

## In Brief

Diabetes self-management education (DSME) for older adults is complicated by the high prevalence of medical comorbidities and declining functional status among this patient population. To adequately meet the DSME needs of older adults, DSME should be individualized, involve multiple disciplines, involve care partners when patients cannot assume full responsibility for their own self-care, and carefully weigh the potential effects of diabetes treatments on quality of life. This article presents pointers for effective DSME for older adults and a case study illustrating some of the particular challenges involved.

# Diabetes Self-Management Education for Older Adults: General Principles and Practical Application

Emmy Suhl, MS, RD, LD, CDE, and  
Patricia Bonsignore, MS, RN, CDE

Diabetes self-management education (DSME) is an integral part of diabetes care “for all individuals with diabetes who want to achieve successful health-related outcomes,” regardless of age.<sup>1</sup> The goal of DSME is to enable patients to better manage their diabetes. Medical care in the absence of adequate self-care is rarely effective for chronic illnesses.<sup>2</sup> Studies of self-management interventions show that health behaviors, health status, and health care utilization improve with increased patient involvement in daily care.<sup>3,4</sup> The value of DSME is evident from research. For example, in one study, patients who never received DSME had a fourfold increased risk for major diabetes complications compared with patients who received some form of DSME.<sup>5</sup>

More than one-fifth of all patients with diabetes are > 60 years of age.<sup>6</sup> As educators, it is important to be aware of current DSME guidelines for older adults and how these guidelines can be incorporated in a clinical setting. However, older adults are underrepresented in DSME research studies, so evidence-based guidelines specifically targeted toward older people are difficult to formulate. The American Association of Diabetes Educators (AADE) and the American Geriatric Society (AGS) have formulated guidelines for DSME in the elderly largely based on expert consensus.<sup>7,8</sup>

Both the AGS and AADE guidelines appreciate that the care of older adults with diabetes is complicated by their clinical and functional heterogeneity (Table 1).<sup>8,9</sup> Older adults have more medical comorbidities, are functionally more heterogeneous, and have a more variable life expectancy than their younger counterparts. This article reviews the principles that emerge from the AGS and AADE guidelines and presents practical applications for clinical practice. A case study illustrates the particular challenges faced by older adults with diabetes.

## DSME FOR OLDER ADULTS: GENERAL PRINCIPLES

Several general principles emerge to guide DSME for older adults based on published literature (Table 2).

### Individualize DSME

Optimal care for elderly patients includes individualized DSME that accommodates the tremendous clinical and functional diversity found within this population. Clinical variables, such as duration of disease, presence of complications and other medical comorbidities, and life expectancy, must all be taken into account when planning care for the elderly. DSME for elders who have clinically complex conditions, limited English proficiency, and are frail or

**Table 1. Clinical and Functional Heterogeneity Among Older Adults With Diabetes****Clinical heterogeneity**

- Duration of disease: recently diagnosed versus long-standing diabetes
- Presence of complications: no or few versus multiple diabetes complications
- Comorbidities: no or few versus multiple comorbidities
- Variable life expectancy

**Functional heterogeneity**

- Physical status: active versus frail
- Cognitive status: intact versus impaired
- Psychological status: healthy versus depressed
- Social status: supported versus isolated

Adapted from Refs. 8 and 9

cognitively impaired can be particularly challenging.

**Clinical variables****Diabetes-related knowledge**

Older adults should be carefully evaluated to determine their knowledge and understanding of diabetes and their ability to learn and apply new self-care skills, such as home blood glucose monitoring, meal planning, and recognizing how and when to administer insulin or take oral diabetes medications. Assessment of social supports, transportation issues, financial difficulties, and cognitive and functional status, as discussed below, is also important.

Treatment goals and management skills may need to be assessed more frequently in this patient population to keep pace with functional and cognitive changes that may occur relatively quickly. Referring these patients to disciplines outside of the diabetes clinic for additional assessment, DSME, or medical management may be necessary.

**Table 2. Guiding Principles for DSME for Older Adults****1. Individualize DSME**

- Consider clinical variables.
- Consider functional variables.
- Consider personal preferences.

**2. Weigh potential benefits versus potential risks**

- Consider quality of life.
- Consider life expectancy.

