



Diabetes Self-Management Education and Training (DSME/T) *Research and Policy Review*

OVERVIEW

Purpose

This research and policy review (“review”) establishes an evidence base for policies that support diabetes self-management education and training (DSME/T).

Methodology

This review includes findings from peer-reviewed articles as well as “grey literature” from stakeholder organizations, federal agencies, and state institutions. (Grey literature refers to documents produced by organizations outside of the traditional commercial or academic publishing and distribution channels.) GoogleScholar, PubMed, and ProQuest were searched using key phrases, such as “diabetes self-management education,” “DSMT,” and “DSME” in combination with “cost-effectiveness,” “Medicaid,” “low income,” “Medicare,” “elderly,” “utilization,” and “participation.” In addition, article citations were independently screened for relevant literature. Abstracts and articles were reviewed, and 44 results were identified as addressing themes relevant to this review. Articles that discussed diabetes education or diabetes self-management generally, but failed to mention diabetes self-management education or training explicitly, were excluded. Articles published in the last 5 years were prioritized; however, studies published earlier were also included when appropriate. Racial and ethnic categorizations vary from study to study, therefore the terms used throughout this review are adopted from the study being referenced.

Roadmap

This review includes the following sections:

1. Definition of DSME/T
2. Effectiveness of DSME/T
3. Cost-effectiveness of DSME/T
4. Participation in DSME/T
5. Gaps in DSME/T evidence base

DEFINITION OF DSME/T

Throughout the literature, researchers and commentators commonly define DSME/T 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.”^{1,2} (DSME/T may also be referred to as diabetes self-management education (DSME) or diabetes self-management training (DSMT).) 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.³ However, the Centers for Medicare and Medicaid Services (CMS) refers to the educational program as diabetes self-management training (DSMT) for reimbursement purposes.⁴

To ensure people receive high-quality, evidence-based DSME/T, a joint task force comprising experts from AADE and ADA developed the National Standards for Diabetes Self-Management Education and Support. Accordingly, CMS currently requires that DSME/T programs be accredited by the AADE or recognized by the ADA to receive reimbursement. Both the AADE and the ADA use the National Standards of Diabetes Self-Management Education and Support as guidelines for accreditation.¹

- ***Standards for DSME/T programs.***

The National Standards for Diabetes Self-Management Education and Support thoroughly outline expectations for DSME/T:¹

- ***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 but there is an expectation that 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.¹
- **DSME/T programs vary among facilities.**
DSME/T programs provide education on a variety of diabetes self-management issues, including healthy eating, active living, monitoring, taking medication, problem-solving, reducing risks, and healthy coping.⁵ Some accredited programs, for example, might offer classes that focus on carbohydrate counting, meal planning, practical nutrition, cooking, reducing risks, and living with diabetes.⁶ Given that curricula are developed by providers,¹ there is no standardized course or educational experience across all DSME/T programs. However, participants in DSME/T typically receive no more than 10 hours of training, in individual or group sessions, over a 1-year period.⁷

EFFECTIVENESS OF DSME/T

Current literature overwhelmingly demonstrates that DSME/T is effective for diabetes management. DSME/T participants generally experience reduced HbA1c levels, reduced BMI, reduced blood pressure, and better clinical care outcomes.⁷⁻¹³

- **DSME/T improves diabetes bundle measurements.**
One analysis surveyed more than 4,500 adults with type 2 diabetes participating in one of several accredited DSME/T programs within Intermountain Healthcare system in Utah.⁷ Its results established that participants were 1.5 times more likely than non-participants to demonstrate improvement in the study's diabetes "bundle elements," an internal measurement tool which required HbA1c results below 8.0%, LDL-c less than 100 mg/dL, a retinal eye exam screening within the last 24 months, a nephropathy screening, and blood pressure levels lower than 140/90 mm Hg.⁷
- **DSME/T improves HbA1c levels and BMI.**
In a 2016 study of 19 patients with diabetes participating in a home-based DSME/T program, participants exhibited reduced HbA1c levels, glucose, BMI, systolic blood pressure, and diastolic blood pressure.⁸
- **Group DSME/T improves patient conditions and satisfaction.**
Researchers from the South Carolina College of Pharmacy studying a group diabetes self-management classes with 32 participants determined that DSME/T reduced HbA1c levels by 1.1%, LDL cholesterol by 2.1 mg, systolic blood pressure by 5.1 mm Hg, and diastolic blood

pressure by 1.9 mm Hg.⁹ The study also revealed that participants in group DSME/T classes were more satisfied with the group structure, which was offered as a clinical pharmacy service for those referred, than they were with one-on-one diabetes education.⁹

