



# 2022 National Standards for Diabetes Self-Management Education and Support

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By the most recent estimates, 34.2 million people in the U.S. have diabetes (1). At the same time, 88 million people are at increased risk for developing type 2 diabetes. The U.S. also sees an increasing prevalence of both type 1 and type 2 diabetes in children and adolescents (2). Thus, more than 122 million Americans are at risk for developing devastating complications associated with chronic hyperglycemia (1). Diabetes self-management education and support (DSMES) is a critical element of care for all people with diabetes (PWD). “The purpose of DSMES is to give PWD the knowledge, skills, and confidence to accept responsibility for their self-management. This includes collaborating with their healthcare team, making informed decisions, solving problems, developing personal goals and action plans, and coping with emotions and life stresses” (3). DSMES interventions include activities that support PWD to implement and sustain the self-management behaviors and strategies to improve diabetes and related cardiometabolic conditions and quality of life on an ongoing basis. Despite progress in diabetes treatment modalities, glycemic and cardiometabolic outcomes continue to decline in the U.S. (4). Now, more than ever, the provision of DSMES is a vital component of the full treatment for diabetes.

PWD are at risk for distress, life stress, and clinical depression, which can lead to poor health outcomes (5). The National Standards for Diabetes Self-Management Education and Support (hereinafter referred to as the National Standards) encourage the DSMES team to acknowledge and address the emotional burden of living with and managing diabetes—diabetes distress—and to consider the multitude of daily demands and decisions required of PWD, their families, and caregivers (6–9). To further illustrate, PWD generally visit their primary care physician (PCP)/other qualified healthcare professional two to four times per year, where the average appointment lasts 15–20 min and addresses four or more health conditions (10). This equates to the person with diabetes (PWD) spending less than 1% of their life with their healthcare professionals (10). Therefore, diabetes management decisions largely fall on PWD and/or caregivers, further highlighting the importance of increasing access to DSMES services that support ongoing self-management and decision making.

The National Standards define timely, evidence-based, quality DSMES services that meet or exceed the Centers for Medicare & Medicaid Services quality standards. While the acronym DSMES is used in the literature and in current practice, it is important to note that the term diabetes self-management training (DSMT) is exclusively used when describing the Medicare benefit for diabetes self-management. The Medicare benefit for DSMT was established by the Balanced Budget Act (BBA) of 1997 with a final rule (65 FR 83130) published on 29 December 2000, implementing the BBA provisions and DSMT regulations (Title 42 of the Code of Federal Regulation sections 410.140 to 410.146). The DSMT benefit has reimbursement guidelines outside of the National Standards.

Jody Davis, CDCES,<sup>1</sup>  
 Amy Hess Fischl, BC-ADM, CDCES,<sup>2</sup>  
 Joni Beck, BC-ADM, CDCES,<sup>3</sup>  
 Lillian Browning, CDCES,<sup>4</sup>  
 Amy Carter, CDCES,<sup>5</sup>  
 Jo Ellen Condon, CDCES,<sup>6,7</sup>  
 Michelle Dennison, BC-ADM, CDCES,<sup>8</sup>  
 Terri Francis, CDCES,<sup>9</sup> Peter J. Hughes,<sup>10</sup>  
 Stephen Jaime,<sup>11</sup>  
 Ka Hei Karen Lau, CDCES,<sup>12</sup>  
 Teresa McArthur, CDCES,<sup>13</sup>  
 Karen McAvoy, CDCES,<sup>14</sup>  
 Michelle Magee,<sup>15</sup>  
 Olivia Newby, CDCES,<sup>16</sup>  
 Stephen W. Ponder, CDCES,<sup>17</sup>  
 Uzma Quraishi,<sup>18</sup> Kelly Rawlings,<sup>19</sup>  
 Julia Socke, CDCES,<sup>20</sup>  
 Michelle Stancil, CDCES,<sup>21</sup>  
 Sacha Uelmen, CDCES,<sup>22</sup> and  
 Suzanne Villalobos, BC-ADM<sup>23</sup>

<sup>1</sup>Dignity Health, Sacramento, CA

<sup>2</sup>The University of Chicago Medical Center, Chicago, IL

<sup>3</sup>The University of Oklahoma Health Science Center, Oklahoma City, OK

<sup>4</sup>SWLA Center for Health Services, Crowley, LA

<sup>5</sup>Eskenazi Health, Indianapolis, IN

<sup>6</sup>Anne Arundel Medical Center, Annapolis, MD

<sup>7</sup>Diabetes Alliance Network, Naples, FL

<sup>8</sup>Oklahoma City Indian Clinic, Oklahoma City, OK

<sup>9</sup>San Diego City College, San Diego, CA

<sup>10</sup>Samford University, Birmingham, AL

<sup>11</sup>El Centro Regional Medical Center, El Centro, CA

<sup>12</sup>Joslin Diabetes Center, Boston, MA

<sup>13</sup>Cecelia Health, New York, NY

<sup>14</sup>Yale New Haven Health System, New Haven, CT

<sup>15</sup>MedStar Diabetes and Research Institutes, Georgetown University School of Medicine, Washington, D.C.

<sup>16</sup>The Healthy Living Center Diabetes Education Program, Norfolk, VA

<sup>17</sup>Baylor Scott and White Healthcare, Dallas, TX

<sup>18</sup>American Diabetes Association, Arlington, VA

<sup>19</sup>Vida Health, San Francisco, CA

<sup>20</sup>Healthy Interactions, Chicago, IL

<sup>21</sup>Prisma Health, Greenville, SC

<sup>22</sup>Association of Diabetes Care & Education Specialists, Chicago, IL

The National Standards provide guidance and evidence-based, quality practice for all DSMES services, including those with no plan to seek reimbursement. The evidence supporting the 2022 National Standards clearly identifies the need to provide person-centered services that embrace cultural differences, social determinants of health (SDOH), and the ever-increasing technological engagement platforms and systems. Because the National Standards aim to promote health equity, technological advancements can often be used to achieve equitable access to DSMES (11); however, technology is not a requirement for delivery of DSMES.

Payers are invited to review the National Standards as a tool to inform and modernize DSMES reimbursement requirements and to align with the evolving needs of PWD and physicians/other qualified healthcare professionals. In the U.S., less than 5% of Medicare beneficiaries with diabetes and 6.8% of privately insured people with diagnosed diabetes have utilized DSMES services (12–14). The American Diabetes Association (ADA) and the Association of Diabetes Care & Education Specialists (ADCES) strongly advocate for health equity to ensure all PWD have access to this critical service proven to improve outcomes, both related to and beyond diabetes. Numerous studies have proven the benefits of DSMES, which include improved clinical outcomes and quality of life, while reducing hospitalizations and healthcare costs (13, 15–19). Engagement in DSMES services lowers hemoglobin A1C (A1C) by at least 0.6%, as much as many diabetes medications—however with no side effects (15). Greater A1C reductions have been associated with more than 10 h of DSMES services (15).

The 2022 National Standards update is meant to be a universal document that is easy to understand and can be implemented by the entire healthcare community. DSMES teams in collaboration with

primary care have been shown to be the most effective approach to overcome therapeutic inertia (20). While the National Standards can be implemented in any care setting, the Chronic Care Model (CCM), which replaced the Acute Care Model as a leading practice in the 1990s, focuses on proactively managing chronic diseases (21). Additionally, Minimally Disruptive Medicine (MDM) is a person-centered approach to healthcare that prioritizes the PWD's self-determined and self-chosen goals for life and health while minimizing the healthcare disruption on their lives. The goal of MDM is to maximize outcomes for the PWD without additional burden; this approach can be incorporated with the CCM and diabetes self-management to reduce complexity (22,23).

The National Standards are applicable to all care models, including solo practice, community, large practice, technology-enabled models of care, and others (24). The National Standards can provide structure and consistency to the coordination of care and population health. DSMES services are not limited to fee-for-service billing to the Centers for Medicare & Medicaid Services and can utilize other financial models, such as value-based payments and collaboration with commercial payers for sustainability (25,26).

DSMES services must be supported and broadly incorporated in emerging models of care, including Accountable Care Organizations, Patient-Centered Medical Homes, Population Health Programs, and value-based payment models (27–29). The National Standards are the basis for recognition by the ADA and accreditation by the ADCES, the two accrediting organizations certified by Medicare (30,31). The National Standards also serve as a guide for all members of the care team as well as insurance providers to ensure PWD receive DSMES services that are evidence-based and up to date.