**3. Involve multiple disciplines as needed****4. Involve care partner as needed****Nutritional assessment**

Research demonstrates that older adults with diabetes can benefit from nutrition education designed to improve knowledge and skills necessary for diabetes management.<sup>10,11</sup> Before beginning dietary education, patients' understanding of diabetes and nutrition should be evaluated. Nutritional status can be assessed using tools such as the Mini Nutritional Assessment.<sup>12</sup> A thorough assessment should also be made of individual food preferences, meal preparation capabilities, and potential barriers to adequate nutrition (e.g., poor dentition, swallowing difficulties, gastrointestinal complaints, decreased appetite, decreased thirst, use of taste-altering medications, limited finances, and social isolation).

Weight loss and malnutrition must also be assessed in the elderly because unintentional weight loss is known to increase morbidity and mortality in elderly patients with diabetes.<sup>13</sup> The risk for weight loss and catabolic state increases for this patient population after acute illness and hospitalization. Moderation in diet and increased physical activity, rather than strict calorie restriction, should be encouraged in older adults who wish to lose weight.

The goals of nutrition assessment for elders are summarized in Table 3. The intent of the individual nutrition plan is to minimize barriers in nutrition management and facilitate changes in eating behavior that will result in improved clinical outcomes, improved function, and enhanced quality of life.

**Physical activity assessment**

Older adults are at increased risk for sedentary lifestyle and deconditioning.

Contributing factors include recent acute illnesses, coexisting medical conditions, chronic pain, lack of access to a safe environment for physical activity, history of falls, and fear of falls. These factors need to be assessed before developing a physical activity plan. Older adults benefit significantly from regular physical activity. In addition to improving blood glucose, blood pressure, and blood lipid control, exercise also increases cardiopulmonary capacity, muscle strength, gait and balance, and overall quality of life. It is important to assess the functional capacity of each older patient before prescribing an exercise regimen and to tailor the regimen to each individual's needs and social environment.

**Comorbidities and polypharmacy**

In a longitudinal study of 1,544 patients in the Netherlands, a diagnosis of diabetes was a major predictor of whether elderly patients were at risk for polypharmacy.<sup>14</sup> This makes sense in light of the numerous conditions that can coexist with diabetes, such as hypertension, cardiovascular disease, and hyperlipidemia. Another study found that patients taking five or more prescription drugs were at higher risk for hypoglycemia, with the strongest predictors of severe hypoglycemia being advanced age, polypharmacy, and recent hospitalization.<sup>15</sup> When insulin is added to the mix, the potential for problems and errors is even greater. For these reasons, assessing polypharmacy in these patients and attempting to simplify their medication regimen is important.

Defining polypharmacy—whether it is the use of 5, 10, or 20 medications—is not easy.<sup>16</sup> However, regardless of the definition, most of us recognize polypharmacy when we see it. The diabetes education assessment should include accurate identification of the medications the patient is taking. Asking patients to bring their medications with them can facilitate this. When educators see redundancy in the medication regimen, such as someone being on a sulfonylurea and a short-acting insulin, the educator should bring it to the provider's attention. For insulin regimens, the simpler the better. Insulin pens can eliminate errors associated with drawing up insulin. In some cases, recommending that patients with type 2 diabetes discontinue insulin use may be the best option. The need to prevent hypoglycemia, particularly in the frail

**Table 3. Goals of Individualized Nutrition Education for Older Adults With Diabetes**

**1. Avoidance of hypoglycemia**

- Regular meal times
- Consistent carbohydrate intake at meals and snacks
- Extra snack if extra activity
- Available treatment for hypoglycemia at all times

**2. Consumption of a healthy diet/blood lipid management**

- Three meals daily
- Lean meat, fish, poultry, or legumes every day
- At least one serving of low-fat dairy products daily
- At least two servings of fruits and vegetables daily
- Six or more cups of fluids daily

**3. Maintenance of a personally reasonable weight**

- Freedom from barriers that interfere with the purchase, preparation, or consumption of a healthy diet
- Social meal times
- Smaller portions if consuming high-fat or high-carbohydrate foods

elderly, will often outweigh the need for tight control. Combination oral agents may help these patients simplify their regimen.