- ***DSME/T programs that are longer in duration, and delivered by nurses, may be most effective.*** An examination of more than 50 DSME/T programs and roughly 9,600 participants revealed that although participants were unable to attain a prediabetes blood glucose level, DSME/T improved HbA1c levels significantly.¹⁰ The study also concluded that programs lasting 14 to 26 weeks had a stronger effect on participants than shorter programs. Lastly, the study suggested that programs may be most effective when nurses are involved.¹⁰ Similarly, a study of 34 randomized controlled trials involving nurse-led DSME/T resulted in reduced HbA1c levels among all participants. Those who participated in programs facilitated by nurses experienced better health outcomes, with a mean HbA1c reduction of 0.70%. In comparison, those who participated in non-nurse-led DSME/T experienced a mean HbA1c reduction of 0.21%.¹¹
- ***DSME/T programs have been associated with better clinical care behaviors and outcomes.*** Another study of approximately 29,500 people diagnosed with diabetes revealed that those who participated in DSME/T were more likely than those who did not participate to have completed an eye exam, a foot exam, and at least 2 HbA1c tests. They were also more likely to have visited a physician in the last year.¹²
- ***DSME/T is effective for reducing distress and empowering patients.*** A comparative study of 141 patients with diabetes who received diabetes self-management support (DSMS) and DSME/T revealed that 6 weeks after completing DSME/T, patients experienced improved HbA1c levels, reduced body weight, reduced distress levels, and more empowerment.¹³ In this study, researchers used a scale to determine factors such as a patient's ability to overcome barriers, set goals, and stay motivated. Those with a DSMS educator, in conjunction with DSME/T support, demonstrated the best results, and sustained lower HbA1c levels 6 months after finishing the programs.¹³

Current literature suggests that DSME/T is effective for Medicaid recipients, but that Medicaid recipients may not receive the same quality of DSME/T as other participants. Further research may help to explore the effectiveness of DSME/T in Medicaid populations and the quality of DSME/T provided.

- ***DSME/T reduces health care use among Medicaid recipients.*** According to researchers of 212 Medicaid recipients in Arkansas, a 1-hour individual DSME/T class and 12 hours of group DSME/T education decreased HbA1c levels and health care use, leading to medical savings of \$415 per DSME/T participant.¹⁴ The study concluded that participants in the program were less likely than patients who did not participate to visit the emergency department or outpatient facilities, and were also less likely to be admitted to the hospital.¹⁴
- ***Quality of care for Medicaid recipients.*** A descriptive needs assessment involving focus groups comprised of 22 people—including diabetes educators, facility administrators, and health care providers from 2 hospitals, 2 emergency departments, and 4 primary care clinics in high-poverty areas—suggested that Medicaid recipients and uninsured patients do not receive the same quality DSME/T as other

participants.¹⁵ In other words, many Medicaid participants received less than the DSME/T standard of care recommended by the American Diabetes Association. The study also surveyed the 8,338 patients with diabetes receiving any care at these facilities, and concluded that only 4% of uninsured patients and Medicaid recipients received DSME/T that was consistent with the standards recommended by the American Diabetes Association.¹⁵

Although research indicates that DSME/T effectively reduces health care expenditures among Medicare beneficiaries,¹⁶ further research is needed to determine the extent to which DSME/T improves health outcomes in this population. However, at least one finding suggests that DSME/T improves health outcomes for elderly adults.

- ***DSME/T improves health outcomes for elderly patients.***

A 2006 study revealed that DSME/T was effective in decreasing HbA1c levels and improving diabetes management knowledge among 105 elderly patients with diabetes from 10 senior centers in northern Georgia.¹⁷ Study participants had a mean age of 73 and were able to self-manage their diabetes after a DSME/T course.¹⁷

Current literature provides evidence that DSME/T reduces HbA1c levels and body weight and increases self-management knowledge among minority racial and ethnic groups.