The authors and collaborating organizations involved in the revision of the

2022 National Standards urge payers, physicians/other qualified healthcare professionals, advocates, and supporters of DSMES to acknowledge and address the evolving complexities within the healthcare landscape (3,32). This revision again reinforces the essential need for person-centered DSMES services offered throughout the life span of a PWD instead of a rigid program structure. The National Standards do not endorse any one approach, but rather seek to delineate the commonalities among effective and evidence-based DSMES strategies. Since the last revision, the terminology for the Diabetes Educator has changed to the Diabetes Care and Education Specialist. The Diabetes Care and Education Specialist is “A compassionate teacher and expert who, as an integral member of the care team, provides collaborative, comprehensive, and person-centered care and education for people with diabetes” (33,34). The new title more accurately reflects this range of diverse skills and specialization and conveys the broad clinical management skill set and the expanded role of technology. The Certification Board for Diabetes Care and Education also changed Certified Diabetes Educator (CDE) to Certified Diabetes Care and Education Specialist (CDCES) in recognition of this change and conveys the level of expertise held by those with this credential (33).

## GUIDING PRINCIPLES FOR THE 2022 REVISION OF THE NATIONAL STANDARDS

Due to the dynamic nature of healthcare and diabetes research, the National Standards are reviewed and revised approximately every 5 years by key stakeholders and experts within the diabetes care and education community. For each revision, the Task Force is charged with reviewing the current National Standards for appropriateness, relevance, and scientific basis and making updates based on

<sup>23</sup>Florida Hospital, Orlando, FL

Corresponding author: Sacha Uelmen, [suelmen@adces.org](mailto:suelmen@adces.org)

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current evidence and expert consensus. In 2021, the group was tasked with reducing administrative burden related to DSMES implementation across diverse care settings. The goal is to increase health equity through access to this critical service while focusing more on person-centered care and decreasing the administrative complexities outlined in previous revisions. The group was also committed to increasing clarity in documentation requirements that enhance communication and continuity of services and reduce ambiguity across all DSMES care team members. As a result, the National Standards have been revised to reduce administrative burden while maintaining the highest quality services for PWD and decreasing burnout for all diabetes healthcare professionals, including the DSMES team. It must be acknowledged that some language contained in the 2022 National Standards revision is from the 2017 National Standards (35). A summary of changes in the 2022 National Standards revision can be found in Supplementary Material 1. For definitions of terms, the National Standards' Glossary can be found in Supplementary Material 2.

### STANDARD 1: SUPPORT FOR DSMES SERVICES

*The DSMES team will seek leadership support for implementation and sustainability of DSMES services. The sponsor organization will recognize and support quality DSMES services as an integral component of diabetes care. Sponsor organizations will provide guidance and support for DSMES services to facilitate alignment with organizational resources and the needs of the community being served.*

Support from the sponsor organizations and internal leadership is crucial for the success of DSMES services. This is needed to overcome the low utilization of DSMES services due to various barriers (e.g., payer, healthcare system, physician/other qualified healthcare professional, individual, environmental, etc.) that impede access to and utilization of DSMES services (3). Support of DSMES services also involves inclusive healthcare teams, which at minimum, include the PWD, the referring physician/other qualified healthcare professional, and the diabetes care and education specialist. The inclusion of and communication between various healthcare team members, specifically diabetes

care and education specialists, has effectively improved diabetes care (20). Ultimately, organizational support of evidence-based DSMES is necessary to ensure that these services are available in the delivery method preferred and accessible and adequately utilized by the PWD. Support could also be from expert stakeholders, who can provide purposeful input and advocacy to promote awareness, value, access, increased utilization, and quality (36,37). Stakeholders can be identified from DSMES participants' referring physicians/other healthcare professionals (within and outside the organization), and community- and affinity-based groups that support DSMES (e.g., fitness clubs and social media networks).

### STANDARD 2: POPULATION AND SERVICE ASSESSMENT

*The DSMES service will evaluate their chosen target population to determine, develop, and enhance the resources, design, and delivery methods that align with the target populations' needs and preferences.*

To best plan, design, deliver, evaluate, and improve quality of services, the DSMES team must identify and understand their target populations' demographics and SDOH (38). Demographic characteristics may include race, ethnic/cultural background, sex, age, geographic location, technology access, levels of formal education, literacy level, health literacy, and numeracy (39–41). The populations' perception of risk associated with diabetes, related complications, and co-occurring conditions (28,42,43) are also key characteristics to consider. This information is available from a variety of sources, including but not limited to community needs assessments by local or state health departments, health system/organizations specific to the populations, and DSMES data.

It is essential to promote access to DSMES services by identifying and addressing population barriers and health inequities (3). Barriers may include socioeconomic, cultural factors, misaligned schedules, health insurance shortfalls, perceived lack of need, or limited encouragement from healthcare professionals to engage in DSMES (28,44,45). SDOH related to the target population should guide service design and delivery (46).

### STANDARD 3: DSMES TEAM

*All members of a DSMES team will uphold the National Standards and implement collaborative DSMES services, including evidence-based service design, delivery, evaluation, and continuous quality improvement. At least one team member will be identified as the DSMES quality coordinator and will oversee effective implementation, evaluation, tracking, and reporting of DSMES service outcomes.*

The DSMES team may include one or a variety of healthcare professionals. The evidence recommends that inclusion of dietitians, nurses, pharmacists, or all other disciplines with special certifications that demonstrate mastery of diabetes knowledge and training, such as Board Certified in Advanced Diabetes Management (BC-ADM) and Certified Diabetes Care and Education Specialists (CDCES), can support all DSMES services, including clinical assessment (24,47).

The quality coordinator needs to ensure the DSMES services are person-centered and understand the process of identifying, analyzing, and communicating quality data. The quality coordinator may partner with other team members to support quality improvement. Although the quality coordinator does not require additional degrees or certifications in informatics, developing an understanding of these skills—as well as marketing, healthcare administration, and business management—will be helpful as the healthcare environment continues to evolve. The quality coordinator role may vary depending on the setting of the DSMES services and may or may not be part of the instructional team.

Other members of the healthcare team, including social workers, Certified Health Education Specialists (CHESs and MCHESs), Exercise Physiologists, Diabetes Community Care Coordinators (previously referred to as paraprofessionals in the 2017 National Standards), and others are also valuable members of the DSMES team. As DSMES team members, Diabetes Community Care Coordinators may include, but are not limited to community health workers, health promoters, dietetic technicians, medical assistants, pharmacy technicians, peer educators, and trained peer leaders. Diabetes Community Care Coordinator team members can provide basic instruction, reinforce self-management skills, support behavior change, facilitate group discussion, provide

psychosocial support, and provide ongoing self-management support (47,48).

To maintain competence and expertise in the expanding diabetes care and education services, all DSMES team members are required to participate in and have documented continuing education, specific to the role they serve within the team (24,47–49). For services outside of the scope of practice of the DSMES team or services, the DSMES team should document communication with referring physicians/other qualified healthcare professionals to support person-centered care.

#### **STANDARD 4: DELIVERY AND DESIGN OF DSMES SERVICES**

*DSMES services will utilize a curriculum to guide evidence-based content and delivery, to ensure consistency of teaching concepts, methods, and strategies within the team, and to serve as a resource for the team. DSMES teams will have knowledge of and be responsive to emerging evidence, advances in education strategies, pharmacotherapeutics, technology-enabled treatment, local and online peer support, psychosocial resources, and delivery strategies relevant to the population they serve.*

The options for delivery of DSMES have grown dramatically in recent years as technology has been incorporated into healthcare, and simultaneously as more people have become comfortable using technology for communication, teaching, and learning. Various modes of delivery can support increased communication between PWD and the DSMES team and improve diabetes-related outcomes. Strong evidence supports DSMES delivery through virtual, telehealth, telephone, text messaging, and web-based/mobile phone applications (apps) (50–55).

The most effective and evidence-based delivery methods move beyond the mere acquisition of knowledge to support informed decision making while addressing psychosocial concerns of the PWD (56,57). The use of interactive teaching styles that include meaningful discussions to address individual questions and needs while fostering a culture of positivity within the DSMES services is recommended. The curriculum content and delivery should be creative, culturally appropriate (58,59), and adapted as necessary for the individuals and groups within the target population (60–64). Furthermore, culturally

tailored services have been shown to be effective in improving diabetes care outcomes (59,65).