**Functional variables.** In addition to a clinical assessment, patients must be evaluated with respect to cognitive status and existence of depression and physical disabilities in order to formulate an effective diabetes education plan.

**Cognitive dysfunction**

The risk of cognitive dysfunction increases with age, and emerging evidence now suggests that this decline is more significant in patients with diabetes<sup>17-19</sup> and is associated with poorer diabetes control.<sup>20</sup>

Cognitive impairment in this population often goes undetected and, if severe enough, can dramatically affect patients' ability to learn about and manage their diabetes. It is important to assess and address cognitive dysfunction early in treatment. The extent to which milder cognitive deficits affect diabetes self-management is not really known. One small study ( $n = 51$ ) indicated that minor cognitive impairment did not significantly affect patients' ability to perform diabetes self-management tasks.<sup>21</sup> However, one of the shortcomings of this study was that it did not focus on patients' ability to acquire new knowledge or skills. Diabetes self-management often requires patients to learn new and sometimes complex skills, so assessing their ability to do this effectively before education is important.

The Mini Mental Status Exam and Clock in the Box are well-studied tests for screening patients' cognitive functioning before implementing education.<sup>22</sup> If these exams are found to be abnormal, then a referral for further neuropsychiatric testing may be warranted along with changes in strategy for diabetes education and management plans. DSME for these individuals should be done on a one-to-one basis and modified as outlined in Table 3.

**Depression**

The rate of depression in patients with diabetes is at least two times higher than in the general population,<sup>23</sup> and the risk of an older person with diabetes experiencing a major depressive episode is 1.6 times higher.<sup>24</sup> Functional disability (difficulties performing activities of daily living and social activities) is significantly increased in the presence of both diabetes and depression,<sup>25</sup> and it negatively affects self-care.<sup>26</sup> For these reasons, screening for depression in all elders with diabetes is important. When patients are found to have depression, the depression needs to be addressed before making changes to the diabetes self-management plan.

**Physical disability**

Older adults with diabetes have increased risk of physical disabilities.<sup>25,27</sup> They have more difficulty performing activities of daily living (eating, dressing, and toileting) and instrumental activities of daily living (using the telephone, preparing meals,

traveling, managing finances, and so forth). In addition, older adults are at higher risk of hearing loss, vision problems, decreased mobility, falls, fear of falls, and chronic pain. Patients who are experiencing difficulties with daily tasks will need individual rather than group DSME. Treatment regimens will need to be relatively simple. Learning new skills will take longer and may require referral to a visiting nurse to make sure the task is fully integrated into the patient's self-care regimen. A physical therapy or local elder services referral may be needed to assess the home environment and prevent potential injury from falls or accidents.

Based on the discussion above, practical pointers for DSME in older adults found to have functional limitations are as follows:

- Choose equipment that is easy to hold and easy to use.
- When possible, simplify the self-care regimen.
- Conduct education sessions at a slow pace, with instruction occurring in steps. Use educational material that is easy to follow and excludes extraneous information. Schedule multiple sessions, if necessary, to prevent information overload.
- Provide individual rather than group education.
- Recommend further evaluation and treatment of depression and cognitive dysfunction before making any diabetes treatment regimen changes.
- Use memory aids (e.g., personalized handouts) to reinforce points made during face-to-face sessions.
- Make sure patients understand how to identify hypoglycemia and when to call the provider.
- Make every effort to minimize the complexity of meal planning and to engage the patient's spouse or others living with the patient in creating a home environment that supports positive dietary change.
- Prescribe weight loss diets with great caution.

**Personal preferences.** Eliciting patients' individual preferences with respect to care is especially important in elderly patients with diabetes. Treatment plans that include patients' preferences enhance adherence, increase patient satisfaction, and increase the likelihood of improved patient outcomes.<sup>2</sup> As discussed earlier, the older adult population is heterogeneous. Some

patients will need no adjustment to their treatment plan, whereas others who are having physical or cognitive challenges may need significant changes to their regimen (Table 4).