- ***DSME/T is effective in reducing HbA1c levels among participants from different racial and ethnic groups.***

A meta-analysis surveying the effectiveness of 20 diabetes educational programs for 3,094 racial and ethnic minority participants—including African American, Latino, Asiatic, and Alaskan-Eskimo participants—determined that DSME/T was effective in reducing HbA1c levels.¹⁸

- ***DSME/T is effective in reducing HbA1c levels and body weight among Chinese adults.***

A study of a short-term (8 weeks) diabetes management education program for 76 Chinese adults with type 2 diabetes revealed a reduction in HbA1c levels and body weight 3 months after participating in the program.⁵ The study compared the outcomes for participants in the program, which involved 2-hour weekly classes providing instruction on healthy eating, active living, monitoring, taking medication, problem-solving, reducing risks, and healthy coping techniques, to patients with diabetes who received standard medical nutrition therapy.⁵

- ***DSME/T increases diabetes management knowledge among minority patients.***

A group of researchers from the University of Miami studying 174 low-income minority patients—primarily non-Hispanic black and Hispanic individuals—concluded that a multisession DSME/T program improved diabetes management, blood glucose monitoring, diet, and complication prevention knowledge among participants.¹⁹ Following DSME/T, participants were more ready to improve their dietary behaviors and had lower HbA1c levels.¹⁹

- ***DSME/T improves clinical care among African American and Hispanic individuals.***

A study of 355 US adults with diabetes revealed that African American patients with diabetes experienced improvements in at least 3 of several clinical service and self-care indicators.²⁰ Researchers also noted that Hispanic participants were least likely to engage in clinical and self-care indicators, although they did exercise more. Hispanic patients who did not participate in DSME/T were less likely than participants to get a flu shot, exercise, or monitor their blood glucose levels.²⁰

Despite evidence that DSME/T is effective among different racial and ethnic groups, literature also indicates that cultural barriers may affect patients' improvement.

- ***Cultural beliefs and behaviors may be inconsistent with DSME/T.***
A 2015 qualitative analysis of focus groups involving 23 Arab American patients with diabetes revealed that cultural beliefs and practices may be inconsistent with DSME/T.²¹ For example, gender roles caused some Arab American women to feel uncomfortable attending DSME/T sessions. In addition, some cultural behaviors, such as food sharing and religious beliefs, may be incompatible with DSME/T strategies.²¹ Another study of 15 Filipino patients receiving care at Kaiser Permanente Hawai'i similarly found that understanding customs, religious beliefs, and other cultural factors may be pivotal to effective provision of DSME/T services.²² Consequently, both studies recommended providing patients with DSME/T resources that are culturally sensitive.^{21,22}
- ***Tailoring DSME/T may improve health outcomes among minority women.***
A review of diabetes self-management interventions for Black African/Caribbean and Hispanic/Latin American women conducted in 2013 concluded that customizing DSME/T programs by incorporating situational problem-solving, frequent sessions, and group interventions may make DSME/T more effective.²³ Following their review of 13 DSME/T interventions, researchers found that traditional interventions may not be as effective for Black African/Caribbean and Hispanic/Latin American women.²³
- ***Culturally appropriate DSME/T is effective in reducing HbA1c levels among Hispanic and Latino individuals.***
Researchers of a community-based, culturally tailored DSME/T program in Starr County, Texas, discovered that participants in the program—approximately 1,100 Mexican American adults with diabetes—experienced reduced HbA1c levels of up to 6% when they attended most of the DSME/T courses offered.²⁴ In this case, DSME/T was tailored to include bilingual educators and dietitians from the community. Spanish-speaking community members, or *promotoras*, provided support in many ways, including in education, mentorship, and outreach.²⁴ Similarly, a study of Spanish-speaking Hispanic and Latino patients in Texas found that a culturally sensitive DSME/T program that focused on empowerment was effective in reducing HbA1c levels. In this study, the DSME/T intervention consisted of one 2-hour class per week for 5 weeks. Locally produced videos targeting the patient audience were used, and the classes were offered at locations within the community, such as libraries and churches.²⁵

COST-EFFECTIVENESS OF DSME/T

The cost of DSME/T varies across geographic regions, facilities, and programs. Data on Medicare reimbursements for DSME/T services shed some light on one aspect of DSME/T cost-effectiveness.

