and diabetes-related health outcomes. Further elucidating the parameters of what constitutes the most effective form and dosage of DSME will help improve evidence-based strategies for preventing complications and maintaining a good quality of life among people with diabetes.

Pal K, Eastwood SV, Michie S, Farmer A, Barnard ML, Peacock R, Wood B, Edwards P and Murray E (June, 2014) Computer-based interventions to improve self-management in adults with type 2 diabetes:

A systematic review and meta-analysis *Diabetes Care*. 2014;Jun;37(6):1759-1766 DOI: 10.2337/dc13-1386

OBJECTIVE: Structured patient education programs can reduce the risk of diabetes-related complications. However, people appear to have difficulties attending face-to-face education and alternatives are needed. This review looked at the impact of computer-based diabetes self-management interventions on health status, cardiovascular risk factors, and quality of life of adults with type 2 diabetes. **RESEARCH DESIGN AND METHODS:** We searched The Cochrane Library, MEDLINE, Embase, PsycINFO, Web of Science, and CINAHL for relevant trials from inception to November 2011. Reference lists from relevant published studies were screened and authors contacted for further information when required. Two authors independently extracted relevant data using standard data extraction templates. **RESULTS:** *Sixteen randomized controlled trials with 3578 participants* met the inclusion criteria. Interventions were delivered via clinics, the Internet, and mobile phones. **Computer-based diabetes self-management interventions appear to have small benefits on glycemic control:** the pooled effect on HbA1c was -0.2% (-2.3 mmol/mol [95% CI, -0.4 to -0.1%]). A subgroup analysis on mobile phone-based interventions showed a larger effect: the pooled effect on HbA1c from 3 studies was -0.50% (-5.46 mmol/mol [95% CI, -0.7 to -0.3%]). There was no evidence of improvement in depression, quality of life, blood pressure, serum lipids, or weight. There was no evidence of significant adverse effects. **CONCLUSIONS:** Computer-based diabetes self-management interventions to manage type 2 diabetes appear to have a small beneficial effect on blood glucose control, and this effect was larger in the mobile phone subgroup. There was no evidence of benefit for other biological, cognitive, behavioral, or emotional outcomes. **Evidence on the use of new technology in diabetes is still evolving, with mixed results.** However, there are trends emerging that may highlight the aspects of self-management that might be effectively supported through computer-based interventions and the areas that may require more intensive or face-to-face input. **More studies with longer follow-up are needed to determine the cost-effectiveness of different types of** computer-based interventions, the long-term impact on health outcomes, and to look for evidence of harm.

Ricci-Cabello I, Ruiz-Perez I, Rojas-Garcia A, Pastor G, Rodriguez-Barranco M and Goncalves DC (June, 2014) Characteristics and effectiveness of diabetes self-management educational programs targeted to racial/ethnic minority groups: A systematic review, meta-analysis and meta-regression *BMC Endocr Disord*. 2014;Jul 19;14:60 DOI: 10.1186/1472-6823-14-60

BACKGROUND: It is not clear to what extent educational programs aimed at promoting diabetes self-management in ethnic minority groups are effective. The aim of this work was to systematically review the effectiveness of educational programs to promote the self-management of racial/ethnic minority groups with type 2 diabetes, and to identify programs' characteristics associated with greater success. **METHODS:** We undertook a **systematic literature review**. Specific searches were designed and implemented for MEDLINE, Embase, CINAHL, ISI Web of Knowledge, Scirus, Current Contents, and 9 additional sources (from inception to October 2012). We included experimental and quasi-experimental studies assessing the impact of educational programs targeted to racial/ethnic minority groups with type 2 diabetes. We only included interventions conducted in countries with membership in the Organisation for Economic Co-operation and Development (OECD). Two reviewers independently screened citations. Structured forms were used to extract information on intervention characteristics, effectiveness, and cost-effectiveness. When possible, we conducted random-effects meta-analyses using standardized mean differences to obtain aggregate estimates of effect size with 95% CI. Two reviewers independently extracted all of the information and critically appraised the studies. **RESULTS:** We identified **37 studies** reporting on 39 educational programs. Most of them were conducted in the United States, with African American or Latino participants. Most programs obtained some benefits over standard care in improving