### Weigh Potential Benefits Versus Potential Risks

**Hypoglycemia considerations.** Hypoglycemia is a major side effect of diabetes treatment. Avoiding hypoglycemia among vulnerable elders is a top priority. In the elderly, hypoglycemia may occur at lower blood glucose levels, be harder to recognize, and result in poorer outcomes compared with younger adults.<sup>29</sup> In the elderly, hypoglycemia may manifest itself solely in terms of neuroglycopenic symptoms (dizziness, weakness, confusion, delirium) as opposed to adrenergic symptoms (tachycardia, palpitation, sweating). In addition, hypoglycemia may exacerbate common comorbidities in the elderly (e.g., coronary artery disease and cerebrovascular disease). Frail elderly may have poor outcomes, such as injurious falls, even with mild hypoglycemia.

**Quality of life.** Comorbidities, such as hypertension, dyslipidemia, coronary artery disease, or cerebrovascular disease, often dominate the overall health of older patients. In addition, the functional status of older adults is often declining, shifting the focus of care from optimizing treatment goals for individual chronic diseases to optimizing function and quality of life. It is important when prioritizing treatment goals to take patients' quality of life into consideration. The overall goal of care for older adults with diabetes is to achieve the best possible glycemic control while maintaining independence and optimizing quality of life.

**Life expectancy.** In some elderly with diabetes, life expectancy may be shorter than the time needed to benefit from an intervention. Before recommending complicated, costly, or uncomfortable treatment regimens that may result in harmful side effects, reduced adherence to recommended therapies, and reduced general well-being, the timeframe needed to realize benefits should be carefully considered relative to life expectancy.

### Involve Multiple Disciplines

A multidisciplinary approach is essential in caring for the elderly.

**Table 4. DSME for Older Adults With Physical Limitations or Cognitive Dysfunction**

<b>Monitoring</b>	Use meters with the following features: <ul style="list-style-type: none"> <li>• Large display windows/ bold numbering</li> <li>• Easy to hold</li> <li>• No coding or handling of strips</li> </ul>
<b>Insulin</b>	<ul style="list-style-type: none"> <li>• Simplify the insulin regimen.</li> <li>• Avoid sliding-scale insulin.</li> <li>• Change to an insulin pen or use prefilled syringes.</li> <li>• Involve the caregiver if available.</li> <li>• Use syringe magnifiers if pens are not an option.</li> <li>• Discuss with the patient's health care provider whether discontinuing insulin is an option.</li> </ul>
<b>Medications</b>	<ul style="list-style-type: none"> <li>• Make sure the medication list is accurate.</li> <li>• Ask patients to bring their pill bottles with them to visits and have them read the pill bottle instructions aloud.</li> <li>• Use memory aids for taking medication.</li> <li>• Involve a family member or friend if available.</li> <li>• Make sure patients understand why they are taking each pill.</li> <li>• Refer to a visiting nurse if needed.</li> <li>• Discuss simplifying the regimen with the provider; suggest use of combination oral agents to simplify regimen.</li> </ul>
<b>Hyperglycemia</b>	<ul style="list-style-type: none"> <li>• May have less polyuria and less polydipsia<sup>28</sup></li> <li>• Emphasize need for regular hydration and increased monitoring, particularly on sick days.</li> <li>• Give very specific guidelines of when to call the health care provider.</li> </ul>
<b>Hypoglycemia</b>	<ul style="list-style-type: none"> <li>• May have less symptoms of hypoglycemia, particularly if on a <math>\beta</math>-blocker</li> <li>• Emphasize recognition of neuroglycopenic symptoms.</li> <li>• Emphasize importance of monitoring particularly before driving.</li> <li>• Do not rely on patient reports alone to determine whether low blood glucose episodes are occurring. Elders may confuse symptoms of low blood glucose with other conditions or may not remember hypoglycemic episodes.<sup>29</sup></li> </ul>
<b>General adaptation of educational materials</b>	<p>Less emphasis on information</p> <ul style="list-style-type: none"> <li>• Simplify the material (low-literacy material may be a good option).</li> <li>• Use a black font with type size &gt; 12 point on white paper.</li> <li>• Invite a family member or friend to the session if possible.</li> <li>• Always provide written instructions.</li> <li>• Individual educational sessions are preferred over group.</li> </ul>

Multidisciplinary intervention is advocated to adequately address the multifaceted nature of diabetes treatment, even in younger adults. Older patients with diabetes are clinically and functionally even more diverse than their younger counterparts and therefore have even greater need for the services of specialists, possibly including nurses, dietitians, exercise physiologists, behavioral medicine specialists, social workers, pharmacists, and rehabilitation professionals.