- ***Medicare reimbursement for DSME/T.***
The total number of hours billed for DSME/T reimbursement through Medicare cannot exceed 10 hours during the initial 12 month period following a diabetes diagnosis, and the services must be delivered in increments of 30 minutes or longer. Medicare beneficiaries are eligible for 1 hour of individual training and 9 hours of group training, unless a beneficiary's provider can

justify otherwise. After the initial 12-month period, 2 hours of follow-up education are available and can be provided as individual or group education.²⁶ According to the 2016 CMS Physician Fee Schedule, individual training is reimbursable at a rate of \$46.38 to \$71.01 per 30 minutes. For group training sessions, for which 9 hours of training are reimbursable, providers are reimbursed \$12.59 to \$19.23 per 30 minutes. Physicians that perform these services in their offices are reimbursed at a higher rate than facilities that perform these services (eg, hospitals).²⁶

Literature overwhelmingly indicates that DSME/T is cost-effective across health care settings.

- ***Diabetes education is generally cost-effective.***
In 2009, researchers examined 26 studies published from 1991 to 2006 for the economic benefits and costs associated with DSME/T.²⁷ Their review determined that 18 of the DSME/T studies resulted in cost savings or cost-effectiveness. The review included a total of 40,588 patients with type 1 diabetes, type 2 diabetes, or unspecified diabetes.²⁷
- ***DSME/T is cost-effective in community settings.***
A study of 127 participants with type 2 diabetes at a community clinic in Austin, Texas, concluded that the annual cost of a DSME/T program was \$35,436, or \$279 per patient.²⁸ Researchers compared this costs to the cost of treatments for certain diabetes complications, and found it to be modest. Treatment for renal failure, for example, can cost \$54,000 each year for 1 patient.²⁸
- ***DSME/T is cost-effective in patient-centered medical homes.***
In an analysis of 34 people with diabetes from 2 patient-centered medical homes, implementation of a DSME/T program with a registered nurse or certified diabetes educator revealed a total pretax financial benefit of \$5,467.²⁹ In their analysis, researchers considered program expenses and physician salary for group classes, totaling an estimated \$10,440 for the program. They then calculated revenue for the primary care providers, which totaled approximately \$15,907.²⁹

DSME/T leads to reduced hospitalization rates and lower health care expenditures.

- ***Diabetes education reduces hospitalization and health care expenditures.***
An assessment of payer-derived claims for 92,297 Medicare and privately insured patients with diabetes revealed that patients who did not participate in DSME/T experienced an increase in health care costs of 10.8% annually, but those who did participate in DSME/T experienced a health care cost increase of only 6.5% every year.¹⁶ Another study of 7,839 patients with diabetes found that those who participated in any education, including diabetes classes, were less likely to be hospitalized than those who didn't participate, resulting in an average savings of \$11,571 per person.³⁰ In addition, a review of approximately 29,000 TRICARE members participating in telephone diabetes management education found that each participant decreased their health care expenditures by an average of \$783.³¹
- ***DSME/T reduces expenditures among Medicaid recipients.***
A 1-hour individual DSME/T class and 12 hours of group DSME/T for 212 Medicaid recipients in Arkansas decreased HbA1c levels and health care use, resulting in medical savings of \$415 per person.¹⁴ The study concluded that participants in the program were less likely than patients

who didn't participate to visit the emergency department or outpatient facilities, and were less likely to be admitted to the hospital.¹⁴

PARTICIPATION IN DSME/T

Despite the persistence of the diabetes epidemic, many studies have suggested that DSME/T is severely underutilized, yielding participation rates that fail to match the rising prevalence of diabetes.³² Such underutilization has been demonstrated across several different population subgroups, including privately insured individuals and Medicaid recipients.