A curriculum provides guidance for the DSMES team, effective teaching strategies, and methods for evaluating learning outcomes and includes all aspects of diabetes self-management and support (66–68). DSMES delivery should integrate topics across content areas rather than creating silos of content that limit informed and wise decision making. The delivery of curriculum content must be dynamic and based on continuing assessment of need, preferences, and evaluation of outcomes (66,68–71). Recent education research endorses the inclusion of practical problem solving and self-advocacy approaches, as well as collaborative care, including family and peer support, addressing psychosocial issues, behavior change, diabetes devices, and strategies to sustain self-management efforts (21,24,65,72–78). The ADCES7 Self-Care Behaviors (i.e., healthy coping, healthy eating, being active, taking medication, monitoring, reducing risk, and problem solving) is an evidence-based framework and outline to provide and document diabetes care and education that can be used in conjunction with the chosen curricula (79). A DSMES curriculum must include the following core content areas, and content must be prioritized to meet the individual PWD's current needs and goals (3,15,80,81):

- Pathophysiology of diabetes and treatment options
- Healthy coping
- Healthy eating
- Being active
- Taking medication
- Monitoring
- Reducing risk (treating acute and chronic complications)
- Problem solving and behavior change strategies

#### **DSMES follow-up and ongoing support**

While initial DSMES is necessary, it is not sufficient for sustaining a lifetime of diabetes self-management; initial improvements in outcomes have been shown to diminish 6 months after conclusion of the intervention (80). To maintain self-care behavior at the level needed to effectively sustain diabetes management over time, PWD benefit from ongoing diabetes self-management support. On-

going support helps PWD to implement and sustain the ongoing skills, knowledge, coping, and behavioral strategies needed to manage diabetes (3). Because family members, caregivers, and peers can be an effective resource for ongoing support but often don't know how to help, it can be beneficial to include family members and caregivers throughout the DSMES intervention (3). Connecting PWD to technology enabled solutions, such as mobile apps, digital therapeutics, online programs, and peer groups, within the local or online community can encourage practical integration of diabetes self-management and psychosocial support into the existing daily routine between and beyond DSMES sessions.

#### **STANDARD 5: PERSON-CENTERED DSMES**

*Person-centered DSMES is a recurring process over the life span for PWD. Each person's DSMES plan will be unique and based on the person's concerns, needs, and priorities collaboratively determined as part of a DSMES assessment. The DSMES team will monitor and communicate the outcomes of the DSMES services to the diabetes care team and/or referring physician/other qualified healthcare professional.*

To ensure that DSMES is addressing the current concerns, needs, and priorities of the PWD, referring physicians/other qualified healthcare professionals should assess the need for DSMES referral or follow-up at four critical times (3). The four critical times are at diagnosis, annually and/or when not meeting treatment targets, when complicating factors develop, and when transitions in life or care occur (3,66).

Every DSMES intervention should be a person-centered process that addresses timely education and supports individual needs throughout a person's lifetime (3,66,82,83). A DSMES intervention can include individual and/or group sessions and is initiated with an assessment of the PWD's current concerns, needs, and priorities to create a DSMES plan of care guided by the PWD's preferred delivery method and timing. The DSMES plan is implemented through a series of sessions, utilizing a variety of methods, while supporting and tracking related outcomes to identify trends and reinforce effective self-management behaviors (3,66,82). Communicating the progress and related outcomes to the

PWD's diabetes care team contributes to the continuum of person-centered collaborative care and assists in overcoming therapeutic inertia (66,84–86).

#### Assessment

To implement a person-centered DSMES plan, the Diabetes Care and Education Specialist must closely work in partnership with each PWD to better understand how (e.g., modality, content, and frequency) to best suit that person. The assessment process involves collaborative communication between a healthcare professional and the PWD to identify needs and agree on the PWD's preferred educational, coping, and behavioral interventions that will be used to develop needed problem-solving, decision-making, and self-management skills and strategies (15,87).

#### Examples of information gathered during the assessment process can include the following:

- Health status: type of diabetes, clinical needs, health history, disabilities, physical limitations, SDOH and health inequities (e.g., safe housing, transportation, access to nutritious foods, access to healthcare, financial status, and limitations), risk factors, comorbidities, and age
- Learning level: diabetes knowledge, health literacy, literacy, numeracy, readiness to learn, ability to self-manage, developmental stage, learning disabilities, cognitive/developmental disabilities (e.g., intellectual disability, moderate-severe autism, dementia), and mental health impairment (e.g., schizophrenia, suicidality)
- Lifestyle practices: self-management skills and behaviors, health service or resource utilization, cultural influences, alcohol and drug use, lived experiences, religion, and sexual orientation
- Psychosocial adjustment: emotional response to diabetes, diabetes distress, diabetes family support, peer support (e.g., in-person or via social networking sites), and other potential promotors and barriers (22,46,84,88–92)

This information can be provided by the PWD as well as obtained from the health record/electronic health record (EHR) and identified support persons or caregivers. This information should be reviewed by the DSMES team to inform and promote person-centered

understanding. The assessment process can be supported by a variety of collection/intake modalities, such as online assessments via consumer portals and EHR, tablet computers that integrate with EHR, text messaging, web-based tools, automated telephone follow-up, and remote monitoring tools (26,93–95). Although not an exhaustive list or applicable to all populations, examples of assessment tools can be found in Supplementary Material 3.

While it would be ideal to have all this information on or before the first session, the realities of the healthcare environment often require the DSMES team to conduct focused assessments in specific areas at the first session and throughout subsequent sessions of the intervention. After the initial assessment, ongoing assessments will be incremental over time based on individual need (3,96). A PWD's concerns and needs change throughout their lifetime due to changes in physical and emotional health, cultural and religious practices, SDOH, the ability to exercise, care support systems, etc. (46,84,89,96).

The assessment can also identify factors that affect the PWD's ability to effectively manage their diabetes that go beyond the scope of practice of the DSMES team. For example, DSMES services play a critical role in closing gaps in care by helping to facilitate necessary referrals (e.g., medical nutrition therapy, social work, psychology, pharmacy, podiatry, optometry, lab tests, specialists, etc.) beyond DSMES that increase access to resources to assist the PWD (88,97–100).

#### Implementing person-centered DSMES sessions

After the initial assessment, the PWD and DSMES team member(s) develop a person-centered DSMES plan. The ADCES7 Self-Care Behaviors (57) can be used as a base for documentation of the DSMES plan to promote continuity of care with all members of the DSMES team and across DSMES services.

The DSMES team member(s) use person-centered and strengths-based plain language (101), jargon-free and culturally relevant information, language- and literacy-appropriate educational materials (102), and interpreter services when indicated (103). Evidence-

based communication strategies, such as goal setting, action planning, empowerment-based principles and strategies, motivational interviewing, shared decision making, cognitive behavioral therapy, problem solving, self-efficacy enhancement, teach-back method, and relapse prevention strategies are also effective (76,104–107). The DSMES team uses nonjudgmental, nonstigmatizing, and gender-inclusive language when speaking and in writing with and about PWD.

The DSMES plan, topics covered at each session, and the outcomes of the intervention are documented in the DSMES record for each person. This documentation provides evidence of person-centered DSMES and communication among other members of the person's healthcare team. This enhances long-term management and continuity of diabetes care, education, and support (108). Using technology tools and EHRs, in turn, increase access to information for all team members to work collaboratively and have access to documentation (109).

#### Supporting and tracking person-centered self-management outcomes

Clinical outcome measures reflect the impact of the DSMES services on the health status of the PWD (110). To demonstrate the benefits of DSMES and/or the need for treatment plan adaptation, it is important for DSMES services to measure and track relevant individual outcomes, such as clinical outcomes, patient-reported outcomes, psychosocial outcomes, and behavioral outcomes. Use of patient-generated health data (PGHD) has rapidly increased with wearable devices and apps, and PGHD can assist in setting and tracking outcomes and goals. There is increasing adoption of PGHD diabetes devices, such as continuous glucose monitors (CGMs). For example, CGMs can assist PWD in setting and tracking behavioral and clinical outcomes with real-time feedback for indicators, such as glucose time in, below, or above range and glucose management indicator (111). Incorporating PGHD (112) into decision making individualizes self-management and empowers PWD to fully engage in personal problem solving toward evaluating and changing behaviors and improving outcomes (26,111,113–115).

It is crucial for each PWD to collaboratively develop action-oriented behavior

change plans to reach their personal behavioral goals, coping strategies, and treatment (or clinical) targets (87,116). The DSMES team will explain and demonstrate psychosocial and behavior change strategies that can be used by the PWD to meet their self-determined goals and targets (117). The role of the DSMES team is to provide support in problem solving during this process (118,119). The ADCE7 Self-Care Behaviors (57) can be used for tracking progress in behavior goals.

For some outcomes, the indicators, measures, and timeframes will depend on evidence-based guidelines from professional organizations or government agencies (15,120,121).