diabetes knowledge, self-management behaviors, and clinical outcomes. ***A meta-analysis of 20 randomized controlled trials (3094 patients) indicated that the programs produced a reduction in glycated hemoglobin of -0.31% (95% CI, -0.48% to -0.14%).*** Diabetes knowledge and self-management measures were too heterogeneous to pool. Meta-regressions showed ***larger reduction in glycated hemoglobin in individual and face-to-face delivered interventions, as well as in those involving peer educators, including cognitive reframing techniques, and a lower number of teaching methods.*** The ***long-term effects remain unknown and cost-effectiveness was rarely estimated.*** **CONCLUSIONS:** Diabetes self-management educational programs targeted to racial/ethnic minority groups can produce a positive effect on diabetes knowledge and on self-management behavior, ultimately improving glycemic control. Notwithstanding, the difficulties underlying the execution of this type of complex clinical trials, ***larger and methodologically more robust trials are very much needed to confirm the findings of the present review and to further identify characteristics of successful programs.***

Yuan C, Lai CW, Chan LW, Chow M, Law HK and Ying M (August, 2014) The effect of diabetes self-management education on body weight, glycemic control, and other metabolic markers in patients with type 2 diabetes mellitus *J Diabetes Res.* 2014;2014:789761 DOI: 10.1155/2014/789761

AIMS: To comprehensively evaluate the effect of a short-term diabetes self-management education (DSME) on metabolic markers and atherosclerotic parameters in patients with type 2 diabetes. **METHODS:** ***76 patients*** with type 2 diabetes were recruited in this study. They were divided into the intervention group (n=36) and control group (n=40). The patients in the ***intervention group received a 3-month intervention, including an 8-week education on self-management of diabetes mellitus and subsequent 4 weeks of practice of the self-management guidelines.*** The patients in the control group received standard advice on medical nutrition therapy. Metabolic markers, carotid intima-media thickness (CIMT), and carotid arterial stiffness (CAS) of the patients in both groups were assessed before and after the 3-month intervention. **RESULTS:** ***There was a significant reduction in hemoglobin A1c (HbA1c, -0.2 +/- -0.56% versus 0.08 ± 0.741%; P< 0.05) and body weight (-1.19 ± - 1.39 kg versus -0.61 ± -2.04 kg; P<0.05) in the intervention group compared with the control group.*** However, no significant improvements were found in other metabolic markers, CIMT and CAS (*P>0.05*). **CONCLUSIONS:** ***DSME can improve HbA1c and body weight in patients with type 2 diabetes.*** Stratton et al. (2000) reported that each ***1% reduction of the HbA1c level was related to a 37% reduction of microvascular complications, 21% reduction of diabetes-related death, and 14% reduction of myocardial infarction.*** There were limitations in the present study. First of all, the time interval of the baseline and follow-up assessments was relatively short. In addition, the long-term effect of the low intensity self-management education on diabetic patients was not fully evaluated in the present study. Moreover, the sample size of the present study was small.

Fitzpatrick SL, Schumann KP and Hill-Briggs F (May, 2013) Problem solving interventions for diabetes self-management and control: A systematic review of the literature *Diabetes Res Clin Pract.* 2013;May;100(2):145-161 DOI: 10.1016/j.diabres.2012.12.016

AIMS: Problem solving is deemed a core skill for patient diabetes self-management education. The purpose of this systematic review is to examine the published literature on the effect of problem-solving interventions on diabetes self-management and disease control. **DATA SOURCES:** We searched PubMed and PsycINFO electronic databases for English-language articles published from November 2006 to September 2012. Reference lists from included studies were reviewed to capture additional studies. **STUDY SELECTION:** Studies reporting problem-solving intervention or problem solving as an intervention component for diabetes self-management training and disease control were included. Twenty-four studies met inclusion criteria. **DATA EXTRACTION:** Study design, sample characteristics,

measures, and results were reviewed. **DATA SYNTHESIS:** *Sixteen intervention studies* (11 adult, 5 children/adolescents) were randomized controlled trials, and 8 intervention studies (6 adult, 2 children/adolescents) were quasi-experimental designs. **CONCLUSIONS:** Studies varied greatly in their approaches to problem-solving use in patient education. To date, *36% of adult problem-solving interventions and 42% of children/adolescent problem-solving interventions have demonstrated significant improvement in HbA1c, while psychosocial outcomes have been more promising.* The next phase of problem-solving intervention research should employ intervention characteristics found to have sufficient potency and intensity to reach therapeutic levels needed to demonstrate change. This systematic review *found persisting methodological limitations in the body of literature that contribute to overall patterns of inconsistency in outcomes of problem-solving interventions to date.*