Although research indicates that DSME/T is effective for reducing HbA1c levels and improving other health indicators,⁷ DSME/T participation rates remain low.^{15-16,33-34}

- ***Low participation rates among privately insured adults.***
In a study of 95,555 privately insured persons, researchers from the Centers for Disease Control and Prevention (CDC) measured diabetes self-management education participation by whether a claim was filed for reimbursement of DSME/T services. The study revealed that only 6.8% of people with diabetes participated in DSME/T within the first year of their diagnosis.³³ In parallel, a study conducted in Ontario, Canada, found that DSME/T participation rates were low even when insurance coverage was not a barrier. In this study, researchers found that only 20.6% of 46,553 newly diagnosed, insured patients with diabetes attended DSME/T within the first several months of their diagnosis.³⁴
- ***Low participation rates among Medicare beneficiaries.***
Researchers from CMS analyzed 110,064 Medicare beneficiaries and concluded that only 5% of those with recently diagnosed diabetes participated in DSME/T.³⁵ Most participants received approximately 1.5 hours of education. In addition, participation increased when more health care providers offered DSME/T. In the study, men, Medicaid dual recipients, patients under the age of 65, patients older than 74 years of age, and Hispanic and Asian patients receiving Medicare were less likely than other beneficiaries to participate.³⁵ Similarly, a 2009 study of 152,074 Medicare recipients with diabetes found that only 4% participated in DSME/T.¹⁶
- ***Low participation rates among Medicaid recipients and the uninsured.***
A study of 8,338 patients with diabetes revealed that only 2.5% of uninsured patients diagnosed with diabetes attended hospital-based DSME/T programs, and that only 8% of Medicaid recipients with diabetes attended hospital-based DSME/T programs.¹⁵
- ***Low participation rates among patients in standard family medicine.***
An analysis of 27,225 patients receiving primary care in university medical home models and standard family medicine practices revealed that only 15.2% of all study participants with diabetes were referred to a dietitian or education program. Roughly 13.5% of patients receiving care in a family medicine practice were referred, while 23.9% of patients receiving care in a university medical home model were referred.³⁶

Current literature offers conflicting evidence as to whether DSME/T participation varies between rural and urban communities. However, some research suggests that participation rates are generally lower in some areas of the country than in others.

- ***Low participation rates among patients in rural communities.***
An examination of records from 295 patients with diabetes revealed that 65% of patients with type 2 diabetes residing in a rural community had never participated in DSME/T.³⁷ Another study of 29,501 adults with self-reported diabetes found that people living in rural areas were less likely to have participated in DSME/T (52%) than people living in urban areas (56%).¹² In contrast, a study of 46,553 patients with diabetes in Ontario, Canada, found that residents living in rural communities were more likely to attend DSME/T than those who did not reside in rural areas,³⁴ though it is unclear whether such findings would be applicable in the United States.
- ***Low participation rates among patients in urban settings.***
In addition, low participation rates among patients in urban settings have also been observed. A 2015 study of 74 patients residing in the Bronx neighborhood of New York City found that 38% of them participated in one-on-one unstructured diabetes education, yet none attended the DSME/T workshops offered.³⁸
- ***Geographic disparities in participation.***
A research study of 95,555 privately insured persons revealed that DSME/T participation rates were highest among those located in the north central region of the United States (9.2% participation) and lowest among those located in the southern region of the United States (5.7% participation).³³

Further research may help to determine whether people of certain demographic groups are more or less likely to participate in DSME/T.

- ***Age disparities among participants.***
Literature offers conflicting evidence regarding whether certain age groups are more likely than others to participate in DSME/T. A study measuring the effects of a culturally sensitive diabetes program for 144 Hispanic/Latino patients in Texas found that participants younger than age 70 were more likely than older participants to attend 3 or more DSME/T classes.²⁵ In contrast, less than half of participants over the age of 70 attended as many classes.²⁵ Another study looking at trends in diabetes care for 355,620 patients from 2001 to 2010 found that individuals between the ages of 18 and 44 were more likely than individuals from other age groups to participate in DSME/T.²⁰ Similarly, a study of 1,273 US youth under the age of 20 diagnosed with type 1 diabetes found that the majority of youth participated in DSME/T.³⁹ In contrast, the 2014 study of 95,555 privately insured adults demonstrated a slightly higher participation rate among older adults between the ages of 45 and 64 years old (7.2%) than among adults between the ages of 18 and 44 years old (5.9%).³³
- ***Participation among various racial and ethnic groups.***
An observational study of data from 355,620 US adults with diabetes found that African Americans were more likely to receive DSME/T than Hispanic and white adults, and that Hispanic adults were least likely to receive DSME/T.²⁰
- ***Participation among people of lower socioeconomic status.***
In addition, the observational study of US adults with diabetes also found that patients with an income below \$25,000 and those without a high school or post-secondary degree were less likely to participate in DSME/T.²⁰

Low participation rates have suggested the existence of several barriers to DSME/T participation.