#### **STANDARD 6: MEASURING AND DEMONSTRATING OUTCOMES OF DSMES SERVICES**

*DSMES services will have ongoing continuous quality improvement (CQI) strategies in place that measure the impact of the DSMES services. Systematic evaluation of process and outcome data will be conducted to identify areas for improvement and to guide services optimization and/or redesign.*

To demonstrate the benefits of DSMES, members of the DSMES team track relevant individual PWD outcomes (STANDARD 5). Then, these individual outcomes are aggregated to report practice level population outcomes. The diabetes self-management education core outcomes measures (68) specify behavior change as a key outcome, and the ADCE7 Self-Care Behaviors provide a useful framework for assessment, documentation, and evaluation (3,57). The DSMES team should select validated instruments or assessment tools (see Supplementary Material 3) whenever possible and consider utilizing, contributing to, or reflecting upon assessment tools within their organization to accurately track progress and outcomes.

Service models that include population health and disease management, an interprofessional team, and ongoing social support improve both individual-level and aggregated practice-level outcomes (3,122). Formal CQI strategies provide a framework to strive for excellence, quantify successes, and identify future opportunities. In addition, formal CQI strategies are best informed through stakeholder input and have been shown to improve diabetes outcomes (123), which in turn may be used as evidence

to inform payment models and policy for support of DSMES services.

Quality improvement initiatives may target DSMES services at an individual practice, multicenter system, or national DSMES effort level (124). By measuring and monitoring both process and outcome data on an ongoing basis, the DSMES team can identify areas for improvement. They can then adjust engagement strategies and service offerings to optimize outcomes. Evaluation of reach, effectiveness, and adoption achieved via quality improvement initiatives generates evidence to support the business case for maintenance and/or expansion of the DSMES services. Positive results from quality initiatives can be used in marketing efforts and shared with administrators/leadership. A focus on quality is also part of overall healthcare quality initiatives. DSMES services can make a substantial impact on many of the measured outcomes, including the Medicare Access and Children's Health Insurance Program (CHIP) Reauthorization Act (MACRA) and the Quality Payment Program, which have shifted the focus of provider payment from unit of service to quality and outcomes. As an example of promoting quality as an outcome, participating clinicians can be rewarded based on annual predetermined quality measure data, and requirements may change each performance year (125).

Once areas for DSMES services improvement are identified, timelines for data collection with internal audits for verification of data integrity, analysis, and presentation of results can be established.

Outcomes are broadly considered as process data or outcomes data. Outcome data may be clinical, behavioral, patient-reported, and PGHD. Examples for each of these outcome types are provided in **Table 1**. Process outcomes indicate what a healthcare professional does to maintain or improve health (110). They provide information to inform what will lead to desired behavioral and clinical outcomes improvement (e.g., attendance at DSMES sessions, medication taking behaviors, or preventive services involvement) (126). Clinical outcomes indicate the result of the process (e.g., whether treatment or behavioral changes are leading to improvements, such as a change in A1C) and should align with the

greater organizational performance measures, when applicable.

Process outcome measures examine activities driving the most important outcomes of interest from the DSMES services perspective. Process outcome measures generally recommended for DSMES services are operational measures (e.g., characteristics of PWD receiving services, results of marketing efforts, attendance and factors impacting attendance, financial metrics including billing and reimbursement rates, copays, facility fees, PWD and physician/other qualified healthcare professional satisfaction, referrals to DSMES, and attainment rates for recommended diabetes-related surveillance testing). For DSMES services, SDOH must also be considered as process measures because addressing elements of SDOH are necessary for the PWD to achieve optimal self-management and are deemed essential to achieving health equity from the individual PWD, program, and population health perspectives (46).

A wide variety of methods can be used to guide quality improvement initiatives at the individual practice or system levels. The Institute for Healthcare Improvement suggests the Model for Improvement as a framework to guide improvement work (126). The model consists of three fundamental questions that should be answered by an improvement process: 1) "What are we trying to accomplish?" 2) "How will we know a change is an improvement?" and 3) "What changes can we make that will result in an improvement?" (126). Evidence-based examples of such methods include the Plan-Do-Study-Act model, Six Sigma, Lean, workflow mapping, the Re-AIM (127) framework, and the Chronic Care Model (128). There are resources available to assist those initiating quality improvement programs for the first time or for those looking for new options (21,123,126–129). The Centers for Disease Control and Prevention DSMES Technical Assistance Guide (129) and accompanying toolkit (130) also provide guidance for planning and implementing activities to increase use of DSMES services and address quality improvement components. Quality and Performance groups at hospitals and in health systems are also a resource for those embarking on DSMES services quality improvement efforts.

**Table 1—DSMES Outcome Examples**

Outcome type	Example
Process outcomes	Referral process Attendance Education mapping Social determinants of health Timing of education sessions (e.g., times that meet the PWD needs)
Clinical outcomes	A1C Time in hypoglycemia Pregnancy outcomes LDL-cholesterol levels BMI and body weight Blood pressure Time in range
Psychosocial and behavioral outcomes (57)	Healthy coping Healthy eating Being active Taking medication Monitoring Reducing risk Problem solving
Patient-reported outcomes	Health-related quality of life Diabetes-related quality of life Diabetes distress Self-efficacy Functional status Patient satisfaction
Patient generated health data	Blood glucose trends CGM glucose management indicator Weight, activity, steps Food/beverage intake Sleep Blood pressure

## CONCLUSIONS

In keeping with the theme of MDM and recognition of the specialist role of the Diabetes Care and Education Specialist and CDCES, this revision of the National Standards focuses on clarifying key concepts and reducing administrative tasks associated with DSMES services that have little to no impact on person-centered outcomes. While the COVID-19 pandemic and public health emergency have had a major impact on healthcare systems, physicians/other qualified healthcare professionals, and PWD, it is imperative that evidence-based solutions are supported, and that every effort is made across government agencies, payers, and physicians/other qualified healthcare professionals to expand the role of and access to DSMES across the country. As we have learned from the disruption in all aspects of people's daily lives from the COVID-19 pandemic, it is clear that structured DSMES programs do not benefit everyone, and delivery of evidenced-

based, person-centered care is needed to drive quality outcomes. It also reinforces the importance of assessing diabetes distress and promoting the use of healthy coping strategies for effective self-management of diabetes. Alternative methods of delivery, such as one on one audio and audio-video contact, can also improve outcomes similar to in-person DSMES and allow the PWD to choose the option that best meets their needs and preferences.

Evidence supports an expanded role of the Diabetes Care and Education Specialist as an effective change agent in overcoming therapeutic inertia. Research studies show that Diabetes Care and Education Specialists can support intensification of treatment plans to achieve glycemic, blood pressure, and lipid targets through the implementation of diabetes management protocols (131). Furthermore, a recent systematic review and meta-analysis adds to the growing body of evidence that professionals who are not physicians, such as the Diabetes

Care and Education Specialist, are well positioned and should be empowered to initiate and intensify treatment plans when supported by appropriate guidelines (20). Use of digital technology (e.g., cloud-based, telehealth, data management platforms, apps, and social media) enhances the ability to employ a technology enabled self-management feedback loop with four key elements—two-way communication, analysis of PGHD, customized education, and person-centered feedback—to provide real-time engagement in self-management, as well as enable and empower PWD to effectively communicate with their care team (26). Disparities and inequities in access, adoption, and optimization of diabetes technology have become increasingly apparent in the COVID-19 pandemic (11). A framework identified specifically for Diabetes Care and Education Specialists to address these inequities that can be used as a practice model to aid in the incorporation of technology into their DSMES services is the ICC Framework (Identify, Configure, Collaborate) (132, 133). Data support that technology can aid in better outcomes; however, additional assessment and judgement to determine if there are barriers to use and if those barriers can be overcome must be considered (134,135). Other tools are available to assist with implementation and ongoing utilization of diabetes technology (111,136,137).

On a final note, implementation science is an emerging and cost-effective way to study real world methods that promote integration of research and evidence into practice and policy (138). DSMES is an area well established for healthcare professionals to utilize a robust body of evidence to evaluate outcomes, reduce costs, and decrease health disparities while addressing and reducing health inequities.