Gucciardi E, Chan VW, Manuel L and Sidani S (August, 2013) A systematic literature review of diabetes self-management education features to improve diabetes education in women of Black African/Caribbean and Hispanic/Latin American ethnicity *Patient Educ Couns.* 2013;Aug;92(2):235-245 DOI: 10.1016/j.pec.2013.03.007

OBJECTIVE: This *systematic literature review* aims to identify diabetes self-management education (DSME) features to improve diabetes education for Black African/Caribbean and Hispanic/Latin American women with type 2 diabetes mellitus. **METHODS:** We conducted a literature search in 6 health databases for randomized controlled trials and comparative studies. Success rates of intervention features were calculated based on effectiveness in improving glycosolated hemoglobin (HbA1c), anthropometrics, physical activity, or diet outcomes. Calculations of rate differences assessed whether an intervention feature positively or negatively affected an outcome. **RESULTS:** From *13 studies* included in our analysis, we identified 38 intervention features in relation to their success with an outcome. *Five intervention features had positive rate differences across at least 3 outcomes: hospital-based interventions, group interventions, the use of situational problem-solving, frequent sessions, and incorporating dietitians as interventionists. Six intervention features (psychosocial content, diaries, feedback, community peer-workers, telephonic coaching, and cultural appropriateness) had high positive rate differences (i.e., $\geq 50\%$) on specific outcomes.* **CONCLUSION:** Different DSME intervention features may influence broad and specific self-management outcomes for women of African/Caribbean and Hispanic/Latin ethnicity. **PRACTICAL IMPLICATIONS:** With the emphasis on patient-centered care, patients and care providers can consider options based on DSME intervention features for its broad and specific impact on outcomes to potentially make programming more effective.

Steinsbekk A, Rygg LO, Lisulo M, Rise MB and Fretheim A (July, 2012) Group based diabetes self-management education compared to routine treatment for people with type 2 diabetes mellitus. A systematic review with meta-analysis *BMC Health Serv Res.* 2012;Jul 23;12:213 DOI: 10.1186/1472-6963-12-213

BACKGROUND: Diabetes self-management education (DSME) can be delivered in many forms. Group-based DSME is widespread due to being a cheaper method and the added advantages of having patients meet and discuss with each other as well as assess the effects of group-based DSME compared to routine treatment on clinical, lifestyle, and psychosocial outcomes in type-2 diabetes patients. **METHODS:** A *systematic review with meta-analysis.* Computerized bibliographic databases were searched up to January 2008 for randomized controlled trials evaluating group-based DSME for adult type 2 diabetics versus routine treatment where the intervention had at least 1 session and ≥ 6 months follow-up. At least 2 reviewers independently extracted data and assessed study quality. **RESULTS:** In total, *21 studies (26 publications, 2833 participants) were included.* Of all the participants, 4 of 10 were male, baseline age was 60 years, body mass index (BMI) 31.6, HbA1c 8.23%, diabetes duration 8 years, and 82% used