- Barriers for Medicaid recipients and the uninsured.**

A study of 8,338 patients across 8 health care facilities determined that uninsured individuals had access to DSME/T programs at only 2 of the facilities, and that Medicaid patients had access to only 1 program.¹⁵ Although one of the facilities offered a free DSME/T program, it was not certified by ADA or AADE. Of the facilities studied, only one-third had full-time certified diabetes educators on staff. Although the location of each facility was not specified, the facilities participating in the study included 2 hospitals, 2 emergency departments, and 4 primary care clinics in a high-poverty area.¹⁵
- Patients lack knowledge of DSME/T programs due to limited outreach efforts.**

Researchers from John Hopkins University conducted focus groups comprised of 49 participants—diabetes educators, physicians, and patients—and suggested that failure to conduct outreach is a contributing factor to low participation rates.⁴⁰ The study revealed that health fairs were commonly used as a platform for outreach. In addition, diabetes educators were providing continuing education credits to physicians to encourage physicians to meet with them as a strategy to increase referrals. Still, many participants of these focus groups cited inadequate resources and reductions in staffing as reasons for limited outreach.⁴⁰
- Limited geographic availability**

A 2016 study conducted by researchers at the University of Washington revealed that offering DSME/T in primary care clinics increased access and enrollment, leading to improved HbA1c and weight levels for patients.⁴¹ At the time of the study, the Diabetes Care Center (DCC) located at the University of Washington Medical Center was struggling to enroll patients in on-site DSME/T classes with an average of only 2 to 3 patients attending each month. When the DCC began a pilot program to offer DSME through its primary care clinics, the number of participating patients increased significantly. 64 patients enrolled in the pilot program. 57% of participants completed the entire program, and 74% of participants attended 2 of the 3 classes. The authors concluded that “[u]tilizing a train-the-trainer model to translate an established academic DSME program into a primary care clinic [setting] showed to be successful in improving access to local diabetes education programs for patients not located near major hospital –based DSME programs.”⁴¹ Researchers have also suggested that increasing the number of courses, offering courses at various times, and offering courses in various languages may increase attendance.^{40,42}
- Lack of physician referrals.**

Low rates of physician referrals are also a barrier to DSME/T participation. One study of 295 patients with diabetes concluded that 76% had never received a referral for DSME/T from their treating physician.³⁷ However, the majority of patients (83%) who did receive referrals for DSME/T attended the program. The study also revealed that patients with comorbid conditions were more likely to be referred.³⁷ Commentators have suggested several reasons for low referral rates, including burdensome paperwork requirements,^{38,40} physicians’ belief that they are better able to provide diabetes education,⁴⁰ and unfamiliarity with the diabetes educational programs in place.³⁸
- Patient-level barriers.**

Several patient-level factors contribute to low participation rates. Such barriers include a perceived lack of usefulness, no DSME/T classes offered at their provider’s office, lack of transportation, inconvenient class times,^{43,44} work conflicts, embarrassment, lack of interest,⁴⁴ length of the program and delays in starting the program,⁴³ as well as language and literacy

limitations.^{40,45} Another barrier commonly emphasized is lack of insurance coverage.^{40,43} However, some literature asserts that even where insurance coverage is not a barrier, participation rates remain low.³⁴ Despite these issues, several factors have been identified as encouraging patients to participate in DSME/T, including the potential for them to succeed in class and positive group support experiences.⁴⁴

- **Physician-level barriers.**

Physicians have raised concerns about DSME/T programs and educators, which may further limit patient participation. Literature suggests that physicians are particularly concerned about the following: perceived lower outcome standards of diabetes educators, inconsistent treatment recommendations provided by diabetes educators, prior negative experiences with DSME/T educators, and lack of support from educators in meeting physician-developed outcome target goals.