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## References

- Centers for Disease Control and Prevention. National Diabetes Statistics Report, 2020: Estimates of diabetes and its burden in the United States. Accessed 10 August 2021. Available from <https://www.cdc.gov/diabetes/pdfs/data/statistics/national-diabetes-statistics-report.pdf>
- Lawrence JM, Divers J, Isom S, et al.; SEARCH for Diabetes in Youth Study Group. Trends in prevalence of type 1 and type 2 diabetes in children and adolescents in the US, 2001-2017. *JAMA* 2021;326:717-727 DOI: 10.1001/jama.2021.11165
- Powers MA, Bardsley JK, Cypress M, et al. Diabetes self-management education and support in adults with type 2 diabetes: a consensus report of the American Diabetes Association, the Association of Diabetes Care & Education Specialists, the Academy of Nutrition and Dietetics, the American Academy of Family Physicians, the American Academy of PAs, the American Association of Nurse Practitioners, and the American Pharmacists Association. *Diabetes Care* 2020;43:1636-1649 DOI: 10.2337/dci20-0023
- Fang M, Wang D, Coresh J, Selvin E. Trends in diabetes treatment and control in U.S. adults, 1999-2018. *N Engl J Med* 2021;384:2219-2228 DOI: 10.1056/NEJMsa2032271
- Mathiesen AS, Egerod I, Jensen T, Kaldan G, Langberg H, Thomsen T. Psychosocial interventions for reducing diabetes distress in vulnerable people with type 2 diabetes mellitus: a systematic review and meta-analysis. *Diabetes Metab Syndr Obes* 2018;12:19-33 DOI: 10.2147/dms0.S179301
- Adu MD, Malabu UH, Malau-Aduli AEO, Malau-Aduli BS. Enablers and barriers to effective diabetes self-management: a multi-national investigation. *PLoS One* 2019;14:e0217771 DOI: 10.1371/journal.pone.0217771
- Tran VT, Barnes C, Montori VM, Falissard B, Ravaud P. Taxonomy of the burden of treatment: a multi-country web-based qualitative study of patients with chronic conditions. *BMC Med* 2015;13:115 DOI: 10.1186/s12916-015-0356-x
- Fisher L, Polonsky WH, Hessler D. Addressing diabetes distress in clinical care: a practical guide. *Diabet Med* 2019;36:803-812 DOI: 10.1111/dme.13967
- Skinner TC, Joensen L, Parkin T. Twenty-five years of diabetes distress research. *Diabet Med* 2020;37:393-400 DOI: 10.1111/dme.14157
- Berk SI. Time to care: primary care visit duration and value-based healthcare. *Am J Med* 2020;133:655-656 DOI: 10.1016/j.amjmed.2019.12.046
- MacLeod J, Scher L, Greenwood D, et al. Technology disparities and therapeutic inertia: a call to action for the diabetes care and education specialist. *ADCES in Practice* 2021;9:34-41 DOI: 10.1177/2633559X211032227
- Strawbridge LM, Lloyd JT, Meadow A, Riley GF, Howell BL. Use of Medicare's diabetes self-management training benefit. *Health Educ Behav* 2015;42:530-538 DOI: 10.1177/1090198114566271
- Strawbridge LM, Lloyd JT, Meadow A, Riley GF, Howell BL. One-year outcomes of diabetes self-management training among Medicare beneficiaries newly diagnosed with diabetes. *Med Care* 2017;55:391-397 DOI: 10.1097/mlr.0000000000000653
- Li R, Shrestha SS, Lipman R, Burrows NR, Kolb LE; Centers for Disease Control and Prevention (CDC). Diabetes self-management education and training among privately insured persons with newly diagnosed diabetes—United States, 2011-2012. *MMWR Morb Mortal Wkly Rep* 2014;63:1045-1049
- Chvala CA, Sherr D, Lipman RD. Diabetes self-management education for adults with type 2 diabetes mellitus: a systematic review of the effect on glycemic control. *Patient Educ Couns* 2016;99:926-943 DOI: 10.1016/j.pec.2015.11.003
- He X, Li J, Wang B, et al. Diabetes self-management education reduces risk of all-cause mortality in type 2 diabetes patients: a systematic review and meta-analysis. *Endocrine* 2017;55:712-731 DOI: 10.1007/s12020-016-1168-2
- Humayun MA, Jenkins E, Knott J, et al. Intensive structured education for type 1 diabetes management using BERTIE: long-term follow-up to assess impact on glycaemic control and quality of life indices. *Diabetes Res Clin Pract* 2018;143:275-281 DOI: 10.1016/j.diabres.2018.07.034
- Pearson TL, Bardsley J, Weiner S, Kolb L. Population health: the diabetes educator's evolving role. *Diabetes Educ* 2019;45:333-348 DOI: 10.1177/0145721719857728
- Bluml BM, Kolb LE, Lipman R. Evaluating the impact of year-long, augmented diabetes self-management support. *Popul Health Manag* 2019;22:522-528 DOI: 10.1089/pop.2018.0175
- Powell RE, Zaccardi F, Beebe C, et al. Strategies for overcoming therapeutic inertia in type 2 diabetes: a systematic review and meta-analysis. *Diabetes Obes Metab* 2021;23:2137-2154 DOI: 10.1111/dom.14455
- Siminerio LM, Piatt GA, Emerson S, et al. Deploying the chronic care model to implement and sustain diabetes self-management training programs. *Diabetes Educ* 2006;32:253-260 DOI: 10.1177/0145721706287156
- May CR, Eton DT, Boehmer K, et al. Rethinking the patient: using Burden of Treatment Theory to understand the changing dynamics of illness. *BMC Health Serv Res* 2014;14:281 DOI: 10.1186/1472-6963-14-281
- Boehmer KR, Abu Dabrh AM, Gionfriddo MR, Erwin P, Montori VM. Does the chronic care model meet the emerging needs of people living with multimorbidity? A systematic review and thematic synthesis. *PLoS One* 2018;13:e0190852 DOI: 10.1371/journal.pone.0190852
- Ryan D, Burke SD, Litchman ML, et al. Competencies for diabetes care and education specialists. *Diabetes Educ* 2020;46:384-397 DOI: 10.1177/0145721720931092
- Kitsiou S, Paré G, Jaana M, Gerber B. Effectiveness of mHealth interventions for patients with diabetes: an overview of systematic reviews. *PLoS One* 2017;12:e0173160 DOI: 10.1371/journal.pone.0173160
- Greenwood DA, Litchman ML, Isaacs D, et al. A new taxonomy for technology-enabled diabetes self-management interventions: results of an umbrella review. *J Diabetes Sci Technol* 2021;19:322968211036430 DOI: 10.1177/19322968211036430
- Grady PA, Gough LL. Self-management: a comprehensive approach to management of chronic conditions. *Am J Public Health* 2014;104:e25-e31 DOI: 10.2105/ajph.2014.302041
- Piccinino LJ, Devchand R, Gallivan J, Tuncer D, Nicols C, Siminerio LM. Insights from the national diabetes education program national diabetes survey: opportunities for diabetes self-management education and support. *Diabetes Spectr* 2017;30:95-100 DOI: 10.2337/ds16-0056
- Saulsbury L, Peek M. Financing diabetes care in the U.S. health system: payment innovations for addressing the medical and social determinants of health. *Curr Diab Rep* 2019;19:136 DOI: 10.1007/s11892-019-1275-6
- American Diabetes Association. Education Recognition Program. Accessed 29 September 2021. Available from <https://professional.diabetes.org/diabetes-education>
- Association of Diabetes Care & Education Specialists. Diabetes Education Accreditation Program (DEAP). Accessed 29 September 2021. Available from [www.diabeteseducator.org/deap](http://www.diabeteseducator.org/deap)
- National Institute of Diabetes and Digestive and Kidney Diseases. Principle 3: Provide comprehensive, patient-centered diabetes care. Accessed 10 August 2021. Available from <https://www.niddk.nih.gov/health-information/professionals/clinical-tools-patient-management/diabetes/guiding-principles-care-people-risk-diabetes>
- Dickinson JK, Burke SD, Traficano S. From diabetes educators to diabetes care and education specialists: time for change. *ADCES in Practice* 2021;9:52-55 DOI: 10.1177/2633559X211029960
- Fain JA. Embracing a new vision for diabetes education and diabetes educators. *Diabetes Educ* 2019;45:331-332 DOI: 10.1177/0145721719859482
- Beck J, Greenwood DA, Blanton L, et al.; 2017 Standards Revision Task Force. 2017 National standards for diabetes self-management