### Involve Care Partners

In chronic illnesses such as diabetes, day-to-day care responsibilities fall mostly on patients. However, when patients are unable to assume full responsibility for their self-care, family members, friends, or other care partners may need to be involved. In older adults in particular, care partners can play a critical role in managing chronic illness, tipping the balance toward effective rather than failed self-care. If needed, family members or other caregivers should be included in DSME.

## CASE STUDY

The following case study illustrates the application of the general principles for DSME in the elderly.

Mr. Z. is a 78-year-old Russian immigrant who has had type 2 diabetes for 20 years. His blood glucose was initially controlled by oral diabetes medications (sulfonylureas) until ~ 8 years ago, when a mix of regular and NPH insulin twice daily was prescribed by his primary care physician. In addition to diabetes, Mr. Z. has a history of hypertension and hyperlipidemia, for which his physician has prescribed multiple medications.

Mr. Z. has weighed ~ 220 lb most of his adult life. This past year, he lost 10 lb. His current BMI is 28 kg/m<sup>2</sup>, which puts him in the overweight category.

Since his wife died, he lives alone. About 1 year ago, a neighbor found Mr. Z. wandering aimlessly in the street. The neighbor called 911, and Mr. Z. was taken to the local hospital emergency department. His blood glucose on arrival was 27 mg/dl.

Mr. Z.'s primary care physician referred him to the Joslin Geriatric Diabetes Clinic. Initial medical evaluation was remarkable for bilateral cataracts, blood pressure 160/100 mmHg, LDL cholesterol 130 mg/dl, serum creatinine 2.1 mg/dl, and hemoglobin A<sub>1c</sub> (A1C) 9.2%. Screening by a geriatric nurse educator identified mild depression and cognitive impairment.

A skills review with the nurse educator revealed that Mr. Z. had reduced his insulin dose after being taken to the emergency department for hypoglycemia a year earlier. He stated that he was unwilling to endure another hypoglycemic episode and so had decided to cut his insulin dose. His poor vision did not interfere with him taking his insulin, he stated, because he used insulin pens and could count pen clicks when dialing up his dose. Nevertheless, when asked by the nurse educator to dial up a dose of regular insulin, he was unable to distinguish the regular insulin from the NPH insulin pen.

Screening by a geriatric nutrition educator revealed erratic meal times. Mr. Z. claimed that he had little appetite and sometimes even skipped meals rather than eat alone. The geriatric nutrition educator also identified that Mr. Z. tended to overtreat per-

ceived hypoglycemia. The geriatric nurse practitioner identified that Mr. Z. was quite isolated socially. His only regular social contact was with his son, who visited him on weekends.

Based on Mr. Z.'s assessment, 10 treatment issues were identified:

1. Elevated A1C
2. Uncontrolled hypertension
3. Hyperlipidemia
4. Impaired renal function
5. Poor vision
6. Hypoglycemia/fear of hypoglycemia
7. Depression
8. Cognitive impairment
9. Social isolation
10. Weight loss

The first seven of these issues are not elderly specific and are commonly diagnosed among younger adults with diabetes. The latter three are only common among the elderly and are often not diagnosed as treatment issues unless geriatric-specific screening is performed. Cognitive impairment (issue 8) is a geriatric syndrome that interferes with the ability of patients to manage their diabetes. Social isolation contributes to depression and poor dietary intake and in these ways also interferes with diabetes management. Weight loss, which would be welcomed and indeed encouraged in younger overweight adults with diabetes, is a negative prognostic indicator in the elderly; unintentional weight loss in the elderly has been found to be associated with increased morbidity and mortality.<sup>13</sup> Great caution must be exercised, therefore, when prescribing weight loss for the elderly.

After consulting with Mr. Z. regarding his treatment goals and preferences, a treatment plan was formulated that included the following components:

1. Mr. Z.'s diabetes medication regimen was simplified. This was done primarily to decrease his risk for hypoglycemia. As an elderly man with visual and cognitive impairment living alone, he was at high risk for an injurious fall resulting from hypoglycemia. In addition, his fear of hypoglycemia was causing him to reduce his insulin dose and overtreat perceived hypoglycemia, behaviors that were counterproductive to his glycemic control. Simplifying his diabetes medication regimen was therefore a top priority.