medication. For the main clinical outcomes, HbA1c was significantly reduced at 6 months (0.44% points; $P=0.0006$, 13 studies, 1883 participants), 12 months (0.46% points; $P=0.001$, 11 studies, 1503 participants) and 2 years (0.87% points; $P<0.00001$, 3 studies, 397 participants) and fasting blood glucose levels were also significantly reduced at 12 months (1.26 mmol/L; $P<0.00001$, 5 studies, 690 participants) but not at 6 months. For the main lifestyle outcomes, diabetes knowledge was improved significantly at 6 months (standardized mean difference [SMD], 0.83; $P=0.00001$, 6 studies, 768 participants), 12 months (SMD, 0.85; $P<0.00001$, 5 studies, 955 participants) and 2 years (SMD, 1.59; $P=0.03$, 2 studies, 355 participants) and self-management skills also improved significantly at 6 months (SMD, 0.55; $P=0.01$, 4 studies, 534 participants). ***For the main psychosocial outcomes, there were significant improvements for empowerment/self-efficacy (SMD, 0.28, $P=0.01$, 2 studies, 326 participants) after 6 months. For quality of life, no conclusion could be drawn due to high heterogeneity. For the secondary outcomes, there were significant improvements in patient satisfaction and body weight at 12 months for the intervention group.*** There were no differences between the groups in mortality rate, BMI, blood pressure and lipid profile. **CONCLUSIONS:** Based on current evidence, there are indications that *interventions delivered by a single educator, delivered in less than 10 months, with more than 12 hours and from 6 to 10 sessions give the best results* but more research is needed to confirm this conclusion. ***Group-based DSME in people with type 2 diabetes results in improvements in clinical, lifestyle, and psychosocial outcomes.***

Tshiananga JK, Kocher S, Weber C, Erny-Albrecht K, Berndt K and Neeser K (January - February, 2012)
The effect of nurse-led diabetes self-management education on glycosylated hemoglobin and cardiovascular risk factors: A meta-analysis *Diabetes Educ.* 2012;Jan-Feb;38(1):108-123 DOI: 10.1177/0145721711423978

PURPOSE: The purpose of this meta-analysis was to determine the effect of nurse-led diabetes self-management education (DSME) on blood glucose control and cardiovascular risk factors. **METHODS:** The electronic databases PubMed and ISIS Knowledge were searched for relevant randomized controlled studies published from 1999 to 2009. Effect size was calculated for change in A1C, blood pressure, and lipid levels using both fixed- and random-effects models. Subgroup analyses were performed on patient age, sex, diabetes type, baseline A1C, length of follow-up, and study setting. **RESULTS:** A total of **34 randomized controlled trials with a combined cohort size of 5993 patients** was identified. Mean patient age was 52.8 years, 47% were male, and mean A1C at baseline was 8.5%. **Mean change in A1C was a reduction by -0.70% for nurse-led DSME versus -0.21% with usual care (UC).** This corresponded to an effect size of 0.506, using a random-effects model for nurse-led DSME versus UC. Effect size was significantly associated with patient age older than 65 years and with duration of follow-up. Nurse-led DSME was also associated with improvements in cardiovascular risk factors, particularly among male patients, among those with good glycemic control, and in studies conducted in the United States. **CONCLUSIONS:** ***Nurse-led DSME is associated with improved glycemic control, demonstrating that programs are most effective among seniors and with follow-up periods of 1 to 6 months. Future programs tailored to the needs of patients younger than 65 years may improve the impact of DSME on blood glucose. Findings from the study presented here suggest that, in particular, male patients and those with good glycemic control are likely to benefit in terms of reduced cardiovascular risk with current nurse-led DSME.***

Davis RM, Hitch AD, Salaam MM, Herman WH, Zimmer-Galler IE and Mayer-Davis EJ (August, 2010)
Telehealth improves diabetes self-management in an underserved community: Diabetes telecare *Diabetes Care.* 2010;Aug;33(8):1712-1717 DOI: 10.2337/dc09-1919

OBJECTIVE: To conduct a *1-year randomized clinical trial* to evaluate a remote comprehensive diabetes self-management education (DSME) intervention, Diabetes TeleCare, administered by a dietitian and nurse/certified diabetes educator (CDE) in the setting of a federally qualified health center (FQHC) in rural South Carolina. **RESEARCH DESIGN AND METHODS:** Participants were recruited from 3-member health centers of an FQHC and were randomized to either Diabetes TeleCare; a 12-month, 13-session curriculum delivered using telehealth strategies; or usual care. **RESULTS:** Mixed linear regression model results for repeated measures showed a significant reduction in glycated hemoglobin (GHb) in the Diabetes TeleCare group from baseline to 6 and 12 months (9.4 ± 0.3 , 8.3 ± 0.3 , and 8.2 ± 0.4 , respectively) compared with usual care (8.8 ± 0.3 , 8.6 ± 0.3 , and 8.6 ± 0.3 , respectively). Low-density lipoprotein (LDL) cholesterol was reduced at 12 months in the Diabetes TeleCare group compared with usual care. Although not part of the original study design, *GHb was reduced from baseline to 12 and 24 months in the Diabetes TeleCare group (9.2 ± 0.4 , 7.4 ± 0.5 , and 7.6 ± 0.5 , respectively) compared with usual care (8.7 ± 0.4 , 8.1 ± 0.4 , and 8.1 ± 0.5 , respectively)* in a post hoc analysis of a subset of the randomized sample who completed a 24-month follow-up visit. **CONCLUSIONS:** *Telehealth effectively created access to successfully conduct a 1-year remote DSME by a nurse CDE and dietitian that improved metabolic control and reduced cardiovascular risk in an ethnically diverse and rural population. Four important factors* may be related to the success of the Diabetes TeleCare intervention: *high participant retention, modification of materials for cultural competency, coordinating administrative functions with the primary-care centers, and the successful personalized interactions* during group education sessions enabled by video conferencing.