- education and support. *Diabetes Educ* 2017;43:449–464 DOI: 10.1177/0145721717722968
36. Siminerio LM, Albright A, Fradkin J, et al. The national diabetes education program at 20 years: lessons learned and plans for the future. *Diabetes Care* 2018;41:209–218 DOI: 10.2337/dc17-0976
37. Institute for Credentialing Excellence. National commission for certifying agencies standards for the accreditation of certification programs. Accessed 29 September 29 2021. Available from <https://www.credentialingexcellence.org/Accreditation/Earn-Accreditation/NCCA/Standards-Revision>
38. Rinker J, Dickinson JK, Litchman ML, et al. The 2017 diabetes educator and the diabetes self-management education national practice survey. *Diabetes Educ* 2018;44:260–268 DOI: 10.1177/0145721718765446
39. Agarwal S, Kanapka LG, Raymond JK, et al. Racial-ethnic inequity in young adults with type 1 diabetes. *J Clin Endocrinol Metab* 2020;105:e2960–e2969 DOI: 10.1210/clinem/dgaa236
40. Abdullah A, Liew SM, Salim H, Ng CJ, Chinna K. Prevalence of limited health literacy among patients with type 2 diabetes mellitus: a systematic review. *PLoS One* 2019;14:e0216402 DOI: 10.1371/journal.pone.0216402
41. Dabelea D, Sauder KA, Jensen ET, et al. Twenty years of pediatric diabetes surveillance: what do we know and why it matters. *Ann N Y Acad Sci* 2021;1495:99–120 DOI: 10.1111/nyas.14573
42. Ausili D, Rebra P, Di Mauro S, et al. Clinical and socio-demographic determinants of self-care behaviours in patients with heart failure and diabetes mellitus: a multicentre cross-sectional study. *Int J Nurs Stud* 2016;63:18–27 DOI: 10.1016/j.ijnurstu.2016.08.006
43. Aftab A, Bhat C, Gunzler D, et al. Associations among comorbid anxiety, psychiatric symptomatology, and diabetic control in a population with serious mental illness and diabetes: findings from an interventional randomized controlled trial. *Int J Psychiatry Med* 2018;53:126–140 DOI: 10.1177/0091217417749795
44. Peyrot M, Rubin RR, Funnell MM, Siminerio LM. Access to diabetes self-management education: results of national surveys of patients, educators, and physicians. *Diabetes Educ* 2009;35:246–263. DOI: 10.1177/0145721708329546
45. Campbell JA, Egede LE. Individual-, community-, and health system-level barriers to optimal type 2 diabetes care for inner-city African Americans: an integrative review and model development. *Diabetes Educ* 2020;46:11–27 DOI: 10.1177/0145721719889338
46. Hill-Briggs F, Adler NE, Berkowitz SA, et al. Social determinants of health and diabetes: a scientific review. *Diabetes Care* 2020;44:258–279 DOI: 10.2337/dci20-0053
47. Association of Diabetes Care & Education Specialists. Diabetes care and education specialists practice levels. Accessed 6 September 2021. Available from <https://www.diabeteseducator.org/practice/practice-documents/diabetes-educator-practice-levels>
48. American Association of Diabetes Educators. AADE practice paper: community health workers role in DSMES and prediabetes. Accessed 21 July 2021. Available from <https://www.diabeteseducator.org/docs/default-source/practice/practice-documents/practice-papers/community-health-workers-39-role-in-dsmes-and-prediabetes.pdf?sfvrsn=22>
49. Gagliardino JJ, Arrechea V, Assad D, et al. Type 2 diabetes patients educated by other patients perform at least as well as patients trained by professionals. *Diabetes Metab Res Rev* 2013;29:152–160 DOI: 10.1002/dmrr.2368
50. Bakhach M, Reid MW, Pyatak EA, et al. Home telemedicine (CoYoT1 Clinic): a novel approach to improve psychosocial outcomes in young adults with diabetes. *Diabetes Educ* 2019;45:420–430 DOI: 10.1177/0145721719858080
51. Fernandes BS, Reis IA, Torres HdeC. Evaluation of the telephone intervention in the promotion of diabetes self-care: a randomized clinical trial. *Rev Lat Am Enfermagem* 2016;24:e2719 DOI: 10.1590/1518-8345.0632.2719
52. von Storch K, Graaf E, Wunderlich M, Rietz C, Polidori MC, Wooten C. Telemedicine-assisted self-management program for type 2 diabetes patients. *Diabetes Technol Ther* 2019;21:514–521 DOI: 10.1089/dia.2019.0056
53. Sahin C, Courtney KL, Naylor PJ, E Rhodes R. Tailored mobile text messaging interventions targeting type 2 diabetes self-management: a systematic review and a meta-analysis. *Digit Health* 2019;5:2055207619845279 DOI: 10.1177/2055207619845279
54. Toma T, Athanasiou T, Harling L, Darzi A, Ashrafian H. Online social networking services in the management of patients with diabetes mellitus: systematic review and meta-analysis of randomised controlled trials. *Diabetes Res Clin Pract* 2014;106:200–211 DOI: 10.1016/j.diabres.2014.06.008
55. Saffari M, Ghanizadeh G, Koenig HG. Health education via mobile text messaging for glycemic control in adults with type 2 diabetes: a systematic review and meta-analysis. *Prim Care Diabetes* 2014;8:275–285 DOI: 10.1016/j.pcd.2014.03.004
56. Boren SA. AADE7 Self-Care Behaviors: systematic reviews. *Diabetes Educ* 2007;33:866–871. DOI: 10.1177/0145721707309662
57. Association of Diabetes Care and Education Specialists. An effective model of diabetes care and education: the ADCE7 Self-Care Behaviors. *Sci Diabetes Self Manag Care* 2021;47:30–53 DOI: 10.1177/0145721720978154
58. McEwen MM, Pasvogel A, Murdaugh C, Hepworth J. Effects of a family-based diabetes intervention on behavioral and biological outcomes for Mexican American adults. *Diabetes Educ* 2017;43:272–285 DOI: 10.1177/0145721717706031
59. Sinclair KA, Zamora-Kapoor A, Townsend-Ing C, McElfish PA, Kaholokula JK. Implementation outcomes of a culturally adapted diabetes self-management education intervention for Native Hawaiians and Pacific islanders. *BMC Public Health* 2020;20:1579 DOI: 10.1186/s12889-020-09690-6
60. Cavanaugh K, Huizinga MM, Wallston KA, et al. Association of numeracy and diabetes control. *Ann Intern Med* 2008;148:737–746 DOI: 10.7326/0003-4819-148-10-200805200-00006
61. Glazier RH, Bajcar J, Kennie NR, Willson K. A systematic review of interventions to improve diabetes care in socially disadvantaged populations. *Diabetes Care* 2006;29:1675–1688 DOI: 10.2337/dc05-1942
62. Magee M, Bowling A, Copeland J, Fokar A, Pasquale P, Youssef G. The ABCs of diabetes: diabetes self-management education program for African Americans affects A1C, lipid-lowering agent prescriptions, and emergency department visits. *Diabetes Educ* 2011;37:95–103 DOI: 10.1177/0145721710392246
63. Rothman RL, DeWalt DA, Malone R, et al. Influence of patient literacy on the effectiveness of a primary care-based diabetes disease management program. *JAMA* 2004;292:1711–1716 DOI: 10.1001/jama.292.14.1711
64. Schillinger D, Grumbach K, Piette J, et al. Association of health literacy with diabetes outcomes. *JAMA* 2002;288:475–482 DOI: 10.1001/jama.288.4.475
65. Funnell MM, Nwankwo R, Gillard ML, Anderson RM, Tang TS. Implementing an empowerment-based diabetes self-management education program. *Diabetes Educ* 2005;31:53–61, 55–56, 61 DOI: 10.1177/0145721704273166
66. American Diabetes Association. 5. Facilitating behavior change and well-being to improve health outcomes: standards of medical care in diabetes—2021. *Diabetes Care* 2021;44(Suppl. 1):S53–S72 DOI: 10.2337/dc21-S005
67. Redman B. *The Practice of Patient Education*. 10th ed. St. Louis, MO, Mosby, 2007
68. Mulcahy K, Maryniuk M, Peebles M, et al. Diabetes self-management education core outcomes measures. *Diabetes Educ* 2003;29:768–770, 773–784, 787–788 passim DOI: 10.1177/014572170302900509
69. Reader D, Splett P; Diabetes Care and Education Dietetic Practice Group. Impact of gestational diabetes mellitus nutrition practice guidelines implemented by registered dietitians on pregnancy outcomes. *J Am Diet Assoc* 2006;106:1426–1433 DOI: 10.1016/j.jada.2006.06.009
70. Boucher JL, Evert A, Daly A, et al. American Dietetic Association revised standards of practice and standards of professional performance for registered Dietitians (generalist, specialty, and advanced) in diabetes care. *J Am Diet Assoc* 2011;111:156–166.e27. DOI: 10.1016/j.jada.2010.10.053
71. Evert AB, Dennison M, Gardner CD, et al. Nutrition therapy for adults with diabetes or prediabetes: a consensus report. *Diabetes Care* 2019;42:731–754 DOI: 10.2337/dci19-0014
72. Tang TS, Gillard ML, Funnell MM, et al. Developing a new generation of ongoing: Diabetes self-management support interventions: a preliminary report. *Diabetes Educ* 2005;31:91–97 DOI: 10.1177/0145721704273231
73. Piatt GA, Orchard TJ, Emerson S, et al. Translating the chronic care model into the community: results from a randomized controlled trial of a multifaceted diabetes care intervention. *Diabetes Care* 2006;29:811–817 DOI: 10.2337/diacare.29.04.06.dc05-1785
74. Norris SL. Health-related quality of life among adults with diabetes. *Curr Diab Rep* 2005;5:124–130 DOI: 10.1007/s11892-005-0039-7
75. Herman AA. Community health workers and integrated primary health care teams in the 21st