- **Facility-level barriers.**

Stakeholder organizations, coalitions, and programmatic staff have indicated facility-level barriers to DSME/T.⁴⁶ The National Council on Aging, for example, suggests that the accreditation process, which must be completed in order for facilities to receive reimbursement from CMS, is time-consuming, costly, overly burdensome, and possibly prevents some facilities that would otherwise offer the program from doing so.⁴⁶

- **Barriers for rural providers.**

According to researchers, rural providers face additional challenges. A study of 34 state Diabetes Control Program Coordinators revealed that rural providers struggled with staffing, accreditation application fees, limited financial resources and administrative support, and scheduling to provide enough hours to patients.⁴⁷ A 2016 study conducted by CDC found that only 38% of all nonmetropolitan counties offer DSME/T programs.⁴⁸

Despite these barriers, commentators have highlighted many opportunities for increasing DSME/T participation.

- **Increasing access to DSME/T services.**

The National Council on Aging encouraged CMS to allow for an abbreviated process for organizations wishing to adopt an already accredited program. In comments submitted recently in response to the Physician Fee Schedule released by CMS, the National Council on Aging suggested the following: (1) CMS should adopt a policy streamlining national accreditation organization (NAO) accreditation standards with reimbursement by Medicare Administrative Contractors when services are provided by a registered nurse or pharmacist; (2) patients with diabetes should be allowed to self-refer to DSME/T services or additional providers should be allowed to refer patients; (3) DSME/T should be classified as a preventive service to eliminate coinsurance for participants; (4) DSME/T providers should be allowed to bill for DSME/T and medical nutrition therapy on the same day to reduce hassle for participants; (5) participants should be allowed to participate in refresher trainings; (6) CMS should increase reimbursement for DSME/T services to subsidize resources needed for the program and promote expansion; (7) CMS should increase the number of reimbursable hours allowed for DSME/T; (8) reimbursement should be provided for DSME/T telehealth delivery in community settings; and (9) CMS should allow general supervision for DSME/T programs.⁴⁶

- ***Increasing DSME/T workforce capacity and coordinating care.***

In a joint position statement, ADA, AADE, and the Academy of Nutrition and Dietetics suggested that increasing DSME/T workforce capacity and coordinating care are both key strategies for improving access to DSME/T services.³ A study conducted by the New Hampshire Department of Health and Human Services produced similar recommendations. The state surveyed certified diabetes educators and conducted stakeholder meetings to examine the DSME/T workforce. Stakeholders, which included community members and providers, emphasized the need to increase the number of certified diabetes educators by partnering with undergraduate and graduate health professional schools and to improve the integration of DSME/T in coordinated care. The New Hampshire Department of Health and Human Services ultimately made several additional suggestions: (1) experiment with alternative locations and platforms, such as telehealth and churches, to increase DSME/T participation; (2) promote DSME/T programs to increase awareness; (3) provide support for facilities wishing to obtain accreditation; and (4) clarify DSME/T billing and reimbursement practices.⁴⁹

GAPS IN DSME/T EVIDENCE BASE

Additional research may provide insight into critical aspects of DSME/T delivery and effectiveness.

- ***DSME/T effectiveness for Medicare populations.***

Current evidence indicates that DSME/T is effective among older adult patients.¹⁷ DSME/T reduces health care expenditures for Medicare recipients.¹⁶ However, additional research may help to determine the effectiveness of DSME/T among Medicare populations. Research has suggested that older adults with diabetes may be less likely than other patients to participate in DSME/T programs^{20,25} and that diabetes is one of the most prevalent chronic conditions among Medicare beneficiaries.⁵⁰ Therefore, it is important to determine what barriers may be limiting participation for Medicare recipients.

- ***Gender disparities in DSME/T participation.***

Further research may help determine whether men are less likely than women to participate in DSME/T programs. Studies surveyed for this review seemingly indicate higher participation levels among women. Because men have a higher incidence of diabetes,⁵¹ further research may help to determine whether there is a disparity and inform DSME/T outreach and development.

- ***Lack of uniformity among DSME/T interventions.***

Although many researchers have adopted the DSME/T definition provided by ADA, AADE, and the Academy of Nutrition and Dietetics, other researchers describe DSME/T simply as “diabetes self-management education/training.”⁵² Accordingly, one study emphasized the difficulty of reviewing literature concerning DSME/T interventions due to the vague and varied descriptions of DSME/T programs. Because the education actually provided was often unknown, the study suggested that future research aim to achieve standardized reporting.¹⁰ The lack of uniformity in describing these programs makes it challenging to determine whether the effectiveness of such programs is due to differences in intervention practices.¹⁰

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