Bibliography of studies and professional guidelines

2017 National Standards for Diabetes Self-Management Education and Support (Beck et al., 2017)

Abualula, N. A., Jacobsen, K. H., Milligan, R. A., Rodan, M. F., & Conn, V. S. (2016). Evaluating diabetes educational interventions with a skill development component in adolescents with type 1 diabetes: a systematic review focusing on quality of life. *Diabetes Educ*, *42*(5), 515-528. doi:10.1177/0145721716658356

Bowen, M. E., Cavanaugh, K. L., Wolff, K., Davis, D., Gregory, R. P., Shintani, A., . . . Rothman, R. L. (2016). The diabetes nutrition education study randomized controlled trial: a comparative effectiveness study of approaches to nutrition in diabetes self-management education. *Patient Educ Couns*, *99*(8), 1368-1376. doi:10.1016/j.pec.2016.03.017

Carolan, O. M. C. (2016). Educational and intervention programmes for gestational diabetes mellitus (GDM) management: an integrative review. *Collegian*, *23*(1), 103-114.

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

Cunningham, A. T., Crittendon, D. R., White, N., Mills, G. D., Diaz, V., & LaNoue, M. D. (2018). The effect of diabetes self-management education on HbA1c and quality of life in African-Americans: a systematic review and meta-analysis. *BMC Health Serv Res*, *18*(1), 367. doi:10.1186/s12913-018-3186-7

Davis, R. M., Hitch, A. D., Salaam, M. M., Herman, W. H., Zimmer-Galler, I. E., & Mayer-Davis, E. J. (2010). TeleHealth improves diabetes self-management in an underserved community: diabetes TeleCare. *Diabetes Care*, *33*(8), 1712-1717. doi:10.2337/dc09-1919

Diabetes Self-Management Education and Support in Type 2 Diabetes: A Joint Position Statement of the American Diabetes Association, the American Association of Diabetes Educators, and the Academy of Nutrition and Dietetics (Powers et al., 2015)

Essien, O., Otu, A., Umoh, V., Enang, O., Hicks, J. P., & Walley, J. (2017). Intensive patient education improves glycaemic control in diabetes compared to conventional education: a randomised controlled trial in a Nigerian tertiary Ccre hospital. *PLoS One*, *12*(1), e0168835. doi:10.1371/journal.pone.0168835

Fitzpatrick, S. L., Schumann, K. P., & Hill-Briggs, F. (2013). Problem solving interventions for diabetes self-management and control: a systematic review of the literature. *Diabetes Res Clin Pract*, *100*(2), 145-161. doi:10.1016/j.diabres.2012.12.016

Garcia, A. A., Brown, S. A., Horner, S. D., Zuniga, J., & Arheart, K. L. (2015). Home-based diabetes symptom self-management education for Mexican Americans with type 2 diabetes. *Health Educ Res*, 30(3), 484-496. doi:10.1093/her/cyv018

General Diabetes Self-management and Education (Institute for Clinical Systems Improvement, 2018)

Greenwood, D. A., Gee, P. M., Fatkin, K. J., & Peeples, M. (2017). A systematic review of reviews evaluating technology-enabled diabetes self-management education and support. *J Diabetes Sci Technol*, 11(5), 1015-1027. doi:10.1177/1932296817713506