- century. *J Ambul Care Manage* 2011;34:354–361 DOI: 10.1097/JAC.0b013e31822cbcd0
76. Weinger K, Beverly EA, Lee Y, Sitnokov L, Ganda OP, Caballero AE. The effect of a structured behavioral intervention on poorly controlled diabetes: a randomized controlled trial. *Arch Intern Med* 2011;171:1990–1999 DOI: 10.1001/archinternmed.2011.502
77. Hemmati Maslakhak M, Razmara S, Niazkhani Z. Effects of face-to-face and telephone-based family-oriented education on self-care behavior and patient outcomes in type 2 diabetes: a randomized controlled trial. *J Diabetes Res* 2017; 2017:8404328 DOI: 10.1155/2017/8404328
78. Aziz Z, Riddell MA, Absetz P, Brand M; Australasian Peers for Progress Diabetes Project Investigators. Peer support to improve diabetes care: an implementation evaluation of the Australasian Peers for Progress Diabetes Program. *BMC Public Health* 2018;18:262 DOI: 10.1186/s12889-018-5148-8
79. American Association of Diabetes Educators. An effective model of diabetes care and education: revising the AADE7 Self-Care Behaviors. *Diabetes Educ* 2020;46:139–160 DOI: 10.1177/0145721719894903
80. Norris SL, Lau J, Smith SJ, Schmid CH, Engelgau MM. Self-management education for adults with type 2 diabetes: a meta-analysis of the effect on glycemic control. *Diabetes Care* 2002;25:1159–1171 DOI: 10.2337/diacare.25.7.1159
81. Gillett M, Dallosso HM, Dixon S, et al. Delivering the diabetes education and self management for ongoing and newly diagnosed (DESMOND) programme for people with newly diagnosed type 2 diabetes: cost effectiveness analysis. *BMJ* 2010;341:c4093 DOI: 10.1136/bmj.c4093
82. Inzucchi SE, Bergenstal RM, Buse JB, et al.; American Diabetes Association (ADA); European Association for the Study of Diabetes (EASD). Management of hyperglycemia in type 2 diabetes: a patient-centered approach: position statement of the American Diabetes Association (ADA) and the European Association for the Study of Diabetes (EASD). *Diabetes Care* 2012; 35:1364–1379 DOI: 10.2337/dc12-0413
83. Boyd C, Smith CD, Masoudi FA, et al. Decision making for older adults with multiple chronic conditions: executive summary for the American Geriatrics Society guiding principles on the care of older adults with multimorbidity. *J Am Geriatr Soc* 2019;67:665–673 DOI: 10.1111/jgs.15809
84. American Diabetes Association. 1. Improving care and promoting health in populations: standards of medical care in diabetes—2021. *Diabetes Care* 2021;44(Suppl. 1):S7–S14 DOI: 10.2337/dc21-S001
85. Rickert J. Patient-centered care: what it means and how to get there. *Health Affairs Blog* Accessed 24 January 2012. Available from <https://www.healthaffairs.org/doi/10.1377/hblog2012.0124.016506/full/>
86. Rutten GEHM, Alzaid A. Person-centred type 2 diabetes care: time for a paradigm shift. *Lancet Diabetes Endocrinol* 2018;6:264–266 DOI: 10.1016/s2213-8587(17)30193-6
87. American Association of Diabetes Educators. AADE position statement: Individualization of diabetes self-management education. *Diabetes Educ* 2007;33:45–49 DOI: 10.1177/0145721706298308
88. Munshi MN. Cognitive dysfunction in older adults with diabetes: what a clinician needs to know. *Diabetes Care* 2017;40:461–467 DOI: 10.2337/dc16-1229
89. Kärmeniemi M, Lankila T, Ikäheimo T, Koivumaa-Honkanen H, Korpelainen R. The built environment as a determinant of physical activity: a systematic review of longitudinal studies and natural experiments. *Ann Behav Med* 2018;52:239–251 DOI: 10.1093/abm/kax043
90. Berkman ND, Sheridan SL, Donahue KE, et al. Health literacy interventions and outcomes: an updated systematic review. *Evid Rep Technol Assess (Full Rep)* 2011:1–941
91. Gucciardi E, Chan VW, Manuel L, Sidani S. 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;92:235–245 DOI: 10.1016/j.pec.2013.03.007
92. Schellenberg ES, Dryden DM, Vandermeer B, Ha C, Korownyk C. Lifestyle interventions for patients with and at risk for type 2 diabetes: a systematic review and meta-analysis. *Ann Intern Med* 2013;159:543–551 DOI: 10.7326/0003-4819-159-8-201310150-00007
93. Mulvaney SA, Rothman RL, Wallston KA, Lybarger C, Dietrich MS. An internet-based program to improve self-management in adolescents with type 1 diabetes. *Diabetes Care* 2010;33:602–604 DOI: 10.2337/dc09-1881
94. Osborn CY, Mayberry LS, Mulvaney SA, Hess R. Patient web portals to improve diabetes outcomes: a systematic review. *Curr Diab Rep* 2010;10:422–435 DOI: 10.1007/s11892-010-0151-1
95. Pal K, Eastwood SV, Michie S, et al. Computer-based diabetes self-management interventions for adults with type 2 diabetes mellitus. *Cochrane Database Syst Rev* 2013; 2013:CD008776 DOI: 10.1002/14651858.CD008776.pub2
96. Srułović E, Leventer-Roberts M, Curtis B, et al. Effectiveness of managing diabetes during Ramadan conversation map intervention: a difference-in-differences (self-comparison) design. *Int J Nurs Stud* 2019;95:65–72 DOI: 10.1016/j.ijnurstu.2019.04.020
97. Oh H, Ell K. Associations between changes in depressive symptoms and social support and diabetes management among low-income, predominantly Hispanic patients in patient-centered care. *Diabetes Care* 2018;41:1149–1156 DOI: 10.2337/dc17-2000
98. Asuzu CC, Walker RJ, Williams JS, Egede LE. Pathways for the relationship between diabetes distress, depression, fatalism and glycemic control in adults with type 2 diabetes. *J Diabetes Complications* 2017;31:169–174 DOI: 10.1016/j.jdiacomp.2016.09.013
99. Cummings DM, Lutes LD, Littlewood K, et al. Randomized trial of a tailored cognitive behavioral intervention in type 2 diabetes with comorbid depressive and/or regimen-related distress symptoms: 12-month outcomes from COMRADE. *Diabetes Care* 2019;42:841–848 DOI: 10.2337/dc18-1841
100. Benzer JK, Singer SJ, Mohr DC, et al. Survey of patient-centered coordination of care for diabetes with cardiovascular and mental health comorbidities in the Department of Veterans Affairs. *J Gen Intern Med* 2019;34(Suppl. 1):43–49 DOI: 10.1007/s11606-019-04979-8
101. Dickinson JK, Guzman SJ, Maryniuk MD, et al. The use of language in diabetes care and education. *Diabetes Educ* 2017;43:551–564 DOI: 10.1177/0145721717735535
102. Kim MT, Kim KB, Ko J, et al. Health literacy and outcomes of a community-based self-help intervention: a case of Korean Americans with type 2 diabetes. *Nurs Res* 2020;69:210–218 DOI: 10.1097/nnr.0000000000000409
103. Attridge M, Creamer J, Ramsden M, Cannings-John R, Hawthorne K. Culturally appropriate health education for people in ethnic minority groups with type 2 diabetes mellitus. *Cochrane Database Syst Rev* 2014:CD006424 DOI: 10.1002/14651858.CD006424.pub3
104. Channon SJ, Huws-Thomas MV, Rollnick S, et al. A multicenter randomized controlled trial of motivational interviewing in teenagers with diabetes. *Diabetes Care* 2007;30:1390–1395 DOI: 10.2337/dc06-2260
105. Ha Dinh TT, Bonner A, Clark R, Ramsbotham J, Hines S. The effectiveness of the teach-back method on adherence and self-management in health education for people with chronic disease: a systematic review. *JBI Database Syst Rev Implement Reports* 2016;14: 210–247 DOI: 10.11124/jbisir-2016-2296
106. Parchman ML, Zeber JE, Palmer RF. Participatory decision making, patient activation, medication adherence, and intermediate clinical outcomes in type 2 diabetes: a STARNet study. *Ann Fam Med* 2010;8:410–417 DOI: 10.1370/afm.1161
107. Welschen LM, van Oppen P, Bot SD, Kostense PJ, Dekker JM, Nijpels G. Effects of a cognitive behavioural treatment in patients with type 2 diabetes when added to managed care; a randomised controlled trial. *J Behav Med* 2013; 36:556–566 DOI: 10.1007/s10865-012-9451-z
108. Ngui D, Qiu M, Mann M. Targeting care gaps in patients with hypertension: a quality improvement project utilizing EMR hypertension dashboards and a chronic disease coordinator. *J Hypertens* 2016;34:e247–e248 DOI: 10.1097/01.hjh.0000500559.72048.84
109. Magee MF, Baker KM, Fernandez SJ, et al. Redesigning ambulatory care management for uncontrolled type 2 diabetes: a prospective cohort study of the impact of a Boot Camp model on outcomes. *BMJ Open Diabetes Res Care* 2019; 7:e000731 DOI: 10.1136/bmjdr-2019-000731
110. Agency for Healthcare Research and Quality. Type of health care quality measures. Accessed 19 July 2021. Available from <https://www.ahrq.gov/talkingquality/measures/types.html>
111. Battelino T, Danne T, Bergenstal RM, et al. Clinical targets for continuous glucose monitoring data interpretation: recommendations from the international consensus on time in range. *Diabetes Care* 2019;42:1593–1603 DOI: 10.2337/dci19-0028
112. Elgart JF, González L, Prestes M, Rucci E, Gagliardino JJ. Frequency of self-monitoring blood glucose and attainment of HbA1c target values. *Acta Diabetol* 2016;53:57–62 DOI: 10.1007/s00592-015-0745-9
113. Floyd B, Chandra P, Hall S, et al. Comparative analysis of the efficacy of continuous glucose monitoring and self-monitoring of blood glucose in