Blood work indicated that Mr. Z. had enough endogenous insulin production to consider discontinuing insulin and substituting an oral diabetes medication. A thiazolidinedione (TZD) was prescribed. TZDs carry almost no risk for hypoglycemia. They are bimodal in action: they increase insulin sensitivity in skeletal muscle and decrease hepatic glucose production. TZDs are particularly useful in older patients with impaired renal function, such as Mr. Z., in whom oral medications such as biguanides and sulfonylureas are contraindicated because they are metabolized in the kidney. Additional benefits of TZDs are that they may improve lipid profiles, which would benefit Mr. Z.'s hyperlipidemia, and they need to be taken only once daily, decreasing medication noncompliance. TZDs are contraindicated in the presence of congestive heart failure and hepatic impairment, but Mr. Z. had neither of these conditions.

2. An antidepressant was prescribed. Mr. Z.'s depression was contributing to his social isolation and also to erratic or decreased food intake. Treating his depression could ultimately reduce his risk for hypoglycemia and weight loss and improve his quality of life.
3. Mr. Z. was referred for further cognitive testing. He had screened positive for cognitive impairment. However, it would be useful to identify his specific type of impairment to more effectively compensate for it when formulating his diabetes management plan.
4. Social meal times were arranged for Mr. Z. at a senior center close to his home. Meal times are an ideal way to increase socialization, especially among the elderly. Eating alone was contributing to his depression and also to skipped meals and weight loss. People tend to increase their food intake when they eat with others rather than alone.<sup>30</sup>
5. Mr. Z. was taught how to use a talking blood glucose monitor so that he could independently monitor his glucose levels at home, reducing his risk for hypoglycemia.
6. To control his hypertension and hyperlipidemia, Mr. Z.'s antihypertensive and lipid-lowering medications were increased. Clinical trials have demonstrated that it takes only 2–3 years for the

benefits of blood pressure and blood lipid control to be realized in terms of reduced complications, whereas it takes 8 years for the benefits of improved glycemic control to be realized.<sup>31,32</sup>

7. Mr. Z. was referred to an ophthalmologist to evaluate the possibilities for vision improvement. Improving his vision can help him prevent medication errors and decrease his risk for an injurious fall.

When Mr. Z. returned to the clinic several months later, his quality of life and mood had improved. He had had almost no hypoglycemic episodes, and he no longer worried about low blood glucose levels. He had more social contact, reporting that he ate his midday meal at a local senior center 3 or 4 days during the week. His diabetes medication regimen was significantly simpler to follow.

His diabetes self-management also improved. He was able to perform home blood glucose monitoring independently. His meal times were more consistent, and he rarely skipped meals. His A1C measured 7.8%, 1.4 percentage points lower than at his initial clinic visit.

For a younger person, the recommended A1C goal is < 7%. For older adults, the A1C goal depends on age, life expectancy, presence of diabetes complications, and presence of comorbidities. Although Mr. Z. is a relatively healthy older adult with diabetes, some factors (e.g., living alone, impaired vision, history of severe hypoglycemia, and history of irregular meals) put him at risk for injurious falls. For this reason, the geriatric diabetes team decided not to make changes in his diabetes medication regimen. A 3-month follow-up visit was scheduled to reassess his A1C and functional status.

### Summary and Conclusion

When evaluating and treating older adults with diabetes, it is important to recognize the specific needs of this patient population. The AGS and the AADE have provided diabetes educators with some important initial guidelines to work with. However, much more research is needed into how diabetes affects older adults and which educational approaches will work best for them.

The most important first step in providing appropriate care for these

patients is to ensure that an adequate initial assessment is provided for them. This assessment should take into account the special needs of this population and evaluate cognitive and physical issues as well as general diabetes concerns. Then, and only then, will this patient population be well served.

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*Emmy Suhl, MS, RD, LD, CDE, is a dietitian and diabetes educator, and Patricia Bonsignore, MS, RN, CDE, is manager for Clinical and Education Programs at the Joslin Diabetes Center in Boston, Mass.*