Gucciardi, E., Chan, V. W., Manuel, L., & Sidani, S. (2013). A systematic literature review of diabetes self-management education features to improve diabetes education in women of Black African/Caribbean and Hispanic/Latin American ethnicity. *Patient Educ Couns*, 92(2), 235-245. doi:10.1016/j.pec.2013.03.007

Johnson, T. M., Richards, J., & Churilla, J. R. (2015). Care utilization patterns and diabetes self-management education duration. *Diabetes Spectr*, 28(3), 193-200. doi:10.2337/diaspect.28.3.193

Lepard, M. G., Joseph, A. L., Agne, A. A., & Cherrington, A. L. (2015). Diabetes self-management interventions for adults with type 2 diabetes living in rural areas: a systematic literature review. *Curr Diab Rep*, 15(6), 608. doi:10.1007/s11892-015-0608-3

Management of Diabetes - a National Clinical Guideline Scottish Intercollegiate Guidelines Network, 2010, updated 2017)

Mobile Health Applications for Self-management of Diabetes (Agency for Healthcare Research and Quality, May 2018)

Pal, K., Eastwood, S. V., Michie, S., Farmer, A., Barnard, M. L., Peacock, R., . . . Murray, E. (2014). Computer-based interventions to improve self-management in adults with type 2 diabetes: a systematic review and meta-analysis. *Diabetes Care*, 37(6), 1759-1766. doi:10.2337/dc13-1386

Pamungkas, R. A., Chamroonsawasdi, K., & Vatanasomboon, P. (2017). A systematic review: family support integrated with diabetes self-management among uncontrolled type II diabetes mellitus patients. *Behav Sci (Basel)*, 7(3). doi:10.3390/bs7030062

Pirbaglou, M., Katz, J., Motamed, M., Pludwinski, S., Walker, K., & Ritvo, P. (2018). Personal health coaching as a type 2 diabetes mellitus self-management strategy: a systematic review and meta-analysis of randomized controlled trials. *Am J Health Promot*, 890117118758234. doi:10.1177/0890117118758234

Ricci-Cabello, I., Ruiz-Perez, I., Rojas-Garcia, A., Pastor, G., Rodriguez-Barranco, M., & Goncalves, D. C. (2014). Characteristics and effectiveness of diabetes self-management educational programs targeted to racial/ethnic minority groups: a systematic review, meta-analysis and meta-regression. *BMC Endocr Disord*, *14*, 60. doi:10.1186/1472-6823-14-60

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

Sugiyama, T., Steers, W. N., Wenger, N. S., Duru, O. K., & Mangione, C. M. (2015). Effect of a community-based diabetes self-management empowerment program on mental health-related quality of life: a causal mediation analysis from a randomized controlled trial. *BMC Health Serv Res*, *15*, 115. doi:10.1186/s12913-015-0779-2

Teljeur, C., Moran, P. S., Walshe, S., Smith, S. M., Cianci, F., Murphy, L., . . . Ryan, M. (2017). Economic evaluation of chronic disease self-management for people with diabetes: a systematic review. *Diabet Med*, *34*(8), 1040-1049. doi:10.1111/dme.13281

Tshiananga, J. K., Kocher, S., Weber, C., Erny-Albrecht, K., Berndt, K., & Neeser, K. (2012). The effect of nurse-led diabetes self-management education on glycosylated hemoglobin and cardiovascular risk factors: a meta-analysis. *Diabetes Educ*, *38*(1), 108-123. doi:10.1177/0145721711423978

Type 1 Diabetes in Adults: Diagnosis and Management (National Institute for Health and Care Excellence, 2015)

Type 2 Diabetes in Adults: Management (National Institute for Health and Care Excellence, 2015)

VA/DoD Clinical Practice Guideline the Management of Type 2 Diabetes Mellitus in Primary Care (Veterans Administration/Department of Defense, 2017)

van Eeden, M., van Heugten, C. M., van Mastrigt, G. A., & Evers, S. M. (2016). Economic evaluation studies of self-management interventions in chronic diseases: a systematic review. *Int J Technol Assess Health Care*, *32*(1-2), 16-28. doi:10.1017/s0266462316000027