- type 1 diabetes mellitus. *J Diabetes Sci Technol* 2012;6:1094–1102 DOI: 10.1177/193229681200600513
114. Gandhi GY, Kovalaske M, Kudva Y, et al. Efficacy of continuous glucose monitoring in improving glycemic control and reducing hypoglycemia: a systematic review and meta-analysis of randomized trials. *J Diabetes Sci Technol* 2011;5:952–965 DOI: 10.1177/193229681100500419
115. Schnell O, Alawi H, Battelino T, et al. Self-monitoring of blood glucose in type 2 diabetes: recent studies. *J Diabetes Sci Technol* 2013;7:478–488 DOI: 10.1177/193229681300700225
116. Lorig K, Ritter PL, Turner RM, English K, Laurent DD, Greenberg J. A diabetes self-management program: 12-month outcome sustainability from a nonreinforced pragmatic trial. *J Med Internet Res* 2016;18:e322 DOI: 10.2196/jmir.6484
117. Swoboda CM, Miller CK, Wills CE. Impact of a goal setting and decision support telephone coaching intervention on diet, psychosocial, and decision outcomes among people with type 2 diabetes. *Patient Educ Couns* 2017;100:1367–1373 DOI: 10.1016/j.pec.2017.02.007
118. Fleming SE, Boyd A, Ballejos M, et al. Goal setting with type 2 diabetes: a hermeneutic analysis of the experiences of diabetes educators. *Diabetes Educ* 2013;39:811–819 DOI: 10.1177/0145721713504471
119. Miller CK, Bauman J. Goal setting: an integral component of effective diabetes care. *Curr Diab Rep* 2014;14:509 DOI: 10.1007/s11892-014-0509-x
120. Healthy People 2030. Diabetes. Accessed 24 July 2021. Available from <https://health.gov/healthypeople/objectives-and-data/browse-objectives/diabetes>
121. National Committee for Quality Assurance. HEDIS measures and technical resources. Accessed 24 July 2021. Available from <https://www.ncqa.org/hedis/measures/>
122. Agency for Healthcare Research and Quality. Practice facilitation handbook module 14: Creating quality improvement teams and QI plans. Accessed 13 July 2021. Available from <https://www.ahrq.gov/ncepcr/tools/pf-handbook/mod14.html>
123. Tricco AC, Ivers NM, Grimshaw JM, et al. Effectiveness of quality improvement strategies on the management of diabetes: a systematic review and meta-analysis. *Lancet* 2012;379:2252–2261 DOI: 10.1016/s0140-6736(12)60480-2
124. Gruss SM, Nhim K, Gregg E, Bell M, Luman E, Albright A. Public health approaches to type 2 diabetes prevention: The US National Diabetes Prevention Program and beyond. *Curr Diab Rep* 2019;19:78 DOI: 10.1007/s11892-019-1200-z
125. Centers for Medicare and Medicaid Services. Medicare quality payment program. Accessed 27 July 2021. Available from <https://qpp.cms.gov/>
126. Institute for Healthcare Improvement. Resources: How to improve. Accessed 21 July 2021. Available from <https://www.ihl.org/resources/Pages/HowtoImprove/default.aspx>
127. RE-AIM – Reach Effectiveness Adoption Implementation Maintenance. Accessed 6 September 2021. Available from <https://re-aim.org/>
128. Stellefson M, Dipnarine K, Stopka C. The chronic care model and diabetes management in US primary care settings: a systematic review. *Prev Chronic Dis* 2013;10:E26 DOI: 10.5888/pcd10.120180
129. Centers for Disease Control and Prevention. Diabetes self-management education and support technical assistance guide. Accessed 19 July 2021. Available from <https://www.cdc.gov/diabetes/programs/stateandlocal/resources/dsmes-technical-assistance-guide.html>
130. Centers for Disease Control and Prevention. Diabetes self-management education and support (DSMES) toolkit. Accessed 21 July 2021. Available from <https://www.cdc.gov/diabetes/dsmes-toolkit/index.html>
131. Zgibor JC, Kuo S, Emerson S, et al. Rationale, design, and implementation of a cluster randomized trial using certified diabetes educators to intensify treatment for glycemia, blood pressure and lipid control: REMEDIES 4D. *Contemp Clin Trials* 2014;39:124–131 DOI: 10.1016/j.cct.2014.07.004
132. Greenwood DA, Howell F, Scher L, et al. A framework for optimizing technology-enabled diabetes and cardiometabolic care and education: the role of the diabetes care and education specialist. *Diabetes Educ* 2020;46:315–322 DOI: 10.1177/0145721720935125
133. Scalzo P. From the Association of Diabetes Care & Education Specialists: the role of the diabetes care and education specialist as a champion of technology integration. *Sci Diabetes Self Manag Care* 2021;47:120–123 DOI: 10.1177/0145721721995478
134. Heitkemper EM, Mamykina L, Tobin JN, Cassells A, Smaldone A. Baseline characteristics and technology training of underserved adults with type 2 diabetes in the Mobile Diabetes Detective (MoDD) randomized controlled trial. *Diabetes Educ* 2017;43:576–588 DOI: 10.1177/0145721717737367
135. Macdonald EM, Perrin BM, Kingsley MI. Enablers and barriers to using two-way information technology in the management of adults with diabetes: a descriptive systematic review. *J Telemed Telecare* 2018;24:319–340 DOI: 10.1177/1357633x17699990
136. American Diabetes Association. 7. Diabetes technology: standards of medical care in diabetes—2021. *Diabetes Care* 2021;44(Suppl. 1):S85–S99 DOI: 10.2337/dc21-S007
137. Messer LH, Berget C, Forlenza GP. A clinical guide to advanced diabetes devices and closed-loop systems using the CARES paradigm. *Diabetes Technol Ther* 2019;21:462–469 DOI: 10.1089/dia.2019.0105
138. United States Department of Health and Human Services. Implementation science at a glance: a guide for cancer control practitioners. Accessed 15 October 2021. Available from <https://cancercontrol.cancer.gov/sites/default/files/2020-07/NCI-ISaaG-Workbook.pdf>