Wu, I. X. Y., Kee, J. C. Y., Threapleton, D. E., Ma, R. C. W., Lam, V. C. K., Lee, E. K. P., . . . Chung, V. C. H. (2018). Effectiveness of smartphone technologies on glycaemic control in patients with type 2 diabetes: systematic review with meta-analysis of 17 trials. *Obes Rev*, *19*(6), 825-838. doi:10.1111/obr.12669

Yuan, C., Lai, C. W., Chan, L. W., Chow, M., Law, H. K., & Ying, M. (2014). The effect of diabetes self-management education on body weight, glycemic control, and other metabolic markers in patients with type 2 diabetes mellitus. *J Diabetes Res*, *2014*, 789761. doi:10.1155/2014/789761

This publication, printed by O.U. Printing Services is issued by the Oklahoma Health Care Authority as authorized by Title VI and Title VII of the 1964 Civil Rights Act and the Rehabilitation Act of 1973. 20 copies have been prepared and distributed at a cost of \$382.00. An electronic copy has been deposited with the Publications Clearinghouse of the Oklahoma Department of Libraries. [74 O.S.2001 § 3105 (C)] Order additional copies on the OHCA website www.okhca.org. SB572ENG-2018 OHCA complies with applicable Federal civil rights laws and does not discriminate on the basis of race, color, national origin, age, disability or sex. ATENCIÓN: si habla español, tiene a su disposición servicios gratuitos de asistencia lingüística. Llame al 1-800-987-7767. CHÚ Ý: Nếu bạn nói Tiếng Việt, có các dịch vụ hỗ trợ ngôn ngữ miễn phí dành cho bạn. Gọi số 1-800-987-7767.

An Act

ENROLLED SENATE
BILL NO. 972

By: Simpson and Pittman of the
Senate

and

Ownbey of the House

An Act relating to the Oklahoma Health Care Authority Act; directing the Oklahoma Health Care Authority to examine the feasibility of a state plan amendment to the Oklahoma Medicaid program for diabetes self-management training (DSMT); requiring the Authority to submit certain report; requiring the Authority to draft certain state plan amendment under certain conditions; providing definition; providing for codification; and providing an effective date.

SUBJECT: Diabetes self-management training

BE IT ENACTED BY THE PEOPLE OF THE STATE OF OKLAHOMA:

SECTION 1. NEW LAW A new section of law to be codified in the Oklahoma Statutes as Section 5009.6 of Title 63, unless there is created a duplication in numbering, reads as follows:

A. The Oklahoma Health Care Authority shall examine the feasibility of a state plan amendment to the Oklahoma Medicaid Program for diabetes self-management training (DSMT).

B. By December 1, 2018, the Authority shall submit a report to the President Pro Tempore of the Senate, the Speaker of the House of Representatives and the Governor estimating the potential costs to the state, clinical findings, reviews of pilot projects and research

from other states on the effects of DSMT on persons with a diabetes diagnosis.

C. Beginning July 1, 2019, and subject to the availability of funding, the Authority shall draft a state plan amendment for DSMT for persons with a diabetes diagnosis. The provisions of this subsection shall only apply if the report required by subsection B of this section demonstrates DSMT to be evidence-based and essential to qualifying participants in the Oklahoma Medicaid Program.

D. As used in this section, "diabetes self-management training (DSMT)" means the process of facilitating the knowledge, skill and ability necessary for diabetes self-care. This process requires incorporating the patient's unique needs and experiences into an individualized education and support plan that promotes new behaviors and solutions, including, but not limited to, healthy eating, physical activity, self-monitoring and medication use.

SECTION 2. This act shall become effective November 1, 2018.

Passed the Senate the 6th day of March, 2018.

Presiding Officer of the Senate

Passed the House of Representatives the 9th day of April, 2018.

Presiding Officer of the House
of Representatives

OFFICE OF THE GOVERNOR

Received by the Office of the Governor this _____

day of _____, 20_____, at _____ o'clock _____ M.

By: _____

Approved by the Governor of the State of Oklahoma this _____

day of _____, 20_____, at _____ o'clock _____ M.

Governor of the State of Oklahoma

OFFICE OF THE SECRETARY OF STATE

Received by the Office of the Secretary of State this _____

day of _____, 20_____, at _____ o'clock _____ M.

By: _____